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The Study on Complex Planting Modes of Urban and Architecture

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ABSTRACT An ideal urban planting mode of contemporary cities is discussed, and the urban complex planting modes are compared and analyzed. Based on architect Emilio Ambasz's "overlay" theory, a multi-cell and three-dimensional complex planting mode closely combined with architectural space is presented. Aiming at the current shortcoming of paying attention only to local advantage and ignoring the whole benefit of urban planting, it is suggested to integrate the urban planting system with the architectural system, so as to emphasize the maximization of the integrative using efficiency of urban space.

KEYWORDS
Integrative using efficiency
Urban space
Complex planting
Holistic

1. Urban greening status complex analysis

The city is an organism from polyhydric subsystems, the formation and development of both each subsystem follows its own laws, and maintain coordination with other subsystems interact together to maintain the sustainable development of cities. Past the city were occupied city of the subsystem dimensional combination of land not only a waste of limited urban land resources, but also due to the lack of an overall orderly between the subsystems, which led to fragmentation of urban functions. Emphasize this shift in the two-dimensional combination of urban planning and architectural design concepts, in Urban spatial coordinates in three-dimensional reconstruction of urban functions can be efficiently digested contradiction between the various functions, and effective use of the limited space of urban resources, to achieve sustainable urban development. urban greening system as an important part of the urban ecosystem, interactive features and will also form the composite although urban greening and cities, buildings and cities, buildings take place, as much as possible combination of architectural space, three-dimensional composite construction of urban green space system, in order to create a good living environment. In form and function in various forms, colorful, but its distribution in space can be divided into the following four kinds of forms.

1.1. Greening and building complex at the top of the building

Since the roof garden produce it along with the technology, material progress and constantly improve their way of design and construction, currently in United States and Europe has become a more mature way of urban greening through green roofs, can effectively reduce the radiant heat of the roof, reduce the air conditioning load of the building, and no green roof compared to the summer, when the temperature 30 °c, no greening ground can reach 40 ~ 50 °c, and green grass roof at 10 cm.

The temperature was a comfortable 20 °c. Second, since the temperature regulation of green plants, can make building roofs each structural layer to avoid expansion and contraction due to temperature fluctuations caused by the transition, thereby reducing the building cracks, leading to infiltration of rainwater, the possibility of leakage of form, extending its life. More importantly, the green roof can improve the ecological effects of the small environment. green roof can help filter the air of dust and smoke, potassium nitrate particles and other harmful ingredients, and can absorb the atmosphere and rainfall harmful substances; reduce noise at least 3 dB, and can promote the enhancement of 8 dB noise effect is due to the positive effects of these green roof, and use this to promote our composite city in urban construction. Greening.

This composite green roof garden on the function mode

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is undoubtedly a success, from an ecological point of view, there are certain positive significance, but because of its inherent limitations green roof and roof garden contradiction in construction, management, making it cannot fully play its due role. First, because the existing green roof, for economic considerations, general roof of shallow overburden on the type of cultivated plants have a certain selectivity, so that the city, the micro-environment Biodiversity system under the not be guaranteed, and because of the lack of necessary continuous, once pest disasters or natural disaster roof garden between the biological environment of the biological environment and natural state, will lead to lower their self-healing capabilities or loss, and destruction. Secondly, due to the construction and management of the property, for the crowd roof garden is limited to a particular level rather than have the wide range of social fairness, which provide the public space cannot be incorporated into the urban public space system, Although the use of green roofs on the ground can be compensated, but not change the fragmented due to the intrusion of the building caused by the urban public space system, alienation, making the urban space broken into units of mechanical tissue cities, the lack of systematic contact again, roof often due to functional, transportation, etc., cannot achieve the maximum roof garden cannot be idealized in quantity. Also, since the establishment of well-grown roof ecosystems need thicker overburden depth, which requires a great economic input. The data show that the ideal conditions for vegetation growth casing 3m, this must increase investment in construction, roofing, build drainage, etc., but only one reached the green cost 300 yuan per square meter. It is for The root cause of the economy, resulting in green roof construction of low quality, poor management of the drawbacks, roof garden is occupied by a variety of other functions examples are not uncommon [1].

