APPLIED RESEARCH ON ENVIRONMENTAL PSYCHOLOGY IN ARCHITECTURE ENVIRONMENT DESIGN

Dissertation for the degree of
Doctor of Liberal Arts (DLA) in Architecture

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Psychology cannot tell people how they ought to live their lives.
It can, however, provide them with the means for effecting personal and social change.

Albert Bandura

Fig. 1. Harmonious coexistence between man and the natural environment-Dialogue and communication between people and the environment. Villány, Hungary.

(Source: Photo by CAO Hui, 2019)

Preface

The title of the doctoral research is Applied Research on Environmental Psychology in Architecture Environment Design, which was a project I worked on while studying at the Faculty of Engineering and Information Technology, UNIVERSITY of PECS, Breuer Marcel Doctoral School, Including theoretical research and practical application. The research topic combined with Architecture and Environmental Psychology, which links different fields such as Ecology, Aesthetics, Feng Shui, Behavioristics, and Relationship, integrate their advantages and apply them to practical architectural and environmental artistic creation. The study needs close interaction and communication to obtain the materials and data with relevant research institutions, local government functional departments, professional researchers, and engineering construction teams. Very fortunately, during my doctoral study in four years, I have got a chance with various professional groups and individuals to carry on close cooperation, who gave me great help in my research. At the same time also gave me a lot of design inspiration and prompted me to accumulate rich design experience. I am very thankful for their generosity and contribution.

First of all, I would like to thank the staff and all the professors at the doctoral school who gave me great encouragement and assistance to complete my research in my professional study. In addition, I am grateful to fully acknowledge the Docent of the University of Belgrade, Faculty of Architecture Dr. Mirjana Devetaković, who gave me so much inspiration for my DLA program research.

Secondly, I would like to express my gratitude to Professor Wang Tie of The Central Academy of Fine Arts for his selfless help and positive encouragement, especially for his advice on my life planning and career growth, which has filled me with firm faith to face the possibilities in the future.

I would especially like to thank Tamás Anna Mária and Dr Sztranyák Gergely for their patient guidance and selfless dedication. I appreciate their valuable comments and inspiration in my theoretical study, for their innovative discussions on each design project, and especially for their encouragement and support during the whole thesis writing process. I also would like to thank them for their inspiring words and valuable suggestions, which have stimulated my potential in architectural design.

I gratefully acknowledge my friends, colleagues, and classmates for their extensive help and support during my study. Especially colleagues in my studio for their efforts in each design project. Last but not least, I would like to thank my family, especially my wife and my children, for their selfless support and spiritual encouragement during the completion of my doctoral thesis and my DLA studies.

General introduction

Environmental psychology is a new discipline that emerged after the 1960s. It is an extension of applied social psychology and has strong vitality. Now, it is the focus of research in architectural design, environmental art design, and interior design. It pays attention to the interrelationship between the environment and human psychology and behavior and hopes to solve the practical problems between them and promotes positive cross-border communication between environmental psychology and multi-disciplines. The inspiration and methodology of environmental psychology can provide more possibilities for the diversified development and systematic construction of architectural design. Interdisciplinary communication can enrich the form of architectural design and establish a better connection between people and the environment.

This study aims to apply theoretical knowledge of environmental psychology to solve practical problems in urban construction in China, focusing on practical application. First, based on the analysis of the relevant research background, the possibility of cross-border integration of architectural design and environmental psychology is discussed, the research purpose, research content, research questions, and research methods are clarified, and the relevant theories of Environmental psychology are discussed to consolidate the theoretical foundation of the research. Secondly, the relationship between environmental cognition, spatial intention, spatial identification, social behavior in the environment, environment evaluation, and architectural design is analyzed to generate a new path to study the practical application of the two aspects.

In the specific design, the author decoded and coded the environmental information of the target site through adaptive thinking. Through the research on users' behavior habits, psychological needs, physiological needs, emotional needs, and social needs, try to create a positive environment to build a harmonious human-earth relationship, to achieve empathy and a win-win situation between people and the environment. The author uses relevant theories of environmental psychology to guide concrete architectural design, actively discusses the innovative application of ideal architectural environment design, and puts forward the direction of future research on this basis.

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CHAPTER ONE. *Introduction*

With the advancement of global climate change and urbanization, humanized and sustainable dwelling environment has become an important social issue. The increased attention to the humanized dimension of urban planning reflects a specific and intense demand for better urban quality [1]. However, the design of most environmental spaces cannot meet the complex needs of contemporary people. The lack of attention to people's psychology and behavior leads to less interaction between individuals, groups, and the environment, and the lack of humanistic care in architectural environment design.

In a good environment, a completely different, broad spectrum of human activities is possible [2]. Based on the relationship between environment space and human health growth, the author believes that a high-quality man-land relationship can bring people healthy, comfortable, and pleasant living experiences. It is significant to realize the sustainable development of material space and human society to understand the ordered environment as an ordered psychological state. Architects should start from a broader dimension and context, actively build humanized and harmonious architectural paradigm, and create architectural works that meet the comprehensive needs of contemporary people through interdisciplinary research. As a result, the author carries out a cross-boundary design study, using insights from environmental psychology combined with an architectural approach to address complex issues among people, society, and the environment. Based on theoretical research and architectural practice to construct a positive design view, meet customers' needs for design products, strengthen the user's sense of experience, and empower the built environment.

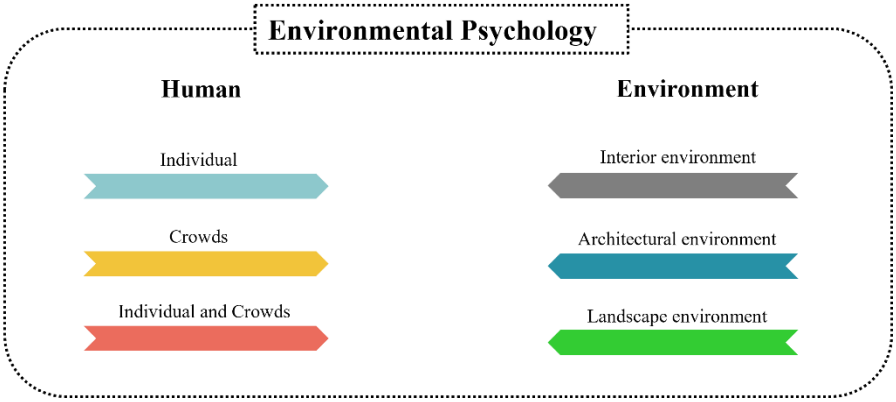
1.1. Background

The study of environmental psychology began in the 1960s in the United States and then developed further in Europe, such as in Britain, Sweden, and France. After years of development, it gradually extended to other countries around the world, while China began to involve in the study of this field in the 1990s. In recent years, the development of environmental psychology has become more active, and the relevant theoretical research system has become increasingly perfect. Various countries have carried out scientific research in this field. However, the concrete application of environmental psychology in the architectural design field has not been implemented, and it has just shifted from academic discussion to scientific research, but most of the study remains in the stage of laboratory research. Therefore, the development potential of environmental psychology needs to be further stimulated and expanded, and its practical application in various fields will become the focus of research in the future.

In complex and contradictory architecture, uncertainty and opposition are everywhere [3]. Nowadays, the development of human society is diversified, and interdisciplinary research has become the norm. With the fast-growing urbanization, the continuous expansion of human activities has stimulated changes in urban habitats, and people have made progress in architectural design. However, everything has two sides, and in this context, the relationship between humans and their habitats will become more complex. Environmental psychology is a branch of psychology that focuses on the interaction relationship between individuals and the environment. It is closely related to the survival and development of human society. Therefore, applying environmental psychology to architectural design is an innovative practice method that has a guiding significance for future architecture design research.

1.2. Overall Aim of the Research

The discoveries of contemporary science and industry have produced new ideas, and created entirely different ways of being [4]. Human civilization is distinguished from other species by human beings constantly modifying their environment to improve their living conditions and using tools to enhance the quality of their physical environment. After the industrial revolution, the physical attributes of the built environment have fully expanded with the comprehensive development of human society. However, with the development of urbanization, the relationship between humans and the environment becomes more complicated, and the pursuit of the human habitation environment gradually rises from the physical section to the spiritual level. As the public's social activities become more and more frequent, the built environment bears more emotional and social factors of human beings. At the same time, the physical environment has an increasingly significant impact on the public's psychological feelings and daily behaviors. How does the environment affect People's Daily life? How do people get along with their environment? How do human activities affect the environment? These problems will become the core of contemporary architecture and environmental psychology. (*Graph. 1*)



Graph. 1. The connection between humans and the environment. (Source: Designed by CAO Hui, 2022)

Architecture is a discipline that studies buildings and their surrounding environment [5]. Architectural environment art design refers to the overall design to create a better living, living and development environment for the public, and it is the design behavior of creating ideal living and living space [6]. Architectural environment design is the process of constructing ideal dwelling conditions consciously by human beings. Its purpose is to balance the relationship between form and function and emphasize human demand and psychological feeling for the physical environment. Environmental psychology mainly studies the physical environment, culture, and social environment. It focuses on the interaction and influence between people and the environment and hopes to solve the related problems between people and the environment through energy transfer.

China's urban construction is in a stage of rapid development and has made remarkable achievements in infrastructure construction. However, in the architectural design field, the research on Environmental psychology and Environmental behavior is still in its infancy and has not formed a systematic system. Therefore, this study attempts to sort out the relationship between human beings and the physical environment through architectural methods from the perspective of cross-border study and actively explore the possibility of contemporary architectural environment design.

Firstly, this study aims to explore how architects perceive the environment and how to improve it, and how to create a harmonious man-land relationship through design. Secondly, in the creative process

of architectural design, what factors should architects consider in constructing a positive spatial experience, exploring the natural way of human and environment, and reconciling the various contradictory aspects of human and environment? Thirdly, to explore the construction strategy and innovative application of harmonious man-land relationship from the cross-border research. Finally, reveal the value of design in shaping human health and well-being and how to evaluate the quality of the architectural environment. Specifically reflected in the following five aspects:

- Through the method of architectural design to balance the contradiction between people and the environment and solve complex environmental problems.
- Try to build efficient communication between architects, clients, and users, to provide sustainable design products that keep pace with The Times.
- Through the design to meet the aspirations and needs of people in the environment, so that people's way of life is encouraged and strengthened.
- Establish an ideal man-land relationship evaluation system to guide the concrete design project.

1.3. Research Objectives

The research objectives of the study are:

- From the perspective of architectural design, explain why the insights of environmental psychology can inspire the work of architects and how to reverse the linear thinking in the creative process of project design.
- Analyze how people experience the environment rather than perceive it and determine what conditions the ideal man-earth relationship should satisfy.
- Explore the possibility of innovative application of architectural environment design and look for low-carbon architectural methods to guide the practical design work.
- Through architectural design to solve the complex problems between contemporary people and the environment, to build a positive environmental atmosphere and harmonious human-earth relationship.
- Analyze the influence of architectural environment, regional culture, and social environment on users' sense of environmental experience.

1.4. Research Significance and Questions

This research is devoted to exploring multi-dimensional design methods, combining the advantages of Architecture and Environmental Psychology, and creating a high-quality architectural environment atmosphere. Focus on innovative design to help users improve their cognition and perception of architectural space and provide new possibilities for the sustainable development of the built environment. This study reveals the value and significance of environmental design in shaping human health and well-being and trying to create a positive space experience to stimulate effective interaction between users and the environment, promoting dialogue between people and the environment through a positive site environment to re-establishing a harmonious man-land relationship.

To promote the harmonious coexistence of people, environment, and nature, especially people's positive experiences of the environment, and to provide new possibilities for the low-carbon design of the built environment, the questions of the research are defined as follows:

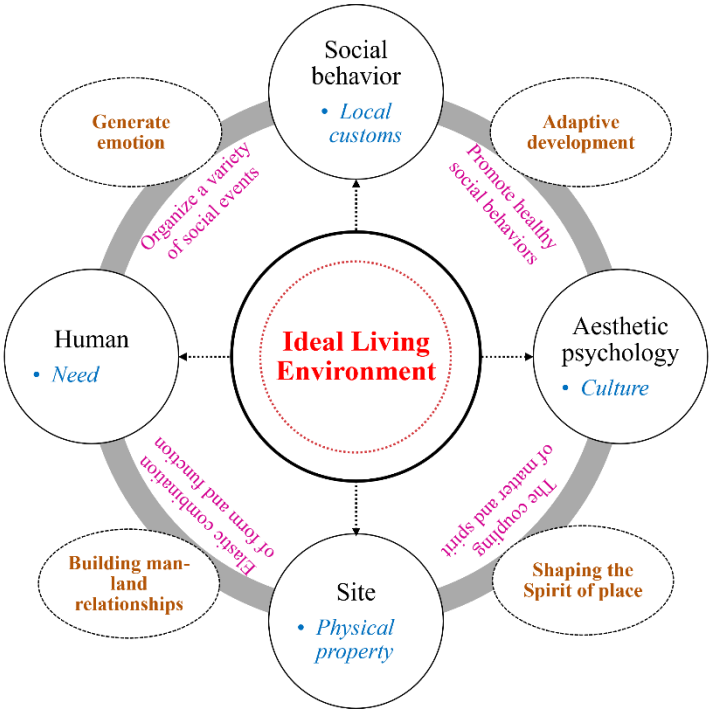
- How and why does our environment influence human experience and behavior, and how can we use this knowledge to create a healthy living environment?
- How can insights from environmental psychology be applied to architectural design?

- How does physical space help build a stronger relationship between living things and their environment?
- How to create the ideal man-land relationship?
- What is the evaluation system of the perfect man-land relationship design?
- How to promote human health behavior through the design of architectural space?

1.5. Conceptual Framework Design

The creative design of the conceptual framework is to review relevant theories and research methods under the existing theoretical framework, reflect on existing literature and actual design cases, conduct field research on the target object, and record and analyze basic information through behavioral observation and drawing. The primary purpose of this study is to propose a new paradigm for constructing an ideal living environment and try to create a harmonious man-earth relationship through cross-boundary research of environmental psychology and architecture.

First, the author identifies people, places, aesthetic psychology, and social behavior as the subjects of this study. After the goal is clear, it continues to clarify the correlation between the four sections, define the relationship and interaction between them, and deduce the four variables that affect the subjects through analysis, namely: demand, physical nature, culture, and customs. Finally, the research framework based on the system defines the orientation between subjects, summarizes the innovative application approaches to construct an ideal man-land relationship, and has been applied and verified in practical design projects. The research aims to enrich the existing research system and respond to the limitations of previous research. The research framework of this study is designed as Graph. 2.

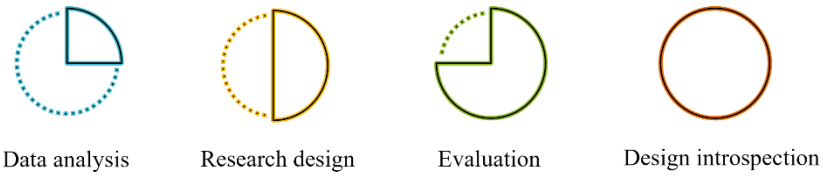


Graph. 2. The conceptual framework of the study.

(Source: Designed by CAO Hui, 2022)

1.6. Methodology

This study is an interdisciplinary study combining environmental psychology and architecture. Research methods mainly include qualitative and quantitative methods. The methodology borrowed from psychology is used for design investigation and applied research, including site experiments, behavioral observation, questionnaire method, and projection technology. In response to the hypotheses and questions of the research, the research conducted investigations, experiments, studies, conclusions, solutions, and other activities. (*Graph. 3*)



Graph. 3. Schematic diagram of methodology. (Source: Designed by CAO Hui, 2022)

The specific methods are as follows:

The first is research data collection. In the process of research on environment and behavior, the observed situation reflects the correlation between space and people and research results. The collected data reflects the characteristics of selected samples, and various data are collected as far as possible to provide data support for research.

