Architecture: A Survey
(1) Early and Classical Architecture

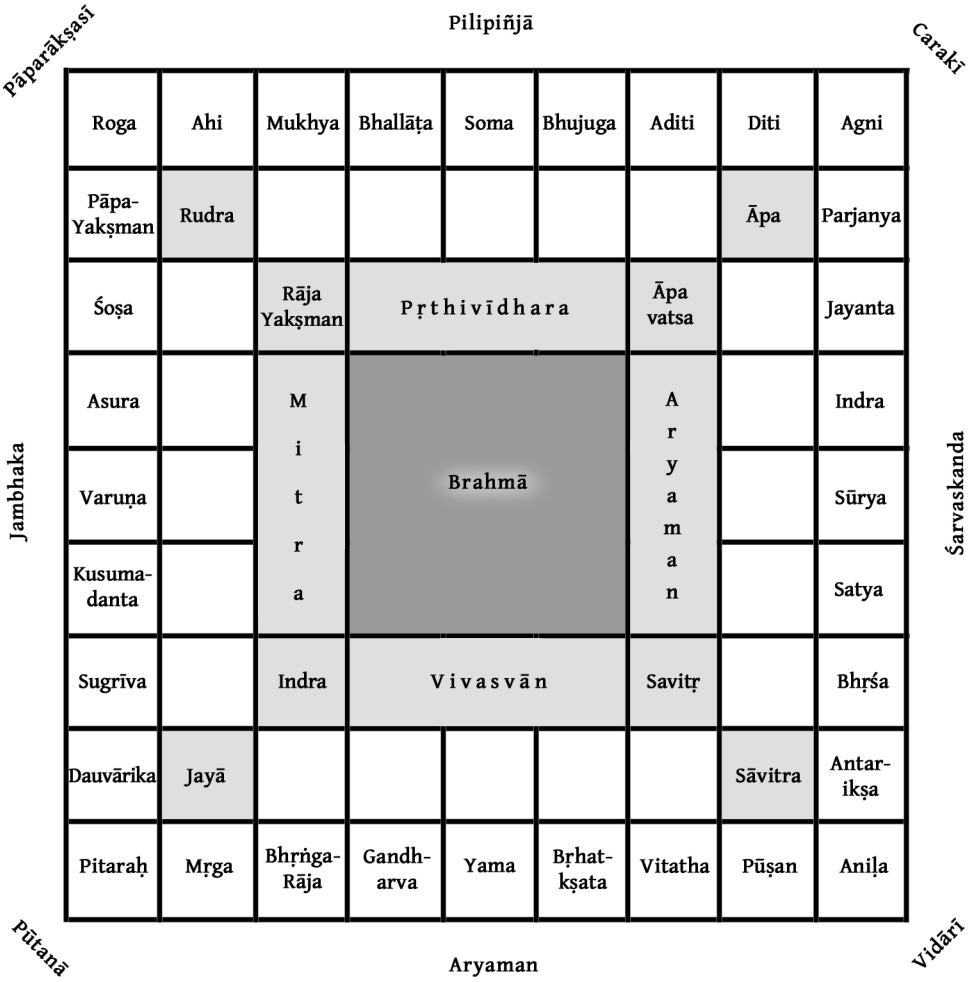
Vāstu-vidyā or *Śilpaśāstra* — the science of architecture — is one of the technical subjects studied in ancient India, along with *āyurveda* (science of medicine), *dhanurveda* (science of archery), *jyotiṣa* (astronomy), etc. In the earliest texts, the word *vāstu* occurs in the sense of a building site or the building itself. Later on, other subjects such as temple construction, town planning, public and private buildings and forts were included in the discipline in which the construction of a structure was regarded as a sacred act.

In the *Atharvaveda* there are references to different parts of the building such as sitting-room, inner apartment, room for sacred fire, cattle shed and reception room. (*Atharvaveda*, IX.3). The *Sāṅkhāyana Gṛhya Sūtra* (c. 500 BCE) describes in three chapters the ceremonials performed for constructing a building. Kautilya's *Arthaśāstra* (c. 300 BCE) deals with town planning, fortifications and other structures of civil nature. *Samarāngaṇasūtradhāra,* authored by King Bhoja (1010-55 CE), discusses methods of examination of a site, analysis of the soil, systems of measurement, qualifications of the *sthapati* (architect) and his assistants, building materials, consecration of the plan followed by construction of foundation, basal mouldings and technical details for each part of the plan, design and elevation. The two principal south Indian texts, *Mayamata* (1000 CE) and *Mānasāra* (1300 CE), share a common understanding of the architectural plan and design of the southern (Drāviḍa) vintage but while the former has a practical outlook, the latter develops the theory of the science.

Temple Architecture

India is justly famous as a land of temples. Many of these temples, especially those belonging to the ancient and medieval ages, are renowned on account of their architectural and sculptural excellence. Hindu temple architecture has broadly been classified as Nāgara or the north Indian style, Drāviḍa or the south Indian style, and Vesara which contains elements of both. Each region of India has given rise to a unique style of temple architecture due to the availability of stone and other material and in keeping with the climatic conditions and other factors.

The origin of Indian temple architecture can be traced to Vedic times. The square shape of the *vedi* (Vedic sacrificial altar) inspired the basic design of temples. The Indian shrine depicted in early bas-reliefs at Bharhut, Sanchi, Mathura and Amravati, has a small square altar, often enclosed by a *vedikā* (square railing) and shaded by a tree or a *chattra* (parasol). *Vāstu Śāstra* visualizes the *vāstupuruṣa-maṇḍala* — the abstract representation of temple architecture — as a square in the form of a *yantra* (symbolic diagram). The philosophy behind this concept is based on an equivalence behind the macrocosm — the universe, represented by the various gods or powers in the *maṇḍala* — and the microcosm — the temple, often taken to be in the image of the human body. One central objective of Indian temple architecture is thus to connect the human being to the universe.

