



Research paper

Investigation of the Endurable Expressway Landscape's Eco-Controlling System

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ABSTRACT

Through rapid urbanizing and quick economically globalizing, the expressway, which is one of the significant highway networks parts, is formed at an incredible rate that obtained growingly intense ecologic environment concerns though contribution significantly for humans. Thus, promoting economically improvement and at the same time controlling the negative expressway effect is essential. It must be an enduring expressway landscape. In this study, the features and the encountered differences of an enduring expressway landscape are investigated. The eco-control system in the enduring expressway landscape has been formed containing the theory and technology control system, adopting ecology, designing, cybernetics, landscape, and related expressway thesis for all guide approaches to the controlling procedure. This can be a combination of engineering technology, processes, and warranty of an enduring expressway landscape. The controlling technology contains 3 layers such as master controlling from 2 sides of designing and key nodes, subsection controlling specifically for the expressway feature of inner and outer factors, and management controlling cross the all living procedure cycle of the expressway. The enduring expressway landscape's eco-control system could be executed on 3 scales such as macro designing controlling, meso-design controlling and micro-engineering and technical controlling.



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Introduction

Expressway: currently, humans are destroying nature (Byoung 2011). A significant ecologic problems portion is associated with transportation. The transportation impact on nature concerns especially harmful substances penetration in the formation of solids, gases, and fluids to the hydrosphere, atmosphere, and lithosphere generating noise, energy, and vibration. The highway impact is so complex and various. With constant economically development, Chinese fast traffic networks, mostly being comprised of expressways, are growing at a rapid rate. Environmentally issues generated by expressway become a focus. The growth of the expressway caused 2 outcomes such as erecting huge economic benefits by society, the space-time idea having varied people and their lifestyles, and the growth has furthermore caused heavily environmental issues (Schultz & Zelezny 1999).

Endurable landscapes: Endurable growth, as determined by reports of the United Nations World Commission, is the growth that satisfies the present requirements by not compromise the future generations' ability for meeting their requirements. Natural systems are functioning successfully for millions of years. Nothing created by humans could perform that. Endurable landscapes are involved in the designing of the outer area. The designing domain of the outer area can vary from large bush block revegetation to the exact designing of small courtyard areas discreetly connected to an enduring house. The vegetation's vastness and its kind can apparently be significant while enduring landscape designing could do numerous items such as supplying empirical solutions for decreasing water usage via water-sensitive designing and as part of a wastewater treatment system. Endurable landscape designing is a method of design and creating the synthetic landscapes that cover our structures. These

landscapes must sustain themselves and stay by being a portion of the natural cycles of the local environment. In some circumstances, this represents discovering what the original local environment was like, that is usually hard. An enduring landscape represents put back considerable of what was in location before growth. Furthermore, represent presenting things that weren't there earlier.

The significant item around enduring landscapes is that they could handle aesthetics and amenity, water management, passive designing, air quality, climate variation, biodiversity habitat creation and local food production at the same time. An enduring landscape could succeed by minimum labor inputs, water, pesticides, and fertilizer. Constructing an enduring landscape represents operating toward a considerate balance among utilized sources and gained outcomes. By regarding in environmental considerations, you could construct an agreeable area, which is portion of an environmental solution rather than an environmental issue (Ding & Lu 2010). Constructing Expressway is a procedure normally more than 3 years, when the constructing landscape is almost a year to one and a half year that would play an essential role for restoring the ruined environment according to the expressway construction (Ding & Lu 2010). Thus, the expressway landscape could reduce the effect on the environment, rescue the post preservation prices and decrease the main workload. Enduring landscape designing is the efficient way for resolving the paradox between human and land sources in the landscape architecture subject, and ecological controlling technology is the warranty of enduring landscape designing (Lei-Chang et al. 2010).

Eco-control: Endurable ecological landscape system is presented for an ecological environment problems series generated during the all procedure of expressway construction. Eco-control is an idea for adapting the enduring growth in world containing whole industries, particularly the landscape architecture that refer to expansive domains of human, engineering, aesthetics, ecology, and vegetation. Nevertheless, the search on it has just begun. landscape designing's eco-thinking model was established by Huang Leichang in the Tong Niu-ling's case study, he considers that the landscape designing's eco-thinking model contains of eco-thinking in the visual designing giving sensorial pleasure, the environment protection and growth with the minimum harm, the site culture, and the eco-thinking in designing procedure of public contribution (Lei-Chang et al. 2010).