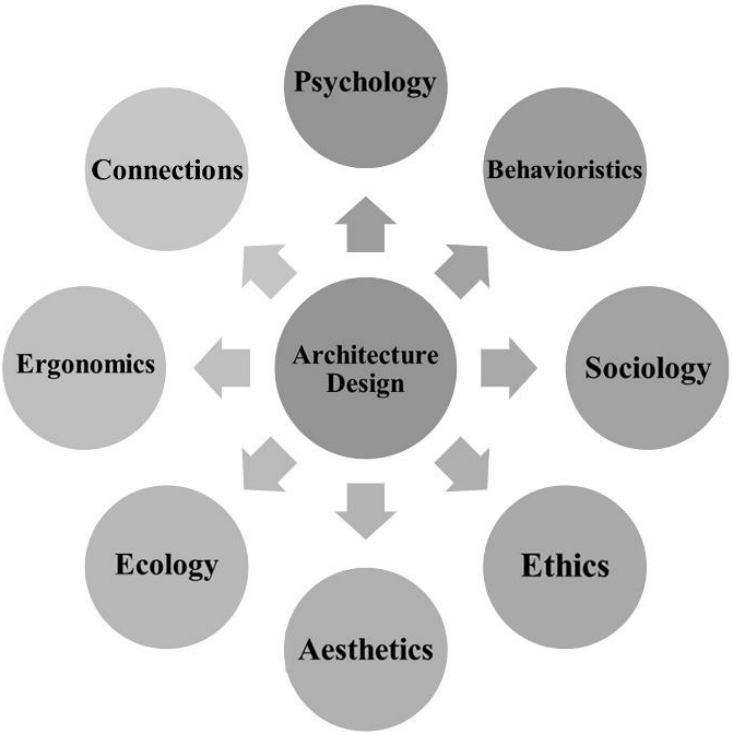
The second is experimental research, that is, the selection of target sites. The choice of the physical environment is the primary variable in the research process. Through the research plan, determined the experimental place of the research object, and observed the differentiated responses of the psychology and behavior of the subjects in different site environments, to study the interaction between the site and people, and determine the importance of relevant factors, structures, relationships, and interactions, try to measure the characteristics of the research object.

The third is to develop research methods. Due to the variability of subjects and sites in the research process, the selection of research methods should be targeted and adaptable. Based on the research object and hypothesis to match the corresponding method, using observation method, access method, indirect method, participatory action research method to analyze and study-specific cases. Observe the relationship between the human and environmental systems as a whole, and clarify the structure and organizational system between them.

Fourthly, data analysis and research conclusions. Use statistical methods to analyze the relevant data and literature and summarize and classify them. Analyze the quantitative data of the design object, summarize its influencing factors, and clarify the internal and external effectiveness factors of the design object. It provides a scientific basis and guidance for the concrete design process through people's perception and evaluation of the environment.

Finally, the research evaluation summarizes and puts forward strategies. Under the background of architectural and environmental psychology, with the insight of multidisciplinary crossover study, to determine the space construction of people's psychological intervention and the effect of behavior on whether to follow the design process, the result is to achieve the consequence of the research hypothesis, including qualitative research methodology validation, project design reflection, social ethics, and

practicality. Through evaluation and summary to verify the early design plan and future development trend, to accumulate reliable design experience. (*Graph. 4*)



Graph. 4. Schematic diagram of cross-research approaches.

(Source: Designed by CAO Hui, 2021)

CHAPTER TWO. *Literature review*

2. Literature Review

2.1. Architectural environment

Throughout the history of human development, the role of architecture is constantly changing with the development of human social form. The built environment has direct influence and indirect power on human beings, which is assumed as the unity of function and meaning. Architecture is a technological phenomenon of human beings. It creates an ideal dwelling environment for human life, takes the creation of use-value as the primary consideration, and endows space with symbolic and emotional sustenance.

The concept of architecture is often interpreted as a physical space that exists and is a necessary tool for human society. With the continuous progress of human civilization, the significance of architecture has gone beyond the scope of material, and its spirit has become the universal demand of contemporary people. The emotional expression of the built environment reflects the response of human beings to the complexity of the environment and includes elements of psychology, sociology, ecology, and philosophy. The architectural environment has multiple dimensions of time and space. It is an aggregation of the physical and spiritual environment and a carrier of human cognition, experience, and emotional expression.

Architecture is not an isolated object but exists in various natural and artificial environments. Human beings provide ideal material places for social, economic, cultural, political, and other events through construction activities. Architecture, human beings, and the environment are an organic whole, which does not only reflect the mechanism of mutual restriction but also reflects a relationship of mutual promotion. Architecture is an art, and emotional representation, outside and above the construction. The purpose of construction events is to bring things together, and the aim of architecture is to affect us. Architecture is a matter of "harmony" which is "pure spiritual creation" [7]. The concepts of place, art, emotion, aesthetics, and experience are all related to the built environment, which forms the basis of everyday human activities and exists in human society in physical and spiritual forms.

2.2. The changing role of the architectural environment

Fig. 2. Guanyin Temple in Hougou ancient village.
(Source: Photo by CAO Hui & WANG Yonggang, 2021)

In ancient society, the cognition of the world was surrounded by gods, demons, and spirits due to the low level of human civilization. The supernatural power often explains people's daily life and phenomena. The role of architecture is often subject to the will of the rulers and serves as a medium to maintain people's continued worship of God. Therefore, architecture is more embodied in the expression of power. Typical architectural forms are temples for deities and palaces for rulers. (*Fig. 2*)

With the progress of human civilization and the transformation of lifestyle, ancient religious buildings and palaces have been transformed into their combination, which has become the public area of citizens and gradually formed the market or city-state, such as shops, hospitals, theaters, arenas, and other public buildings. The role of architecture is constantly enriched and evolved with the development of human society.

In modern society, the role of architecture has become more diversified. The evolution of human civilization has driven the development of science and technology. The new materials and technologies have made a qualitative leap in the built environment. At the same time, the demands of human activities on architecture and its environment are becoming more complicated, and human social activities are affecting the balance of the ecological environment.

2.3. The crisis of modern human settlement environment and its countermeasures

With the rapid development of science and technology, human society has entered the era of intelligence. Many new architectural morphologies have appeared in cities of various countries. They have become more technological and intelligent, and people's way of life is quietly changing in this context. However, every coin has two sides. Building environment brings the innovation of the living environment for high quality and has a severe negative impact on contemporary as well. A more intelligent environment leads to the reality of social life gradually narrowing, and many people live in their world even in the virtual world, and people face all kinds of electronic screen time encroaching on the opportunity to communicate face to face. In addition, global climate change makes the quality of the human ecological environment decline year by year, many artificial built environments threaten the natural environment, and modern construction behavior has many irreversible consequences on the environment.

The imbalance of the ecological environment has many passive effects on contemporary people's physical and mental health. In this context, the relationship between people and the environment becomes more complex, and the dimensions of the built environment also change. With the continuous transformation and upgrading of human's demand for living environment, architecture is transformed from the original functional manufacturing to spiritual creation, and the user is the most powerful witness.

At present, the functional feature and formal characteristics of architecture are interrelated, and the creation of form needs to embody the material and psychological needs of users and the artistic quality. In the actual design, not only the positive site cognition should be emphasized, but also the personal experience of people in the environment, including tangible experience and intangible feelings.

When evaluating the quality of a built environment, we tend to focus only on its form and function. However, if we consider the emotional and behavioral factors, we can create a more harmonious atmosphere. It is an adaptive organization of the relationship between human beings and the environment. Therefore, in the dimension of Time and space, paying attention to the relationship between the environment and people will obtain a more three-dimensional environmental experience. This process will optimize the quality of our current environment and humanize the space.

2.4. Environmental Psychology

The environment has always been a topic of human concern. Throughout history, people have studied their surroundings to make them more adaptable to their environment. With the continuous development of human civilization, human society has become more complicated, and people have been pursuing a habitat that meets their physical and mental needs. In this context, architects and artists, psychologists, sociologists, geographers, anthropologists, and economists have reached many consensuses on environmental issues and have carried out extensive cross-border cooperation.

Environmental psychology is an interdisciplinary research field, mainly studying the relationship between humans and the physical environment. It focuses on the interaction between human behavior and the environment. Environmental psychology focuses on the human aspect of surroundings problems and explores ways to solve them. As a field of study, it emphasizes the interrelationship between individuals and their surroundings. It seeks to understand how and why our environment affects us, how we can use this knowledge to our advantage, and what we can do to improve our relationship with the world around us.

Environmental psychologists believe that the physical environment interacts with people's inner psychological processes in their daily behavior. The physical environment acts as an active stimulus on individual or social behavior. The physical environment itself has the meaning of the site, and it allows people to contact and act as equal partners in the process of human behavior. The essence of environmental psychology is the theoretical study and practical application of human-environment interaction. It emphasizes interdisciplinary cooperation, especially with architects, sociologists, and medical rehabilitation areas. After years of communication and collaboration, it can be seen from the current development trend that environmental psychology is more closely related to the practical application of related industries, and some independent research fields have emerged whose research nature is psychological and behavioral.

2.5. The emergence and development of Environmental Psychology

The emergence of Environmental psychology is closely related to the rapid development of human industrialization and urbanization and is also the product of the development of human technology. The progress of human production and science and technology leads to the rapid increase of the urban population, and the influx of large numbers of people into cities accelerates the process of modern urbanization. However, this is a double-edged sword, which has both positive aspects and negative consequences. Many natural landscapes have been replaced by modern living facilities. The rapid urbanization process has led to the gradual loss of ecological balance, and the natural living environment of human beings has been threatened. The change in environment causes the contradiction between human psychological demands and social needs to increase day by day and breaks the balanced relationship between humans and the environment. Therefore, for the benefit of human well-being and healthy life, contemporary people pay more attention to the influence of the environment on individual behavior.

In the 1960s, Environmental psychology first appeared as a psychological trend in the United States and Canada, and then began to spread in Britain, France, Sweden, and other European countries, and then gradually became popular and expanded throughout the world. China's research in this area started relatively late and did not officially launch the study in this field until the 1990s.

At the end of the 1920s, Hawthorne, an American scholar, carried out the first outdoor study on the influence of the physical environment on human behavior, hoping to improve the efficiency of social

production under the shadow of economic crisis. Elton Mavo, along with several renowned physiologists and electrical engineers, is involved in a study that aims to improve productivity by improving lighting quality and production conditions to see if these conditions lead to changes in worker behavior.

After the end of the Second World War, countries urgently need to build many houses to meet the housing demand. An ideal and affordable living environment has become a common concern of scholars. In Europe, a few sociologists shifted their attention to environmental problems and carried out extensive social investigations and studies. Later, the relevant research results were fixed in legislation, which launched the research in the Environmental psychology field.

In the 1950s and 1960s, Environmental psychology develops in different places and aspects. For example, Ittelson and Proshansky set out to study the influence of the built environment on the psychology and behavior of psychiatric patients in American hospitals. Research by Paul Sivadon, a French academic, has won recognition from the World Health Organization for his work on the role of the physical environment in the treatment of psychiatric patients. In 1960, Kevin Lynch, an American scholar, analyzed the spatial perception of cities and published a famous book called Image of the City. Since then, scholars have realized the importance of environmental psychology and began to study the psychological problems in urban planning, especially Hall's The Hidden Dimension, 1966 and Sommer's Personal Space, 1969.

In 1966, the American Journal of Social Issues published a related academic album with the theme of People's Reaction to the real environment, which reflected the science circle's attention to Environmental psychology. At the same time, in 1968, the American Society for The Study of Environmental Design established the first formal organization for Environmental psychology. In 1969, after the publication of Environment and Behavior, it gathered relevant research results on environmental psychology and became an authoritative journal in this field. Also included: Design & Environment in 1969, Journal of Architectural & Planning Research in 1984, And Journal of Environmental Psychology, founded in 1981. Through the successful publication of these academic journals and works, the status of environmental psychology in science has been strengthened.

In 1969, the Environmental Design and Research Association (EDRA) was founded. Its Research topics include built environment studies, behavioral studies, facility planning, and post-use evaluation.

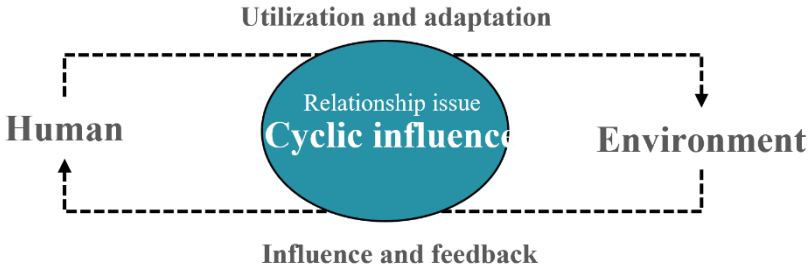
In 1974, Ittelson and Proshansky established the first doctoral program in environmental psychology at the City University of New York and wrote the first Environmental psychology textbook. Subsequently, some influential universities have established environmental psychology research groups in the world. At this point, Environmental psychology officially appeared in academia as an independent discipline.

The Handbook of Environmental Psychology published by Daniel Stokols and Irvvin Altman in 1987, is a milestone in the history of environmental psychology. The 1,654-page, 2-volume overview of Environmental psychology comes not only from the United States but also from The United Kingdom, Sweden, Germany, Italy, Japan, and Latin America.

The study of Environmental psychology in China started relatively late, and its research reflects in relevant teaching and research activities. As a discipline, environmental psychology was formally born in China in 1993, followed by the establishment of the "Chinese Society of Built Environmental Psychology" in 1995 (renamed as Chinese Society of Environmental Behavior in 2000). At present, the research of Environmental psychology in China mainly focuses on theoretical study, while the study of practical application is still in the exploratory stage, and the practical application in the field of architectural environment design needs further exploration.

2.6. The definition of Environmental Psychology

Environmental psychology is more than psychology, which is a multi-rooted scientific field. It is a new subject that studies the interaction between humans and the environment. It involves the relationship between human behavior and the environment. As an applied science, it researches how the natural and built environment shapes the way we are as individuals, emphasizing how humans change the surroundings and how space alters human experience and behavior.



Graph. 5. Definition of Environmental psychology.

(Source: Designed by CAO Hui, 2021)

Environmental psychology defines environment broadly, including ecological environment, social environment, architectural environment, learning environment, and information environment. In general, Environmental psychology considers all problems related to the environment, studies the interaction between people and the environment, and uses research to solve practical environmental issues. (*Graph. 5*)

2.7. Relevant theoretical models of Environmental Psychology

The difference between Environmental psychology and other disciplines is the generation of Environmental psychology in practical application. After problems are found in the actual daily environment, relevant experts combine the methodology of psychology to solve the issues. It involves surveys, experiments, and studies, and ultimately conclusions and concrete solutions through the approach of cross-border research.

Environmental psychology focuses on the study of everyday environments and people's behavior. Because the research is based on the practical application level, its related theories have diversification characteristics. The theoretical viewpoint mainly comes from two aspects. First, it studies the relationship between man and the environment based on determinism. Secondly, the interaction between man and the surroundings is analyzed based on relativity theory. The theories of environmental psychology mainly include stimulus theory, control theory, behavioral situation theory, interaction theory, operant orientation, and place theory.

