Vāstusāstra:
An Eastern Precedent as an Ecological Case Study

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INTRODUCTION

Occurring at the turn of the century is an interesting juxtaposition: global technologies are being influenced by local techne. Rather than being solely based on technological advancements that are disconnected from the environment and culture, global technologies are gathering inspiration from technologies of local culture and the nature of the corresponding region. This local techne involves an awareness of optimizing natural processes in technological practices of the constructed environment. The tools by which a culture interacts with the Earth constitutes its technology. Whether passive or advanced, technology is the means by which humans create their relationship with the environment. In this way, technology is an essential part of any culture, as well as the method by which globalization is implemented. By intertwining technology with site, the form becomes an animated comprehension and communication of the specificities and diversity of place. In examining the word *techne*, the twentieth century philosopher, Heidegger, states, "*techne* signifies neither craft nor art...the word *techne* denotes rather a mode of knowing."[1] In this way, technology becomes a mode to comprehend the site, as well as enhance the legibility of its essence.

BACKGROUND ON VĀSTUSĀSTRA

In looking to the Vedic[2] building practices of Vāstusāstra, a potential techne or process for ecological design can be deduced. Vāstusāstra[3] goes beyond being a treatise on aesthetics, but is rather an explication of the nature of the universe and the individual's place relative to it. (See Figure 1) The interrelationship of all organisms and their environments as a primary concern makes Vāstusāstra a precursor to the science of ecology. Vāstusāstra establishes a methodology that emphasizes ecology as a primary generator of design responses, thus allowing the environment to participate in the design process. Through a method of demarcation using environmental elements, along with a simultaneous expression of metaphysical symbolism, a built form can possess a sense of animism. The understanding of ecological phenomena is intertwined with a

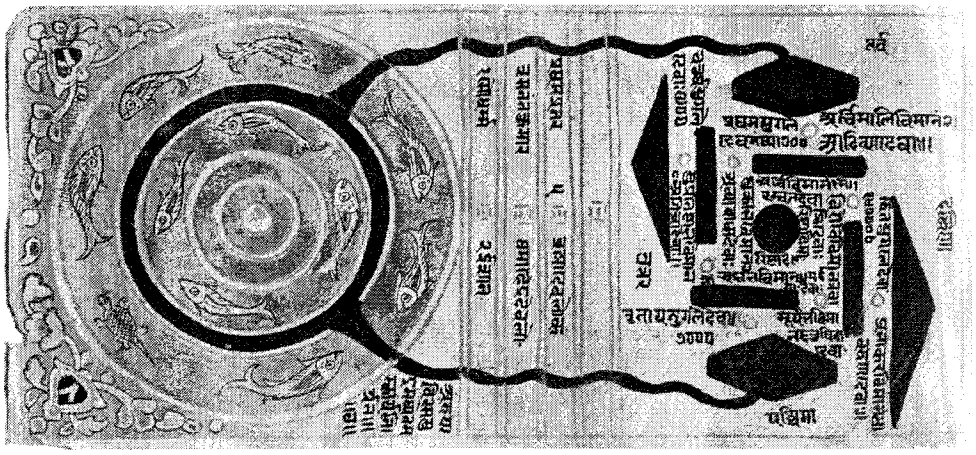

Fig. 1. Cosmogram depicting the linking of the cosmos to the built environment through layers of the five elements to the earthly world. From Philip Rawson, The Art of Tantra.

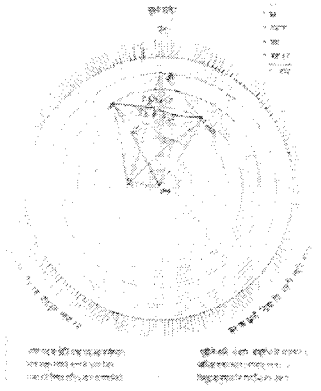

Fig. 2. Image representing the five elements and the magnetic forces surrounding the earth. From The Tantric Way: Art Science Ritual.

mythopoeic meaning and an ecological response in terms of building. In this way, the observance and marking of physical phenomena can have an inherent link to the transcendental. Resulting from this building practice is the integral nature of symbolism with the construct. Allegorically, the vastupurusha mandala becomes a visual illumination of the science, the myth and the guidelines for the design of a house. These guidelines utilize a means of measure, order and proportions based on ecology and the body. Literally, mandala means circle. However, through the spatial and temporal process of the creation of the mandala, it comes to simultaneously graphically represent a demarcation of ecological factors as well as the individual and the cosmos. Thus, the center of the dwelling is both the center of the cosmos and the center of the individual.

