Sthapati: Astanga-Sthapatya that is eight-fold engineering technology.

Dr. Prabhakar Apte

Er. Arvind Phadnis.

Stha is an Indo-European verbal stem meaning 'to stay'. In Sanskrit and derivative Indian languages as well as Latin and its derivative European languages there are several derivations of the verbal stem: Stha in common parlance, such as sthana, sthiti, sthairya, sthanu etc. and state, stability, static etc. All these are common derivatives of common verbal stem,are spread over entire globe.

Stha-pati is the master of stha i.e. e-sta-blishment or foundation. His mission or function is Sthapatya, the derivative abstract noun of Sthapati. Raja Bhoja grasped the basic import of these two terms, in the context of the traditional architectural engineering and allotted one chapter each respectively(48&49) to these two thematic units. The topic of the qualifications, merits-demerits and the rewards and punishment on state-notice is comprehensively treated in standard Silpa-treatises. However, Bhoja has meaningfully employed the term: Astanga-Sthapatya, on the analogy of Astanga-yoga and Astanga-Ayurveda, suggesting eight in-built components. Those components are well known as: Yama-niyama etc. and Sutra, Sarira,Nidana etc. respectively. Bhoja has encompassed Sthapatya under thematic components:

1. Vastu-pumso vikalpana i.e. digrammatisation of anatomical sketching of Vastu-purusa technically termed as: Vastu-Mandala. This is, in architectural engineering, called master-site-plan. In other words, is the pioneer-plan of all global site-plans and the site-plan for colonizing the entire global surface, prepared by Visva-karma and executed by his four sons: Jaya, Vijaya, Siddhartha and Aparajita, sharing colonization of eastern-southern-western &northern sectors. Before this global engineering feat was undertaken by the cosmic architect: Visvakarmaa and master-planner of Indra's capital -city: Amaravati, Medini, the uneven earth was flattened(prathita) by the first human king and flattener of Medini who was converted into flattened earth(Prthvi).After

the global colonization phase, Prthu allotted shelters to his subjects shelters and assigned them vocational jobs in the earliest rural and urban settlements. Historically, it can be said that the graph of indigenous science and technology showed horizontal and vertical growth from mythological king Prthu to historical king Bhoja. This master-plan has been used by Bhoja to compare architectural and structural engineering notes on the basis of modular infra-structure of township.

2. Pura-nivesa i.e. town-erection. Town-plan, in Bhoja's conception, encompasses palace-complex, surrounding civic residential colonies, temple-complexes, sacrificial fire-pits and pendals and the town-flag named Indra-dhvaja, i.e. four components.

3. Palace-complex. This component houses royal mansion and the mansions royal family-members as well as state-officials: both civil and military. Palace-complex is one sub-set of the aforesaid town-settlement.

4 Town-flag: Indra-dhvaja, located exactly in the central zone of the township. In the Vastu-Mandala-paradigm, Indra-dhvaja occupies the central grid: Brahma-pada.

4. Residential civic colony is the next component. As per medieval social convention, the civic colonization is based on Varna-based pattern. Accordingly, cardinal zones are allotted to Brahmana, Ksatriya, Vaisya & Sudra. Bhoja has planned the residential houses on the cameral pattern: unicameral, bi-cameral, tri-cameral& quadric-cameral i.e. Eka-shala, Dvi-sala, Trisala and Catuh-sala. Bhoja's innovative genius has reached its pinnacle in creating an album of over thirteen lakh plans, by using arithmetic permutations and combinations, and thereby augmenting the numbers by squaring those.

5. Prasada, i.e. Deva-prasada meaning temples. The author has given over three hundred and fifty temple-patterns and four temple-styles: Dravida, Nagara etc.

7. Koti-homa suggesting religious architecture specializing in YAJNA-KUNDAS.
8. Sibira and Durga-vidhana i.e. military-engineering specializing in army camp-erection and building forts. Somehow, Bhoja has summed up aforesaid 7th and 8th topics in small number of verses in the chapter named Astanga-Sthapatya.

Sthapati-laksana i.e. the characteristic qualities of the professional architectural engineer include multi-disciplinary knowledge and twofold professional experience, besides theory and practice Bhoja terms it as: Bhasita-rupita i.e. oral instructions from the teacher and professional job-observations. The norms and professional conventions set by Bhoja are mostly relevant even today. For example, he equates the Sthapati well-versed in theory alone to a lame person always dependent on someone else for activity. Likewise, he equates the Sthapati, expert in practice alone, to a blind person; since, he lacks professional vision to execute the job, efficiently. Having given this eternal truth , he turns to king's duty to punish half-equipped Sthapati with capital punishment .The reason given by Bhoja is that such a person wanders on the earth, like living death for people. This is experienced by us today, when we read daily news of death of several people under collapsing buildings and bridges being built by unqualified engineers. Bhoja gives the positive contribution of Sthapati, in as much as they are the builders of constructions of various types, covered in eightfold engineering technology.