2.7.1. Stimulus theory

Stimulus theory emphasizes the influence of the actual environment on people's feelings and believes that the surroundings provide people with significant information sources, such as light, sound, color, house, indoor and outdoor environment, streets, pedestrians, and other things. Two main variables affect the degree of environmental stimulus, which embodies quantity and meaning. Theories related to stimulus theory include:

Adaptation Level Theory (Helson, 1964) is a significant theory based on environmental stimuli, which refers to the level of people's adaptation to a certain degree of environmental stimuli in the surroundings. Although these stimuli have positive and negative aspects, when the level of stimulation and accommodation is not balanced, people's feelings and behaviors will be affected.

Arousal Theory (Mehrabian & Russell, 1974) holds that the content and form of people's behavior and experience are determined by the level of physiological stimulation people receive, and the level of arousal determines the impact on the efficiency of daily activities.

The theory of stress holds that when the internal and external stimuli of the environment exceed the individual's ability to adapt, it will affect the individual's behavior and health in daily activities, which is manifested in the individual's psychological and physiological reactions. Camppell (1983) summarized stress into acute stressors, ambient stressors, and everyday troubles.

The significance of stimulation has attracted the attention of many psychologists. The meaning of the environment is realized in the interaction between individuals and the environment. Individuals form positive and negative environmental experiences through stimulation and act on individual behavior processes.

2.7.2. Control theory

Control theory, another theory of environmental psychology, emphasizes the degree of self-control that people experience when they are exposed to different levels of environmental stimulation. The relevant part includes the following two aspects:

Theory of Personal Control. Barnes believes that it is difficult for individuals to influence the pattern of environmental stimuli and that the control of stimulus recovery is affected by individuals' lack of control function in daily activities, which is explained as Learned helplessness.

Boundary Regulation Mechanism. This theory was put forward by Altman (1975), who believed that individuals could control themselves through boundary adjustment mechanisms such as crowding, personal space, privacy, and domain in daily activities, emphasizing the core role of privacy in individual activities.

2.7.3. Behavior setting

Barker (1968) and Wicker (1979) proposed the behavioral occasion theory, which emphasizes social rules, individual habits, site events, and studies and explains the relationship between individuals and the environment through the social characteristics of the occasion and place. The level of individual participation is the core point of the theory. The degree of individuals' involvement in activities in specific behavioral situations is variable and affects people's sense of experience. Wicker (1987) further studied this theory and pointed out that the behavioral occasion is a moving entity rather than a static entity, and its process is embodied in generation, effort, adaptation, success, and extinction.

2.7.4. Interactionism

Interactionism was proposed by Stokols & Shumaker (1981). This theory emphasizes that the individual and the environment are integrated entities. They are interdependent and act on each other, the individual affects the environment, and the environment also affects the individual. In addition, Organismic Theory believes that individuals and the environment jointly construct complex social systems. Society and the environment influence individual social activities, and at the same time, the surroundings are also affected in this process.

2.7.5. Operable Approach

Geller (1987) proposed a theoretical outlook, namely the operable approach. According to the theory, individual behaviors influence specific environmental problems and can influence specific environmental behaviors and solve relevant environmental problems by strengthening and weakening individual behaviors.

2.7.6. Place Theory

The place theory was put forward by David Canter (1977, 1983, 1991, 1993), which emphasizes the evaluation of the environment. The concept of "place" is embodied in individual environmental experiences. It is not only a physical space but also a comprehensive experience system of various aspects, including individual, social, and cultural. The goal of individuals and groups on the site is the central issue of the theory, and different site goals and intentions determine people's behavior. People's actions on the site can obtain direct environmental experience and indirect information sources to obtain the emotional experience of the site, which constitutes the evaluation of the site. Therefore, the environment objectives formed the main body of environmental assessment, different site objectives correspond to diverse environment assessments, and site objectives distinguish disparate people and surroundings.

2.8. Psychology of environmental design

Environmental design is an emerging art discipline in China. It refers to the process of addressing the surrounding environmental factors in the design of plans, procedures, policies, buildings, or products. The aim is to create spaces that can improve the natural, social, cultural, and physical environment of a particular area [8]. It focuses on issues related to ecology and sustainability, covering interdisciplinary fields including architecture, geography, urban planning, landscape design, and interior design. The essence of environmental design is to create an ideal living environment to meet People's Daily needs. The designer's work is not only the creation of space art and technology but also the design of environmental behavior and environmental relations. Design should meet people's physical needs as well as their psychological demands.

The organic combination of environmental aesthetics and functionality is the main task of environment design. The design's practical application is that designers improve and strengthen the relationship between users and the environment through artistic means of space creation. In this sense, the environment designer is more like a relationship maker. The work of environmental design lies between the physical aspect of the environment and the psychological aspect of people. By creating and designing the actual physical space, the designer harmonizes the emotional connection between individuals, groups, and surroundings. Thinking from the perspective of psychology, environmental designers can solve many complex problems between people and the environment, especially in the aspect of psychological problems caused by the environment to contemporary people.

Social behavior reflects the process of interaction between people and the environment, which emphasizes the external behavior related to people and the environment. Its focus is on how people communicate and talk with the environment and how people control space, which is the focus of environmental psychology and is undoubtedly consistent with the research object in the environmental design field. The ideal dwelling environment of human beings is the product of the combination of physical space and emotional space, which makes environment design and psychology closely related. Applying Environmental psychology to environmental design is an innovative design way, which helps to optimize the design process of designers and create a better experience space for users.

The psychology of environmental design can provide many possibilities for the well-being and healthy life of human beings. Its cooperation with many fields has achieved phased results, such as visual communication, industrial design, media art, psychotherapy, environmental design, and other sections. Studying the influence of Environmental psychology in environment design and its application in practical design projects can broaden the environment designer's cognitive ability and analysis ability, inspire more creativity at the same time, help the designer to build a harmonious relationship between people, strengthen the interaction between human and environment to stimulate the construction environment of energy transfer. It plays a significant role in guiding and evaluating designers in the early stage of project creation and the late stage of project implementation.

2.9. Summary

First, this chapter analyzes the contemporary crisis and response of the built environment, the role change of architecture, and the living environment. Secondly, it expounds on the concept and characteristics of environmental psychology, the emergence and development of Environmental psychology, and its theories and focuses on the relevant theoretical models of Environmental psychology. Among them, stimulus theory and control theory are relatively early theories that laid the foundation for the later development of Environmental psychology theory. The behavior setting and operable approach take human behavior as the research object and emphasize the social characteristics of the occasion to explain the relationship between humans and the environment. Interactionism represents a more advanced theory of environmental psychology, which highlights the dynamic interaction between man and the environment, which has inspired the author's design practice. Place theory is a set of the relatively complete theoretical model, which improves the methodology of environmental psychology research, focuses on the goals of people's activities in the place, and takes environment evaluation as the orientation, which provides many possibilities for the practical application of environmental psychology in environmental design in the future. Finally, at the end of this chapter, the author discusses the related content of environmental design psychology, analyzes the possibility of combining environment design and Environmental psychology, and provides new ideas for future theoretical research and design practice.

PART II: RESEARCH DESIGN

CHAPTER THREE. *Psychology in architectural environment design*

Thesis_ I.

Breakthrough the traditional barriers and blur the boundaries of architectural design, redefining the architects.

3.1. Coupling of Environmental Psychology and architectural environment design

Human society is a complex emotional community which is an attractive way of approaching how emotional bonds are formed and reproduced [9]. It is composed of a material environment and a spiritual world, the balance of which promotes the development of human society. Architecture is the carrier of the physical environment of human society, and the architectural environment design is the conscious creation of human beings on the site, which reflects in the combination of art, technology, and science. Therefore, the knowledge of architecture is extensive and enriched by various kinds of knowledge [10].

Architects make the environment more suitable for the needs of human social development through the means of art and technology. This process reflects the process of human cognition, perception, creation, experience, and evaluation of the ideal dwelling environment. This process has psychological characteristics. Therefore, psychology can provide help and support in most stages of an architect's work and could enrich the theory of architectural environment design research to serve the design practice. It embodies breaking traditional barriers, creating adaptive architectural concepts, blurring the boundaries of architecture, rebuilding man-land relationships to promote the transformation of environmental energy, shaping healthy social behavior, environmental experience, environmental evaluation, and others.

First, break down traditional barriers. The architect's work usually focuses on the expression of physical spatial forms and the application of techniques and materials, such as the scale, shape, color, material, structure, artistic style, and other factors of architectural space. However, the dimensions of the built environment continue to be extended with the development of urbanization, and the field of architecture environmental design needs to integrate fresh ideas to adapt to the development of The Times. Architects should not just design some outdated architectural works. It is necessary to analyze the psychological impact of the environment on people for architects to identify and correct inappropriate attributes of the current environmental conditions.

Integrating the inspiration of Environmental psychology into architectural environment design is an innovative methodology that could help architects break down traditional barriers to design creation. Getting architects to think like psychologists can enhance their understanding of the nature of the site. At the same time, architects can take the initiative to carry out cross-border cooperation to strengthen theoretical research and design innovation in this field and provide more possibilities for architectural design.

Second, to create an adaptive concept of architecture. With global climate change, contemporary people pay more attention to sustainable lifestyles and become more complex in terms of the psychological adaptability of the environment, such as anxiety, depression, stress, and crowding. People's demand for emotional sustenance and emotional restoration of the architectural environment is increasing day by day, and the need for the built environment pays more attention to the space experience with a sense of temperature.

The work of architects should study the psychological phenomena of the masses, not only from the general aesthetic vision but also consider the needs and expectations of clients. Study the details of functional, formal, emotional, and aesthetically compatible spaces and use them all to shape a high-quality living environment. Applying the methods of Environmental psychology to architectural design can help architects explore the deeper relationship between the physical environment and psychological phenomena, study the essence of space design, and establish an adaptable architectural view to evaluate current design activities and guide future design work.

Third, blur the boundaries of the building. Throughout the history of architecture in the world, architecture's concepts are constantly evolving and updating. Its definition has not only provided the physical environment for habitation but also had more social significance and emotional factors. In contemporary times, the influence of the built environment on people's behavior and emotion and how people act in their surroundings has become the focus. The physical boundaries between people, buildings, and the environment become blurred, and architects need to incorporate new concepts to reorganize the relationships among them.

Insights from environmental psychology provide a new context for this question. It can help architects better organize the relationship between people, buildings, and the environment during the planning stage, making design work more prescriptive and systematic, and giving the built environment more human characteristics.

Fourth, rebuild the relationship between man and land and promote the transformation of environmental energy. To interpret the role of architects from the psychological context, they are not only the builders of physical space but also a maker of relationships. There is a mechanism of interaction between human activities and the environment. Architectural environment design is not only a simple space design but also emphasizes the physical and mental feelings and personal experiences of users. It pays attention to people's physical and mental feelings and individual experiences. To identify and improve the negative attributes of the existing environment by analyzing the current (future) psychological impact of the physical environment on people, optimize the details of the physical space, and use it all to shape the future positive environmental experience of human beings, repair and re-establish an adaptive human-earth relationship.

In addition, the research framework based on environmental psychology establishes a bridge for communication between humans and the environment, architect and user. In specific design work, through the analysis of people's behavior and psychology, architects can more clearly define the needs and expectations of users, smooth communication can optimize the work efficiency of architects, and help architects accumulate practical experience.

Fifth, to shape healthy social behaviors. The focus of contemporary architectural environment design reflects the characteristics of The Times in the dimension of time and space. On the one hand, it pays attention to the interpretation of aesthetics and function. On the other hand, it pays attention to the study of human behavior. The relationship between most aspects of the physical environment and psychological phenomena affects People's Daily behavior and health. Such as the nature of space and people's emotional communication.

Nowadays, cities, streets, and communities are becoming a significant part of urban environment design. Designers began to pay attention to the physical and psychological effects of the physical environment on people, such as the impact of crowding and noise on the community. The public has also begun to realize that the complex environment will lead to many psychological obstacles, and the influence of environmental problems on people's social behavior is becoming clear. In such a tanglesome

context, architects and psychologists should carry out interdisciplinary cooperation to break the shackle of tradition and jointly build a positive living environment. Through innovative design methods to guide the public to establish positive social relations, form healthy behavior habits and good environmental perception ability, to face more complex environmental problems in the future.

Sixth, environmental experience and environmental assessment. Once the sciences made emotions an object of study, they not only produced knowledge about emotions, but also had a significant social influence [9]. Through the path of emotional integration and space sublimation to create a harmonious site atmosphere, strengthen people's perception of the site, and improve the sense of the experience of space. The design of the architectural environment should not only meet the diversified needs of contemporary people for the environment but also pay attention to improving the dwelling environment into a compound form with the spirit of place. It is not only to let people perceive the environment but also to experience the benefits that the environment brings to people.

Psychology can guide most design works and provide operational and feasible solutions. Help architects not just only think from the usual aesthetic and visual views but also consider the needs and vital interests of users. In the project design, the architect conveys professional and ethical ideals to the user, and users can get a feeling of the actual space through environmental experience and objectively evaluate the environment according to their needs and expectations, which is conducive to correcting architects' subjective assumptions about design projects and providing specific design experiences for future design. For example, the Gubei Yunzhu parent-child homestay project is based on the relevant theories of child psychology. The author created this parent-child commercial project with the client through cross-border cooperation. The design aims at a child-friendly space environment. The author breaks through traditional design thinking and takes children's psychological characteristics and behavioral needs as the core to create an ideal parent-child space. (*Fig. 3*)

Fig. 3. Gubei Yunzhu Homestay Center, Yunzhu yard- An architectural environment design project guided by early childhood psychology. (Source: Designed by CAO Hui & HUANG Zhenkai, the actual picture is provided by Gubei Yunzhu Management Consulting Co., LTD., 2019)

The coupling of environmental psychology and architectural environment design reflects the characteristics of The Times. By studying the relationship between the two, we can construct a sustainable design method for the future and help architects create a systematic design idea to deal with the current complex man-land relationship. On the one hand, to improve the efficiency of architects' work,

more importantly, to provide customers with high-quality design services. In the next part of the paper, the author will analyze the coupling between them from the aspects of site construction, atmosphere creation, social behavior, and environmental evaluation.

3.2. Site construction and environmental cognition

3.2.1. Environmental perception in site construction

Environmental perception is the source of people's access to environmental information, and it is the process of extracting and interpreting surrounding information. The first step for people to start social activities is to understand the environment in which they live and explain the relevant environmental message through the simultaneous action of the five senses of vision, hearing, smell, touch, and taste. At the beginning of site construction, architects should obtain environmental information through perception, including place messages and the perceiver's own experience. Firstly, people's senses extract relevant information from the environment for sensory registration. Secondly, extracting spatial features from environmental stimuli to analyze; Then, people's perception and experience of the site are formed according to the site characteristics of the perceptual object. In actual design projects, from target perception to environment perception, try to establish the context connection between people and the environment so that people can get utilitarian nature and aesthetics environmental experiences.

In daily life, people strengthen and establish psychological representation through continuous learning and form the perceptual constancy of the site. During information processing, human attention and cognitive capacity have certain limitations and passivity, which provides new inspiration for site creation. Therefore, the efficient organization of the visual elements of the site system becomes a key consideration for the architect and reflects the basic needs of the users. Of course, the unconscious perception of the environment should also be a concern for architects. Architects should properly control excessive design on the site to avoid visual fatigue and perceptual obstacles to the environment. In addition, the architect should prevent people from changing their beliefs and attitudes towards the environment due to the perception of disasters through spatial intervention. In this process, the architect should also consider the impact of individual differences on environmental information, perceptual ability, undergo, and experience.