Being dependent on the Vedic belief that everything is interconnected and interdependent, Vāstusāstra necessitates a holistic view involving nature, people and time.[4] Therefore, for internal and external harmony, it is important to maintain the order that is inherent in the universe. Essentially, the external energies are inherently in balance, while the internal energies of a constructed space and individual are not necessarily so. Also fundamental to the Vedic beliefs is that all things that exist possess a sense of animism. As postulated in a theory of atomic structure of matter in the Ancient Indian text, *Nyaya-Vaiseshika*, all the energy of the universe, including human beings, is composed of the five elements of space (the panch-bhutas): ether, air, fire, water, and earth.[5] To achieve a balance, Vāstusāstra engages the orientation of physical space to optimize the benefits of these five elements along with the magnetic fields surrounding the earth.[6] (See Figure 2) In respecting these elements, one honors nature and oneself.[7] In many respects, there is not a sense of differentiation between the two.

The Vedic atomic theory suggested that the elements were the manifestation of different combinations of paramanus (a sub particle of an anu or atom) with varying characteristics, except for ether, whose structure was not considered to be atomic.[8] These paramānus were thought to vibrate in the dimension of

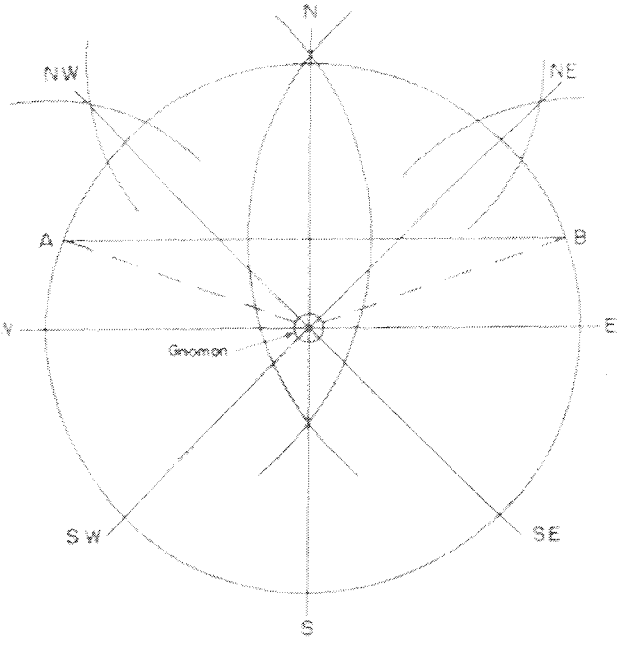

Fig. 3. Cosmic Compass. From the Mayamatam.

time (Kāla), thus producing an invisible energy that emitted light. This energy could either be engaged positively or negatively. This invisible energy is simultaneously composed of prakriti (the transcendent order of nature) and purusha (the

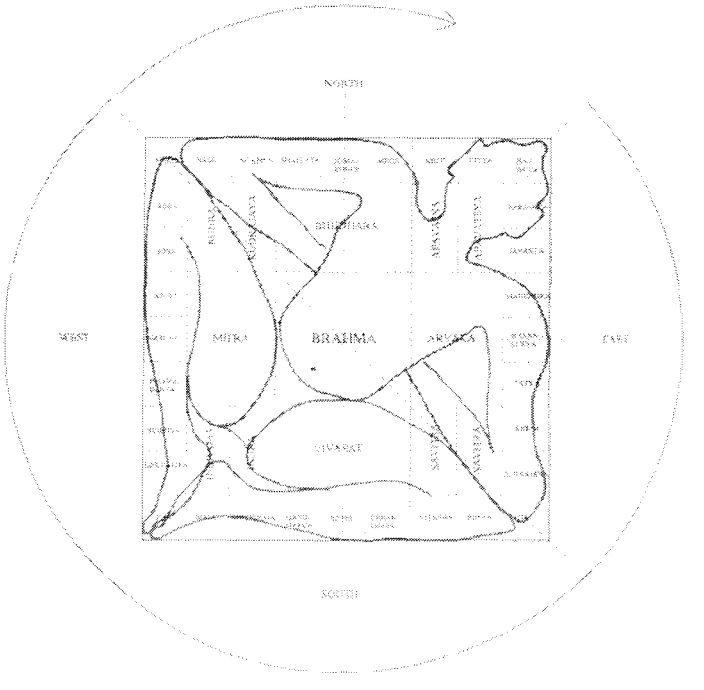

Fig. 4. Vastupurusha Mandala with the rotational direction for three Vastu characteristics.