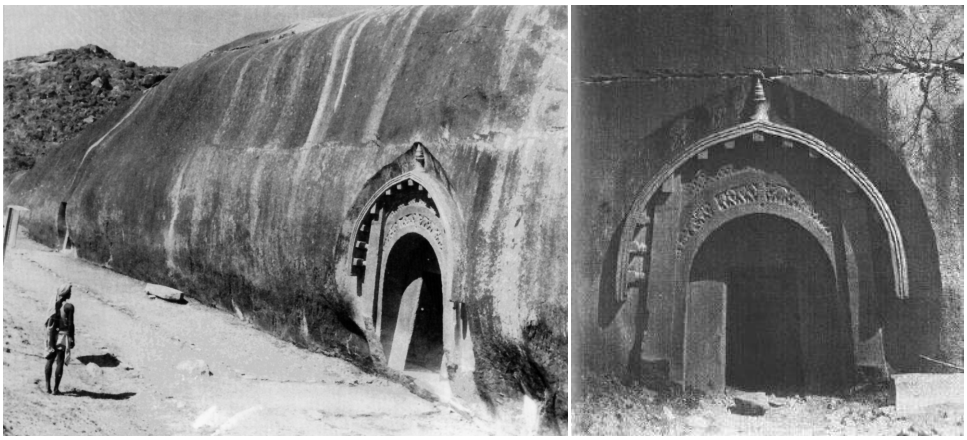


One of the *vāstupuruṣa-maṇḍalas* on which India's temple architecture is based (adapted from Stella Kramrisch).

Rock-Cut Structures

In India, temples were initially constructed of perishable material like wood, brick and mortar, perhaps reinforced by metal. Later, the need to have a permanent structure to house the deities led to the creation of shrines in stone and this is how the artificial 'cave temples', scooped out of hard rock came into being in several places in India. The early rock-cut cave temples in various parts of India were Hindu, Jaina and Buddhist in nature.

Some of the earliest examples of this type of architecture are the caves excavated during the 3rd century BCE in the time of the Mauryas, one of the best known being the Lomas Ṛṣī cave in the Barabar Hills of Bihar, excavated out of hard granite for the Ājīvika sect, a heterodox sect. The entrance is a representation in stone of a hut's entrance, with mock timber crossbeams protruding from the roof. A carved frieze of elephants is a stone imitation of similar work in wood along with a stone imitation of bamboo trellis.



Lomas Ṛṣī cave, Bihar

Subsequently, the rock-cut caves of different parts of India developed variations depending upon the nature of the rock into which they were carved. The *caitya* shrines of the Buddhists as also the *vihāras* or monasteries are found in large numbers in the earliest phase of the evolution of cave temples. Remains of a circular *caitya* shrine belonging to the time of Aśoka are seen at Bairat in Rajasthan. Buddhist rock-cut caves are also found in Maharashtra, most notably at Ajanta and Ellora, where sandstone is abundant.




Left: Ajanta Caves, *Right*: Ellora Caves (source: Wikipedia)

The earliest Hindu caves, which belong to the early 5th century, are seen at Udayagiri, near Bhilsa in Madhya Pradesh. Badami (ancient Vātāpi), in Karnataka, the capital of the Cālukyan dynasty is home to a number of such cave temples of sandstone belonging to the 6th century. They are mostly for Hindu deities and one is a Jaina cave temple. Many such cave temples were excavated during the Pallava dynasty of the 7th–8th century in the northern part of Tamil Nadu, especially at Mamallapuram (also known as Mahabalipuram), their port-city in Tamil Nadu. During the reign of the Pāṇḍyas of south Tamil Nadu who were the contemporaries of the Pallavas, many such Hindu and Jaina cave temples were excavated, followed by important Jaina cave temples at Ellora in the 9th century.

Monolithic Temples

The concept of creating cave temples slowly faded away as the architects graduated to making monolithic temples, i.e., shrines carved from top to bottom out of one piece of rock. Examples of these are seen in Mamallapuram belonging to the 7th century. Famously known as the 'Five Rathas' (chariots), these five monolithic monuments are

each of a different shape and size and are believed to replicate monuments made of perishable material that existed prior to their time. The grandest of the monolithic temples is the famous Kailāśa temple at Ellora in the reign of the Rāṣṭrakūṭas in the 8th century.

Constructed Temples

This type of architecture began with *stūpas* (relic mounds), *caitya* halls and *mahāvihāras*, which go back to the time of Buddha (6th century BCE). Originally the *stūpas* were made of bricks and surrounded by a wooden railing, then were enlarged and elaborated over centuries to magnificent complexes during the period of different empires and dynasties — Maurya empire, Śuṅga dynasty, Andhra period and Kuṣāṇ period.



The great *stūpa* at Sanchi

Mauryan architecture, which is inspired by Buddhist thought, is illustrated by the *stūpas* at Sanchi, the monolithic rail at Sarnath and the pillars of Bodh Gaya. Śuṅga

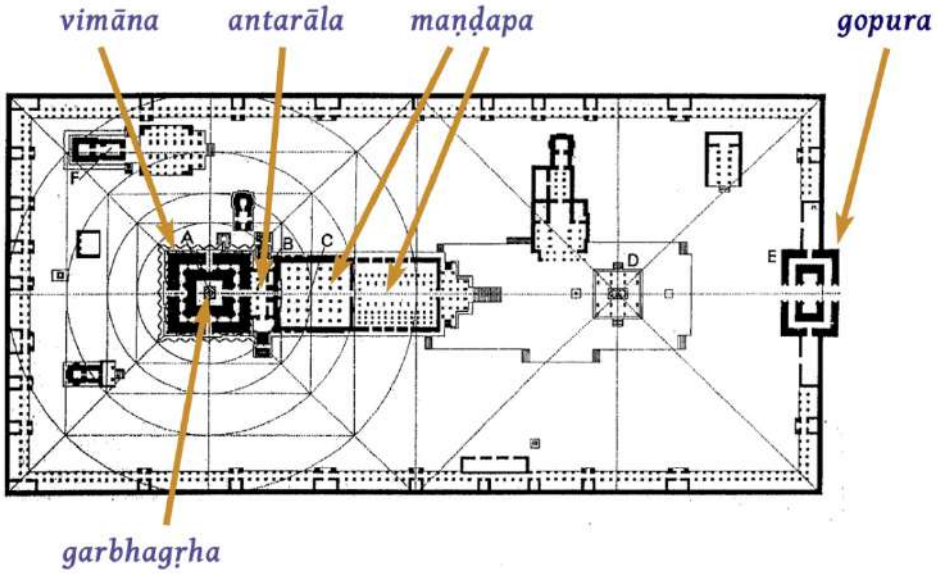
architecture added decorations of stone *vedikas* (railings) and gateways surrounding the *stūpa*. Examples of these monuments are the *stūpas* at Sanchi (near Bhopal), Bharhut (Madhya Pradesh), and Amaravati on the Krishna River. At Bharhut the gateways are imitations in stone of the wooden portals of early Indian towns. Most prominent in the embellishment of the *vedikas* are the carvings of Yakṣas and Yakṣīs (supernatural beings). The great *stūpa* at Sanchi, whose foundation was originally laid by Aśoka, was enlarged under the patronage of the Andhra Dynasty. Architecture under the Kuṣāṇas produced relief friezes carved in dark schist and portrayed figures in classical poses with flowing Hellenistic draperies; it also made use of ivory and imported glass. The *stūpa* in Gandhara marks the gradual elaboration of the primitive types known at Sanchi and Bharhut.

