



Developing Neo-Vernacular Building Technologies to Integrate Natural and Built Environments: A Model Tourist Village in Qeshm Island

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Available online at: www.isca.in, www.isca.me

Received 17th December 2013, revised 31th January 2014, accepted 5th April 2014

Abstract

Human beings have, throughout history, made different but evolutionary relations with the earth on the basis of their ideology and way of thinking and are now entering the fourth cultural era in which ecology and the Earth, as the source of life, are in the center of attention. During these evolutionary stages, the way of considering technology, has processed the natural environment to create built environment and this process has led to the formation of many new revolutions in construction technology in the last hundred years. These new technologies, mainly steel and concrete ones, have defectively entered the rural areas in developing countries and changed the environmental quality of the built environment. This research, which roots in the eco-centric paradigm, firstly covers a brief review on the necessity of conserving natural environment and then investigates the relation of man, nature and the built environment and the schools of architecture in relation to nature; Following the initial introduction, modern building technologies are analytically compared with those of vernacular and the concept of neo-vernacular architecture is introduced. Eventually, on the basis of this knowledge and investigating the geographical, natural and architectural features of Qeshm Island, a tourist village has been designed in which proper neo-vernacular nature-friendly construction technologies are proposed. The tourist role of the complex contributes to the spread of the idea within the region, the country and the similar developing countries.

Keywords: Neo-Vernacular Building Technologies, Integration of Natural and Built Environments, Rammed-Earth, Model of Tourist Village.

Introduction

From the existence of human beings as a species on the earth, man has passed three important cultural stages any of which have proposed specific patterns for the built environment. The first and the second eras are respectively related to the hunting and agriculture. The third era which roots in the Greek philosophy and the concept of *Demos*, leads to an intellectual, artistic and scientific bloom in the fifteenth and sixteenth centuries. In this era, the built environment and the buildings follow an *industrial model* in which the organic nature is disassembled to its elements and then reassembled in another mechanical existence. The living earth and all people are the resources with which the economical system is structured. It seems that human beings are now moving on the edge of the fourth era the guiding principle of which is the *ecologic principle*. The ecology era follows the goal of revitalizing the living world in which the life forms are influenced by the existing resources. This era, does not reject science and technology but aims at bringing together these two in a context in which the phenomena are the elements of a systematic spiritual¹.

Nature, as the basis for all architectural formations, has features like diversity and harmony and it is generally a rich architecture in itself. Human beings, through building technologies they

have used, have changed the surface of the earth in a vast range extending from the two extremes of *opposition* to nature and *integration* to it. If we consider the rights of next generations, it seems that they will have a rational claim for the using different resources; they have the right to use virgin natural environment. What the next generations will enjoy or get interested in, would, to a great extent, depend on what they inherit from the world we leave for them. In the natural image of sustainability, the key to sustainability is to work with, not against, nature; to understand, sensitively exploit and simultaneously avoid damaging natural systems². In an ethical viewpoint, today, environmental ethics need to go beyond the traditional boundaries and develop ethics to non-human beings³; According to Alexander von Humboldt, in geographical perceptions of landscapes, the harmony between climate, geomorphology, natural plants and the animal living, will demonstrate landscape aesthetics. The geographical aesthetics concerns conserving natural beauties and historical values⁴.

In many developed countries, vernacular architecture in different scales can be found, although these buildings are widespread through the countries, vernacular traditions are being subject to extinction by modern technology and the process of modernization and globalization. In the second half of the 20th century, the globalization process has lead to fast and great changes in economic, social, cultural and natural

structures of local geographical habitats and brought about international functions, forms and materials to all regions⁵. The necessity to integrate natural and built environments by architecture can be seen from many viewpoints mainly on the basis of environmental ethics, which is one branch of sustainable acts, for the sake of the earth which eventually leads to the good of humanity⁶.

The research as an applied research, on the basis of the theoretical framework, would eventually seek solutions for construction phase. The research would follow a descriptive-analytic approach to the theoretical foundations, and finally by analyzing the geo-natural features of Qeshm Island, we have tried to find proper nature-friendly technologies for the location selected on the basis of a comparative approach. The research is also to seek substitutes for the current building technologies in Qeshm Island; thus, all potentials in the region that might help to introduce a new method have been studied, such as the natural, geographical, cultural and architectural features. This paper will finally demonstrate how neo-vernacular building can be applied to rural residential areas and thus has chosen tourist function to help demonstrate the ideas to the visitors.