cosmic person). While prakriti, consisting of the panch-bhutas, is the creative energy that forms all the material attributes that can be seen, purusha is the unseen spirit or animating principle. Although distinct, they are inseparable. The ultimate intent is to liberate the purusha from the prakriti. The purusha is both the measure and the measured. The vastupurusha becomes a visual illumination of this concept. A duality of meaning is derived from the layering of context within the self and the cosmos. The house has its own life cycle that incorporates the individual, the environment and the cosmos.

Vãstusãstra prescribes certain conditions for an advantageous site. It must have particular characteristics including a higher elevation in the south or west, soil that is "compact, smooth and pleasing the touch," and specific sounds and fragrances.[9] Certain prescribed soil tests help to ensure the fertility and stability of the soil.[10] These recommendations help to ensure the viability of the soil for both building and growth of vegetation, as well as the health of the occupants.

DEMARCATION OF SUN THROUGH COSMIC COMPASS

Similar to various other indigenously based cultures, the idea of measure is encapsulated in the Vedic tradition. The role of the system of measurement is to achieve harmony between the absolute and the quantifiable.[11] Essentially, within the boundless cosmos, prior to building, it is the marking of the site using the sun that sets the limits of a boundary of a place. The inscribing of the sun's impact diurnally and annually on the site was an essential ritual. In doing so, this location was set apart from all others. This rite of demarcating the building begins the mimesis of the creation of the cosmos out of chaos.[12] In this way, "the sun becomes the architect of the space."[13] This ritual also speaks of the marking of both space and time through the axes of the cardinal directions. The actual process determines the sun orientation and cardinal points using the cast shadows of a gnomon-pillar sitting in the center of a circle, which is to be considered the center of the building.[14] (See Figure 3) This also locates the sun as the center of the building. As the starting point of reference, bindu, for all constructs, this is also the beginning of the world scientifically and spiritually. The point, bindu, is representative of the point from which the universe emerged and to which it will eventually recede. The gnomon pillar also represents the axis mundi of the individual. This internal energy connects the person to the cosmos.

CONSTRUCT OF THE VÃSTUPURUSHA MANDALA

After the cardinal points are established, the vastupurusha mandala is physically inscribed with a system of cords and pegs upon the site. The Vãstupurusha figure is figuratively held facedown across the site by various deities. (See Figure 4) This is symbolic of the ordering of chaos.[15] Being facedown, the Vãstupurusha is facing the same direction as the viewer. The house is organized around a center courtyard, which is overseen by Brahma, the ultimate spiritual power. Using a grid work of lines, the square of the mandala can be further divided into smaller squares that are assigned various deities. The mandala can range from 1 square to 1024. Eight planetary bodies surround the center space, thus referencing the cosmos. On the outer border, various deities stand guard. While connecting to the cosmos and time (diurnal and seasonal), the mandala maps coexisting physical and spiritual meanings. There is a simultaneous existence of the macrocosm, microcosm and mezzocosm.

ECOLOGICAL IMPLICATIONS OF THE VÃSTUPURUSHA MANDALA

In looking towards ecology, the mandala can be further explicated according to environmental conditions. The Vãstupurusha, or cosmic man, lies facedown with his head towards the northeast and his feet to the southwest, thus establishing a strong axis from the northeast to the southwest through the house. (See Figure 4) The northeast is seen as a source of positive energy. India itself is in the Northern Hemisphere with the northern portion of the country having a colder climate, and the southern portion of the country being more tropical and prone to monsoons. The north provides relief from the heat and rain. With the Himalayan and Hindu Kush Mountains to the north, mythologically, the north is "the quarter of the light, or the area of the Devas, or shining ones," or in other words, the domain of the gods.[16]

The Vedic culture was also aware that relative to the earth's orbit around the sun, the earth's north south axis tilts 23.45 degrees. In addition to drawing in cosmic energies, this provides a constant magnetic gravitational force.[17] This axis of energy flows from northeast to southwest of not only the site, but of the entire earth as well. This tilt leads to temperature changes, seasonal variation in the length of daylight hours and prevailing wind patterns. The Earth's magnetic field originates approximately along this tilt, creating field lines that rise near the South Pole and enter the Earth again near the North Pole. In fellowship with the Earth's magnetic fields, the solar wind shapes and supplies energy to the Earth's magnetosphere.