In the Gupta age, the tradition of excavating cave temples and monolithic shrines evolved into the construction of brick and stone temples. This was due to two reasons. One reason was that while the architects and sculptors could create a cave temple only where boulders or hills were available, a structural stone temple could be created at any chosen site by baking bricks or quarrying and transporting stones. Secondly, there was more scope for architectural and sculptural innovation and experimentation while constructing a temple.

Initially, temples were made as small shrines with possibly only the central sanctum sanctorum or the main cell enshrining the principal deity. Over time, they evolved into bigger temple complexes, with more sculptures and niches enshrining deities. Eventually, temples evolved into various styles, but those remained based on certain common concepts and features:

- *gopura*: an elaborate gateway, especially in south Indian temples, generally in the form of a tower;
- *jagatī* (literally, 'earth'): the platform on which the temple is erected;

- *maṇḍapa*: a open pillared hall for public events, including rituals, discourses or art performances;
- *antarāla*: an antechamber between the *maṇḍapa* and the *garbhagṛha*;
- *garbhagṛha*: the sanctum sanctorum, where the presiding deity is installed;
- *śikhara* (for north Indian temples) or *vimāna* (for south Indian temple): the tower over the *garbhagṛha*.



The main parts of a classical Hindu temple (here the Bṛhadīśvara temple of Tanjavur)

Some of the best examples of such structural stone temples are of the Gupta age like the Daśavatāra Viṣṇu temple in Deogarh in Uttar Pradesh of the early 6th century *(right)*, which is studded with intricate sculptures.



The structural temples of the Cālukyas in Badami, Aihole and Pattadakal in Karnataka, belonging to the 7th and 8th centuries, follow close on the heels of the Gupta creations. The temples of Aihole and Pattadakal need special mention as some are in the Drāviḍa and some in the Nāgara styles of architecture, situated in close proximity of each other.

Around this time, also arose the magnificent Drāviḍa temples of the Pallavas in Mamallapuram and in Kanchipuram, their capital city. Special mention must be made of the Shore temple in Mamallapuram which is one of the earliest structural stone temples of this dynasty constructed in the 8th century.



Shore Temple, Mamallapuram (courtesy: Dr. Chithra Madhavan)

In the same century was constructed the Śiva temple now known as the Kailāśanātha temple in Kanchipuram, almost wholly out of sandstone, far more grand that its predecessors. Later, many others in this town were constructed by the kings of this dynasty.



Kailāśanātha temple
(courtesy: Dr Chithra Madhavan)



(Left:) Sun temple, Konarak. (*Top right:)* Liṅgarājā. (*Bottom right:)* Mukteśvara temple, Bhubaneswar (courtesy: Michel Danino)

In Orissa, from the 7th century up to the 13th century temples of the Nāgara order were built. These temples, while retaining the blueprint of the earlier ones of this style, became far larger and more ornate. This regional school, called the Kalinga or Orissan style, had a long period of evolution. The curvilinear *śikhara* over the sanctum sanctorum is the most eye-catching feature as also the hall called the *jagmohana*. The walls are profusely decorated with sculptures. The Paraśurāmeśvara temple in Bhubaneswar belongs to this century, the Mukteśvara temple (third quarter of the 10th century), the Rājārānī temple (11th century) and the Liṅgarājā temple (mid-11th century). The best-

known temple by way of architecture, the Sun temple in Konarak, is a 13th-century creation.

With the coming of the age of the Imperial Cōḻas who came to power in the 9th century with their capital initially at Tanjavur (Tamil Nadu), Dravidian temple architecture reached its pinnacle. The great temples of the Cōḻas at Tanjavur, Gangaikondacholapuram, Darasuram and Tribhuvanam are standing examples of the height temple architecture of south India had reached. The *vimānas* are very tall in these four temples. In addition to these grand temples, the Cōḻas constructed numerous others of varying sizes in almost every town and village across their vast empire. The innumerable sculptures of stone and bronze in the Cōḻa temples are outstanding examples of the skill and dexterity of the artisans of the period and also reflect the patronage given to them by the Cōḻa emperors. It must be pointed out that the grand *gopuras* of Tamil Nadu, which started to evolve in the Pallava times, gained much prominence in the Cōḻa age.



Great Cōḻa temples at Tanjavur and Darasuram, Tamil Nadu

Improving upon the already known Nāgara style and contributing greatly to this style of architecture of approximately between the 9th and the 12th centuries was the Candela dynasty. Its major claim to fame is the group of outstanding temples at Khajuraho in Madhya Pradesh, the best-known being the Kandāriyā Mahādeva temple

constructed in the 11th century. There are literally hundreds of sculptures adorning the walls of these temples. Some of the minute carvings are explicitly erotic in nature. Scholars have over time attributed this to the then prevalent Tantric beliefs. The increasing complexity of the form of the Nāgara art and architecture is best exemplified in the architectural style of the Candelas.



Kandāriyā Mahādeva temple (source: Wikipedia)

In the South, the Pāṇḍyas of Madurai, who returned to power after the fall of the Cōl̲a Empire in the second half of the 13th century, are known for their contribution to the famous Mīnākṣī-Sundareśvara temple in Madurai.



Mīnākṣī-Sundareśvarar temple in Madurai

This temple's *gopuras* set the example of many more to follow in the subsequent periods. The Pāṇḍyas also added many new shrines and *maṇḍapas* to the already existing temples in Tamil Nadu.



