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Article

Methodology for Conducting Preliminary Analysis Stages in Courtyard House Landscape Design

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Abstract: In the context of urbanization and an increasing ecological awareness in modern landscape architecture, such a way to organize small open spaces "in the courtyard" echoes the requirements of the 21st century developed towns where impacts on open space are felt through infilling of courtyard houses. Aimed at both the ecological benefits and aesthetic effects of landscape design for courtyard house, a program-based de-sign is completed systemically in terms of pre-design analysis to develop an ecological and beautiful figure within it functionality. Yet interest has moved beyond a unified approach that combines scientific knowledge with landscape-oriented solutions. While earlier researches have observed that the integration of ecological, function and aesthetic thinking should be strengthened in the initial stage of landscape design process, infrequently a systematic approach has been suggested. The aim of this paper is to discuss the process from designing the courtyard landscape as beginning, and then creating analysis poster and finally how the concept model are formed. It is also proposed that following the systematic steps at pre-designing stage, helps bring natural and man-made environment in accordance with each other and support for ecology towards ecological-sustainability. A new approach is proposed that provides a theoretical basis for the transformation of analytic knowledge into categorical representations of design, and makes possible a theory-practice nexus in landscape design. A method like this could contribute to improvement of the landscape design process for shaping more environmentally positive and visually-adequate court spaces and provide a view at past design performance against which future designs can be compared.

Keywords: Topographic map, photography, courtyard house, analytical poster, environmental sustainability, aesthetics, functionality, flora and fauna, orientation, conceptual analytical model.

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1. Introduction

The reasonable control of small landscapes, especially where green space is concerned in the shade courtyard of traditional rural and urban dwelling houses are more pertinent in modern landscape. The salience comes from needs as city planner demand of today, landscape design requires ecological sustainability and increased aspirations for beautify environment [1].

Constructing courtyard house landscape does not only to improve and green the external environment, it is a multiple functional, systematic project, which can provide various-scale service according to different needs of guiling life and soul psychological comfort, ecologic safety and spatial quality reliability. The effective implementation of the method depends on a complete and scientifically formalized performance of these preparatory stages [2].

As the core part of landscape design, the preface chapter should lay a foundation for the whole examination to be made: (I) The courtyard house landscape examined is of more detailed and scientized information. It is in these stages that the natural, ecological, spatial social constructional and functional aspects are examined conjunct with the developed concept and scenario [3].

These stages are, namely the development of an analytical poster and environmental analysis model that demonstrates the influence between site and its surrounding area, draft proposals based on ideas and alternatives for design (concepts), strategic solution on photo-collages as well basic studies such as clausural regular; landscape: mixed. Together these methodological tools r the equipments for the first phase of landscape design [4].

The plan was based on these stages: the independent realization of Decorative zoning provides an accurate functional area distribution, a combination of the aesthetic and environmental requirements, and choice of landscape material(perennial coniferous trees, ornamental deciduous trees shrubby(ornamental flowering and foliage plants), wine entwines(rishability decorative and flowering plants), flowers annual (flowers perennials so cover down) [5]. It also dictates the planning of landscaping compositions (single, rows, groups, groupy, hedge plantings -- boskety or massovy; flower regularities beds), when are accommodated zones of flowering plants according to flowerbeds, partersami, borders and robatkami - mixborders —yet and for specific composition gardening with stony gardens- alpine gardens rose gardens- fountains-arabesquies etc.- as well as small architectural forms: friendship groups-stołwki-Stairs-pergolas-benches-lighting-waste baskets-newsstands-gardens kayloi projections-breakdown burst tanks-Kasztanka-container-treščhotki-Pergola-pavilion-sheds etc. These are fundamental elements of the architectural-compositional solution as well as the ecological functionality and potential of the landscape design [6].

Seen from this angle, the early stages of a project are not only those which collect the first pieces of information, but represent a methodological phase in which space professionalism and vision and scientific-analytical thoughts of the designer take shape. [7]

Scientific development of small private spaces, notably courtyard house landscapes, has attracted worldwide attention in recent years. Based on researches, utilization of environmentally sound materials, microclimate enhancement measures, rational water resources management, use of local landscape species and scenery partition principle are the main methods.