The enduring expressway landscape features

Inner features expressway: it is mostly consist of road pavement, more than 2 traffic lanes, center green belt that splits the road to the negative and positive road. In addition regarding the green driving visual and opposite light reflection, road shoulder covering the expressway from the raining and maintaining routine work, amenities containing light, rescue, system of guidance, connected services. Also whole the previous thing that have been performed for the traffic flow, the major section, and whole the inner landscape designing should have been accomplished by considering the local culture (Fig. 1).

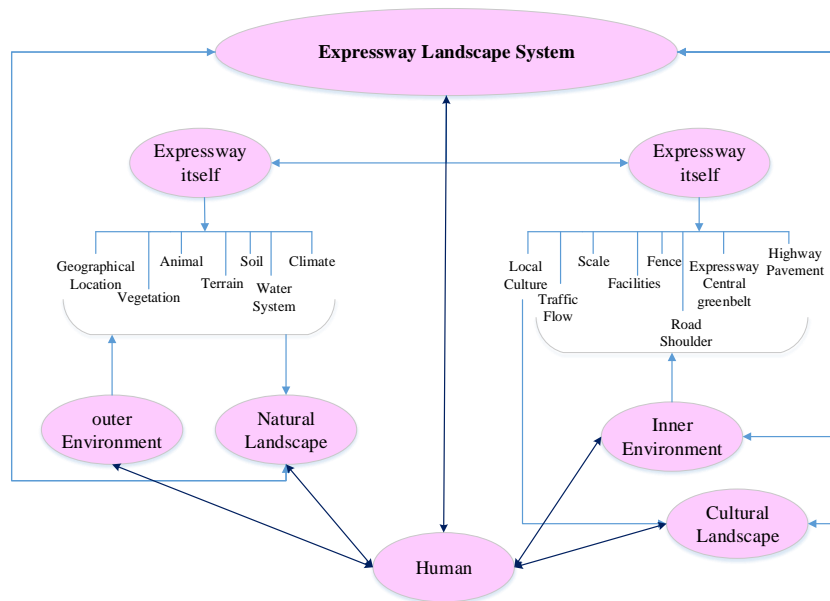


Fig. 1. The expressway landscape eco-system composition

Outer features environment: Ecosystem is the fundamental system, containing the organism-

complicated and the entire complicated of physical characteristics comprising what we name the

environment (Henry David Thoreau 2008). expressway's outer features considering its environment: the geographical zone is the region crosses that determines the scope it could impact, the environment tension; the natural features are essential, that presents the nature like the animal, vegetation, water, soil, forest, every is a single ecosystem. The provincial or the local climate possess near connection by other environment factors (Fig. 1).

Eco-control system construction of Endurable expressway landscape

The eco-control system construction

The endurable expressway landscape's eco-control system has consisted of the eco-control system approach and technologic theory. selecting ecology, designing, landscape, cybernetics, and connected

expressway approach for all novel theories guiding the controlling procedure, where the after is a combination of the engineering technologies series, the techniques, and warranty of an endurable expressway landscape. The technology controlling in 3 layers contains main controlling from 2 sides of designing and key nodes, sub-section controlling especially for the precise expressway feature of inner and outer factors, managing controlling cross the all live procedure cycle of the expressway. In addition, the eco-controlling system of the endurable expressway landscape can be executed from 3 scales such as macroscopic-designing controlling, Meso-design controlling and micro-engineering and technical controlling (Fig. 2).

