

Auxiliary towns with a stable architectural approach

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Abstract: The purpose of this study is to introduce a technological and intelligent architecture called auxiliary town in which three important principles (eco-technology, green architecture, and stable development) have been as main basis for design, calculation, and implementation. According to consideration of other stable architectural principles (perception of place sense, existence space and without disturbing in it, use of natural energies such as solar and wind energy, applying native durable recyclable materials, collecting and use of water specially rain, thermal and acoustic insulation, proper isolation of the building, natural conditioning ability by the favor of ceiling, and correct sky lighting), this town can be introduced as a successful sample of stable architecture in our country. Its simple executable details with ability of easy implementation, high speed in implementing the building, anti-earthquake, waterproofing, soundproofing, heat resistant, anti-striking, high bending strength, high tensile strength, eliminating various types of mortars and irons, manufacturing ability, 100 percent of recycling ability, without construction waste, without polluting the environment, anti-flammable ability, plain external and internal surfaces so that it can be easily wallpapered or can be coated with a dye, and the most important of them, its consistency with all weather conditions available in our country, and optimization of energy consumption are some other benefits. In addition to application of various types of it in construction industry as vertical internal and external walls, it is applied as floor, false ceiling, and final ceiling without using truss and consistent with the culture and native architectural tradition of every region.

[Hassan Dushamil, Professor Hossein Baher. **Auxiliary towns with a stable architectural approach.** *Rep Opinion* 2015;7(4):90-95]. (ISSN: 1553-9873). <http://www.sciencepub.net/report>. 12

Keywords: Materials, Vertical wall, Polymer, New, Compatible, With all, Regions, Building, Auxiliary

Introduction

Construction techniques are an attempt for providing integrated quality from economical, social, and environmental aspects. Rational use of natural resources and proper management of construction helps conservation of restricted natural resources and decreasing energy consumption (energy conservation) and causes environmental quality improvement. The quality is the fundamental of stable designing. Desirable quality is not provided without considering nature. Achieving high quality standards, security and welfare that really provides human health are of the most important purposes of stable architecture. Achieving such conditions is possible using efficient management and applying last technologies. In this basis, the principles that must be used in this architecture are as follows:

- Perception of the place sense, existence space, and without disturbing in it
- Use of natural energies such as solar and wind energies
- Applying native materials that are recyclable and durable
- Collecting and use of water specially rain
- Thermal and acoustic insulation and suitable isolation of the building
- Natural conditioning ability by means of the ceiling

- Correct sky lighting and true designing of the openings.

Based on these studies and researches, more attempts have been done for designing and implementing of the buildings in form of a residential town with stable architectural approach. Since these places are completely intelligent and have frequent mounting and collecting, we can use them in critical conditions specially passive defense and inasmuch as the design of the buildings of this town and the other urban elements are so that mounting and rapid and easy collecting them are possible, the word "auxiliary" has been added to it.

Research background

Stable architecture that is really a subset of stable designing maybe can be considered as one of important contemporary issues. It is considered as a logical reaction against issues and problems of industry era. For example, 50 percent of fuel reserves are consumed in buildings that in turn results in environmental crises and this trend will be continued. Therefore, necessity of creating and more developing stability in architecture is greatly observed.

At first, in order to familiarizing with stable architecture, the most important titles are listed as bellow:

- Echo-technology architecture
- Green architecture

- Stable architecture

Stable architecture such as the other architecture issues has its own particular principles and rules and includes these three stages:

- Saving resources
- Designing for returning to life cycle
- Designing for human

From one hand, Economy of resources aims to properly utilize resources and nonrenewable energies such as fossil fuels and in the other hand, pay serious attention to control and better applying natural resources as renewable resources. For instance, the energy originated from sun light is one of the immortalized resources that are today used by means of photovoltaic technology for providing water and electricity in buildings. Three strategies including energy conservation, water conservation, and administration of the buildings can be considered for controlling resources. The principle of life cycle design is the second principle of stable architecture and is based on this thought or theory that materials are converted from one usable form to the other form without damaging their usefulness.