As a society dependent upon solar energy for existence, the orientation also gives importance to the rising sun. Vãstupurusha is an allegorical representation of these various energies. However, the Vãstupurusha is not a fixed entity. There are three characteristics to the Vãstupurusha: fixed, seasonally rotating, and daily rotating. The *Chara Vastu*head is towards the south from August to November, the west from November to February, north from February to May, and east from May to August. The *Sthira Vastu* head is always to the northeast. The *Nitya Vastu* heads east the first three hours of

the day, south the next three, west the following three and north the final three.[18] In this way, the vastupurusha not only recognizes the gravitational pull of the earth, but marks the seasonal, yearly and diurnal cycles as well.

The center of the mandala is always empty. In residential building, it is the courtyard, the most sacred and private space, which is used primarily for household activities. The center is the "heart of the body and is the meeting point of all centrifugal and centripetal energies of the land."[19] This courtyard provides for natural convection of air over the course of a day, thus cooling the house.[20] It is protected by the enveloping building from direct sunlight with the surrounding rooms opening on to it. Rainwater is often collected from the roof and stored in a tank beneath the courtyard.[21] In addition to being the realm of Brahma, the central square is related to the element of ether and the sense of hearing. The northeastern square is related to the element of water and the sense of taste, the southeastern to the element of fire and the sense of sight, the southwestern to the element of earth and the sense of odor and the northwestern to the element of air and the sense of touch. (See Figure 5) Related to the element of water, the northeastern portion of the site is where Vāstusāstra suggests for placement of the well. First, the site is sloped towards this direction, thus allowing for drainage. This placement also keeps any spills away from the house. The southeastern section is governed by fire, thus leading to the positioning of the kitchen in this area. This corner would provide a pleasant, sunny and breezy space for the daily domain of the women.

Although India has varying climatic and diverse topographical conditions, there are some commonalities. The monsoon season typically exhibits rain and wind from the southwest. Also, implying a southwest directionality, the sun is typically at its hottest in the mid-afternoon. Both issues indicate a need for protection from those phenomena. Ideally, the site has a northeast slope with the house to be sited along it, thus allowing for drainage as well as protection from the monsoons.[22] Trees along the southwest help block both rain and sun. The heaviest and tallest walls with minimal openings are placed towards the southwest for further protection from sun.[23] Oftentimes, if a second story was considered; it was placed in the southwest corner to further block sun from the courtyard. The placement of the earth element in this corner further accentuates the need for heaviness and weight as a barrier.

Vedic culture understood light to emit two different types of rays. Ultra violet rays, or morning light, were thought to be positive, cleansing, bacteria killing, uplifting and healthy for the eyes,[24] while afternoon light was seen as thermally intense and harmful.[25] Water elements were highly undesirable in the southwest because of possible reflection of heat into the house.