Somanathapura (Keśava temple), near Mysore, in Hoysāla style

The kings of the Hoysāla dynasty, who ruled over south Karnataka and for some time over parts of Tamil Nadu as well, contributed immensely to temple art and architecture. Their very unique star-shaped temples, mostly built of soft soap stone, are profusely decorated with hundreds of minute sculptures. The most important Hoysāla temples are at Belur (constructed in 1117), Halebid (its construction commenced in 1118) and Somanathapura (13th century).

The very large and powerful empire of Vijayanagara was established in the ancient city of Vijayanagara (now called Hampi) in Karnataka in 1336. The monarchs of Vijayanagara contributed in no small measure to the development of temple art and architecture in South India. They drew upon the architectural plan of the temples of the Tamil country and constructed the beautiful temples in Hampi such as the Viṭṭhala temple, Acyutarāyā temple and the *gopura* of the Virupākṣa temple.







(Left) Virupākṣa temple. (*Top right)* Viṭṭhala temple. (*Bottom right)* Acyutarāyā temple.

The temples of Kerala are very different from the others in South India, with wood being used much more than stone. The central part of the Kerala temple called the *śri vimāna* is mostly circular with sloping tiled roof. The *kūṭṭambalam*, which is the hall where the traditional music and dance performances are staged, is one of the striking features of temples of this region.

To a large number of temples in Tamil Nadu and Andhra Pradesh, they added *gopuras*, *prakaras* (enclosures) and many smaller shrines and *manḍapas* (open pavilions). The expansion of many of the temples into mammoth temple complexes is the result of the impetus given to religion and temple architecture by the monarchs of Vijayanagara.

These emperors, beginning from the 16th century, appointed viceroys called Nāyakas in different parts of their empire. In Tamil Nadu, these Nāyak chieftains ruled from many areas, the most important being from Madurai, Tanjavur and Ginjee (or Senji, near Tiruvanamalai). They too followed in the footsteps of the Vijayanagara monarchs and added to the already big temples like those in Madurai, Tanjavur, Rameswaram and Srirangam, among many others. Many of the *gopuras* and *manḍapas* seen in temples of Tamil Nadu are creations of the Nāyak times.

While Jain temples share most of their architectural features with Hindu temples, Sikh temples or gurdwārās do not have to conform to any particular architectural style; their chief requirements is that the Guru Granth Sahib should be installed on a seat under a canopy, usually on a higher platform. In practice, however, gurdwārās, the most famous of which is the Harmandir Sahib in Amritsar, often draw their features from Indo-Persian architecture.



A view of the temples at Mount Shatrunjaya (near Palitana, Bhavnagar district, Gujarat). This site, which is sacred for Jains, has around 900 temples (source: Wikipedia).

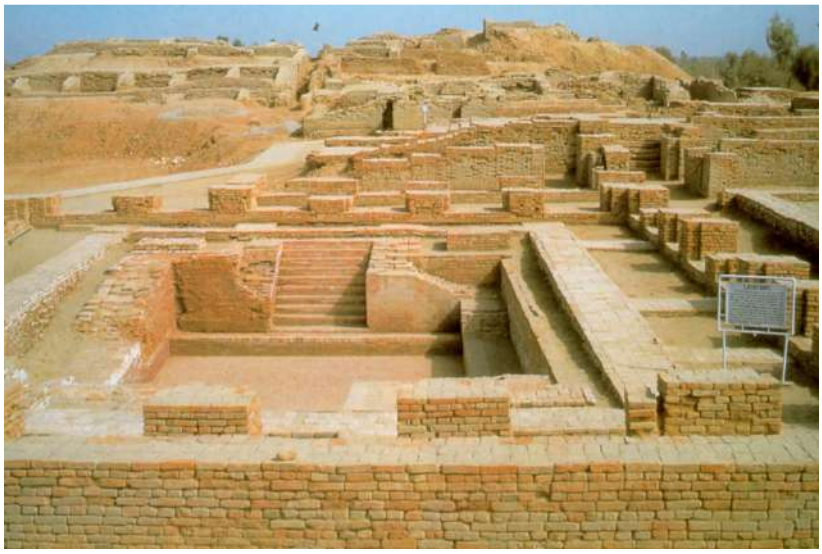


A view of the Harmandir Sahib or Golden Temple in Amritsar (source: Wikipedia).

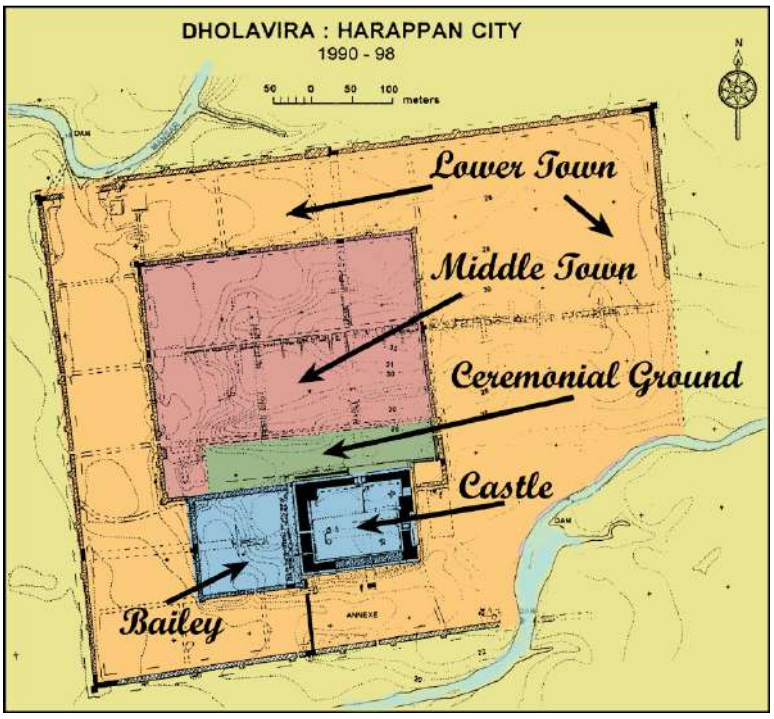
Public and Private Architecture

Excavations at Harappa and Mohenjo-daro in 1921-22 marked the discovery of the Indus or Harappan civilization (2600–1900 BCE). Later discoveries include major sites like Kalibangan (Rajasthan), Lothal (Gujarat) and, in the last two decades, Dholavira (Gujarat), Bhirrana, Rakhigarhi and Farmana (all three in Haryana). To date, over 1,100 urban and rural Harappan settlements have been found in the northwest of the Indian subcontinent.