In addition, Environmental perception is related to the physical form in the environment, so recognizing the shape becomes the core point. The insights of the Gestalt school of psychology are of great significance to architects in terms of environmental cognition. They believe that the perception of the environment should be in a simple, clear, and understandable way to carry out that can be easily recognized by people as much as possible. One of the most important contributions is the phenomenon of figure and ground. In this conception, the perceived object is divided into figure and ground, the figure is the focus of vision, and the ground is the background of graphics. This theory provides architects with a more scientific perspective to interpret space. The phenomenon of graphics and background as the aesthetic basis of morphological research has guiding significance for the specific architectural environment design, and it can help architects perceive and analyze the environmental information of the site and accurately establish the visual focus of the site, but also to enhance the perception of users to assist them to process environmental information. *(Fig. 4*)

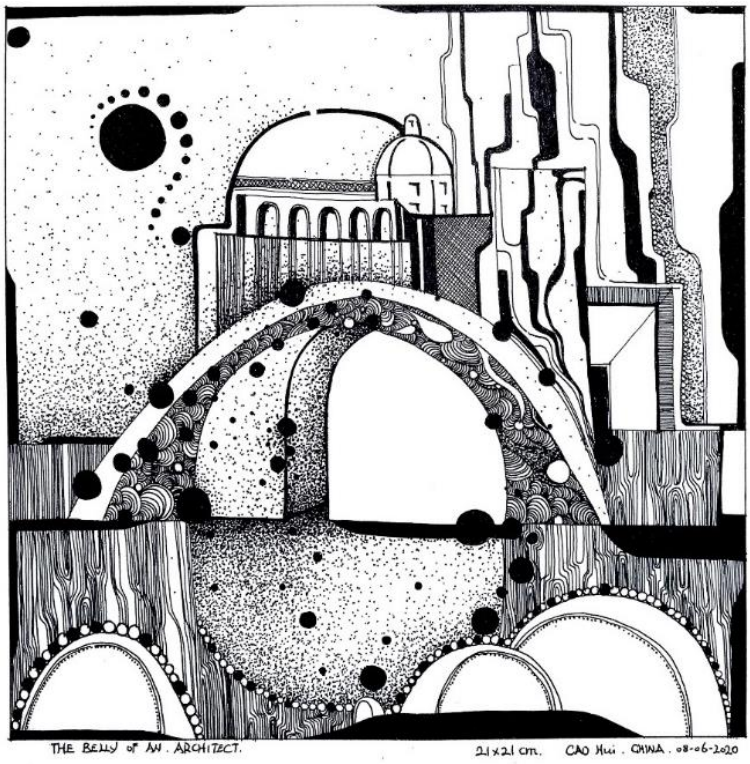


Fig. 4. Visual presentation of the relationship between the figure and the ground.
(Source: Draw by CAO Hui, 2020)

Based on the above analysis, the author believes that environmental perception is the primary response of people to the environment, and it is a process of self-cognition and processing of the target environmental information by architects and users. However, environment cognition also involves more psychological processes, including the interrelated information-processing processes of perception, attention, representation, memory, learning, thinking, language, concept formation, and problem-solving [11]. Architects should systematically interpret the process of environmental perception in concrete design.

3.2.2. Spatial cognition in site construction

The cognition of the target environment is the primary ability of architects in site construction. They should understand the location, direction, distance, and other information of the project in the city and could identify and recognize the environment as well. In addition, the environment users' ability to express and remember the place psychologically is also an important skill, which can reflect people's attention to the environment.

Spatial cognition is composed of a perceptual process integrating various psychological changes. Individuals acquire information related to location and phenomenon attributes in the daily spatial environment through this process, and encode, store, recall and decode it [12]. From an architect's perspective, site cognition is a process of processing and processing spatial information, which aims to provide users with professional site information to meet their individual needs.

First of all, spatial cognition is the basis of spatial perception. People sense the site information through their sensory system and analyze its characteristics, correlations, and differences between them, to master the place attributes. Second, after acquiring messages, all senses process and analyze the

information through the brain, forming the memory of the target site, encoding and classifying the data, and then transforming it into people's experiences and personalities. Finally, the analyzed information has special categories and attributes that enable people to form associations with previous site experiences. This process is a circular existence that is activated and decoded as site events occur again.

In the site construction of the built environment, architects can apply the site cognition results to specific design practices. Focusing on the impact of the physical environment on spatial cognition and individual differences in spatial awareness is of great inspiration to the work of architects. It can guide the implementation process of design activities, the processing way of environmental information, and the design results.

The cognitive map is the specific application of spatial cognition. It is the way for people to recognize and understand the site information and the ability to reproduce the site image in their memory. From the perspective of psychology, the cognitive map is a process of diagraming and structuring individual site information, which reflects the process of decoding and coding space. The site information summarized by the cognition map is usually visual, but it is also compatible with other types and has the characteristics of intuition and imagery. For example, the figure below is a cognitive map drawn by the author in the planning project for Hougou Ancient Village's scenic spot. The author interprets complex site information most concisely. It includes path, boundary, region, node, landmark, and other elements of the site environment, which reflect the cognitive orientation of the site environment. The author also divides different groups according to the size of the site for spatial cognition, which provides the identification of the site environment. (*Fig. 5*)

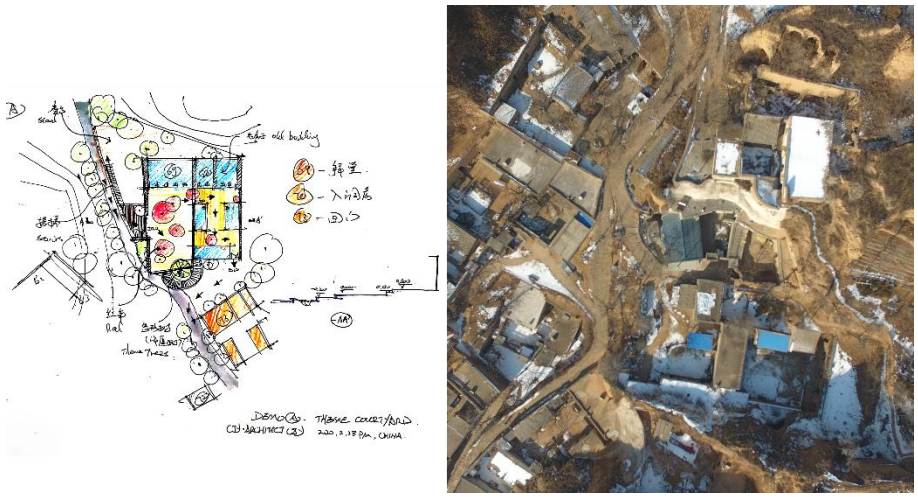


Fig. 5. Cognitive map expression - cognition of vernacular architecture layout in Hougou ancient Village.
(Source: Draw by CAO Hui, 2020)

In a word, architectural environment design starts from the construction of the target site, and the first step of site construction is environmental cognition, which reflects in the analysis and organization of various elements of the target site. For example, create sensible paths, clear boundaries, organized areas, well-designed nodes, and create significative landmarks. It is a practical and economical design path. A high-quality built environment design should establish users' efficient perception and cognition of the target site to provide users with a positive sense of site experience.

3.3. Analysis of environmental image and spatial identification in the construction of environment atmosphere

3.3.1. Analysis of environmental image in site atmosphere construction

In the book The Image of The City, Kevin Lynch (1960) studied people's City Image and analyzed the visual quality of the environment, especially the "readability" of the surroundings. This study focuses on the unscrambling of the cognitive symbols in the surroundings to form well visual understanding, believing that only the environment that people can feel can reflect the value and significance of the surroundings. Kevin Lynch proposed that the environmental image is formed by the sensory stimulation continuously caused by the external environment [13]. It is the result of the interaction between the user and the environment. He also summarized five morphological types of urban image elements, namely, roads, markers, boundaries, nodes, and regions.

Environmental image is people's feelings about daily life. It is the impression of the physical environment in people's minds and is composed of individual characteristics and the essential characteristics of the surroundings. Environmental image is closely related to the creation of an architectural environment atmosphere. First, the atmosphere creation of the architectural environment is the art of time and space. It is the systematic construction of geographical features, spatial organization form, color collocation, material structure, sound, and smell in the environment. Secondly, to create a good social atmosphere, the builder constantly adjusts the environmental form by analyzing the external causes of the formation of the environment image so that people can feel the enjoyment of beauty brought to them by the environment and build the impression of the surroundings. This process reflects the architect's creation of the environmental image and the user's feeling of the environmental image.

Fig. 6. Aerial view of Hougou Ancient Village scenic spot - Fengshui artistic conception expression of architectural environment design. (Source: Designed by CAO Hui, 2021)

In China, the atmosphere of the built environment has been developed around traditional culture since ancient times, especially the presentation of the artistic conception of "Feng shui" in terms of environmental significance. (*Fig. 6*) The atmosphere of the built environment can be understood as the user creating a "readable" environmental space that satisfies the joint image of the individual and the group. Architects need to find an organizational clue to identify the environment to create an environment

atmosphere and analyze the factors that affect the public environmental image and atmosphere creation. (*Table. 1*)

By analyzing form types and related influencing factors, architects can accurately master the method of creating environment images. Try to establish a specific symbol system to create a personalized, orderly, meaningful environment, to provide users with the possibility of choice and emotional security. In addition, a positive site relationship can be established between individuals and the environment, trying to expand the site experience and social interaction of individuals and groups and ultimately make people get emotional and experiential satisfaction.

In addition, architects and planners should also design around the site environment and the customary route of people's daily activities. In the specific design, it is necessary to transform the route image into the overall environment image, make clear the controlling symbol in the environment, and combine the social meaning to enrich the connotation of the design.

Environmental aspects	**Architectural aspects**	**Person's aspect**	**Sensory aspect**
Road	Visibility	Age	Sense of touch
Markers	Usage rate	Gender	Sense of hearing
Boundary	Symbolism	Occupation	Sense of sight
Nodes	Cultural meaning	Social stratification	Sense of taste
Landmarks	Historical meaning	Ethnic	Sense of smell
Environment form	Duration of residence	Religious beliefs	Kinesthetic sense
Neighborhood	Attributes of architecture	Cultural background	Habit

Table. 1. Factors influencing the image and atmosphere of public environment.
(Source: Designed by CAO Hui, 2022)

3.3.2. Analysis of spatial identification in the construction of site atmosphere

Architects should clarify the location of places and objects in the city, especially the comprehensive analysis of environmental attributes and characteristics, and take this information as the reference factor of the early planning to propose the design hypothesis. For example, how to make the experiencer form a clear environmental image? How do enhance the user's sense of presence and security on the website? How do solve complex environmental problems through a high-quality environmental atmosphere? And so on. Solving these problems requires analyzing pathfinding and cognitive distance.

First, Passini (1984) believes that pathfinding refers to a person's cognitive and behavioral ability to reach the spatial destination, namely, pathfinding decision, execution of pathfinding decision, and information processing [11], which reflects the process of solving spatial problems. When people enter or are about to enter an environment for an activity, they first have to make pathfinding decisions. This event includes the person's behavior and the site where the behavior occurs. Pathfinding behavior records the sequence of people's behaviors from the beginning to the end and the environmental information related to the behavior. In this process, people accumulate cognitive experience of the environment. It is a process of matching feedback when people deal with environmental problems in an unconscious state.

The analysis of the pathfinding process enables the architect to create a clear image of the environment for the user in the early stage of environment construction.

Secondly, obtaining accurate and explicit information about directions is the demand of users, which is a significant link that architects need to consider when designing. When designing a new site, architects need to plan the path in the environment reasonably. They need to encode users' pathfinding experience, behavior, and environmental information about the place and gather scattered destinations to form a new spatial form. However, unfamiliar environments are uncertain for users, which leads to people having to make frequent pathfinding decisions in the surroundings. As a result, people get lost and reduce their sense of experience for the environment. Therefore, the architects also need to decode the various factors that influence the loss of the site and analyze these factors to construct a site environment with recognizable and fixed structural patterns that provide a sense of security for users. (*Table. 2*)

The Human Factor						Environmental Factors					Other Factors			
Age	Gender	Occupation	Familiarity with the environment	Attitude towards destination	Experience the density of events	The road system	Road sign labeling system	Landmark system	Neighborhood layout system	Architectural vision system	Time	Commercial factors	Behavioral factors	Climate factors

Table. 2. The various factors that influence getting lost.

(Source: Designed by CAO Hui, 2022)

For example, in the commercial landscape design of Wen Hua Jin Yuan sales center, the author constructed a landmark shared landscape in the form of geometry. As a reference in the place, it realizes the information coding of the surrounding environment, which is easy to make people have a sense of intimacy and familiarity. (*Fig. 7*)

Fig. 7. Wen Hua Jing Yuan Sales Center - commercial landscape design.

(Source: Designed by CAO Hui, 2020)

Finally, the cognitive ability of distance has a particular influence on people's perception of the environmental atmosphere. When entering a new environment, people often overestimate or underestimate the space distance that affects people's experience of the site and their sense of presence in the space. This phenomenon reflects that the structure of the environment will affect people's ability to encode distance, which reflects in individual experience and behavioral activities, as well as the form and context of the site. The route segmentation hypothesis proposed by Allen (1981) provides a good explanation for this phenomenon. He believes that people will divide the route in the environment into multiple links and take its boundary as several heuristic points, thus improving their cognition of distance, which also reflects that people's cognition has the characteristics of the economy.

The physical factors of the environment and individual psychological factors commonly affect cognitive distance. Architects should pay special attention to these two aspects in the design process. For example, in the environmental construction of the tourist reception center project of Hougou ancient village scenic spot, the author cleverly used the obstacles in the environment and the twists and turns of the route to affect people's experience of finding their way. Meanwhile, the author paid attention to the active control of different boundaries in the site to weaken the negative impact of distance on people's cognition. In the specific design, the author organizes the site information with rhythmic environment nodes and brings tourists a relaxed environment experience through environmental integration, which satisfies the tourists' cognitive, emotional, and personality needs. (*Fig. 8*)

Fig. 8. Environment construction in tourist reception center of Hougou Ancient Village Scenic spot.
(Source: Designed by CAO Hui, 2018-2021)

3.4. Analysis of social behavior in architectural environment design

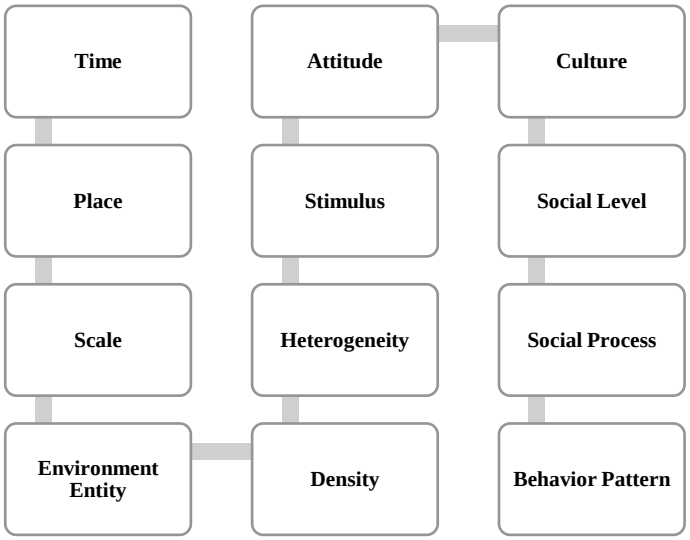
Behavior is the continuous reaction or activity of the human body to achieve the desired goal [14]. Then the study of people's behavior becomes the starting point of the design of the man-land relationship because the relationship between people and society is often affected by the actual environment. Therefore, the external behavior related to the site environment is the core of the architectural environment design.