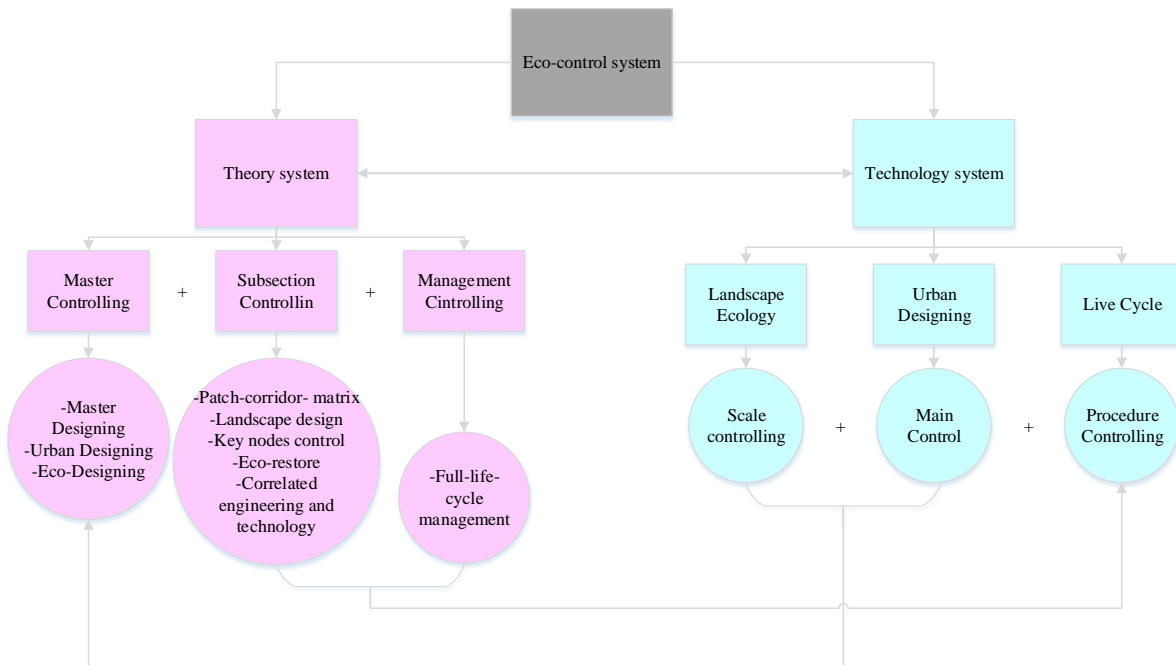


Fig.2. the eco-controlling system of endurable Expressway Landscape

The Eco-control System Approach

The eco-controlling system approach specifically contains connected issues such as ecological approaches like the patch-corridor-matrix approach, construction theory and function approach, landscape optimization, and landscape heterogeneity, which all came from ecology. the corresponding approach of cybernetics is especially key for the eco-controlling system and the “full-life-cycle” approach could consider the entire procedure which nears an entire circle, the urban designing and landscape designing approach could be acceptable for the main controlling that is essential. Just every approach integrated with the expressway concrete condition will play an essential role in an endurable expressway landscape.

The Eco-Controlling Systems Technology

The eco-controlling system's technology especially consists of 2 sections: main controlling and subsection controlling. The previous options can be chosen as an appropriate expressway area and key nodes that affect the environment laboriously. The full-life-cycle managing is selected in the main controlling for its all life procedure. The after can be controlled by responding engineering to the expressway inner and outer environment features.

Eco-Controlling System Is an Improved One

Since the endurable, by the technological improvement, the main issues can be solved smoothly and the new issues can require to be handled for the equilibrium between the expressway and the environment, presenting an endurable expressway landscape. The corresponding approach and technology system could be updated.

The Main Controlling, Eco-Engineering Keeping Up By It

Ecologic designing has been described as any state of designing, which minimize environmental damaging effects by combining live procedures (Van der Ryn & Cowan 1996). Ecologic engineering is the designing of durable systems that combine human society with its natural environment for both advantages (Mitsch 1996). It identifies the association of organisms with the environment and the limitations on designing set by the complicatedness, variation, and unreliability intrinsic to the natural system. Prosperous ecologic engineering will need designing methods compatible by ecologic guides (Scott et al. 2001). By considering the eco-control system, the main controlling should be first; all the eco-engineering can serve this purpose. Since a considerable level of the society transformation and reform has been generated by environmental decay, ecologic methods in environment designing have attracted concentration from experts as various world perspectives and as a functional designing method. Especially in landscape architecture, ecologic comprehension has been at the profession's core since its emergence. In addition plays a crucial role in the decision-making procedures. When ecology can support the work with an accurate cause, aesthetics play a main part in supplying different comprehensions regarding the aesthetic experience of people that is rather subjective. Nevertheless, the methods for seeking harmony between them are even contentious (Byoung 2011).

Cost Controlling

Cost-benefit is one of the rules in the durable landscape. In an durable landscape designing, the cost-effectiveness consideration is influenced by the procedures, plants, and tough goods utilized in the execution of that landscape, and with each quality.

A plain low-cost landscape must be as durable as a comprehensive high-cost landscape. In most cases, the installation cost of an durable landscape can be lesser.

Conflict of interest

The authors declare that they have no conflict of interest.

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