Unlike our modern cities, most of which grew organically out of a town or a village, Harappan cities were planned, with the streets generally oriented along the cardinal directions. Houses were built with bricks of standardized proportions; some of the larger ones had at least an upper storey; roofs consisted of wooden structures covered with grass or leaves. Most houses had individual bathrooms connected to extensive drainage networks. Complex structures, such as Mohenjo-daro's Great Bath or the so-called Granary, demonstrated advanced planning and construction skills. In the Great Bath's central basin, for example, the floor was made of tightly fitted bricks set on edge and cemented with a gypsum plaster to make a watertight surface; it was then covered with a layer of bitumen (natural tar). Humbler structures, such as wells constructed with trapezoid bricks, which prevented inward collapse, were no less advanced. Some of these Harappan techniques and concepts were preserved in later Indian architecture: for instance, the general house plan, with rooms organized around a central courtyard, survives in many parts of rural India; the drainage system of the later Ganges civilization was very likely a Harappan legacy.



The Great Bath at Mohenjo-daro (source: Michael Jansen)



Dholavira's plan with the city's different areas
(adapted from Archaeological Survey of India)

At Dholavira, a large and rigorously planned city located on an island in the Rann of Kachchh, stone was used to build massive fortifications, while a network of enormous reservoirs ensured water supply to the city through the year. The city was divided into upper town (consisting of Castle and Bailey, see plan below); middle town (where most habitations were located), which included a 283-metre-long ceremonial ground; and lower town. Dressed stone was used in construction along with mud bricks that conformed to Harappan standardized proportions. Stone pillars made of highly polished segments have also been found here.



(Left:) Massive stone fortifications at Dholavira (courtesy: Michel Danino). *(Right:)* A row of bathing platforms connected by a common drain at Lothal (courtesy: Archaeological Survey of India).

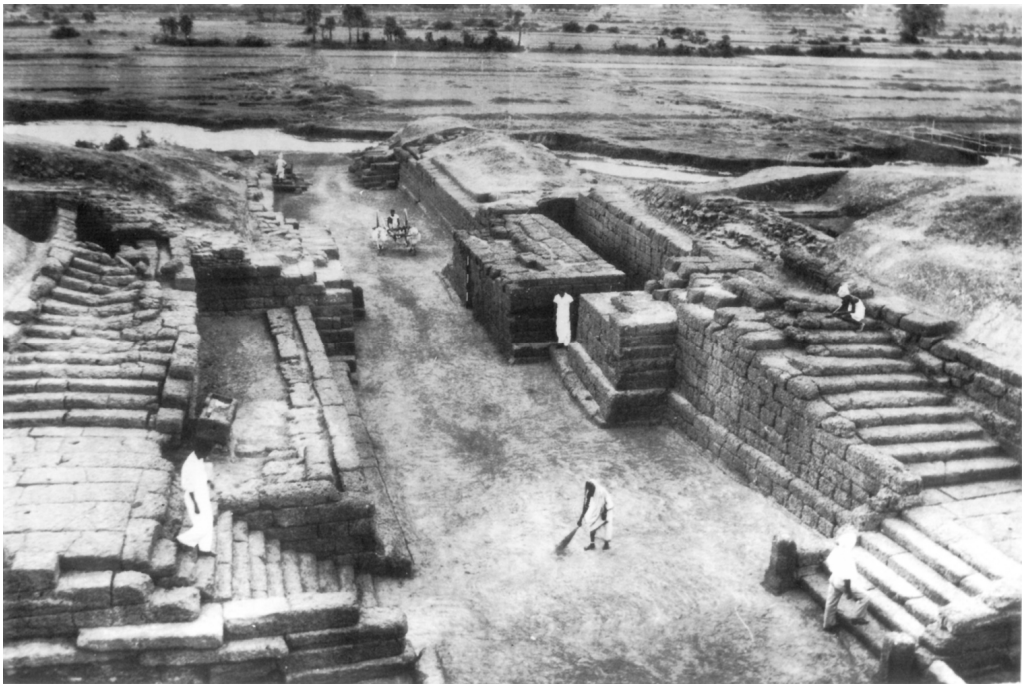
Bathing platforms with drains were often situated in rooms adjacent to the wells. A small drain cut through the house wall out into the street directed dirty waters into a larger sewage drain. Tapered terracotta drainpipes were used to direct water out to the street. Many houses had distinct toilets, separate from the bath areas; commodes were large jars or sump pots sunk into the floors. Drains were made of burnt bricks and connected the bathing platforms and latrines of private houses to medium-sized open drains in the side streets. These open drains flowed into the larger sewers in the main streets: those were covered with baked bricks or dressed stone blocks. In Mohenjo-daro, large garbage bins were also provided along the major streets at regular intervals.

Nearly a millennium after the Indus civilization had collapsed, the Ganges civilization arose in the first millennium BCE. Among the first cities to emerge in the Ganges plains from about 800 BCE were Mathura, Kanyakubja (modern Kanauj), Kauśāmbi and Vārāṇasī (Benares) in today's Uttar Pradesh, Rājagṛha (Rajgir) and Vaiśalī in Bihar. But this urban development extended beyond the Ganges valley, as testified by Takṣaśilā (Taxila, today in northern Pakistan), Ujjayinī (Ujjain, in Madhya Pradesh) or Śiśupālgarh (probably the ancient Kaliṅganagar, near Bhubaneswar in Odisha).



A segment of Rajgir's Cyclopean Wall, near the southern gateway (courtesy: Dr. B.R. Mani).

In Rājagṛha, a huge fortification called 'Cyclopean Wall', running over several kilometres around the city, consists of unhewn stones being piled one on top of the other; it was constructed in the 6th or 5th century BCE. At Śiśupālgarh (3rd century BCE at least), stone masons were at work using large blocks of laterite to build a very well-made fort entrance that could be closed with huge doors turning on hinges. At the centre of the city, a huge apsidal (semi-oval) structure with pillars has been excavated, which may have been either a temple or a palace.