3.4.1. Characteristic analysis of human behavior

The significant feature of human society is concentration and gathering, which reflects in the collection of people, human activities, and sites. Gathering itself is also a collective expression of human behavior. Concentration is the instinctive response of individuals and groups to the competition for survival. People tend to feel and think collectively, which is also the motive force of society and religion. In modern times, people live in big cities and small towns, and communities are the basic modules of cities. The analysis of people's behavior in big cities and small towns is of great value to the study of site relationship design, which covers both major and minor aspects of human society. The views of urban life determinism and place ecology reveal the behavior characteristics of people in big cities and small towns.

The determinism of urban life. On the macro level, life in big cities is characterized by large scale, high density, diversity, and excessive stimulation, which puts forward high requirements on individual adaptability, which easiness leads to the formation of various abnormal conditions and psychological disorders in daily life, such as selfishness and indifference, personality loss, fear, and emotional disorders. On the contrary, small towns perform better than big cities. On the micro-level, residents in big cities and small towns have some differences in behavior, attitude, and social level. For example, the pace of life in big cities is generally faster than in small towns. In addition, in terms of social frequency, the larger the city is, the lower the frequency of people's active social interaction. People tend to carry out activities centering on themselves, while the reverse is true in small towns. Human social behavior is directly influenced by the size, density, and stimulation of the environment. In other words, small is ideal.

Site ecology. Ecological studies define cities based on their size, density, and heterogeneity. In terms of the physical properties of a city, variables are the focus of its research, and individual differences and psychological aspects are less concerned. The concept of behavior setting was put forward by Barker (1968), which is a significant concept in ecological psychology. This concept emphasizes that place, time, behavior patterns of participants, and objects in the environment together constitute a behavioral site module, forming a natural place unit. The conditions of the site naturally catalyze the behavior of the participants. The number of participants and the degree of participation directly affect the differences in urban residents' environmental behavior. In addition, it also includes the purpose of the use of the site.



Graph. 6. Factors affecting the behavior of the place.

(Source: Designed by CAO Hui, 2022)

The accumulation of place behavior enables people to establish their own urban experience, which also reflects the behavior characteristics of residents in big cities and small towns. To put it simply, residents in big cities tend to have more negative social behaviors, while residents in small towns tend to have more positive social behaviors. However, such behavioral differences are complex and result from the interaction of various factors, which should be treated in a case-by-case manner. Architects should pay special attention to all kinds of factors affecting the behavior of the site in practical work. (*Graph. 6*)

3.4.2. Analysis of behavior mechanism in architectural environment design

The human behavior mechanism composes four elements: privacy, crowding, territoriality, and personal space. The privacy of individuals and groups allows them to control their contact with the outside world; Crowding is a negative state caused by insufficient control of privacy by individuals and groups. Territoriality and personal space are the coping measures people take to obtain privacy. By analyzing the factors affecting the behavior mechanism, architects can better understand the users' needs in site planning and establish a harmonious man-land relationship.

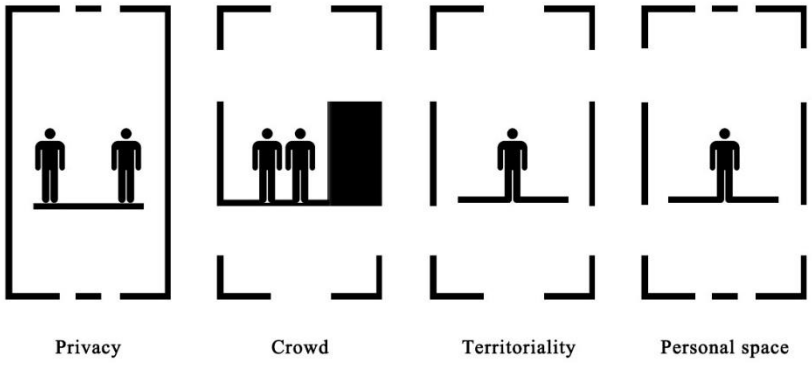


Fig. 9. Four elements of behavior mechanism.
(Source: Draw by CAO Hui, 2022)

Privacy. Altman (1975) proposed the definition of privacy. Privacy is the selective control of access to oneself [15]. The command of individual behavior is the focus of privacy. Individuals or groups adjust the degree of their social activities by regulating the activities between people and the interaction between people and the environment. Privacy includes the organization of social communication related to the environment and the information management concerning individuals. Generally speaking, privacy is an adjustment mechanism for individuals to control their openness and closure to the external environment.

For architects, privacy embodies the boundary control of the environment and the dynamic adjustment of the man-land relationship. For users, privacy is the embodiment of its adaptability to the environment. First, architects in the space design must consider the environmental elements, according to the needs of users and the nature of the venues to build the place, full consideration of behavior characteristics of different groups to create a rational space form, such as the uniqueness of the preschool, of the particularity of the universality of adults and the elderly. Secondly, the user's feeling about the site reflects by the individual's degree of adaptation to the environment, and reasonable privacy control is beneficial to the user's sense of experience. In addition, different spaces have inducements and constraints on users' behaviors. For example, the negative space and positive environment bring completely different

privacy experiences to users. The architect needs to identify the individual needs of the users to use the site.

In daily life, to achieve personal privacy, people must balance the relationship between individuals, others, and the physical environment. It can be said that the physical environment is one of the significant factors affecting people's privacy. For example, in Liang Wang Bie Yuan's environmental design project, the design team considered the importance of privacy in the design of site relations. The traditional space layout emphasizes the user's control over the space boundary, and the hidden lighting atmosphere reflects the individual's degree of closure to the space, which meets the individual's demand for privacy in the site environment overall. (*Fig. 10*)

Fig. 10. Liang Wang Bie Yuan-vernacular architecture restoration project.
(Source: Designed by ZHANG Erqing & CAO Hui, 2019)

Crowding. Crowding is relative to privacy. It's all about density, situation, and individual characteristics. It is a state of people and the environment and a subjective reaction of people to the actual environment. It is a sense of pressure generated by people's perception, cognitive ability, physiological response, and other factors. In other words, crowding is the psychological and physiological response of people to an excess physical environment, which will cause people to lose control of the environment due to excessive stimulation and form behavioral restrictions.

Relevant studies show that the degree of crowding straight affects the user's experience of the site environment. Crowding is the feeling of density and pressure in an environment. The factors affecting the sense of crowding are reflected in the influence of high-density situations on people's behavior, environmental factors, and individual factors. The negative and positive effects of high density are the main task of studying crowding and the factors that need to be considered in the design of the built environment.

High-density built environment has a superior negative impact on people's physical and mental health, work efficiency, and social activities, which is people's experience in daily life. However, high-density stimulation will also have a positive impact on people. For example, in a live concert, the denser the situation, the higher the mood of the people present. In addition, individual characteristics and some situational factors also affect the sense of crowding, such as people's personality, gender, situation type, crowd, cultural differences, and other factors. For example, in the "Fifty miles" theme bar design process, the author strengthened the external behavior research related to the environment. Using congestion and pressure to build the relationship between the site and users, through the organization and control of the

specific area to differentiate space, makes the bar more atmospheric and increases the possibility for people to interact with each other rather than only share it. (*Fig. 11*)

Fig. 11. "Fifty Miles" themed Bar - a modest design of crowded and stressful entertainment Spaces.
(Source: Designed by CAO Hui, 2018)

Personal space. The research on personal space is the most widely studied part of architectural environment design. It is a behavior mechanism that people show to the environment in their daily life. People control their interaction degree with the outside world with the help of personal space. Robert Sommer (1969) explained personal space as: "Personal space refers to an area with invisible boundaries around the human body that intruders are not allowed to enter [16]. Personal space is a phenomenon of individual boundary adjustment to a complex environment, and it is a dynamic process with the change situation. The study of personal space is to analyze it in a physical environment, which involves people's control of distance in physical space. Reasonable interpersonal distance and spatial organization will lead to positive emotions and behaviors, and conversely, it will lead to negative attitudes.

Fig. 12. Architectural environment design of Jinzhong No.1 Kindergarten.
(Source: Designed by CAO Hui, 2021)

Physical space plays a significant role in the process of social interaction. The function of personal space reflects in the adjustment of the individual to environmental privacy, the determination of appropriate interpersonal distance, the control of individual social degree, and others. It can help people

regulate the level of stimulation from different environmental conditions, and people can also adjust the level of social communication through personal space. Hall (1966) once proposed the theory of nearness. He put forward four applications of interpersonal distance, namely, close distance, individual distance, social distance, and public distance [17], and believed that cultural background could also affect the scope of personal space. In specific projects design, architects should comprehensively study the relationship between people and distance, not just focusing on the study of interpersonal distance in the static state but also on the study of people on the move.

For example, in the design of Jinzhong No.1 Kindergarten, the author studied the factors affecting personal space, emphasized the systematic organization of architecture and community environment, and created a child-friendly environment by analyzing children's behavioral characteristics and environmental needs. In the design, the author emphasizes the control of static and dynamic relations in the site, which satisfies children's expectations of the surrounding environment and strengthens their perception range with accurate spatial scale and distance control, making the design of site relations more humane and dynamic. (*Fig. 12*)

Territoriality. Territoriality behavior is a typical pattern of human social behavior but also a complex concept. It not only occurs in a large-scale environment but also exists in a small-scale space and has a definite connection with the personal area. Territoriality refers to the temporary or permanent control of an individual or group over a domain, which can be a place or object, and the owner will defend it when people's territory is violated [11].

The primary territories, the secondary territories, the public territories, the interaction territories, and the body territories are the main types of domains, and these types correspond to closed space, semi-open space, open space, public space, and private space. It also shows that the design of architectural space is to rationalize the planning of different areas to meet people's needs for disparate spaces.

In the specific design, the establishment of explicit domain clues can express the personalized needs of users. Establishing suggestive clues can achieve the owner's purpose of marking the domain. When people's territory is threatened, it will cause the owner to react defensively. If people take possession of a particular area, that contributes to its use and gives it meaning. Territoriality is closely related to People's Daily life. It promotes social development and the establishment of rules to a certain extent and helps people form a sense of identity and belonging.

Fig. 13. The overall planning and design of Hou Gou New village.
(Source: Designed by CAO Hui, 2021)

For example, in the overall planning of the building environment of Hou Gou New village, the author fully considers the various factors influencing the territories, systematic organization of the relationship between people, between people and space, from the perspective of relationship design to explore multiple possibilities of China's new rural construction, which has changed the completely closed field thinking of village planning in the past. By creating a shared environment, the living environment of the village becomes more flexible and emphasizes the social activities and information exchange of residents, establishing a systematic site environment and harmonious inhabitation paradigm. (*Fig. 13*)

3.5. Analysis of environmental evaluation

In the research of Environmental psychology, environmental evaluation refers to people's feelings after the comprehensive experience of the environment, which reflects people's aesthetic evaluation, satisfaction evaluation, emotional evaluation, and post-use evaluation of the site, which provides a significant reference for architects and reveals the value and significance of the built environment. The environmental assessment offers more possibilities for the innovative design of the built environment. Architects can integrate psychological theories to evaluate and reflect on the site environment.

3.5.1. Environmental evaluation

Brightly colored and dully colored	Attractive and unattractive	Happy and depressed	Nervous and relaxed	Beautiful and ugly
Rich in color and monotonous in color	Moderate in size and not large enough	Busy and cold	Open and closed	Dynamic and static
Light is soft and light is harsh	Comfortable and uncomfortable	Dull and vivid	Natural and artificial	Hot and cold
The right temperature and the wrong temperature	Popular and unpopular	Clean and dirty	Safe and dangerous	New and old
Convenient to use and inconvenient to use	Healthy and unhealthy	Elegant and vulgar	Exciting and bland	Solemn and casual
Easy to understand and puzzling	Harmonious and disharmonious	Empty and crowded Modern and traditional	Neat and messy	Exaggerated and unpretentious
Well ventilated and poorly ventilated	Odor-free and odor-free	Complex and monotonous	Hard and soft	Coordinated and out of balance
Vibrant and lifeless	Organized and disorganized	Expensive and cheap	Kind and cold	Clear and fuzzy

Table. 3. Comprehensive environmental description scale.
(Source: Designed by CAO Hui, based on Kasmar, 2022)

Environmental assessment is a comprehensive analysis and summary of the quality of the target site by architects and users, which reflects people's interpretation of the environment on physical and psychological levels. Description, satisfaction, likability, and emotion are the main ways to evaluate the environment. In specific design, architects should balance the relationship between economy, culture, site conditions, and design, pay attention to the interaction between people and the environment, and balance the possibility of design from a multi-dimensional perspective as far as possible.

The first concept is the description. People use language to describe their subjective feelings about the objective environment and rate them with personal characteristics. Adjectives are often used to measure emotions and express people's personal feelings. Based on the structural analysis of the user's description of the environment, architects could establish a thesaurus to evaluate the built environment, which is related to the context of the building environment and can be used to describe the complex site environment.

Kasmar (1970) used 195 adjectives to form an adjective combination to evaluate the built environment [18], and the author referred to the part of the adjective combination to describe the environment of the actual site. In addition, the description of the environment can also interpret in terms of the dimensions of the built environment, such as overall evaluation, utility evaluation, aesthetic evaluation, space, activity, effect, organization, temperature, and others. However, in the face of the environmental description of different cultures, regions, and situations, we should pay attention to their differences and people's semantic differences. Therefore, the author constructed the environmental description scale to describe the environment. (*Table. 3*)

The second concept is satisfaction. Satisfaction is the most direct way for people to evaluate environmental quality. By asking people how satisfied they are with the environment, we can understand the degree of interaction between environment elements. In the early stage of the project design, the core content of the work is determined by assessing the importance of all aspects of the environment, which can make the design process more efficient. In addition, it can also improve the overall quality of the project after completion. Finally, the content of satisfaction evaluation should comprehensively consider the aesthetic and physical properties of the target object and distinguish the differentiated assessment of the environment by observers and users.

A good living and working environment can make people feel happy and at the same time help to improve work efficiency. The progress of human society has led to the development of living space and working space, and the evaluation of these two aspects can obtain people's more common assessment of the environment. In the process of project design, architects should pay special attention to the collection of such information to establish systematic environmental assessment indicators.

The third is likeability. When people judge the significance of the environment, they often compare different places with the help of concepts such as quality, value, hobbies, and visual features, showing that people unconsciously use the experience to evaluate the process. Therefore, the comparison is a significant feature of environmental evaluation.

The characteristic of space is one of the concerns of whether people like the environment. We can analyze the site characteristics from different aspects, such as open and closed, spacious and cramped, limited and unrestricted, organized and unorganized, single function and compound function, new space and old site, artificial and natural, and others. Among them, open and limited are two important spatial variables. These environmental characteristics can distinguish different environments and are also important factors affecting people's liking degree. In addition, order and complexity are also significant characteristics affecting liking degree. Complexity can enhance people's interest in the environment,

while order can reinforce people's liking degree, but their relationship is affected by the degree and environmental heterogeneity.

Environmental needs are another concern of people's evaluation of environment liking degree. Architects must face the problem of understanding people's needs for the environment and what needs the environment can meet, which can help architects better understand the needs of individuals and groups and formulate coping strategies. Environmental needs reflect in the three aspects of environmental protection, environmental usability, and social functions, which are also the basic demands to be satisfied by architectural design. In addition, these sections relate to people's goals in the environment.