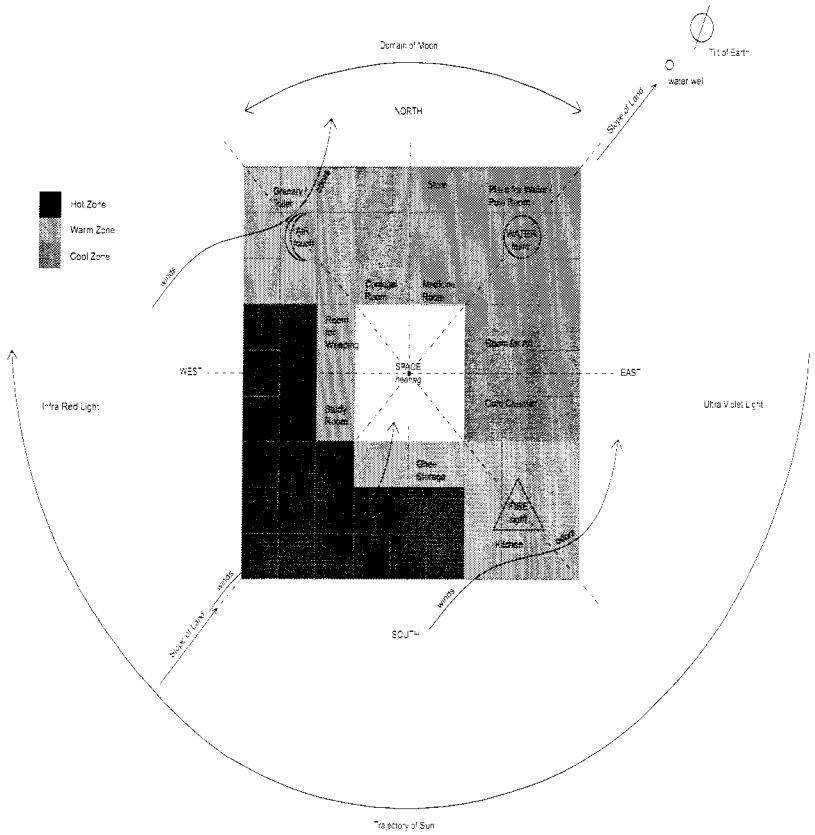

Fig. 5. Analytical Diagram of the Vastupurusha Mandala, by author.

The zoning of the house can be broken into hot, warm and cool zones. Functions were placed according to time of day, thus relating to the relative heat, and the time the room was used. (See Figure 5) Placement of potentially odor-producing rooms, such as the kitchen and toilet, in southeast and northwest corners ensured cross ventilation from southwest breezes straight through these areas to the outside. Placement of doors, windows, balconies and verandas occurred primarily on the east and north.[26] This allowed for doors to get desirable eastern light, particularly the entry door. Minimizing openings on the south and west kept out the hottest sun.

Vāstusāstra also prescribes the three dimensional and proportional relationships of all the architectural elements of the house. This allows for a recreation of an entire dwelling from one small piece. Suggestions are also given for the relative length to width to height ratio. These ratios are based upon the amount of sun desired to enter the house, load distribution purposes, and openings for ventilation.[27] The width of the wall is stipulated as a ratio of the width of the house. This is primarily related to load bearing necessities.

Utility, aesthetics and durability are important aspects of Vastu.[28] In the 1660s, Francois Bernier wrote the following concerning urban havelis:[29]

> In these hot countries a house is considered beautiful if it be capacious, and if the situation be airy and exposed on all sides to the wind, especially the northern breeze. A good house has its courtyards, gardens, trees, basins of water, small jet d'eau in the hall of the entrance and handsome subterranean apartments are provided with large fans...no handsome dwelling is ever seen without terraces on which the family may sleep during the night.[30]

This quote describes several cooling techniques: subterranean rooms maintaining a constant temperature due to their submersion in the ground, courtyards, sleeping terraces, vegetation, and evaporative cooling from water sprays and fans. Often, window and door screens of dried grass roots were wetted and thus provided cooling by the passage of breezes.[31]

Varying regional climates, topography, locally available building materials, and differing cultures led to different interpretations of the mandala and expression of its zoning. In regions with extreme temperatures, massive, thick walls and flat roofs were used for insulation. Eaves projected over walls to protect from direct sunlight and rain. Windows were often shuttered. Bedrooms might be open, thus allowing cooling at night.[32] Materials were chosen due to varying climates and topographies that led to different resource availabilities.

Rajasthan, in the western desert, has a hot and arid climate that leads to several different house types including an inwardly focused dwelling, or haveli. The house was typically rectangular and zoned into nine squares.[33] This haveli focuses on the courtyard for convection and two foot thick stone walls as the primary building material.[34] In arid climates, timber is scarce. It is typically not used for construction, but rather saved for use in ornamentation.[35] The wall construction consisted of stone over brick and lime masonry, thus creating a thermal mass. The courtyard was protected by the mass, and cooled by convection during the day. In the cooler evenings, the mass radiated heat. The rooms of the house opened onto the courtyard, thus taking advantage of the conditioned air. The spanning capabilities of stone controlled the proportions of the house.[36] The compactness of the house led to cool common internal walls.