Theoretical Framework

In this part of the paper, firstly the relation of man and nature through architecture is covered and following that, the whys of the research have been explained. At the end of this section we will introduce overlapping values of deep ecology and the natural image of sustainability and finally compare modern building technologies with vernacular ones.

The Environmental Paradigms and the Relations of Man and Nature from Architectural Viewpoint: The effect of human activities on the environment can be mentioned as the following⁷: i. The change in the quality of air, water and earth, ii. Influencing the natural resources, and iii. vital currents and natural landscapes. In ecology schools and geography, there are two main viewpoints for the relation of man and the environment; that is, the utilization relation, in which human beings master the environment, and the conservative which seeks the ways to conserve nature. The beginning of the utilization relation began with the religious beliefs in America in which human beings must mutate the virgin nature to achieve the *paradise*; this can be seen in some of 19th century paintings⁸. This relation, in its extremes, leads to human's mastery over the nature. Some theoreticians believe that the

today's natural crisis roots in this kind of relation; the famous Le Cor Busier's statement that "architecture is a machine for life" follows the same viewpoint⁹. Among the environmental paradigms, the human-centric paradigm is taken by all the movements of sustainability; in this paradigm, the provision of responses to human needs is in priority and balanced exploitation of nature is recommended¹⁰.

In another categorization, the relation of man and the environment comprises five branches of non-systemic, detached-systemic, attached-systemic, organic and ultra-systemic¹ relations⁹. The utilization relation accords with the values of non-systemic and detached-systemic, while the conservative relation does with attached-systemic and organic relations.

Based on the range of the relations of man and the environment, four schools of architecture can be defined with their own approaches that are shown in table-1.

It should be noted that in order for human beings to have a proper relationship with the nature, Islam (as the religion of the region studied) has set up a responsibility for man toward the natural environment. This responsibility evolves from the role of man as God's *Khalifa* on earth. The interpretation of this verse is that man is only a *manager* of the earth and not a proprietor; and that man may realize the following objectives: (a) contemplation and worship, (b) inhabitation and construction, (c) utilization and (d) enjoyment and appreciation of beauty. So man's responsibility toward the natural environment can be framed within the two principles of utilization of natural resources and preservation of natural balance¹¹. This viewpoint accords with the principles of conservation while utilization and vice versa.

Ethical Viewpoint: Leopold's *land ethics*, and also the critical view of Lockean to consider the earth as commodity, would lead us to the fact that human beings are no longer allowed to consider the earth as dead matter and to use it in any way they desire; The earth must be seen as a living organism that might be healthy, injured or killed. Leopold describes the earth as "a fountain full of energies which is flowing in a circuit of earth, plants and animals"⁶. Generally, philosophers divide ethics to three branches of anthropocentric, non-anthropocentric and holistic ethics⁶; this paper takes the holistic ethics as one of its bases. On the basis of this ethical viewpoint, an act is *perfect*

Table-1
The four schools of architecture in relation with the natural environment

| School of Architecture | System Description | Development Approach Taken |
|------------------------|----------------------------------|----------------------------|
| Nature-Fighting | Non-Systemic | Opposing Nature |
| Nature-Escaping (Free) | Mechanically Systemic (Detached) | Isolation From Nature |
| Naturalist | Organically Systemic (Attached) | Harmony with Nature |
| Nature Maker | Ultra systemic | Completion of Nature |

when it leads to connectedness, interdependency, continuity and the beauty of the living society. The ethical viewpoint to the earth is completely non-anthropocentric. In this view, humans have no privileges over other creatures and are ordinary members of the living society³. In the green architecture movement, the policy is to consider ethical issues in construction processes, that is, by use of renewable, non-polluting and recyclable materials against the unlimited development and the inimical relation with the nature. The sustainability movement roots in the idea that sees the relation of humans and nature in humans self-bloom on the earth. In this regard, the Frampton's critical regionalism also approves of indigenous way of building and the sensitivity to the geographical and climatic features. Frampton, as well as Heidegger, resists against globalizing and homogenizing economic forces by defining a restricted boundary on the earth¹².