The last is emotions. Emotional change is the value judgment made by people to the objective environmental conditions. It is a reaction of people's instincts, a process of dynamic accumulation, and evaluation results. In the process of environmental assessment, people's site emotions are more reflected in physiological, behavioral, cognitive, and other aspects. It includes emotional evaluation and experience. Users can use adjectives such as pleasant and unpleasant, excited and calm to indicate emotion assessments. Most times, it shows the orientation of interdisciplinary to a certain extent.

3.5.2. Post-occupancy evaluation

The main task of architects is to provide users with a high-quality site environment through professional design means. The success of the design work is judged mainly on whether it could meet the expectations and needs of users on the site, whether people's lifestyle is strengthened, and whether people and the environment could live in harmony. Therefore, the architect should clarify the individual needs and wishes of the users, understand their attitudes and opinions on the site design, and get the users' feedback as comprehensively as possible. Generally speaking, post-use evaluation is a widely used evaluation method for an environmental satisfaction survey.

Post-use evaluation is a term from marketing, which is an investigation of the needs, desires, and opinions of users in the built environment [11]. It involves many disciplines, including urban system, architectural design, environmental impact, construction equipment, and other aspects, so it is interdisciplinary. Post-application evaluation is a crucial method in architectural design, which reflects the satisfaction degree of individuals and groups with the environment. It uses a systematic approach to evaluate the actual effect of the built environment from the perspective of users, including the function planning of the site, device application effect, user's environmental experience, and assessment of the adaptability of the environment to events.

The characteristics of post-use evaluation reflect in the following aspects: First, post-evaluation comprehensively evaluates design results, and clear and rigorous research methods are the premise. The methods mainly include interviews, questionnaires, behavioral observation, sampling survey, data collection, and analysis of relevant results. Secondly, it emphasizes the objectivity and fairness of evaluation. Thirdly, post-use evaluation is an activity for architects and users to analyze and solve practical environmental problems and full of practical application value.

In the architectural environment design, the contribution of environmental assessment lies in that it can help architects carry out positive environmental design assessments, draw up architectural plans and carry out design reflection.

Environmental design evaluation. A. Friedman proposed (1990) that environment design is the evaluation of the designed place in terms of meeting and supporting the superficial or internal needs and values of people [20]. Environmental assessment is the investigation and analysis of the built environment and the subjective experience of its users. The main work of environmental assessment is

to systematically analyze the quality and value of the target object, evaluate the contribution of the built environment in meeting the needs of users and provide an objective basis for future work. Environmental design evaluation is consistent with the research method of environmental behavior but more applicable.

Architectural programming. Another contribution of post-use evaluation is that it can help architects translate research information into design plans. In the early stage of the design work, the architectural programming is the collection of site data and the arrangement of environmental conditions by the architect, as well as the summary of the relevant needs of users, and the comprehensive information is conveyed to the corresponding personnel of the architectural environment design, such as architects, users, and clients. To understand the requirements and expectations of individuals and groups for the architectural environment and then formulate corresponding countermeasures to solve these problems, this process needs to integrate various factors to form a systematic implementation plan. The most important is to meet the needs of users and the interests of owners.

Sound methods and procedures are at the heart of a building plan. Architects need to analyze different projects and different groups of people in a systematic way, encode users' wishes, site information, and design objectives comprehensively, and then translate them into the analysis and application of form, material texture, site organization and environmental behavior. Try to build a dynamic process and form a jointly participatory design pattern to enrich the results.

3.6. Summary

Architectural environment psychology is a systematic study of the physical space form and human social organization, focusing on the harmonious human-earth relationship construction, which involves the systematic design of individuals, groups, and environments. The core work of architects is to recognize the site from the perspective of psychology and comprehensively analyze the relationship between people's social behaviors and the environment. The core information of the correct organization of design objects is the professional skills of architects, which is beneficial to creating design products that keep pace with The Times and harmonize people and the environment.

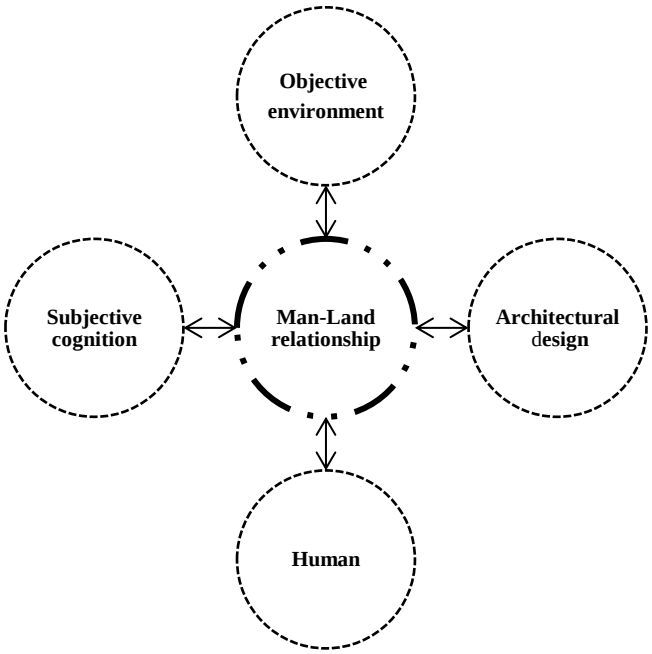
The architectural environment design is not only the expression of beauty, perfect functional organization, and application of high-tech technology, but also the equal dialogue between people and the environment through a low-carbon design approach. The comprehensive analysis of environmental information in physical and spiritual aspects can help architects establish an overall design framework. It is not only the planning in the early stage of design but also the summary and reflection in the later stage of design. Contemporary architectural environment design needs more emotional characteristics and artistic creation, and it is the responsibility of architects to pay attention to the comprehensive needs of users.

PART III: DESIGN APPLICATION

CHAPTER FOUR. *Design strategy of ideal man-land relationship*

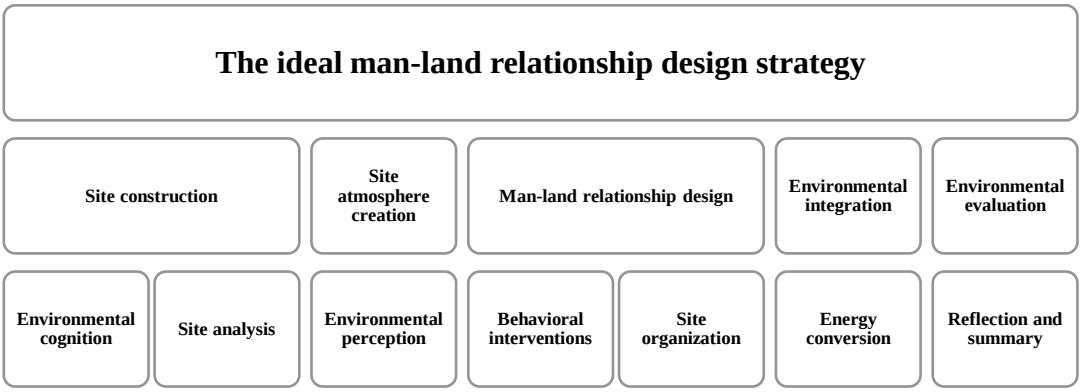
The goal of architectural environment design psychology is to construct a harmonious man-land living paradigm based on the theoretical framework of Psychology and Architectural methods. Through the interaction mechanism between humans and physical space, the author studies the way of harmonious coexistence between humans and the environment. (*Graph. 7*) Try to examine how actual architectural environment design work by evaluating the dimensions of society, values, behavior, and preferences. Consider design as a dynamic unit of physical, emotional, behavioral, and evaluation of the environment.

Architects should break out of closed-loop design ideas and think like psychologists, organizing the target environment in the dimensions of time, space, and emotion, rather than just focusing on designing within the framework of complex technologies and structures. Identify and optimize the attributes of the existing environment by analyzing the combined current and future impact of the physical environment on the user.



Graph. 7. The interaction mechanism between humans and physical space.
(Source: Designed by CAO Hui, 2022)

Through the analysis of related theories and design practice, the author puts forward the design strategy of the ideal man-land relationship. In the actual design project, the author emphasizes systematic design thinking to carry out the low-carbon architectural design to create a high-quality architectural environment that meets the needs of contemporary people. The ideal man-land relationship can be realized through site construction, atmosphere creation, man-land relationship design, environmental integration, and environmental evaluation. It is a design approach that combines Environmental psychology and Architecture and has strong practicability and popularization. (*Graph. 8*)



Graph. 8. The construction system of ideal man-land relationship.

(Source: Designed by CAO Hui, 2022)

4.1. Site organization and space construction

The primary task of site construction is to recognize the environment and site, clarify the nature and characteristics of the site through the analysis of site information, establish the situational connection between people and the surroundings based on spatial cognition, and build the basic framework of the site. In the actual design process, the core of site construction is mainly about the site information analysis, the organization of the target environment framework, and the response to relevant environmental problems.

David Canter points out in his place theory that the meaning of place refers to the personal concepts and emotions acquired by people from direct environmental experience and auxiliary information sources [11]. Place endows different individuals with special meanings. Environment design and site construction are the processes of systematically constructing the target environment in the dimension of time, space, and emotion, which is also an instinct of human beings to deal with nature. The core of architectural environment design is the site and people. Site construction is a process in which architects encode and decode the spatial structure and environmental information of the target site, reflecting the evolution of people from environment perception to spatial cognition. The organization of the target site conditions is the basis of constructing the ideal architectural environment paradigm. Architects should break the traditional design concept and think about the relationship between people and the site from the view of psychologists. Not only focus on the organization of physical space but also pay attention to the impact of space on people's bodies and minds.

Thesis_ II.

Establish a positive site system and spatial atmosphere to create a flexible environmental experience for users.

4.2. Site atmosphere creation

The site atmosphere creation is a process of artistic treatment of the target site because of analyzing the environmental intention and spatial characteristics. The space atmosphere of the architectural environment is the image of the site in people's minds and people's experience and feelings of the environment, and it is the impression generated by the concrete space in people's minds. In the specific design, architects should pay attention to the geographical style, spatial organization form, color collocation, material structure, sound and smell, and other factors of the design object. Architects should

also clarify users' requirements for the environment, analyze the characteristics of the environment and construct a viable path for creating the environment atmosphere. Creating a high-quality environmental atmosphere helps people build positive environmental images and brings people profound environmental experiences through artistic space construction. Try to strengthen users' sense of existence and security to achieve empathy with the environment.

Creating the site atmosphere is based on the approach of artistic design and the inspiration of Environmental psychology. At the level of architectural design, architects need to pay attention to the creation of landmarks on the site, the rational planning of routes, and the improvement of the visual quality of the environment to build an adaptable space paradigm. At the psychological level, architects should actively communicate with users to analyze their personalized needs for the environment, especially to clarify the purpose of the site and the motivation for people's behavior on the site. From an architect's point of view, it is necessary to sublimate the physical properties of the environment utilizing artistic design and create a positive and flexible space experience for users to achieve empathy between people and the site.

Thesis_ III.

Re-establish man-land relationships and stimulate social interaction and communication through a positive site organization.

4.3. Design of man-land relationship

The site relations construction is usually about the formal creation of physical space, including internal space, external space, and gray space. Architectural environment design is the orderly construction of color, material, technology, space, proportion, form, structure, rhythm, and other factors in the site, focusing on the reasonable organization of sustainable relations between various elements. Building a high-quality built environment is an orderly organization of all kinds of physical relationships in the site, which requires architects to reasonably organize and plan the complex relations between people and the built environment.

The constitution of a harmonious man-land relationship is jointly completed by man and the environment. Its purpose is to meet people's diversified demands for the use of the environment, and at the same time, people's environmental behavior does not affect the sustainable development of the ecological environment. The design of the man-earth relationship reflects the orientation of interaction between man and the environment, and it is a compound dimension of the coexistence of materiality and spirituality. In the design of site relationship, architects should carry out the design work based on people's physical and mental needs, behavioral characteristics, and site characteristics to build more interaction and information exchange between users and the site, to give more value to the environment.

Thesis_ IV.

Integrate the complex site environment to realize the energy transformation between people and the environment.

4.4. Environmental integration

Through artistic design and emotional spatial expression to rebuild the harmonious human-earth relationship, emphasize the comprehensive impact of a high-quality architectural environment on people's lives, and thus help people identify and improve the negative attributes of the existing

environment. Based on the reasonable organization of physical space, architects combine people's physical and emotional needs and promote the building environment to achieve a wide range of empathy with people through design. To stimulate the energy transformation between the environment and people and use it all to shape human positive environmental experience in the future, repair and re-establish a sustainable man-earth relationship. It tries to integrate people's emotions and spatial power into the cognition, experience, and expression of the environment so that they can jointly present the meaning of architecture.

Positive site information is transformed by creating a clear spatial image to enhance the user's sense of the experience of the environment and stimulate the function of space appeal in shaping positive human social connections. Highlight the value of architectural environment design in the emotional communication between people and the environment. Try to increase more communication opportunities between people and the surroundings and shape healthy environmental behavior. To realize the transfer of architectural energy through environmental integration and achieve the harmonious coexistence between man and the environment. When one is in an actual environment, the surroundings are also in one's mind, as if they are integrating into each other.

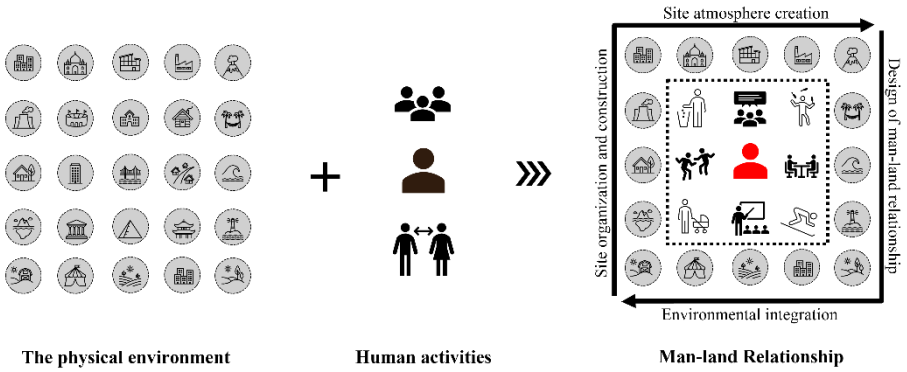
Thesis_ V.

To guide future design work through environmental assessment and design reflection.

4.5. Environmental evaluation and design reflection

Through the evaluation of environmental design, analyze the intervention effect of the physical environment on human behavior and emotion, and these factors integrate to form the content of the environmental evaluation, to systematically summarize and reflect on the design of the project, provide architects with specific design experience, and promote the new development between human and environment. These new developments create an extensive range of possibilities for the future change, adaptability, and interactivity of the built environment.

4.6. Summary



Graph. 9. The implementation approach of ideal man-land relationship.

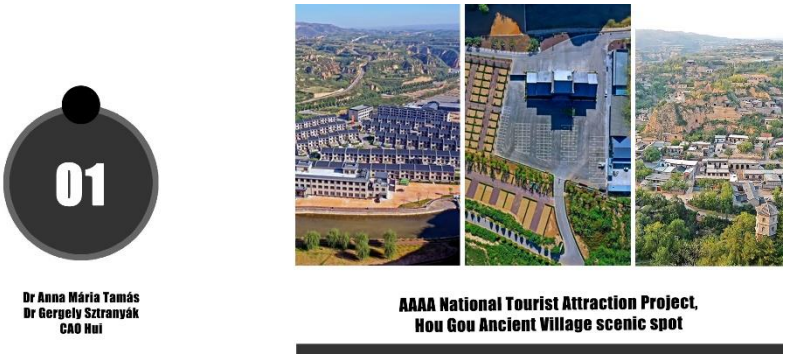
(Source: Designed by CAO Hui, 2022)

Architects can respond and change to the uncertainty of the future through innovative design approaches, but this change is for the service of clients and users, not an architect's badge. Architects should adapt to

the requirements of The Times and adjust their roles according to the needs of users. In the future, the architects' roles will be more diversified, not only the creator of space but also the designer of space and time.