1.2. Greening and Architecture in the composite construction of the ground floor

This complex form of green vegetation favorable growing conditions, taking into account the requirements of urban space intensive development, which is widely used in various city squares, green spaces and other open space. This model is the future of urban landscape ecological construction and energy saving Type the city's development goals consistent build harmony between man and nature in the public space on the ground system, the ground below a hierarchical construction of urban public facilities and a variety of functional facilities to achieve comprehensive utilization of space and three-dimensional. However, at the same time maximize the green coverage reached its use of urban space in the basement under the current technical and economic conditions cannot do the maximum use of space. Although the Japanese have begun to depth of 100 m below ground level space has been planning studies, but cannot represent the reality in the context of the purpose of the effective integration of space urban underground space in use on two aspects different from the usual floor building. First, underground construction feature allows underground construction is not in the usual technology and economic background should provide architectural quality. Human sensory experience is the most important factor in judging the built environment, in the underground environment, people long period of artificial lighting, mechanical ventilation, temperature and humidity of the environment is not conducive to physical and psychological health.

On the other hand, due to the lighting, ventilation and other objective conditions, give full play to the function of the building is also a disadvantage. Many features must be carried out by means of a mechanical device, so invisible in the increase of the building using the economic input. Secondly, the underground construction for the building type has a certain selectivity. Although underground construction at home and abroad for a series of studies showed that underground construction can accommodate all types of residential, commercial, office and industrial, but the building of comfort and effective use sex, most building types try confined to small-scale test status of individuals rather than have broad utility in the city of more common or a combination of public transport system, especially rail transport commercial retail, parking and other facilities. In addition, the underground construction economy is also an important issue. For example according to the cost of the statistical Japan 1976 to 1980 built 11 underground commercial street, which cost three to four times the size of the ground building the same building Combining runs underground construction equipment and use of inputs, economic issues for our country is still the key factors that hinder the development of underground construction.

1.3. Composite vertical greening and building construction

This complex pattern of green plants as a building envelope materials, building facades styling elements, or micro-climate regulation epidermis composite green way this vertical urban greening perspective covering at least, while the largest relative one of the other less complex manner. According to the study showed that 4 to 5 layers of the building, which covers an area ratio of 1:2 and the vertical, with the increase of the floor, the ratio increase, as long as building facade renovation appropriate use, you can greatly increase the green indicator of the city. Because of this, the composite green vertical plane can better improve the ecological environment, can increase air humidity, reducing the dust floating debris, improve urban microclimate environment. Meanwhile, this green mode Help to improve the thermal performance of buildings, reduce energy consumption of buildings. In the summer, the walls covered with green plants than those without green-covered wall surface temperature lower 10 °c, the indoor

temperature is low 7 °C.

Greening element Composite and architecture is also reflected in its design elements as a new penetration into the facade of the building process. balcony, windowsill, pick the scaffolding outside the building can be accessed through the cultivation of green plants and change the old buildings There face, showing organic and full of vitality unique personality. Advantages of composite building vertical greening lot, its disadvantages should not be ignored. First, the kind of growing plants with strong selectivity main green walls use some climbing plants, depending on the surface and the sun can be divided into the shady side of the composite construction of hi-positive and negative-resistant vines, plants that require a higher growth environment, lack of diversity on the species. Secondly, a large area of green building vertical building insulation in increased performance, but also provide the conditions for the breeding of some insects in the summer in temperate and subtropical regions, such cases are more prominent, increase mosquito will affect the quality of people's lives Finally, the surface of which are attached to the building higher, such as the use of exterior paint, exterior paint can with aging and loss, but also the end of their life cycle, and this cycle is based on the longevity of the paint, Currently exterior paint commonly used service life of only 10 years, which means that the use of the effectiveness of climbing plants is much lower than the general shrubs and trees for the use of more to aluminum plates and glass walls for the building facade envelope material, smooth surface on the one hand cannot provide good fixation, making it easy to fall off, on the other hand, these materials have a heat reflective more, at higher temperatures, plants cannot grow normally and even burned to death.