In Kerala, the climate is wet and humid with large diurnal temperature swings, thus leading to a different superimposition of factors on the mandala. The house is often square, which is most efficient against heat loss, with "concentric zones" around the central square.[37] Large inner and outer verandas were organized around the central square, thus causing greater air circulation. This along with exposing as much wall area as possible to outside air helps to minimize the humidity.[38] The outer verandas also ensure air movement between houses in densely populated areas. In this region, timber is a plentiful and renewable resource. Coconut palms provide for strong roof beams and thatch for roofing material.[39]

In the colder climate of Kashmir, the square house's courtyard was often replaced by a stair hall.[40] Due to the abundance of timber and the scarcity of stone, the house is a load bearing, timber framework of horizontals, verticals and diagonals that is independent of its masonry infill. In an earthquake prone zone, the timber framing is more resistant to tremors, while the brick provides thermally insulating and defensive qualities.[41]

Vāstusāstra also instructed on the use of vegetation on the site. Trees were classified on the basis of their water absorption properties, soil retention capacities, off gassing characteristics, root spreading tendencies, density of foliage, size or height, shape and color of leaves. The guidelines attempted to optimize these characteristics. Trees were suggested in the south and west to protect against sun and rain. Lawns and greenery were advised to the north and east.[42] Specific species of trees and vegetation were suggested based on their inherent characteristics and relationship to the cardinal directions.

RELATIONSHIP TO CURRENT ECOLOGICAL DESIGN

Although contemporary science has expanded exponentially on many of the notions intuited in this Vedic culture, the development of metaphysical meaning in the present world has been differentiated from scientific progress. In the traditional Indian culture, scientific notions were developed in harmony with spiritual beliefs. The importance of the Indian example is that the symbolism and meaning are not applied, but rather

intrinsic to the nature of the forms. These forms cannot in and of themselves create significance within the contemporary world. However, the logic begins to suggest a methodology for developing significance in the present. The guidelines of Vãstusãstra cover the following topics: site selection, where and when to commence excavation, orientation, location and extent of open spaces, proportions of building elements, materials, joinery, location of the well, laying of foundation stone, orientation of entrance door, number and placement of windows, direction and location of stairs, position of Puja room, placement of kitchen, locations of rooms, position of grain store and safe, bathrooms, and types of vegetation surrounding the house. However, this technique was developed specifically for a particular climate, topography, lifestyle and culture. It should not become a checklist, but rather it can suggest a logic for design.

Obviously, the cultural content is not transferable, but the logic is. The focus point is the idea of harmony. The attempt is to elucidate meaning – a symbolic meaning through a holistic understanding of cultural and environmental conditions.

For the present world, Vãstusãstra suggests a process of analysis of site conditions, demarcation of the elements upon the site, and the creation of contemporary mandala systems that could superimpose environmental conditions with local cultural conditions. This contemporary system could begin by mapping the environmental conditions in a similar manner.

CONCLUSION

In many ways, the issues in this Vedic course of thought are similar to the goals of contemporary architects concerned with ecology. These current objectives often incorporate the following: the local context, the effect on the local ecosystems, determination of land use, energy, transportation, energy efficiency, life-cycle implications of materials, minimal waste discharge, and the integration of ecologically sensitive systems. However, the next layer of meaning, the animism of the form, is not necessarily suggested by these objectives. These aims only relate to an understanding of ecology and technical expertise.

However, as the Ancient Indian precedent suggests, the poetics of the building are to be found in the structure's animism through a metaphysical or intellectual construct inherent in the process of making. The methodology should look to create meaning not just by understanding the land's constituent components, but also by trying to derive the essence of the site. This suggests a process of environmentally sustainable design principles and application of ecologically sensitive technology in the contemporary world that can reconnect humans with their micro- and macro-environment through an understanding of the natural elements and ecology as the generator of form. In this way, the contextual response goes beyond the local to include the world, allowing for a shared experience of meaning that can be understood across various cultures.

ENDNOTES

[1] Martin Heidegger, "The Origin of the Work of Art," in Albert Hofstadter, translator, *Poetry, Language, Thought* (New York: Harper & Row, Publishers, 1971), p. 59.

[2] The Vedic period in Indian history is categorized as approximately 3000 BC to 1000 BC.