The Rate of Natural Materials Consumption and Managing Human Resources in Construction Industry: Regarding environmental problems, the consumption of building products and energy in building industry, has caused the great need for raw materials and energy which has lead to many environmental problems with exploiting the resources, such as impoverished environmental conditions, loosing different ecosystems and also with energy production such as pollutions, acid rains and global warming. In 1997, according to the US trade department, about 36 percent of all consumed energy in US has been allocated to commercial and residential sectors. To have a more clear understanding of the scale of energy used, the energy used in construction industry must also be added. The material consumption in construction industry even goes beyond that; about 40 percent of the material consumption in the world relates to construction industry and repairing of the built environment¹³.

Industrial construction substitutes human resources with abundant natural resources. In developing countries, where human and natural resources are relatively abundant and cheap, modern technologies are rare and expensive, and the handicrafts and skills are usually well-evolved, the tendency to industrial construction seems to result in environmental, social and economical disasters. Meanwhile, the indigenous ways are neglected for they are assumed outdated and related to weak societies. Regarding the fact that in the beginning of the 21st century, 1.3 billion people live in industrial buildings, two billion in mud structures and the other 2 billion in other indigenous structures, and considering that the population of the world will reach 9 to 10 billion by 2050, it can easily be understood that maintaining and developing low-impact construction technology alternatives seems necessary. In natural architecture, two main goals are to be achieved; first, to increase the pallet of raw building materials and to decrease the energy in production, manufacturing and transportation of the materials¹³.

The Aspects of Sustainability: Sustainability stems from the word *sustain*. Meanings of sustain that are important to this paper include: to keep in existence, i.e., to maintain a status quo. It can mean to maintain a static state or maintain a rate of growth. Sustain also means to keep alive. Sustainability is the ability to sustain¹⁴. In the context of this paper, the word sustainability is used as it relates to the concept of sustainable development. Something is said to be *sustainable* when it can be maintained. *Development* is a noun that stems from the word *develop*. To develop is to grow or change into a more advanced form¹⁴. This growth can be quantitative or qualitative or a mix of both. According to Coetzee, development is "a concept carrying with it the connotation of a favorable change: moving from worse to better; evolving from simple to complex; advancing away from the inferior"¹⁵. Sustainable development is development that can be maintained forever. Sustainable development is defined quantitatively and qualitatively in relationship to man whereby development should provide for his needs today while taking into account the needs of future generations: The main motivation behind sustainable development is to sustain the species *Homo sapiens*. Sustainability is thus the condition or state that would allow the continued existence of *Homo sapiens*; Thus, Sustainability is the goal, while sustainable development is the process of attaining the goal¹⁶. Green architecture is also a term entitled to the architectures which dedicate great importance to the environment, is one of the characteristics of the sustainable design in which environmental sustainability is more important¹⁷. The Earth architecture which has been analyzed in this paper would be categorized into a green sustainable group of architectural building technologies.

Overlapping values in Deep Ecology Paradigm and the Natural Image of Sustainability: For the modern science, the natural world, comprising non-human animals and plants, is considered as a resource for more economic benefit. This approach, developed by the French Philosopher Rene Descartes, leads to a twofold attitude in which humans are the leaders and controllers of the living earth. In the recent two centuries, the idea of twofold attitude has lead to a great change in the quality of exploiting the environment, and the mastery behavior, has greatly mutated the geographical face of the earth⁴. Eco-centric Paradigm seeks its roots in the system of universe. From this viewpoint, the whole environment and its elements, consisting of plants, animals, resources and the earth each has a specific responsibility and value in such a way that each eco-system would maintain features like unity, balance, sustainability, variety and holistic purposes¹⁰. Aldo Leopold also, in his *Land Ethics*, emphasizes eco-centrism by developing the living society to all natural elements⁶. Eco-centrism roots in a holistic approach in which every element is inter-related with other things and it is this whole that is more dominant than the elements¹⁰.