1.4. Greening and complex internal architecture in building space

This composite green form in the interior space of the building reflects the green as a design language and combine design elements with the physical space of the building, in the rich interior landscape, increase the space interesting, affinity coordination of human and architecture play an important role in its performance mainly in the form of green atrium and the side tribunal. The earliest examples of modern atrium greening of 1851 Paxton designed the Crystal Palace in London, while the plant as a principle incorporated into the design of the atrium is the American architect John Portman. In Portman shaped atrium space, the plant is one of the elements of the most viable, it can form a space, dividing the space, create a small quiet environment confused atmosphere, while by greenery in the light of investment type, the mottled shadows across the building, so that the dispersion in the architectural space, the shape of natural features poetic, and by contrast with the building component geometry, with its free-spirited attitude people feel the quality of the human side of space. More importantly, photosynthesis of green plants to provide air space within the building cleaning, temperature regulation to achieve a balance ecological sense. This building environment microclimate regulation, can be at the level of the economy and relatively low-tech solve building maintenance and sustainable use. However, people enjoy green plants bring the visual and psychological pleasure at the same time, and without taking into account the building to provide the necessary environment for plant growth and physical condition. On physiological characteristics of the plant in terms of its growth must meet certain temperature, air and light. plant photosynthesis and respiration is the opposite of a continuous process on the two natures, is in the light conditions and the dark conditions, the conversion of the different periods of continuous, therefore, indoor environment of continuous artificial lighting for growing plants at a disadvantage. Second, the growth of different plants have different growth characteristics. For example, tropical perennial plants need a stable environment to maintain a certain temperature, ambient temperature and subtropical plants need with the seasons cyclical changes in order to adapt to the change of its physiological cycle changes. Under natural conditions, plants exposed to natural circulation of air, the ratio of various gases in the air, humidity and air flow rate for the growth of plants, especially leaves Health is crucial, and the thermostat inside the atrium and humidity conditions for the growth of certain plants is clearly negative.

More than four kinds of complex patterns in the integration of greening and urban greening, construction of which feature only one aspect of the pursuit, which inevitably has this or that contradiction. And because of this complex is built in the city greening local space on the local level and space is difficult to form a continuation of the overall urban greening system, and improve and benefit the urban ecosystem into full play is its comprehensive, complete and systematic construction as a precondition. Therefore the need for a more comprehensive and integrated urban greening complex concept, this concept is based on the pursuit of urban space efficiency, emphasizing building and greening of urban green space, quality improvement at the same time, emphasis on the integration of architecture and urban functions; emphasis on urban "green quality" (natural ecological factors) and "gray" (artificial material elements) maximize the overall efficiency of the pursuit of the urban economy, ecology, function and other aspects of heterogeneous coexistence pursuit.

2. Overall comprehensive type of urban greening composite mode

2.1. Inspiration Emilia Abad Mu Bazi "coverage" Theory

Aimiliao Eminem Baz (Emilio Ambasz) for the common people "green quality" siege "gray" (green surround gray) architecture, landscape mode, proposed a "green quality" coverage "gray" (green over gray) the new building, green

composite mode. in this mode, the urban greening the built environment is no longer separated from the outside elements, but in close connection with the construction of the "building blocks", is to wrap a building on the "flexible "clothes, urban greening system is extended on a three-dimensional dimension. Aimiliao Eminem Buzz proposed funding for urban space Source exploit new ideas: it creates two to maximize use of space, it has been to maximize both can be built within the scope of building coverage, and also received with the building covering the same area of green maximum blanked (Figure 1).

Figure 1. Fukuoka Prefectural International Center.

We look at today's high density urban space architecture and green environment to enhance the quality of urban space, improve the urban ecological structure has some inspiration. First, the construction of urban green space and two in the city aspects of the space occupied by conflicting resource, able to reach a unified an integrated manner. Second, composite construction and greening can do to maximize the interests of both sides, both to give one hundred percent of the land occupied by buildings, but also to give one hundred percent green coverage, achieve in a limited urban space double value, while maintaining the original urban greening indicators, created the "extra" space. Again, this design is actually a relatively "low technology" of Building eco-design approach, it almost in sensibility, but is fit humane way to solve ecological problems in the building and the city. Finally, in this way for the integration of urban public space system is advantageously in the greenery here is not off the ground and isolated existence, but the combination of the natural environment, there is a dialogue between each other; at the same time, due to the continuity of this space, an increase of up to the line of the building, it is also possible from an external environment, easy access to the upper part of the building space and in access to visual and psychological pleasure of this space provided [2].

2.2. Ideal compound greening model

As Richard Rogers in "compact city" (Compact City) in the assertion that modern cities are dispersed to the collection, a highly dense, compact urban form is to deal with the rapid growth of modern urban space, to solve the sustainable urban development Inevitable in high density urban areas to pursue sustainable development, an inclusive city, construction, afforestation wider integration is inevitable future development of urban form, shaping the green ecological environment are increasingly showing a multi-dimensional, multi- diversified, three-dimensional feature level. It requires urban natural and artificial ecological factors breakthrough layout form two-dimensional plane, the "green quality" point, line, surface and other parties.