Most importantly, at the heart of this process are scientifically conducted early uses studies stages which reveal the potential of the internal courtyards. These stages determine the methodological principles of substantial-functional and aesthetic designation area of courtyard houses, it is the scientific fundamentality and theoretical constructive reasoning of architectural-planning decisions as well as conceptual a scenario [8].

Scientific research of the methods for making of precursors project stages in landscaping of a courtyard house is an important direction that allows us to develop rational designing techniques, to standardize methodical approaches, work out effective landscape designs solutions on small areas and acquire international scientific experience. This paper focuses on the analysis of content, significance, structure and application technology of these stages.It is to lift the courtyard house landscape design plan's quality to a new level [9].

2. Materials and Methods

When designing a courtyard house with landscape plan, extensive site analysis is the most crucial feature of initial project stages. Being visual summaries of the prevailing natural, functional and regulatory landscape status the site analysis posters form a tool for

working method which ensures a differentiated differentiation in the formation of landscape planning stages that is categorically justified by scientific facts. This involves a detailed analysis of the relief, soil-typological composition, microclimate of the site; state of vegetation and trees; situating buildings and structures on the site planning documents, location typological structure in terms of passenger and vehicular traffic to study as well as its aesthetic and historical features [11].

The structural principle of the site analysis poster is a practical-analytical, through which based on the exercises in landscape design studios it becomes possible to (1) identify the resources on the site; (2) assess its negative factors and provide optimal design solutions. Its graphic elements (diagrams, drawings and notes) express the designer´s thoughts effectively, in a clear and understandable way, contributing as stimulus for the development of the concept base for this project. Thus, the site analysis poster is not just a product of the first phase and even has particular significance as methodological instruction for all visual planning steps to follow [12].

Analytical Stages in the Site Analysis Poster of the Project Object By definition, the site analysis poster of the project object includes analytical work that is conducted in several stages, usually eleven for example: 1.

Site Dimension Analysis. The following are the tasks that will be analyzed with respect to this category:

A) Identifying and illustrating the site boundaries from a topographic map:

-Graphically displaying the lengths of the sides of a courtyard based on orientation thereof;

-Calculating the overall length of yard;

-Calculation and plotting the total courtyard area (pp. m&; sq.m.; sotkas change; hectares) in graphical form;

-Determination and graphic representation of the construction site within the yard (residential buildings, outbuildings, roads, etc.) and garden area (square meters).

B) Schematic legend of the map conventional symbols: KЖ – dwelling construction; HЖ – non-dwelling buildings; T- toilet and like schemes.

C) Drawing a line in red around the courtyard area recorded in photographs, graphically describing and making notes on it [13].

3. Results

Review of Vegetation and Wildlife. Task requirements: A) Plant World (Flora): Trees (fruit-bearing, ornamental: coniferous and deciduous); Shrubs (fruit-bearing, ornamental: with decorative foliage and flowering); Climbing lianas (fruit-bearing, ornamental: with decorative foliage and flowering); Flowers in blooms classification by type. (Table 1).

Table 1. Mechanism of the Stepwise Procedure for Compiling the Existing Plant Assortment Table Based on Analysis

Stage 1	Determination of the Plant's Botanical Name (Latin, e.g., Ficus carica L.)
Stage 2	Local/Common Name (e.g., anjir, injir)
Stage 3	Life Form (classification into tree, shrub, liana, flower (annual, perennial), or groundcover) types
Stage 4	Determination of Height and Size (dwarf, medium, tall, compact, branched)
Stage 5	Plant Characteristics: Morphology (habit, stem, leaves, flowers, fruits); Physiology – Vegetation (photosynthesis, transpiration, climate tolerance (heat, cold), drought resistance, flowering and fruiting, growth rate, and other processes)
Stage 6	Ecological Requirements: Soil (fertile, sandy, clayey, saline, rocky, etc.)