Deep ecology also believes that the techno-centric paradigm that rules in the industrial countries separates human beings from

nature and confirms his mastery over nature. A comparison of the approaches of mastering ideology and deep ecology is shown in the table-2

Table-2

The comparison of the approaches of mastering ideology and deep ecology

| Deep Ecology | Nature Mastering Ideology |
|------------------------------------|------------------------------------|
| Integration with nature | Mastering nature |
| Communal life style | Competitive life style |
| Social Democracy | Hierarchy of power |
| Limited earth resources | Abundant amount of stock resources |
| Balanced consumption and recycling | Unlimited consumption |
| Proper technology | Advanced technology |

In the natural image of sustainability, the key to sustainability is to work with, not against, nature; to understand, sensitively exploit and simultaneously avoid damaging natural systems². "Design with nature", at the building level, is a code for recognizing natural elements to work with in order to make somewhere for people to inhabit, while protecting specific natural features. In this attitude, natural features are used instead of mechanical ones, and the building lives in symbiosis with the natural environment. Thus, both the building and the "other" of nature are sustainable. This image of architectural sustainability, then, mirrors a view that it is necessary to position human activities as a non-damaging part of the ongoing ecological landscape, with a brief that "nature knows best"². The deep ecology paradigm and eco-centric logic embraces this image of sustainability, linking it strongly with rhetoric of a fragile, delicately balanced earth where straying far from this path will lead to environmental catastrophe.

Comparison of Vernacular Building Technology and Modern Technology: According to Heidegger, technology must not be considered simply as means of doing something; it is a kind of unfolding. On the basis of this viewpoint, modern technology is criticized as having invasion essence. It puts

nature in an irrational expectation that nature must provide as much energy as human beings can reserve. Technology ethics, which asks questions of whether a new technology is good at all or not or that how power changes by changing technology, together with new engineering philosophies take critical approaches to modern technology. On the other hand, the characteristics of vernacular technology that differentiates it from modern technology might be listed as the following¹⁸: Rational exploitation of natural resources and an integrative unfolding, Heaviness of masonry construction and decreasing the use of energy (of exploitation, transport etc.), Social dynamism of construction process and participation of the people.

The Potential in the Region for Developing Neo-Vernacular Architecture: Comparing the features and the values, lying in the architecture of central Iran and also the Persian Gulf architecture, as the physical formation of the fundamental values of Iranian-Islamic culture, with the IEPs of utilization and preservation and also the different logics related to the natural image of sustainability, it can be concluded that this architecture has in itself the values and the characters mentioned in IEPs and the natural image of sustainability and that these two bases, are inter-connected¹⁹. The diagram indicates that there is potential for developing neo-vernacular architecture in the region.

The Concept of Neo-Vernacular architecture

The word *vernacular*, as a word relating to language knowledge has entered to the literature of architecture for a few decades now. Many efforts have been taken to define the expression vernacular architecture, but no clear result has yet been gained. In general, it refers to a wide range of architectures such as indigenous, folk, peasant or traditional ways of building²⁰. Vernacular architecture, comprising shelters and other types of buildings of the people, are usually constructed by the society in relation to environmental contexts and available resources, and by using traditional technologies.

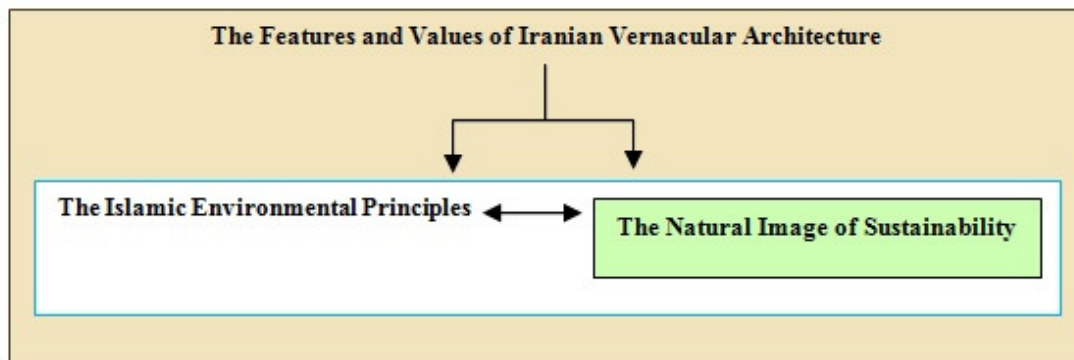


Figure-1
 The Diagram Showing the Relation of Iranian Vernacular Architecture with the IEPs and the Natural Image of Sustainability

All forms of vernacular architecture are built to meet specific needs and embody values, economies, life styles and cultures that shape them. These architectures may adapt and develop throughout time by change in needs and the environmental conditions⁵. In another description, vernacular architecture means the complex of architectural and urban units which have been clustered together in a specific place and are harmonious in contexts such as shape, form, function, color and also in material and construction aspects. This harmony has features that might be referred to such as harmony on the basis of difference, distinguishability based on rules, etiquettes and tastes of the environmental culture, uniqueness created by mutual respect and having environmental behavior on the basis of provided freedom from non-written but living contracts²¹. Christopher Alexander describes the process as "a process in which architecture and the city are shaped instinctively by human beings, animals, plants and whatever else there is in the environment"²².