One of Śiśupālgarh's gateways, excavated in 1948 (courtesy: Archaeological Survey of India)

Other important structures of this period include Aśoka's pillars, a series of columns dispersed throughout north Indian, erected or at least inscribed with edicts by the Mauryan emperor Aśoka during his reign in the 3rd century BCE. Originally, there must have been many pillars but only nineteen survive with inscriptions. They are monolithic, about twelve metres high, two metres underground, with mirror-like polish. The finest among them, now in Sarnath museum, had at its capital (top) a sculpture of four lions fused together, which was adopted as the emblem of the Republic of India.



Examples of Aśoka's pillars with their capitals depicting lions (source: Wikipedia)

Comprehension

1. What do you understand by *vāstu*? How old is the *vāstu* tradition in India? Justify your answer by giving a reference to an ancient text.
2. What information do we get from the *Samarāngaṇasūtradhāra* about architectural planning and design?
3. Name the two south Indian texts which expound the practical aspects of the science of architecture?
4. 'Indian temples are renowned on account of their architectural and sculptural excellence.' Justify.
5. Name a few rock-cut temples in India mentioning the period in which they were carved. Also mention their religious context.

6. What are the characteristics of monolithic temples? What distinguishes them from the other types of temples?
7. What is a *stūpa*? Make a line-drawing of it and label it. Also make a list of the most visited *stūpas* and *vihāras* in India?



8. See the above picture of Delhi's Akshardham temple, which is based on *vāstuśastra*. Compare it with any of the ancient temples.
9. Name four major cities of Indus civilization. Express your views on the concept of town planning of that period. What features of construction / architecture of that period testify to the continuity of tradition in India?

Activity 1

- Be in groups and list down the temples, forts, palaces, mosques and mausoleums of various states in India.

	State	Temples	Fort and Palaces	Mosques and Mausoleum
1.				
2.				
3.				
4.				
5.				
Etc.				

Activity 2

- There are three major styles of temple architecture in India — *nāgara, drāvida* and *vesāra*. Explain the prominent features of these styles and prepare a list of temples with those respective styles.

Style	Prominent Features	Temples
Nāgara		
Drāvida		
Vesāra		

Activities

- Form groups, study important temples such as those at Khajuraho or Tanjavur and identify the various elements of a temple: *gopuram*, *jagatī*, *maṇḍapa*, *antarāla*, *garbhagṛha*, *śikhara* or *vimāna*.

- Go through the above Survey text above and prepare a worksheet on temples built by these various dynasties: Vijayanagara, Co̲lās, Pāṇḍyas, Hoysālā, Kaliṅga. You may use the following hints to prepare your worksheet:

  - Name of the monument
  - Location (route from your school to the monument)
  - Organization which maintains the place
  - Interesting features and facts about the monument
  - Add pictures / drawings of the mentioned monument
  - Any suggestions and recommendations you would like to give a visitor to the heritage site.

Projects

- State tourism organizes educational trips to various historical monuments. Work in groups and design an information brochure which includes:

  - Route map of various monuments of your respective states
  - History of each monument along with images
  - Folklore associated with the monument.
  - Also prepare a budget which includes travel expenses, boarding lodging and state the expenditure per person.

- Make a list of temples built in *drāvida, nāgara* and *vesāra* style in the last 100 years and document the following:
    - History, period, dynasty of temple architecture.
    - Where did the craftsmen live during the construction of the temples, forts etc.?
    - Visit various monuments and study the floor and elevation plan and decoration of the building.
    - Write your views on how the world would have been without beautiful monuments.
    - Indicate the role of our heritage sites in enhancing the love and understanding (brotherhood) in society. Also mention the government and non-government initiatives taken to preserve our architectural heritage.

Further Reading

1. Acharya, P.K. 1913. *Mānasāra.* Oxford: Oxford University Press.
2. Agrawal, V.S., (ed.) 1966. *Samarāngaṇasūtradhāra*. Baroda: Oriental Institute.
3. Bhattacharya, Tarpada. 2007. *Vastuvidya Systems of Indian Architecture*. New Delhi: Ajai Book Service.
4. Dagens, Bruno. 1994. *Mayamata* (text with translation). New Delhi: Indira Gandhi National Centre for the Arts.
5. Fabri, C.L. 1963. *Introduction to Indian Architecture.* Mumbai: Asia Publishing House.
6. Kapoor, Kapil, (ed.) 2010. *Encyclopedia of Hinduism,* vol. 1. New Delhi: IHRF in association with Rupa.
7. Kramrisch, Stella. 1976. *The Hindu Temple*, 2 vols. New Delhi: Motilas Banarsidass.
8. Krishna Deva. 1995. *Temples of India,* 2 vols. New Delhi: Aryan Books International.
9. Meister, M.W., et al., 1988. *Encyclopedia of Indian Temple Architecture,* vol. 2, part 1; *North India: Foundation of North Indian Style,* New Delhi: American Institute of Indian Studies.

Internet Resources (all URLs accessed in May 2013)

- Indian Temple Architecture: www.templenet.com/arch.html
- Archaeological survey of India, Photo gallery of monuments: http://asi.nic.in/asi_pgallery.asp
- Overview of Ajanta caves: http://sahapedia.org/ajanta/
- An online encyclopaedia on temple architecture of various regions: www.templenet.com/encyclo.html
- Monolithic temples in Mahabalipuram (Mamallapuram): http://asi.nic.in/asi_monu_whs_mahabalipuram_monolithic.asp
- Mohenjo-Daro: Introduction to the site: www.mohenjodaro.net/mohenjodarointroduction.html
- Slides on Mohenjo-Daro: www.mohenjodaro.net/mohenjodaroslides.html
- Slides on Harrapan civilization: www.harappa.com/walk/index.html

Architecture:
Excerpts from Primary Texts

Viṣṇudharmottarapurāṇa

> The *jagatī* [site platform] should be divided according to the portion of the temple. The *jagatī* should consist of three *bhūmikās* [stages] of equal height. The *bhūmikā* one after the other should have the shape of the *bhadrapīṭh* shape.
>
> *Kaṭi* [the hip or the waist] of the temple should be made, half of the [height of the] temple, similarly the *kūṭa* [the portion of the temple above the *kaṭi*]. The width of the flight of the steps should be one-eighth of [the measurement of] the bottom of the *kaṭi.*
>
> For each *bhūmikā* should be of equal number. The *kūṭa* should be divided into three parts, each having an auspicious *āmalasāraka* [topmost part].
>
> O king! The *kūṭa* should be quadrilateral and gradually elevating. The [three parts] *vicchedas* [compartments] should be decorated with a roe of lions. (Khaṇḍa III, 86:4–8)

Note: Here the characteristics of a temple which is the best and which increases victory and health.