In the other hand, considering this principle one of the designer duties is preventing environmental pollution.

This theory investigates the building in three stages in order to achieve this purpose. These stages are as follows:

Pre-construction stage, constructing stage, and after the construction stage

It must be noted that these stages are related to each other and there is not a certain boundary among them. For example, we can use recyclable materials in after the construction stage as initial materials for the other constructing stage.

Humane design

Humane design is the last and maybe the most important principle of stable architecture. This principle is rooted in the needs that are necessary for conservation and preservation of chain elements of ecosystem that in turn guarantee human survival. This principle has three strategies for preservation of natural resources, urban designing-site designing, and human welfare which their focus is on the enhancement of coexistence between the building and its outside environment and between the building and people that use them. In fact, it can be said that for achieving stable architecture, the designer must moderate these stages and principles in his/her own design that are introducer of a main framework for stable design.



A sample of polymeric panel composite used in auxiliary town

The aims of stable architecture

The aims of stable architecture are caring about human life, conservation and preservation of it in the present and future, applying materials that are compatible and stable with their environment whether in producing time or in destroying, minimum usage of fuel energies, maximum usage of natural energies, minimum environment destroy, physical and mental improvement of human life and all live organisms, and consistency with natural environment. The purpose of the design of these buildings is decrease of damages of environment, energy resources and the nature and includes of rules bellow:

- Decrease of consumption of nonrenewable resources
- Natural environment development
- Elimination or decrease of poisonous materials or damaging the nature in construction industry (Reference: Wikipedia, stable architecture, Azar 2014)

Analyzing elements and construction details in auxiliary towns

1- The most important materials that has been used in the buildings of auxiliary town is polymeric panel composite that is made from poly propylene, poly styrene, synthetic fibers of glass and resin. As well as these materials are properly consistent with the environment, they are easily recyclable and

convertible to new panels in the company and therefore they have not only environmental pollution after their expiring date but also they can be sold as initial materials.

This type of composite panel in different thicknesses has been used in external walls, internal separators, and in final ceiling. This type of composite panel is a good insulation against heat, coldness, humidity, and sound. It has not freezing and fragility ability; it is washable and shows a good strength against tensile and bending stresses. Despite of its low weight, it has been resistant against winds with a velocity of 300 km/h in wind tunnel in comparison with similar types. No mortar and cement are required. However, if its applicability is changed from auxiliary state to permanent state the ability of use of this type of mortars and the other construction mortars, even mounting stone and tiles, putting, painting, and the other types of decorations are easily possible. It has no collapse and construction waste.

2- The materials used in floor foundations, columns, and horizontal masts are completely cold rolled sheets that have an ability to return to the producing cycle. Following pictures show insertion of foundation built from galvanized cold rolled sheets and also covering them by composite panels.





Also, the connection way of horizontal masts to floor and their connection to final ceiling are shown in following pictures.







Solar cells are applied on the roof of these houses after sealing and placing preventive layer. The openings are thoroughly designed based on stable architecture principles. Services and kitchen cabinets have been also designed in form of a package that is place before work completion. Installation systems are completely embedded in ducts. System of connections is mainly designed in male and female forms in order to accelerate mounting and dismounting them in minimum possible time.

Investigating the climate regions of Iran

The experiences show that Iran has eight different climate regions and five architectural areas including:

- Temperate and humid architectural area
- Cold and very cold architectural area
- Humid and very warm architectural area
- Dry and warm architectural area
- Very warm and semi-humid architectural area

Naturally, construction materials used in these areas must completely impermeable against temperature, humidity, water, wind and dust, snow and ice, and the other atmosphere factors. Based on conducted experiments this composite panel is consistent with all climate regions in our country.

Conclusion

According to stated descriptions these towns are one of options that are listed in stable architecture from view points of structure, time, saving in energy consumption, final price, and also again return to manufacture cycle, not polluting environment, simplicity in designing (humane design), creating standard spaces proper for inside, use of solar energy by applying solar cells for light and providing warm water purposes, and decreasing damages.

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