Vernacular architecture is always considered restricted by the undeveloped technology. At the age of agricultural civilization, the natural environment and the instruments limited the appearance of all architecture and this condition lead to the primary disadvantage of vernacular architecture, the limited technology. Nevertheless, the circumstance has changed. We have varied means of communion among different. But if there is vernacular spirit, it doesn't mean "undeveloped". Perhaps Vernacular Spirit contains the attitude towards technology; in the countryside, mountain valley or any other natural environment where high modern technology can't easily be used, architects may select feasible building means befitting the circumstance. The authors believe that in adaptation to the present or future time, vernacular architecture, with all its nature-friendly aspects and all its environmental features and societal benefits, might merge with new green-material technologies to produce alternative construction technologies, creating namely *neo-vernacular* building technologies; That may be done by upgrading the updatable features of vernacular building technologies that can be taken from what mentioned before. This viewpoint, in accordance with eco-aesthetic principles, reinforces accordance with nature and natural systems; in this case, neither does the building dominate its natural setting; rather it expresses *humility* in the face of nature, and an impression of shelter (of a kind) is provided, but it is constructed of local materials with minimal impact on its environment and will decay back into the same environment. We are prepared to do so for the benefits to us of 'living close to nature' and the benefits to nature of continuing to live undisturbed.

Some of the principles of creating neo-vernacular architecture might be listed as in the table-3.

Qeshm Island as the Case Study Site for Design

In order to create architecture in harmony with and integrated to natural environment in a specific geographical context, it is needed that the geo-natural features of the region be

investigated precisely to make possible proper architectural design and programming. For this purpose, we have holistically studied Qeshm Island in order to decide properly for the construction technology. The study covers the geo-natural, cultural and architectural characteristics; besides that, the handicrafts in the region, as a potential for creating neo-vernacular architecture, have been studied.

Table-3

The Principles of Creating Neo-vernacular Architecture

| Principles in Design and Construction Scale |
|--|
| Least change in natural resources to keep the natural face of the earth |
| Proper exploitation of the resources near to the site |
| Creating visual harmony between architecture and the natural context |
| Participation of local people in construction process and construction dynamism |
| Blending traditional methods of construction with modern ones by a new technological viewpoint |
| The use of mixed technologies to introduce and develop new technologies |
| Relative development of planting building-related trees suitable in the specific climatic conditions |

The Geo-Natural Features and Resources of Qeshm Island:

Geologically, the main constituents of the land are coral, lime gravel and gravel. The island is environmentally divided into three main areas; the central land, the shores and the sea ecosystems. The most ecologically sensitive of these regions is the linear shores around the island²³. The shores are varied in different parts of the island; there are mainly three kinds of shores; coral-cliff, graveled and muddy shores. The variety of the shores provides great tourist potential while the natural materials in any of them prescribe different natural building technologies. Most of the natural resources in the northern part of the island are earth and rock. In the southern shores, coral rocks dominate. The main plant texture in the island is the Avicenna Marina for a 2000 square kilometer area. Most of the plants are suitable to dry conditions needing much humidity in summer. Palm trees may grow in 300 meters heights from sea level but will grow much better in shores in sea level. Due to this and proper climatic conditions, in the long shores of the island, where land allows, there is the potential for growing palm which can be used as a building material in different ways. Because of proper climatic conditions, reeds, as minor building materials, may also be grown in the island and be used for different purposes.

The architectural features and architecture-related handicrafts:

In architectural scale, we may refer to *Badgirs*[wind catchers], domes, minarets, etc. The form of the settlements may follow natural topography in their form having *Badgirs* as vertical distinctive elements such as those in *Laft Village* port. The main color of the outer facades' finishing is

white. The dominant materials are coral rocks, gypsum-earth mortar, with wooden beams covered by matting with the outer mud-straw finishing on the roof. The materials used to construct *Badgirs* are adobe, mud bricks, earth, gypsum and wood²⁴. These compositions of materials are found in most of the vernacular architectural heritage. In some of the buildings, the construction materials have been transmitted from overseas. In this paper, we have chosen an attitude to use local materials in different structural scales. In Qeshm Island, numerous handcrafts can be found; these handcrafts might be regarded as a potential that may contribute to developing neo-vernacular technologies. Matting, mat basket making, dhow model making, wooden crafts, and crafts like these might be considered architecture related crafts.