*

Viṣṇudharmottarapurāṇa

> *Catursra* [square] temple having one story and the shape of a house is known as *gṛha.* Lakṣmī [the goddess of wealth] should be installed there.
>
> For all gods, the same [*gṛha* temple] should be made having many storeys according to one's desire ... that desired temple is called *bahubhūmikā.*
>
> The temple having twelve storeys and six sides is called *meru.* It should be made with four doors for all the three gods.
>
> All the temples having eleven storeys are called *śuktīmān.* When it has ten storeys, it is called *mandara.*
>
> That with nine storeys is known as *pāriyātra* and that with eight storeys is well known as *alaka.* That with seven storeys is *vimāna* and that with six storeys is called *nandana.* By five it becomes *pancabhauma* and that with four storeys *catuṣkaka.* That with three storeys becomes *tribhūmi* and that with two storeys *dvibhūmika* and that with one storey is called *eka-bhūmika.*
>
> ... There is a temple *rājarāja.* It is praised as the chief temple. It has one *jagatī* which is knee-high and equal to one third of the temple, similarly *kaṭi* is also one third. Its *śikhara* [tower above the sanctum sanctorum] is equipped with *kuhara* [opening] and decorated with various figures. It has one *maṇḍapa* [pavilion]. Four small temples are placed at the intermediate directions, which are joined on the ground through four *maṇḍapas,* out of which two are at the base of the *sopāna* [staircase]. (Khaṇḍa III, 86:91–97)

Note: Here the temples have been classified on the basis of their characteristics, particularly the number of storeys.

*

Viṣṇudharmottarapurāṇa

> On an auspicious day constellation ... after worshipping, the *sthapati* [architect] follows a *daivajña* [an astrologer] and enters a forest. There he should examine the trees and decide which are to be cut and which should not be cut.
>
> The trees whose core is red are auspicious for kings; whose core is white are auspicious Brāhmaṇas, whose core is yellow are auspicious Vaiśyas, and whose core is black are auspicious Śūdras.
>
> O King! They should be offered food of *kulmāṣa* — *ullopika* and other flowers; incense [*dhūpa*] and then O one coming from the Yadu dynasty this mantra should be spoken.
>
> O the living Beings — *bhūtāni* [ghosts] — living here, I bow down to you. May you be blessed. Accept this offering and change your residence.... If you cannot leave this tree, you should kindly tell me clearly in the dream.
>
> O King! O fortunate one! Saying this, the architect and the astrologer guarded by armed men, should sleep there. If one of them sees an auspicious dream or does not see accordingly the tree may be cut. (Khaṇḍa III, 89: 1–2, 12–19)

Note: This discourse between Mārkaṇḍeya and Vajra is a piece of advice to the architect regarding *dārū-parikṣā* [the test of the wood] for constructing a building.

*

Viṣṇudharmottarapurāṇa

> The learned people say that the stones which have uniform colour, which are even and glossy, which are under the ground, which break only after severe

> blows, which are massive and pliant and beautiful, which are smooth, void of sand, pleasing to the eye and mind, which are washed by the water of the river, pure and plunged in water, which are hidden by the shade of trees, which are near a sacred place and which are extensive and broad should be selected. (Khaṇḍa III, 90: 2–5)

Note: This discourse is an account regarding *śilā paīkṣā* [the testing of the stone] for the constructing a building.

*

Viṣṇudharmottarapurāṇa

> The land which is white, red and yellow or black are beneficial to the *varṇas* [Brāhmaṇa, Kṣatriya, Vaiśya and Śūdra] respectively. The land that tastes *madhurā* [sweet], *kaṣāyā* [astringent], *āmlā* [sour], *lavaṇā* [salty] are beneficial for all the people of the *varṇas* respectively.
>
> The ground which gives out good smell and good sound, which is glossy and firm, whose earth dug out from the pit not only is capable of filling it, but also remains in excess and in whose pit the lamp does not faint and the flower put in it, does not wither and water stays for a longer time, this ground should be known as praiseworthy. (Khaṇḍa III, 94: 32–33, 42–43)

Note: This account show as to how the examination of land should be made for constructing a building.

***

Kautilya's *Arthaśāstra*

> On all the four quarters of the boundaries of the kingdom, defensive fortifications against an enemy in war shall be constructed on grounds best fitted for the purpose: a water-fortification [*audaka*] such as an island in the midst of a river, or a plain surrounded by low ground; a mountainous fortification [*pārvata*] such as a rocky tract or a cave; a desert [*dhānvana*] such as a wild tract devoid of water and overgrown with thicket growing in barren soil; or a forest fortification [*vanadurga*] full of wagtail [*khajana*], water and thickets. Of these, water and mountain fortifications are best suited to defend populous centres; and desert and forest fortifications are habitations in wilderness [*atavīsthānam*]. (II.4)

Note: Here Kautilya classifies the fortifications against an enemy in war.

*

Kautilya's *Arthaśāstra*

> Round [the] fort, three ditches with an intermediate space of one *danda* [about 1.8 m] from each other, fourteen, twelve and ten *dandas* respectively in width, with depth less by one quarter or by one-half of their width, square at their bottom and one-third as wide as at their top, with sides built of stones or bricks, filled with perennial flowing water or with water drawn from some other source, and possessing crocodiles and lotus plants shall be constructed. At a distance of four *dandas* [7.2 m] from the [innermost] ditch, a rampart six *dandas* high [10.8 m] and twice as much broad shall be erected by heaping mud upwards and by making it square at the bottom, oval at the centre pressed by the trampling of elephants and bulls, and planted with thorny and poisonous plants in bushes. (II.4)

Note: Here other defensive measures, to be used around the fort, have been suggested.