In the future, the interdisciplinary cooperation between the field of architectural design and the field of psychology will become a new possibility. It is a trend of social development for architects to combine theories and methods of different disciplines through innovative design to create a space paradigm that is more in line with contemporary people's use.

Architectural design is changing from the creation of physical space to the design of the human-ground relationship nowadays, and the nature of architecture will become more diversified. In the following chapter, the author will examine the actual design works in the Environmental psychology context. (*Graph. 9*)



5.1. AAAA National Tourist Attraction Project, Hou Gou Ancient Village scenic spot planning, Jingzhong, Shanxi, China, 2018-2021.

People, time, place, event, emotion, experience, and innovation together constitute the daily activities of human society and take place in the actual built environment, which gives life and meaning to the built environment. It is a systematic social structure with specific organizational relationships, and how to integrate them organically is related to human well-being and healthy life. The rational planning of the built environment can play a positive role in this aspect, and the interpretation of relevant theories becomes the premise of optimizing the system. Of course, people and sites are the protagonists in this aspect.

Before the project analysis, the author will change his role as an architect, interpreting the story of man and place in the form of a memoir and sharing his innovative design according to the needs of social development.

5.1.1. Historical overview

Project Background

Fig. 14. Old appearance of Hougou ancient village.
(Source: Photo by Hougou ancient village scenic spot, 2017)

Hougou ancient Village is a beautiful traditional village in China with a long history, which carries the happy memory of the northern people about their hometown. Many Chinese remember their hometown as the small village where they lived in childhood. It is an indelible impression. When the author was a child, he would go back to this small village to spend the summer holidays every year. Kids very much enjoyed the natural environment as a paradise outside the world.

The memory of this small village is not only fragmentary image storage but more of a feeling of nostalgia or an impression of a happy atmosphere. This project is a tribute to the author's childhood memories and his interpretation of the ideal man-earth relationship. （*Fig. 14*）

Origins Of the Project

Shanxi Province is the gathering place of Ancient Village culture in China, with profound cultural deposits. The development of ancient villages is self-contained and has distinct regional charm. Among them, Hou Gou Ancient Village is a typical representative. Hougou Ancient Village locates in Dongzhao Township, Yuci District, Jinzhong City, Shanxi Province. The village covers an area of 1.33 square kilometers, with 251 residents in 75 households. Hougou ancient village is a typical hilly landform of the Loess Plateau, with the highest elevation of 974 meters, the lowest 907 meters, and a relative height difference of 67 meters. （*Fig. 15*）

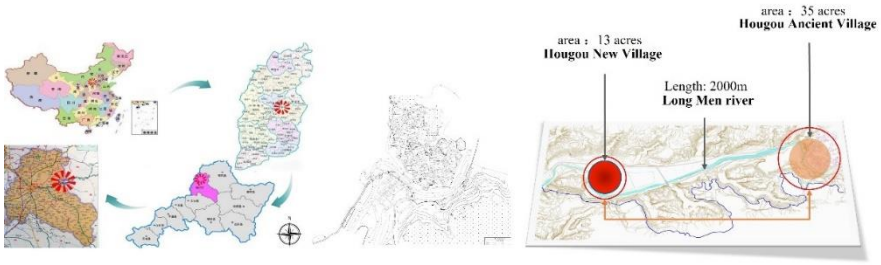


Fig. 15. Regional analysis map of Hougou ancient village.
(Source: Designed by CAO Hui, 2020)

Hougou ancient village has a long history, which can be traced back to the Tang Dynasty. It concentrates on the farming civilization on the loess plateau, and it is a well-preserved, systematic, and original traditional ancient village. The village has retained the traditional folk culture of northern China completely, such as farming culture, religious culture, folk culture, ancient construction culture, and others. The village with a history of thousands of years with rich connotations.

This charming little village is far away from the hustle and bustle of the city. Villages are located according to the terrain as if they grew out of the ground. People and the environment have always lived in harmony and are interdependent. The residential buildings of Hougou Ancient Village are mainly cave dwellings, which is a very ecological dwelling mode. The buildings in the ancient village construct along with the terrain, which is highly adaptable and diverse, forming the unique scenery of Hougou Village. （*Fig. 16*）The village's construction form follows the traditional Chinese geomantic layout form, embodies the ideal inhabitation paradigm of the unity of nature and man, and constructs a very ecological human-earth relationship.（*Fig. 17*）

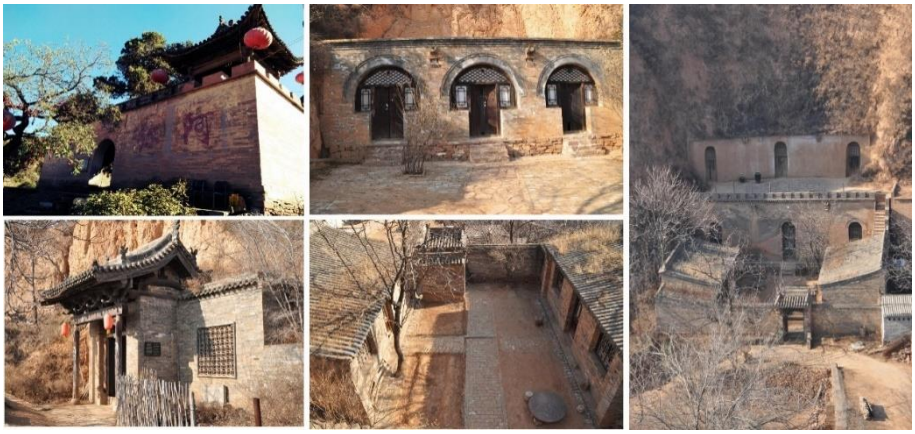


Fig. 16. Cave buildings in Hougou ancient village.

(Source: Photo by Hougou ancient village scenic spot, 2018)

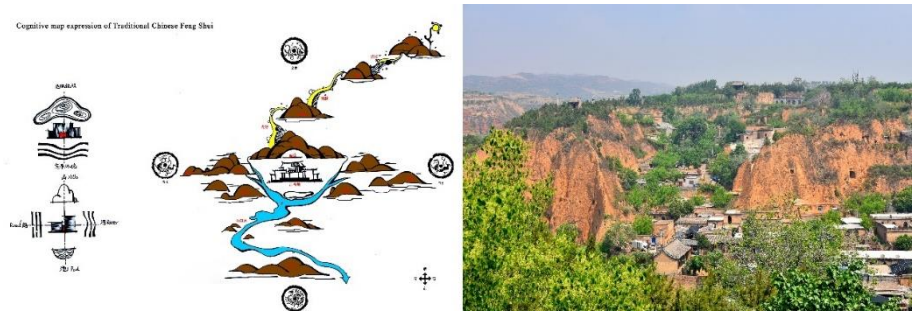


Fig. 17. Geomantic layout diagram of Hougou ancient village.

(Source: Photo by CAO Hui, 2021)

In addition, the temple system of Hougou ancient village is quite perfect, with 13 temples and 48 statues of gods built by villages of only one square kilometer. The temples construct according to Feng Shui, which combined Buddhist, Taoist, and Confucian temples into a single area, a phenomenon rarely seen in China and a reflection of the ancient people's close interaction and interdependence with the natural environment. （*Fig. 18*）

Fig. 18. All kinds of temples are built according to the land in Hougou ancient village.

(Source: Photo by CAO Hui, 2020)

As the most profound memory in the author's mind, the original ecological environment atmosphere of Hougou ancient village and the harmonious human-land relationship have influenced the author's

cognition of the environment, especially defining the thinking of the tuneful man-land relationship and the design of an ideal living environment. Nowadays, as an architect, the author tries to build an adaptable man-earth paradigm to balance the contradiction between humans and the environment when facing various complex design projects, and the author firmly believes that diversified perception and experience of the environment can increase people's cognition of the dimensions of the built environment. Most importantly, the design of the built environment is an interpretation of the human-earth relationship, and it is the release of the power of time and space in people's behavior.

5.1.2. Project features

Project Operation Overview

With the development of urbanization in China, there has been an imbalance between rural and urban development. Many rural residents migrate to urban life, resulting in many "hollow villages" in traditional villages. Against this backdrop, many ancient villages are left empty or abandoned. Due to disrepair, many of the old houses have fallen into disrepair, and the lively countryside atmosphere is no longer there. Hou Gou ancient village also has the same situation.

In January 2003, Hougou ancient Village was identified by the Chinese Folk Literature and Art Association as the Demonstration base of the Chinese folk cultural heritage rescue project. At the same time, it was awarded the title of the first village of Chinese ancient Village rescue and protection. Since then, the conservation and restoration of the village have officially begun.

In 2005, invested by the Government of Yuci District, Hougou ancient village was opened as a farming culture scenic spot and officially opened to the public on September 9, 2005. And in August 2007, local entrepreneurs set up Hougou ancient Village culture tourism Development Co., LTD., through the mode of leisure tourism to continue to develop the scenic spot.

In November 2016, Shanxi Zhenpeng Real Estate Co., Ltd. took over the Hougou ancient village scenic spot, which had been losing money for years, injecting new vitality into the development of the village.

At the beginning of 2017, the local government formulated an implementation plan for the protection and repair of Hougou Ancient Village because of its disrepair status and planned to carry out comprehensive repair and protection of the area.

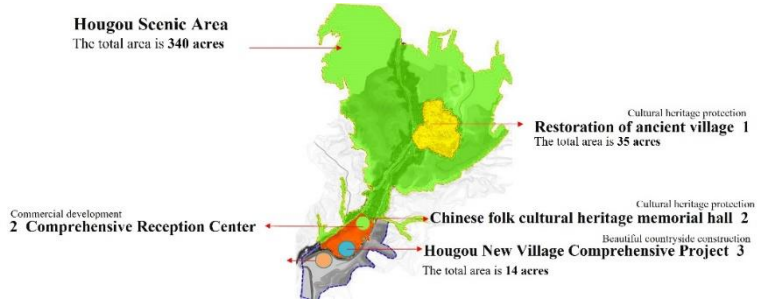


Fig. 19. General plan of Hougou ancient village scenic spot.

(Source: Designed by CAO Hui & Hougou ancient village scenic spot, 2019)

In December 2018, the author was honored to be the general director of the Renovation project of Hougou Ancient Village scenic spot, focusing on the protection and sustainable development of ancient

village scenic spot. The specific design work is mainly about four modules: Hougou ancient village restoration project, Chinese folk cultural heritage rescue project memorial Hall project, Reception center comprehensive project, and Hougou New village comprehensive project. （*Fig. 19*）

Planning and design related issues

To better develop the rural cultural tourism industry of Hougou ancient village, solve the contradiction between the village protection and the pursuit of modern life of villagers, and achieve a win-win situation of investors' business interests and villagers' well-being, architects need to repair and optimize the man-land relationship in the scenic spot as the core content of the design. Before launching the specific design work, the architect needs to clarify the relevant technical issues of the planning and design to promote the development of the design work.

In the context of Environmental psychology, the author makes a systematic investigation and analysis of the project from the perspective of environmental cognition. The site quality of the project is analyzed and evaluated utilizing environment assessment, and related technical problems are mapped by decoding the actual environment information.

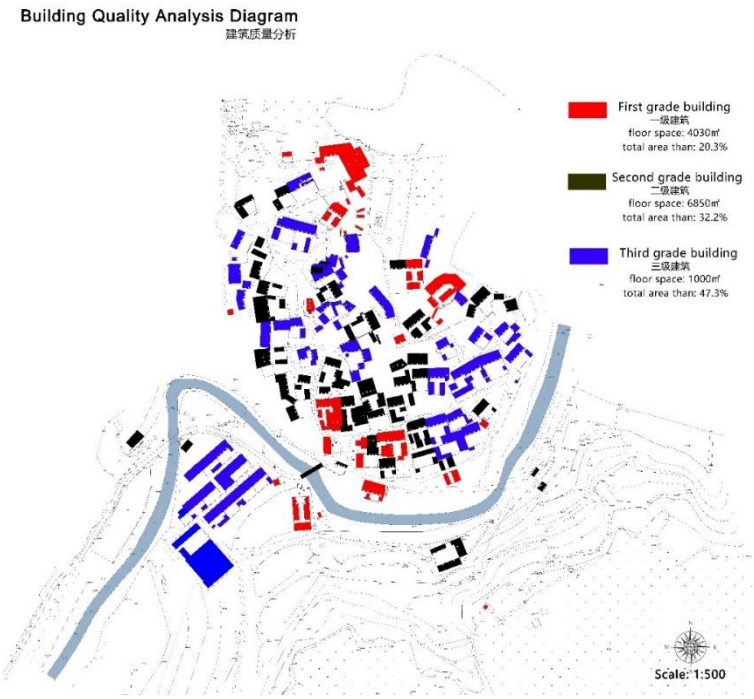


Fig. 20. Hougou ancient village building quality analysis chart.
(Source: Designed by CAO Hui, 2022)

A. Evaluation of architectural environment in the ancient village. （*Fig. 20*）

- The road in the ancient village is relatively old and single, with only one stone road connecting the main building area, and there are a lot of unhardened dirt roads. The roadways in the village are narrow and steep, and there is no systematic traffic planning.
- There are a large number of ancient cultural buildings in the ancient village. The oldest building was built in Ming Dynasty, accounting for 12% of the total proportion, Qing Dynasty buildings accounted for 7%, and Ming dynasty buildings accounted for 18% of the total ratio. Most of them

are earthen cave structures and traditional brick and wood building structures. According to the Feng shui layout, they form the primary landscape nodes in the ancient village, but overall, there is no clear boundary and connection, and the problem of structural damage and disrepair is widespread.

- As part of the ancient village collapsed, leading to severe damage to a small number of houses, there is a hidden danger of another collapse.
- There are many simple houses built with cheap materials. The architectural image is relatively simple and with security risks.
- The landscape greening in the ancient village is not systematic, mainly for the irregular growth of wild plants and lack of design and beauty.

B. Evaluation of tourist service facilities in scenic spots. （*Fig. 21*）

- The service facilities in the scenic area are relatively backward, and the setting of the tourist service area is relatively simple, which can only meet the primary ticketing and ticket checking functions.
- Infrastructure is not perfect, the number and quality of tourist toilets need to be improved, barrier-free facilities need to be further promoted.
- The overall environmental atmosphere in the scenic spot is not enough to reflect the strong farming culture.
- The scenic spot itself does not have accommodation conditions. The village has 15 farmhouse restaurants, mainly for traditional caves without toilets, poor living conditions, and it is hard to provide elementary tourist services.
- As the main body of farming culture, there are few experiential projects in the scenic tourism area, and tourists lack an immersive experience.
- The equipment network in the ancient village is crisscrossed on the building surface, and the visual effect is poor, which increases the difficulty of shooting films and TV dramas.
- The connection between the scenic spots is insufficient and lacks systematic organization and planning.

Fig. 21. The current situation of tourism facilities of Hougou ancient village scenic spot.