[3] The term Vãstusãstra refers to the science of architecture. In the *Mayamatam*, the term "vastu" is defined as dwelling site or anywhere that immortals and mortals live. Vastu is categorized as the Earth (or the original dwelling from which the following three are derived), buildings, vehicles and furniture. Being dependent on the Vedic belief that everything is interconnected and interdependent, Vãstusãstra necessitates a holistic view involving nature, people and time.

[4] Adrian Snodgrass, *The Symbolism of the Stupa* (Delhi: Motilal Banarsidass Publishers, 1992), p. 1.

[5] Anita Mookerjee and Madhu Khanna, The *Tantric Way: Art Science Ritual* (London: Thames and Hudson Ltd., 1977), p. 107. It is important to note that this theory was deduced through intuition and not guided by experimental knowledge. Each of the elements also had a direct relationship to one of the senses: earth to smell, fire to vision, air to touch, water to taste, and ether to sound. The stupa, especially as exemplified in the Buddhist precedent, also incorporates the five elements that comprise the cosmos. Each element relates to a figure and furthers the notion of representing the cosmos.

[6] Kathleen Cox, *Vastu Living*, p. 3, and Padam, *Vastu: Reinventing the Architecture of Fulfillment*, p. xiv.

[7] Cox, *Vastu Living*, p. 33.

[8] Mookerjee and Khanna, *The Tantric Way*, pp. 98-99, 107, 109.

[9] Bruno Dagens, editor and translator, *Mayamatam: Treatise of Housing, Architecture and Iconography, Volume I* (New Delhi: Indira Gandhi Centre for the Arts, 2000), p. 9.

[10] Ibid., p. 11.

[11] Cox, *Vastu Living*, p. 35.

[12] Adrian Snodgrass, *The Symbolism of the Stupa*, p. 17. *Time and Eternity: Studies in the Stellar*

[13] Adrian Snodgrass, *Architecture, and Temporal Symbolism of Traditional Buildings, Volume I.* (New Dehli: Aditya Prakashan, 1990), p. 103.

[14] Snodgrass, *The Symbolism of the Stupa*, p. 14-15. The radius of the circle is twice the height of the pillar. In this way, at the two points in the morning and the evening where the shadows touch the circumference, the direction of the east-west axis is determined. This process only works flawlessly on the equinoxes. On other days of the year, an adjustment needs to be made for the midpoint of the line between the cast points to be at the same location as the center of the circle. Another method avoids this issue by use of a different construction. In this system, in addition to the two points cast on the circumference, a third point, which falls within the circle, is taken at midday. Using these three points as the centers, three circles are created. Lines are then created between the intersections of the circles. In this way, the north-south axis is determined.

[15] Snodgrass, The Symbolism of the Stupa, p.110.

[16] Gayatri Devi Vasudev, *Vastu: Astrology and Architecture* (Delhi: Motilal Banarsidass Publishers, 1998), p. 80.

[17] Cox, p. 48.

[18] Jin Purush Ashok Padam, *Vastu: Reinventing the Architecture of Fulfillment* (Dehradun: Management Publishing Co., 1998), pp. 112-113.

[19] Ibid., p. 25.

[20] Ibid., pp. 186-7

[21] Cooper, Ilay and Barry Davis, *Traditional Buildings of India* (London: Thames and Hudson Ltd. 1998), p.18.

[22] Vasudev, p. 85.

[23] Padam, p. 68.

[24] Ibid., p. 67.

[25] Vasudev, p. 76.

[26] Padam, p. 81.

[27] Vasudev, p. 61.

[28] Padam, p. 10.

[29] The term *haveli* originates with the word *hara* meaning wind.

[30] Cooper, p. 18.

[31] Ibid., p. 19.

[32] Ibid., p.18.

[33] Chakrabarti, Vibhuti, *Indian Architectural Theory: Contemporary Uses of Vastu Vidya* (Surrey: Curzon Press, 1998), p. 10.

[34] Ibid., p. 12.

[35] Cooper, p. 34.

[36] Chakrabarti, p. 13.

[37] Ibid., p. 10.

[38] Ibid., p. 14.

[39] Cooper, p. 34.

[40] Ibid., p. 48.

[41] Ibid.

[42] Vasudev, p. 71-3.

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