***

Mayamata

> The architect will be from a renowned land and issued from a mixed caste. He will be a man of quality, capable of establishing constructions and well versed in all sciences. He must be of perfect body, just, compassionate, disinterested, free from envy and weakness, beautiful and learned in mathematics. He must have studied the authors of old, be frank and a master of his senses. He must know how to draw and be familiar with the whole land. He must be generous, free from greed, in good health, attentive and free from the seven vices, endowed with a well-chosen name and persevering. He must have crossed the ocean of the science of architecture. (5.14-18, translation adapted from Bruno Dagens)

Note: This passage from *Mayamata,* a south Indian text on architecture composed in the time of the Co̲la Empire, lays down the qualities and knowledge an architect must be endowed with.

*

Mayamata

> The *mānāṅgula* [one of the various types of *āṅgula*, a linear measure equal to the width of the middle finger or the length of its middle phalanx] is said to be a multiple of the atom, which is defined as the smallest thing those who have mastered their senses can distinguish. Eight atoms make up a speck of dust; multiplying by eight every time takes us from the speck of dust to the tip of a hair, then to a nit, to a louse, and finally to a grain of barley. Eight

> barley grains make up a digit [*āṅgula*] called *mātra* [*mātrāṅgula,* another type of *āṅgula*]. Twelve *āṅgulas* make up a span [*vitasti* or *tāla*, the distance between the tips of the extended thumb and little finger]. Twice that is what scholars call a cubit [*hasta,* the length of the arm from the end of the middle finger to the elbow]. Twenty-five *āṅgulas* make up a *prājāpatya,* twenty-six a *dhanurmuṣṭi* and twenty-seven a *dharnurgraha.*
>
> For vehicles and seats, the cubit is used. For buildings, the *dhanurmuṣṭi*. For all kinds of settlements, the *dharnurgraha*. However, the cubit can also be used for all types of buildings. ... Four cubits make up a toise [*yaṣṭi* or *daṇḍa*, 96 *āṅgulas* or roughly 6 ft or 1.8 m]. Villages of various kinds, towns, villas, palaces must be measured out in toises, while houses must be measured in cubits. (5.2-9, translation adapted from Bruno Dagens)

Note: This lays down a system of linear units to be used by architects, which is very similar to that described in Kautilya's *Arthaśāstra*. In practice, units from the *āṅgula* (digit) to the *daṇḍa* (96 *āṅgulas*) were those in common use, especially the span of 12 digits and the cubit of 24 digits. These linear units patterned on the proportions and dimensions of the human body were the basis for all measurements of rooms, houses, temples, palaces, towns or cities. The same units were used in iconometry, that is, the science of measurements and proportions of sculptures.

***

Mānasāra

> The characteristic features of the palaces of kings [of various ranks] will be described now. The breadth ... is said to begin from 181 *daṇḍas* [of four cubits each] and end at 201 *daṇḍas*, the increment being by two *daṇḍas*. ... The length

should be greater than the breadth by one-fourth, one-half, three-fourths, or twice the breadth. (40.1-7, adapted from P.K. Acharya's translation)

Note: The *Mānasāra*, another south Indian text on classical architecture, lays down here various dimensions as well as proportions for a king's palace. The choice of specific proportions perceived to be auspicious is a constant feature of Indian classical architecture, and was applied to houses, palaces and temples alike.

*

Mānasāra

Leaving out the *Brahmā* plot at the centre, in all the surrounding quarters [of the palace complex] should be constructed the dwelling houses of kings, and all other desirable people. In the *Indra* [east], or the *Varuṇa* [west] quarter should be built the palace of the *Sārvabhauma* [class of kings]. ... The palace of the *Adhirāja* [class of king] should be built in the *Yama* [south] and the *Vivasvat* quarters. ... [Several other classes of kings follow.] All the main palaces should have their [main] door towards the east. ... The coronation hall should be situated to the south of the main palace. ... The treasury and the house for the storage of [valuable] clothes should be separately situated in the *Varuṇa* [west] or the *Nair-ṛita* [south-west] quarter. ... The houses for keeping jewels and gold, etc., should be situated in the *Soma* [north] or the *Mukhyaka* quarter. ... The dining hall should be situated in the south or south-west, as well as in the north-east, where should also be situated the kitchen. The tank should be dug in the north-west or the south-west. ... The stables for horses and elephants, etc., should be built on the left side of the gate. The guard-house for the watchmen should be situated on the right side of the gate. (40.73-111, adapted from P.K. Acharya's translation)

Note: These are only a few instructions in a long list describing every possible feature of the king's palace, its location with regard to the cardinal directions or with regard to quarters associated with specific deities. This is the tradition of *vāstuśāstra,* which associates divine powers to the various rooms of a residence and therefore to various human occupations. It may be noted that such arrangements were never completely standardized, and despite commonly agreed general principles, there were sometimes substantial differences from one text to another.

*

Mānasāra

> There should not be any defect in the breadth, the height, the plinth, the lintel, the pillar, the entablature, the platform, the neck, the [spherical] roof, the dome, the nose, the windows, and the door, with regard to the portico, the stalk and such other parts, the sanctum, the floors, all the stairs and staircases, the wall, the gatehouses, the pavilions, the corridors, the balconies, the roof, the shed-yards, the sides and the tops, and with regard to the foundation and the neighbouring area: nowhere should there be any defect. The [vigilant] eye of the architect should avoid the possibility of any defect in those members. (69.3-11, adapted from P.K. Acharya's translation)

Note: The *Mānasāra* devotes a whole chapter to the misfortunes that will befall a house master, a king or the kingdom itself if there are any defects in the construction of the home, the palace or the city. Perfection in architecture and construction were clearly highly valued.

Comprehension

1. According to *Mayamata,* what qualities and knowledge should an architect possess?
2. What is iconometry?
3. According to *Mānsarā*, what should be the proportion and dimensions for the palaces of kings? Do the same principles apply to any other kind of buildings?
4. According to *Mānsarā* , what should be the location with regard to the cardinal directions that is appropriate for building palaces for kings.
5. 'Perfection in architecture and construction were clearly highly valued'. What vital factors should the architect keep in mind during the construction of the home, palace or city to avoid misfortunes befalling a housemaster or king?