Stage 7	Study of Moisture Requirements (moisture-loving, drought-tolerant) and Light Preferences (shade-loving, sun-loving)
Stage 8	Adaptability: Tolerance to Urban Conditions (gas, dust, noise); Climate Tolerance (tropical, subtropical, desert, temperate, cold, highland) – hot and dry climate.
Stage 9	Functional Role in Landscape Design: shading, windbreak, erosion control, decorative (color, form, flowers), fruit-bearing/utility use.
Stage 10	Conservation Status (common, rare, included in the Red Book)

B. Fauna Analysis : Identification of species, evaluation of their ecological role in the environment and significance for conservation. Rst-treatment to element 23 Analysis of Surface Contour (Relief) and Soil in the Area. The paper is organized as follows: A. Surface Contours (Relief): Changes in elevation, irregularities, incline plane and flat areas on the site. B. Analysis of the Soil and Soil Composition 1) Mechanical composition:.. sandy, sandy-loamy, saline, clayey, hard … soil;. 2) Content of Humus (organic matter): … high, medium, low.; 3) Moisture Regime: moist, dry, and rapidly drying.; 4) Acidity (pH): acid, neutral,alkaline.; 5) Shape: granular, grainy, compact.; 6) Rate of fertility: fit or unfitted for vegetable culture.

Drainage Analysis of the Area. Their drainage analysis has been done using the subsequent stages: A. Surface Water Flow (in the courtyard and immediate surroundings)—Ditches/excavated channels, natural streams, wet ponds, lakes, etc. B. Groundwater: 1) Depth of the water table: 1–2 m; 2) The chemical composition of groundwater: saline, fresh and partially mineralized; 3) Effect on the site itself: influence plant roots and building foundations. C. Moisture and Saturation of Soils: 1) Permeability of the soil: from sandy (low), to clayey (high); 2) retention of water in the ground; 3) Risk that there is pooling of water after rainfalls or irrigation. D. Artificial drainage system: Existence and operating conditions of wells, collectors, ponds, ditches, canals etc. E. Areas of Concern: 1) Low spots where water stands; 2) Areas susceptible to drought conditions due to shade or wind barrier locations; and 3) Sites like buildings or roads that could become dislodged.

Transport and pedestrian orientation analysis. The process of the analysis is described in the next stages: A. General Outline: 1) Main entrances and exits on the site; 2) Access to the main street or highway; 3) Vehicle traffic (light, medium, heavy). B. Traffic Movement: Roads for vehicles (core roads, service roads); Parking space (In the courtyard); Independent entrance for loading and unloading of goods vehicle. Relationship between vehicular traffic and pedestrians movements. C. Pedestrian Traffic: Primary pedestrian routes for residents and visitors; Access for children, the elderly and disabled (ramps, safer walkways); Courtyard pathways, open spaces and intermediate public places; Separation of vehicular road / pedestrian routes [14]. D. Problems: Confined passageways and overcrowded areas; Unsafe conflicts of pedestrian and vehicular paths; Mislocated walkways.

View analysis from the Site's Landscape View Perspective. The study remains in the following stages: A. Identification of Photo (Photographic) Points Locate points from which views encompass the entrances to sites, terraces, recreational spaces, walkways and window views or look outside surroundings A/ialary 1990-05-31 Date: Printed: 2003-02/14Page 17 *". B. Sight Lines: Draw the sightviews for each selected point onto the master plan (or photo map). C. Identification and Description of Primary Objects (external and internal): 1) External – mountain landscapes, gardens, streets, neighbouring houses, minaret mosque panorama of the city; 2) Internal – house auxiliary buildings small architectural forms plants other significant elements.

Noise Analysis. The analysis is described in the following steps:

A. Preparation of Site Master Plan – Identify main objects i.e. House, paths, trees, barriers and site boundaries etc. B. Noise Sources: External 1) Puluplay xxaasu(ūsas)purxa Seasexəw these consist of roads, street-cars (tram), neighbours, the industrial zone and the flea market nearest schools and restaurants Internal 2) Pump-Unit." +yuwanaas baalaaq axayyaujanaxa tarakila= mabalaanazsukan 'generator', puarkyii garage hardly pute' (-yĕ); opequnan filter pool orphan zoous Bedoum`› = koynykchinja yshelbi d(o)(n)o.(T)mIi(d)+(p)oabī; Return to Vn+Adj.Con so it is clear in some undiscussed cases that this system must be supplemented with others!!!!..!!?"! C. Assessment and Noise Direction Representation: Measure the noise levels and represent it graphically as to its direction.

General requirements: 1) Pinpoint external sound levels, both for orientation by direction (high intensity and low intensity); 2) Delineate comfortable sections to stay in; 3) Identify points where green or artificial barriers are necessary to reduce noise pollution.