Bhoja has used novel technique in compiling his magnum opeus: Samarangana-Sutradhara by tracing the origin of engineering technology to the earliest phase of geology, when human engineers invoked Vishvakarma for providing shelter to people. Vishvakarma responded to the first king of humanity: Pruthu by undertaking the global colonization. His novel technique lies in the queries put forth by Vishvakarma's eldest son: Jaya whose questionnaire indirectly prepared model syllabus for engineering degree-course. To answer his queries Bhoja, in the guise of Vishvakarma composed eighty chapters (4-83). Because of the third chapter: Prashnadhyaya , Samarangana-Sutradhara deserves the title : Jaya-Pruchha. Jaya's querries were supplemented by the queries of his younger brothers: Vijaya and Siddhartha in the form of Vijaya-Pruchha and Siddhartha-Pruchha. There

queries were supplemented by exhaustive and comprehensive questionnaire by Aparajita, the youngest son. His queries culminated in a bigger treatise by Bhuvanadevacharya, composed after 150 years .From the point of view of the growth of engineering technology, right from Pruthu's time, it can be said that the four Pruchhas assigned to four sons of Vishvakarma together serves as ready reference in the form of medieval encyclopedia comprising four volumes. It is to be noted that the graph of growth of engineering technology was forced to have down-slope due to Muslim invasion.

The perfection of Sthapatya: Vijnana and Tantrajnana bloomed into Ashtanga-sthapatya like Ashtangayoga. Bhoja has given a specific order for these components. However, his allotment of chapters is as per convenience of thematic needs. He has given exhaustive treatment to town-planning and town-settlement. Pura-nivesha happens to be the second component of Sthapatya. He has given intensive and extensive treatment for a township equipped with seventeen roads: major and minor: Rajamarga, Maharathya, Uparathya , Yanamarga etc. A township, as per Bhoja is provided by rampart surrounded by a water trench. Bhoja employs his engineering skill digging a trench and using the dugout material for construction of the rampart. The trench served as protection for the city from enemy attack. The mud which was dug out from the trench served as fencing barrage for overflow of water. Bhoja's engineers used the surplus clay and water to develop an entertainment park where various groves, bowers and flower-plants were grown.

Bhoja's capital city: Rajadhani included palace complex,civic colonies as well as vocational settlements. Bhoja planned the colonies in such a way that all the houses built on four cardinal zones were facing the central plot covering Brahmasthana and hosting Indradhvaja: the town-flag. The town-flag, palace-complex and civic colonies comprised three components of Sthapatya. Those are three sub-sets of the mega-set: Pura-nivesha . One more component which is getting extensive treatment by the author is Prasads-nivesha, i.e. temple-architecture. Bhoja has allotted four chapters for giving divine origin and genealogy of shrines of gods built on earth and allied topics of structural composition of temple –doors etc. (chs 50-53) . Thereafter he has given structural details: horizontal and vertical for culminating into various

temple-patterns numbering over 350 and having individual names. The chapters are also named after patterns: Mervadi-vimshika, Shreedharadi-pancashat etc. (54-60). Bhoja has also taken survey of temple-styles: Dravida, Nagara, and Bhumija (chs 61-65). Bhoja has allotted fourteen chapters for iconography, painting etc. However, he has not given any specific place for it in Ashtanga-scheme.

The proportion of space occupied by different components is glaringly unequal. Indradhvaja extends over two chapters , town-plan one chapter , residential houses six chapters , palace complex , king's personal mansion, mansions of royal officials and horse-stable and elephant-shed together five chapters and temple-patterns and styles sixteen chapters. The seventh and eighth components describing sacrificial fire-pit military encampment and military fort together occupy less than half chapter allotted to Ashtanga-sthapatya. The first and the foremost component is the designing of Vastu-mandala wherein anatomical sketch of Vastu-purusa is super-imposed on geometrical grids of Vastu-mandala. That plan is the master-plan. It serves as a term of reference for tallying the structural composition of all structures spread over all components of Sthaptya. Bhoja's encyclopedic treatise contains several original contributions in civil, mechanical, religious and military engineering ventures.

The use of mercury in aeronautics is being taken note of by foreign research scholars through 2011 Jan. Bhoja's residential architecture and temple-architecture have been topics of monograph writing by foreign authors till today. Pruthu being a legendary king, no monumentary evidence in relic form is available for comparing notes. However, Bhoja's case is unique. The dam built by him, a millennium back is providing drinking water to millions of people and irrigating several thousand acres of land through one thousand years. His capital city: Dhar in Madhya Pradesh is available for comparing notes on select Sthaptya components. The town-plan for his proposed capital city: Bhojpur under archaeological survey alongwith half-finished Shivamandir is also available for comparing notes and the themes: temple-text correlation and township-text-correlation have rich research potential for doctoral degrees.