Type in the three-dimensional network of urban space in motion, organization, formation of a new body, face relationships. This green composite mode the maximum expression of the integration of "green quality" and the built environment. In the whole, it takes a kind of "mimicry "The measures will be building into the urban natural environment, at the local, the integrated use of a variety of green design approach, in elevation, section and greenery will be the integration of building elements of the building, making the natural elements and the space inside the building external to continuous, so that the building is covered with green plants, infiltration (Figure 2) on the city, microeconomic environment, green reflects the complex integration, diversity and broad continuity features.

Figure 2. Shanghai World Expo Design Plan by Southeast University School.

Integrity is reflected in the following aspects. First is to integrate green features and architectural forms, not only for green buildings to create a good micro-environment, but also create architectural forms itself. Secondly, embodied in the urban natural environment and artificial environmental integration, architecture and the environment is no longer a conflict of heterogeneity, but with the natural environment together to maintain symbiosis of sustainable urban development. Finally, this composite model is conducive to the integration of urban public space and architectural space. Architectural able to break through which limits the interface itself, actively interact with the urban space occurred, reflecting the social characteristics of the building. The result is the creation of an integrated cost-effective use of urban space so that the space in the building, outside the complex multi-level urban greening, more inclusive urban functions in urban ecological landscape systems.

Because of this complex green model has other green do

not have integrated manner, can induce artificial environment ecological factors to achieve pluralistic coexistence diversity reflected in two aspects: First, the use of green building integrated mode, according to different overburden depths, different settings to select different parts of green vegetation, build a variety of buildings microenvironment by the shrubs, trees, flowers, grass and water combination, to maintain self-regulating resilience and establish a stable micro-environment system, increasing ecological exchange and integration capabilities with city views. Second, this diversity is reflected in the combination of green space in the building space in four ways from the original way, and gradually developed into a combination with functional space architecture, penetration in building space every corner, spread over the building and site to form multi-dimensional, three-dimensional multi-level structure [3].

Continuity includes two levels of physical and social. For the purposes of the material level, in the city of microscopic dimensions, the continuity of the urban environment is Urban Ecological continuous a necessary condition. In this complex green mode, architectural space, natural landscape and man-made landscape as an urban unit in the space is continuous, because the building is divided and broken, jointly maintain the network in urban space complete urban form. Materiality consecutive some extent determines the serials, the urban public space system can be continuous, the internal space of the original building interface and integration exist in isolation in the city, a majority of urban residents to use public social space common structure place, and reached broad equitable social space to use. also, people fair use of space in turn promote the development of the material continuity of space.

2.3. Related questions

This multi-dimensional, multi-level complex green way different from the traditional way in terms of the appearance of the green shape and internal mechanism, and therefore the concept of planning, implementation, management and other aspects of the existing urban planning, management proposed a new policy problem.

Firstly, this compound is different from the traditional way of green building design and green landscape design, it needs to be based on the relevant system of urban comprehensive, interactive above, in the traditional neighborhood design integration of more and broader related Factors which the whole concept of interaction; continuous concept system;; the concept of space-efficient concepts of public space and urban architecture combining technology and technical applicability of the concept of integrated essential.

Secondly, the current urban planning and architectural design, urban greening system metrics limited green coverage rate of two, they are based on elements of urban natural ecology and artificial architectural elements in a two-dimensional environment, urban land were occupied premises , do not reflect the quantization characteristics of urban greening in reconstruction of three-dimensional space, the need to introduce new green control indicators supplement, such as green, green and green wrap cover volume rate, to better reflect the overall style of complex integrated green features.

Moreover, as the city administration building, should the use of effective incentives to encourage urban design, architectural design, urban development and land utilization efficiency in the use of highlight composite green pattern. Such incentives like reward American high-rise building When the policy, when a land or building development, ecological indicators greening rate reaches a certain value, you can allow developers to increase the floor area ratio. Only in this way, complex urban greening to his law to discipline the urban ecological environment in order in this way The transition process gradually improve and mature.

Finally, because of this emphasis on complex multi-level green pattern green environment and close contact between artificial structures, it should be taken in close cooperation between the corresponding manners the relevant functional departments. The needs of urban management, municipal, transportation, landscape, planning jointly involved in the design and other departments under the unified guidance of the urban space, functional, ecological landscape and other aspects of the implementation of the macroscopic grasp in the planning, development, design and management process to emphasize the institutional and legal, continuous , to ensure the joint role of economic principle, market principles and administrative principles, legal principles, the construction of good urban public space system and urban greening system.

Conflicts of interest

These authors have no conflicts of interest to declare.

Authors' contributions

These authors contributed equally to this work.

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