Study of the Motion of Sun and Wind. The analysis is performed in the following steps: A. Sun : First find the interrelated light, heat and shade situation. B. Wind: What are the main directions, how fast and intense (consistent) is it)?

Figures: Site master plan (topography, pictures); Compass; App for smartphone Sun path chart (seasonal) Wind direction with collected data (behind a tree, between two buildings) Sources of reference meteorologic places.

Sun Movement Analysis:Identify the principal cardinal orientations based on the site plan (N-north, S-south, E-east and W-west). Establish sunrise and sunset positions on the site plan. Show seasonal sun angles throughout the year. Summer: intense solar radiation (low angle of the sun above the horizon). Winter: low solar irradiance (long shadows) . Spring and Autumn: with moderate temperature and shadow length.

Analysis of Wind Motion: To find the major wind direction(s). Draw wind direction (spring, summer, autumn and winter) graphic symbols in the site plan (topographic map and photos). Red lines are typically used to show the wind direction in spring-summer. Blue lines indicate wind directions in the Autumn-Winter.

Existing Buildings and Landscape Structures Analysis. As part of the "Courtyard House Landscape Design" project, functional, artistic and technical capabilities are defined through step-by-step examination of buildings, small architectural forms, landscape structures and above-ground underground utilities.

A List of Buildings and Structures: 1) House (residential building); 2) Accessory buildings; 3) Parking lot or garage; 4) Garden structures (shed, stockroom, greenhouse); 5) Leisure facilities (gazebo, terrace, pavilion). Location, design, dimensions and functional role are found for each structure.

B. Description of Buildings and Structure Location: Orientation to cardinal points; Openings/entrances or exits for buildings and structures, level of sunlight/shadow (full shade, semi-shade, full sun); Relationship with prevailing winds; Influence of existing features on landscape." Buildings are analyzed not only in terms of spatial zoning but also based on the massing of structures and how a design is composed.

C. Study of small architectural forms: 1) Benches, pergolas, gazebos, bridges; 2) Borders and barriers; 3) BARBECUE – areas, nodes outdoor kitchen; 4) Elements children's playgrounds; 5) Landscape lighting and other elements.

Generally, landscape construction elements include: Construction works on the ground (pavements, borders, stairs and ramps, barriers of all kinds); Water features (fountains, pools / ponds, lakes, waterfalls usurgerots,L silaerotechiques, showers étagérégates); Structures made of plants (pergolas, trellises, arbors, espaliers and so on). Technical, functional and aesthetic-artistict data concerning buildings and landscape structures in the courtyard as wellas environments nearby are processed analytically.

The reasoning of existing courtyard house landscape design There are certain problematic conditions in the existent courtyard house among gardens. Study of the existing problems is one of the most important part of preliminary study in courtyard

house landscape design. The first and most important aspect of the design process is actually an in depth analysis "to analyse scientifically the actual condition of the site.

The landscape system is the result of an interplay of natural elements (soil, vegetation,hydrology) and man made elements (buildings, paths, structures in the landscapeand services). Consequently, in the preparation of the “Site Analysis Poster”, prior evaluation of landscape-diagnostic parameters and ecological stability grade landscapes space structure organization functional zones determination aesthetic-composition status is needed.

In the process of this exploration, the problematic points and restrictive elements in the site are revealed; this forms a basis for establishing an effective design strategy to promote sustainable development of the landscape ecosystem for courtyard houses [15].

The analysis of the current problematic situation is presented in this table: Table 1 The procedure for analysing the existing problematic state. The examination is made with the use of an integrated scientific-methodical course (Table 2).

Table 2. Mechanism/Procedure for Conducting Analysis of Existing Problematic Conditions