Architectural Design Approach

In this section of the paper, site selection considerations, the proposed construction technology and finally the architectural design documents are introduced.

Site Selection and Analysis: The location of the tourist complex has been the result of many considerations in different scales; in the largest scale, the tourist potential of the Island itself which has been previously mentioned within Qeshm tourism-related footnotes. In the scale of the island which is by itself a great natural museum, it has been located within a proper distance from the main harbor and the main city and beside one of the greatest tourist attractions of the island to let the tourists glance experience the nature on their routes from the city to the village. The proper distance from Avicenna Marina water jungle as a distinctive and famous natural-tourism attraction and from

the village to *provide* and *prepare* enough human resources for the construction process is another important factor that has been considered.

Construction Technology Proposed (For the Northern Sub-Region of the Island): On the basis of the information given in the previous section, as the selected site is situated in the northern muddy shore, where earth, to a great extent, and rock, to some extent, dominate, the authors propose a mixed natural structure for the village, including: i. The use of the rock context for foundation purpose and the cut rocks in landscape construction, ii. The use of rammed-earth system for the main structure (regarding the northern shore resources). iii. The system of wattle and daub for interior partitions. iv. The use of preserved palm wood and matting for the roof structure.

Some of the advantages of this system of construction may be listed as: decreasing materials with high reserved-energy, decreasing construction wastes, optimum energy consumption during use and building's long life²⁵. Regarding the capabilities of the system to be mechanized, it seems suitable in the present time for a great portion of rural residences.

Architectural Design: The architectural design of the village contains residential houses as hotels and a main open square in front for the visitors to experience mud structures. The appearance of the buildings and the spatial and physical elements typical of the region are easily detectable. There is also a larger-scale building (in rammed-earth structure) that may be used as an exhibition or a commercial space. The buildings are at most in two stories. The following are the architectural design documents related to the village:



Figure-1
Air views of the selected site in Qeshm Island

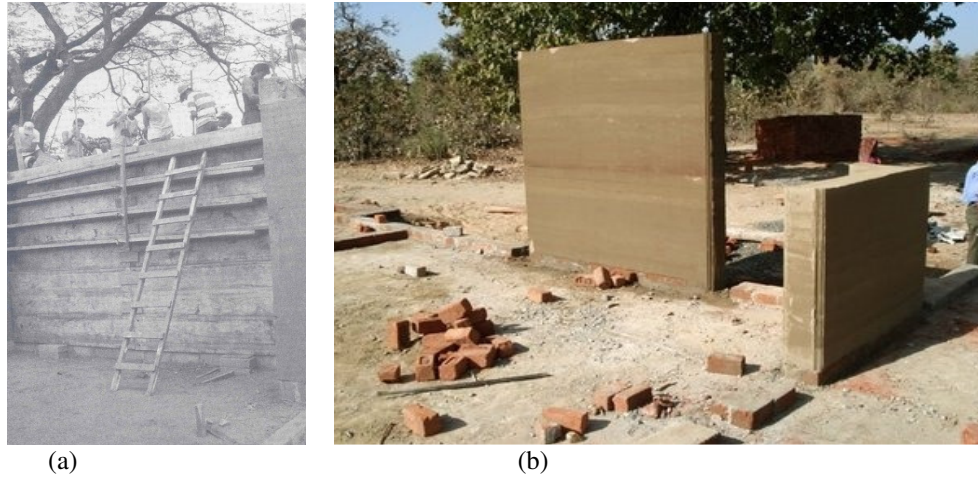


Figure-2
(a): Constructing a Rammed Earth Wall (b): Walls after Removing Forms

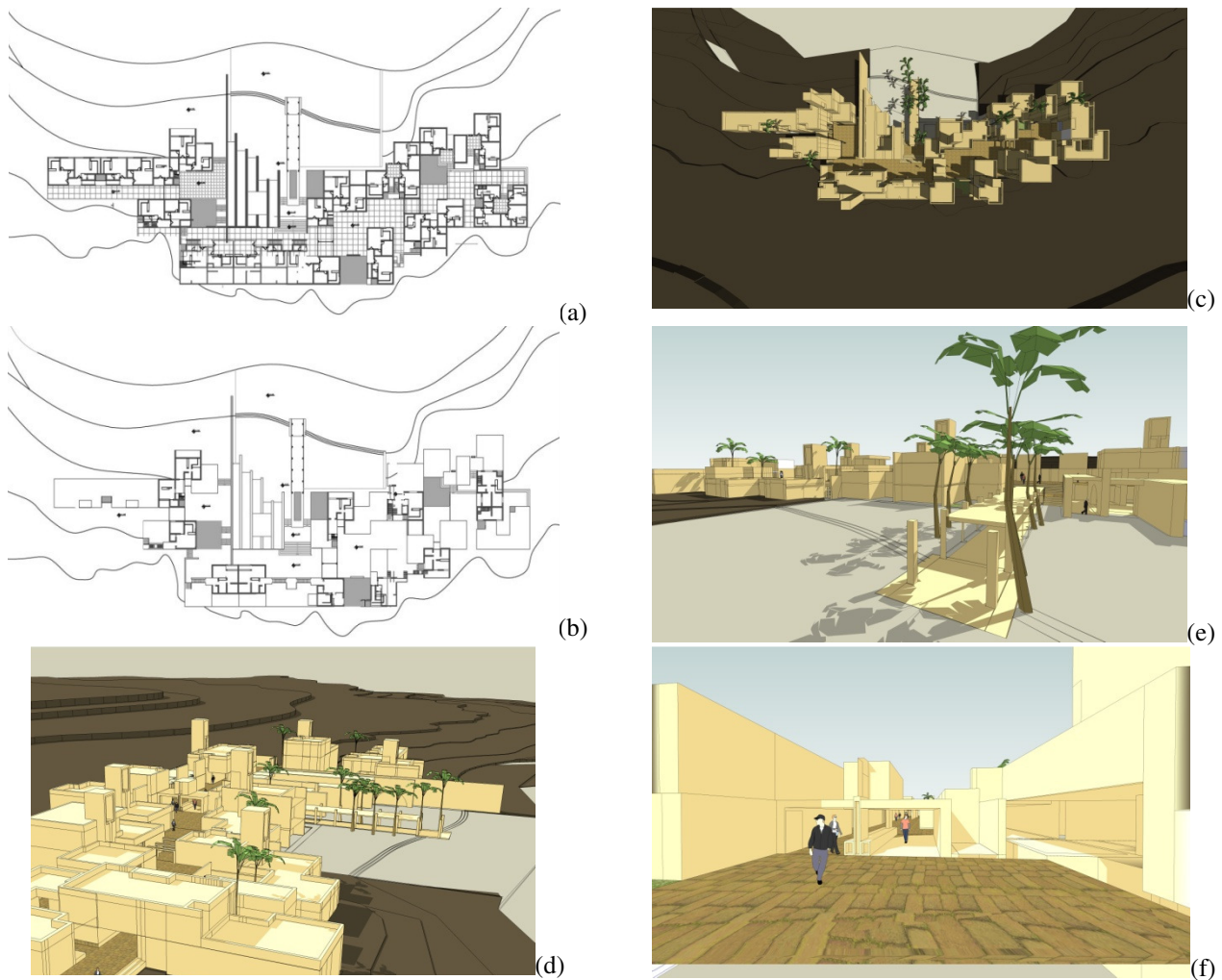


Figure-3
Architectural Design (a): Ground Floor Plan, (b): 1st Floor Plan, (c): Top view, (d): bird view perspective, (e): Perspective, (f): perspective of inside the village

Conclusion

The relation of man and nature through architecture should be revised for the sake of both human beings and nature. One way to make a proper relation is to go back to vernacular traditions and find ways to update those traditions of construction, especially in suburbs or rural areas. Authors propose a kind of architecture, namely neo-vernacular architecture in which some of the features of vernacular building technology are updated, or mixed with other new green technologies to introduce alternative building construction. By using neo-vernacular building technologies, the integrative relation of natural and built environments will be achieved; regarding this, in this paper, a model for residential developments in which societal, physical and possibly economical sustainability lie, was introduced. This model project also has instructive goals for the visitors and is also considered as a publicity drive.

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