№	Conducting Preliminary Analysis of Natural and Anthropogenic Elements of the Site	The site’s natural and artificial elements (terrain, condition of plants, existing buildings and structures, pathways, small architectural forms, and utilities) are reviewed. During the analysis, shortcomings that may affect the quality of the courtyard house landscape design are identified.
1	Assessment of the Existing Condition of Functional Zones in the Courtyard Area	The existing activity zones in the courtyard (recreational areas, children’s playground, utility zones, parking, etc.) are analyzed. Their location, interconnections, and efficiency are assessed.
2	Identification of Problematic Points and Limiting Factors	-Lack or insufficiency of the drainage system; -Uneven terrain or risk of erosion; -Poor condition of plants, disease, or incompatibility with the site; -Inconvenient or unsuitable placement of pathways; -Insufficient or excessive lighting; -External negative impacts such as noise, dust, and wind; -Limitations related to the location of existing utilities are analyzed.
3	Assessment of Ecological and Technical Conditions	Soil quality, irrigation possibilities, groundwater depth, wind directions, and microclimatic conditions are

		examined. These factors are recorded as elements influencing the sustainability and long-term performance of landscape design solutions.
4	Analysis of Safety and Usability	The safety of movement within the site, convenience for children and adults, evening lighting systems, and the presence of slippery or hazardous areas are assessed.
5	Categorization of Problems	All identified problems are classified into the following groups: -Technical problems; -Ecological problems; -Aesthetic problems; -Functional problems.

Based on the Findings, specific recommendations are delineated for improvement in the areas of concern and penciled solutions to include proposed revisions to master plan.

Historic Development of Existing Condition of the Site. THE PRESENT STATUS OF COURTYARD SPACE MALYADMISSION THE current spatial layer in the courtyard adaptation sequence is formed through complicated historical development stages, and combined action of natural processes, social- economic changes and human activities over a long period. In order to make a proper evaluation of the present situation at the site, its historical formation and development as a landscape, regularities in variation of natural parts, the stages of man's influence on it have been examined according to a scientific-methodological approach.

As the first phase of natural landscape, the original patterns correspond to natural morphological processes: terrain molding over time, exhaustive organization of soil layers and distribution of autochthonism vegetation (trees, shrubs, lianas, flowers and ground cover). At the same time it is proposed to analyze ecological stability, biodiversity and hydrological regime of the site according to principles of natural ecosystems. Natural Key Features and Early Anthropogenic Impact.

The main natural features of the area are the following ones: 1) The microrelief flatness or unevenness; 2) Origin of soil layers; 2) Microescale climax formation by this moment (local hophabions); and 3) Natural water bodies as well as subsoil liquification. At this time the humans still didn't do any anthropogenic impact.

The Anthropogenic phase is when existing condition of the site changed in some fundamental way due to human economic processes. The natural landscape was altered substantially by construction works, land use changes such as cultivation and tree planting, water control and channel deviation. Differences between something and the subsequent period of time include:– construction territories appearing;– spreading hard surfaces;– anthropogenic vegetation appearing (decorative bushes, cultivated plants);– origin of water-supply networks.

This process represents the change from a naturally stable terrain to an artificially tended anthropogenic landscape. The landscape structure has been influenced heavily by the socio-economic process in the course of historical development. The changes in population, built up area buildings modernization, culture trends and the growing of households demands are conditioning the form of territory. The most common are: 1) consolidating functional zones (recreational zones, utility areas, car parks, etc.); 2) an increase in the number of ornamental species as well as of new compositional structures;

3) renovation and updating of abuildings; 4) modernization of water supply systems; and 5) a surge in themed elements which correspond to stylistic trends characteristic for different periods in landscape design aesthetics. Therefore, the landscape formation of the region has formed "crystallization of multiple historical strata", where some incongruities are generated when it is not in a consistent state with current design.

Consequently, 'multi-layered historical strata' is produced in the structure of landscape and inconsistencies appear in places that have not adjusted to new planning ideas. In the phase of landscape generation situation becomes disturbing because functional load is growing disproportionately with landscape aesthetics and ecological requirements. Increasing residential needs, excessive water usage, and ecological strain on plants create unique problems for today's landscape.

At the present stage the follow-ing problems exist in this landscape: 1) The condition of pavements and coatings is worsened or mostly technically w orn; 2) Vegetative layer degradation (aging of old trees, mal-adaptation of recent cultures); 3) Soil compaction and reducti on o f its fertility;

4) Impaired drainage systems functioning, 5) Variation of microclimate (overheating, modified air flows). These phenomena help explain why the landscape is out of balance with ecology. The phases that led to problematic conditions can be described according to the historical development of the site. The main factors are: -Degradation of natural landscape: destruction of natural water run off drainage, compaction degradation; and decrease in local flora species; -Intensification of anthropic charge: coverage of hard surfaces, lack of planning in the placing of underground utilities, the increase activity transport; -Historical layer disharmonies: Old growth/new plan elements in plants, Unrelated architectural features from various periods; Microclimatic disorders: loss of shaded and exposed areas, modifications in the wind direction, too much heating or not enough ventilation in those places.

Current appearance of the site is an end product of historical processes, which contributed to create a complicated spatial system endowed with geographic history that makes possible natural development patterns for landscape elements within a continual influence of human beings. Historical analysis showed how the natural potential of the site became reduced over time, anthropogenic stages moulded functional structure of environment and due to them percieved crispness between ecological and compositional inconsistency has intensified in contemporary stage.

There is a demand for aesthetic, eco-friendly, modern and functional solutions that take into account historical layers in the making of today's landscape design projects. 5 [0.001 to 0.25] In urban planning and landscape design, the technical - functional aesthetic management and exploitation of small residential courtyards spaces is very important. Particularly, in the course of design of courtyard landscapes, methods of analysis based on profound exploration of natural, biotic and functional features belonging to sites have borrowed from site analyses - a scientific and methodological information source for device new models - pre-design stage conceptual-analysis model. This foundation guarantees a scientific design procedure, justifies the compositional coherence between landscape units and makes possible the creation of technical, useful, aesthetic and ecological solutions that are in accordance with the needs of users

Figure 1. Conceptual pre-design analysis model of the site and surrounding relief at a 1:400 scale, based on the results of the analysis poster, for the project on the topic "Courtyard Landscape Design."

As a first step in courtyard designing, as the analysis poster functions as a visual mechanic to reveal all the stuff on site. It systematically unfolded from the size of the site, courtyard parts, plant cover, and structures, to access, environmental elements and spirit sources. The data collected for the analysis poster can be used to start structuring an architecture project and is important in the definition of the concept of a landscape project.

The future shape of the courtyard in volumetric-space terms has been represented by the conceptual analysis model, according to the results obtained from the analyses. Using the model it is possible to check and to compare the compositional axes, functional zoning, disposition of terrain and movements communication routes as well as location of buildings, small architectural forms and landscape details. This model was a fundamental tool for the project to take shape, where conceptual ideas become real spatial visualizations, thus the architect was able to check scale, proportion and height balance in real life situation.

The pragmatic side to this approach is that it consequently breaks down the design process itself in a chronological course of stages; with description on site, representation of existing conditions through graphic poster, modelisation of an idea in space through a model and finally final solutions. This procedure allows that the landscape architect should not simply analyse a successful reutilization of natural resources to build user-friendly an environmentally sane and aesthetically harmonious environment.

Therefore, the method to establish a conceptual model with unveiled poster used in this study provides a largely novel way to make the courtyard landscape design scientific (rational), functional and beautiful. The use of the same is capable of being favorable to the structure layout space, landscape composition and ecological balance, realizing a good overall design effect.

4. Conclusion

Design of the courtyard landscape The yard landscape design is a process consisting, impose -site's natural functional and analytical-parametric investigation. The poster of analysis-poster being a pivotal part in the whole chain, that will give the big picture, and make it possible to elaborate on the main features (clauses and sketches) of this project. Using this model, a conceptual analysis based on the poster is introducing into the process that it becomes possible to estimate and improve in three dimensions a new design's future plan spatial structure, scheme of functional zoning and layout solutions as well.

This approach guarantees that the project is scientifically based, ecologically sustainable, design responsive and aesthetically compliant. As a result, the composition of the poster and the conceptual design serves as a contemporary model with guaranteed efficiency, practicality, and aesthetic innovation in courtyard landscape.

The utilization of the analysis poster and conceptual model to courtyard landscape design need to be ruled standardly. We should first know the site related to natural, climatic and functional and aesthetic conditions then represent it step by step exactly in the poster. The 3D PM relies on these data to validate spatial relationships of landscape elements, land uses and circulation paths. User needs, criteria of the ecological and sustainable design as well as potential of the site give directions for planning. Modern technological tools, such as digital modeling combined with 3D visual representation, are facilitating more precise architectural plans. Fluid application of the lovely analysis poster and conceptual model enhance project quality and help produce a site courtyard that is both functional and aesthetic, as well as ecologically efficient.

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