(Source: Photo by CAO Hui, 2019)

C. Villagers' evaluation of living environment. （*Fig. 22*）

Fig. 22. Hougou ancient village building environment old condition.
(Source: Photo by Hougou ancient village scenic spot, 2018)

- There is a lack of medical care facilities in the ancient village, and the villagers' daily medical treatment and care are limited.
- Lack of shared fitness and entertainment facilities.
- The road surface in the ancient village is seriously damaged and limits the daily travel of the elderly and young children.
- The original house has no modern toilet facilities and no systematic sewage facilities.
- The aging of houses is run-down, the function is insufficient, and there is the phenomenon of people and livestock cohabitation.
- The walls between the courtyards are dilapidated, and the living environment is less private.
- There are no modern road lighting facilities in the ancient village, and villagers are restricted from traveling at night.
- There is no perfect disposal facility for daily household waste.
- In winter, residents use homemade boilers for heating their houses, which consumes a lot of coal and wood and causes much pollution to the local ecological environment.

Planning Target

This project mainly focuses on the restoration and tourism development of the traditional ancient village to restore and optimize the ideal man-land relationship. Through systematic planning and tourism development, tries to build an ecology cultural heritage tourism model and make it achieve healthy and sustainable development.

The author innovatively integrated the relevant theories of environmental psychology into the actual design planning. At the same time, inspired by the Chinese Feng Shui theory and combined with the characteristics of the project, the reconstruction of the man-land relationship was taken as the core goal of the design. Through this project, the design team hopes to provide a positive design experience for the contemporary ancient villages in China. We also hope to make positive attempts for the practical application of environmental psychology in architectural design and explore the possibility of interdisciplinary cooperation.

A. To protect the spatial pattern of the ancient village and maintain the overall historical feature and the fabric of historic buildings. Repair their damaged architectural environment, and respect local history and culture.

B. Inheriting and protecting the local intangible cultural heritage through scientific planning to form a sustainable development path.

C. On the premise of protecting the natural ecological texture of the scenic spot, orderly development of the scenic spot, actively expanding the extension of the ancient village tourism area, improving the infrastructure and the tourism function, creating environmentally friendly characteristics of the tourism environment to meet the diversified needs of tourists.

D. Build Hougou's new village, improve the villagers' living environment, support the villagers to set up farmhouse entertainment and characteristic homestay to expand income channels, develop feature industries, promote the healthy development of the local economy, and achieve a win-win situation for villagers' interests and economic development.

E. To further improve the ecological quality of the scenic area, build a natural scenic area with local characteristics, rebuild the harmonious man-land relationship, and make positive contributions to the local environmental protection and rural revitalization.

Architectural programming

The construction plan of the first phase (2018-2022) of the Hougou Ancient Village Scenic Spot project includes the following five sections:

A. **Hougou New Village Comprehensive Planning Project.** In order to improve the quality of life and living conditions of villagers, the project plans to invest 50 million yuan to build the Hougou New village community. The construction includes 89 detached houses, two high-rise apartment buildings, one comprehensive service building, and cultural and entertainment facilities, with a total construction area of more than 20,000 square meters.

B. **Chinese Folk Cultural Heritage Rescue Project Memorial Hall Design Project.** The construction of the Chinese folk cultural heritage rescue project memorial Hall, which is a national name project approved by the Chinese Folk Literary and art Association, the purpose is to display the folk cultural heritage rescue achievements nationwide, including exhibits display, academic lectures, cultural exchanges, and other activities.

C. **Comprehensive Design Project of Visitor Reception Center.** The project of the tourist reception center of Hougou ancient village scenic spot is the basic facilities and image project of the scenic spot. The project covers an area of 9000 square meters, a construction area of 1200 square meters, and a total investment of 5 million. The supporting film and television theme hotel has a construction area of 4500 square meters, with an investment of about 9 million. Through the construction of this project, it can thoroughly meet the needs of tourists for tourism services.

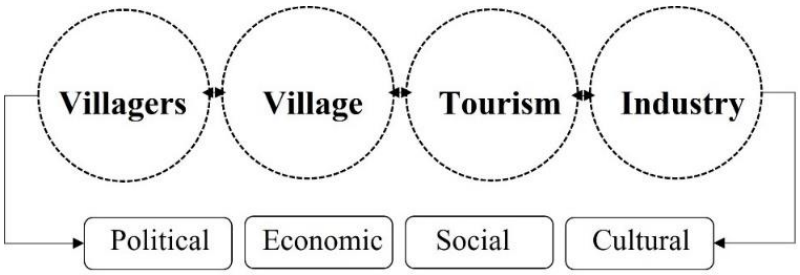
D. **Hougou Ancient Village Restoration Project.** Based on the ancient streets and buildings of Hougou Ancient Village, the project tries to restore the lifestyle of traditional farming villages through scientific planning, repair, transformation, and regional integration. This project investment of about 20 million will start construction after the villagers of Hougou Ancient Village move into Hougou New Village.

E. **Longmen River Landscape Construction Project.** To further expand the extension area of the core scenic area and improve the experience of tourists and the overall image of the scenic spot, invest 8 million to transform the landscape belt along the Longmen River. It includes anti-seepage and dam engineering of the river, construction of sightseeing lanes and pedestrian paths in scenic spots, landscaping, and supporting facilities on both sides of the Longmen River.

5.1.3. Problems and Solutions

The planning and construction of the project are based on the design concept of rebuilding the harmonious ecological human-land relationship, fully respecting the natural environmental texture of the village, and using the approach of architectural design to low-carbon intervention from the perspective of Environmental psychology. The design team will inherit the DNA of the architectural environment of the ancient village and extend it to the construction of the whole scenic spot. The author attaches importance to the touching of contemporary people brought by the historical imprint of the ancient village and hopes to turn this image of the past into an experiential environment.

The restoration and protection of ancient villages need combination with various factors in planning. The design should integrate ecological conservation, tourism development, and villagers' interests. Tries to form a sustainable development pattern to achieve a win-win situation in politics, economy, culture, and society. (*Graph. 10*)



Graph. 10. Analysis on the planning idea of Hougou ancient Village Scenic spot.
(Source: Designed by CAO Hui, 2019)

Fig. 23. Demonstration process of project planning scheme.
(Source: Photo by Hougou ancient village scenic spot, 2018)

After defining the design objectives and ideas, the author makes a preliminary design strategy and implementation plan through the evaluation and collective demonstration of the project. In the demonstration process, the author adopts the participatory action method and expert method to comprehensively demonstrate the project, whose members include investors, local government representatives, design experts, villagers' representatives, engineering experts, and psychologists. The aim is to systematically analyze and demonstrate the design scheme to ensure its scientific nature. (*Fig. 23*)

According to the characteristics of the project, the author redefines the implementation strategy of Hougou ancient village scenic area planning and constructs a new development path. Since the Hougou scenic spot expanded to the outer area of the whole village after being taken over by a new investor, which will form a comprehensive cultural tourism town in the future, it will be a complex and long-term construction process. Therefore, the construction of the project will divide into different stages. After consideration of various interests, the author puts forward the design strategy of the "DPD" mode, that is, the path of development-protection-redevelopment. (*Fig. 24*)

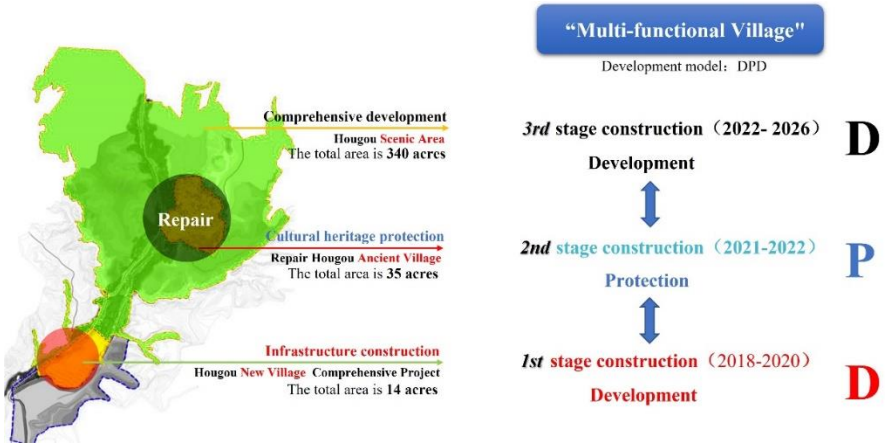


Fig. 24. Analysis on development mode of Hougou Ancient Village Scenic spot.
(Source: Designed by CAO Hui, 2018)

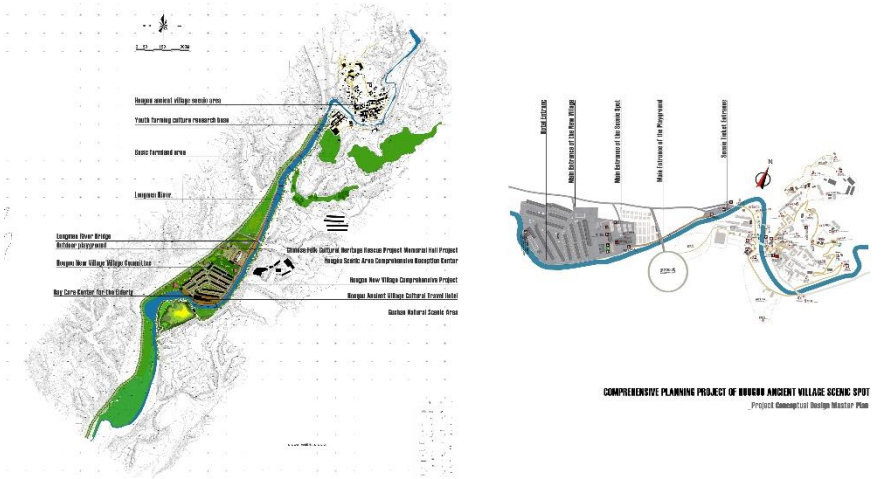


Fig. 25. The content of architectural environment design of Hougou ancient village scenic spot.
(Source: Designed by CAO Hui, 2018-2019)

This project consists of four sections which are mainly about: the comprehensive planning of Hougou New Village, the design project of the Chinese folk cultural heritage rescue project memorial hall, the tourist reception center project of Hougou ancient Village scenic spot, and the restoration project of Hougou ancient village scenic spot. The author will analyze the implementation of each project in detail from the following five aspects: site construction, atmosphere creation, man-land relationship design, environment integration, and environment evaluation. (*Fig. 25*)

Part I. Hougou New Village Comprehensive Project

A. Site construction

How to improve the living conditions of the villagers in Hougou Ancient Village? How to realize the sustainable development of Hougou Ancient village scenic spot? For these two problems, the construction of Hougou New Village gives the best response. Hougou New Village is in the area to the west of Hougou ancient village, which is only 1 km away. Hougou New village and old village are connected by the Longmen River, forming a dialogue between the past and the present, full of romantic poetry against the backdrop of the surrounding natural environment.

The site selection of Hougou New Village is combined with the requirements of Chinese people for the site selection of residential bases, reflecting the traditional feng shui thought, which emphasizes the harmonious coexistence between people and the environment, which is consistent with the insight of environmental psychology. It is the study of how people and the environment live in harmony. As can be seen from the picture below, the new site has beautiful natural scenery and is surrounded by mountains on three sides. It has a unique ecological microclimate, and its ecological indicators are very suitable for long-term living. In addition, the new village is close to farmland, river, and road, which is conducive to farmers' daily farming and information exchange with the outside world, forming an ideal habitat form. (*Fig. 26*)

Fig. 26. Site selection and site characteristics of Hougou New Village.
(Source: Photo by CAO Hui & WANG Yonggang, 2017-2018)

The internal planning of Hougou New Village also reflects the architects' expectation of an ideal living environment. The inside planning adopts the design expression of the bionic form and its layout inspired by the traditional Chinese cornucopia form. The terrain planning of the whole village is in the shape of a treasure bowl, which symbolizes auspiciousness in Chinese culture and reflects the symbolic meaning of the architectural environment, the cultural connotation of the site, and the artistic expression of the architectural environment. （*Fig. 27*）

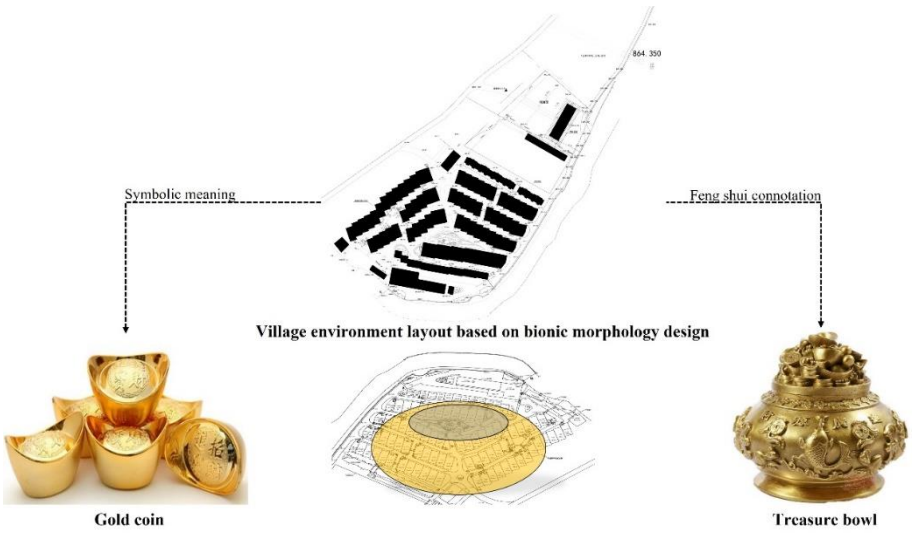


Fig. 27. Analysis of village environment layout based on bionic morphological design.
(Source: Designed by CAO Hui, 2019)

Hougou New village has a planned total area of more than 20,000 square meters, with a plot ratio of 0.56. The functional settings are systematically designed according to the characteristics of the site conditions and the villagers' needs. Compared with the ancient village, there is a qualitative leap. The new community has reasonable paths, clear boundaries, organized zoning, refined nodes, and significant landmarks. (*Fig. 28*)

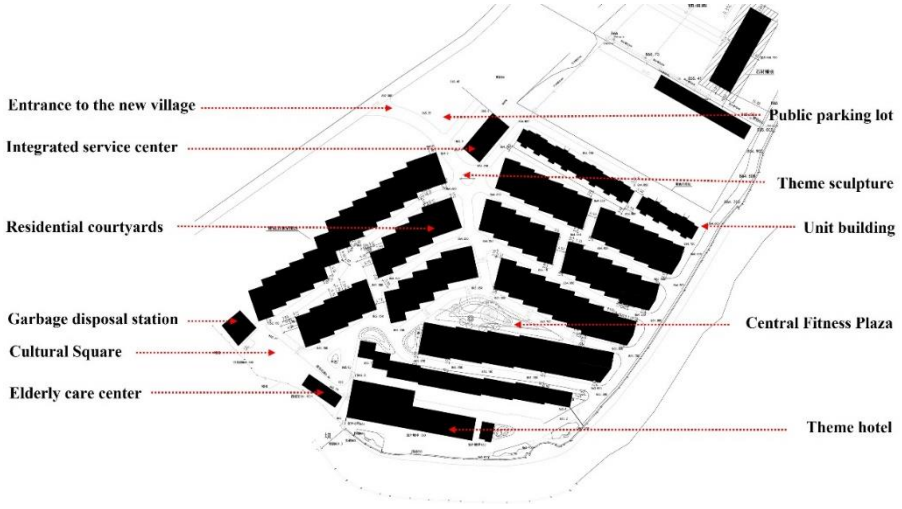


Fig. 28. Hougou New village architectural planning layout plan.
(Source: Designed by CAO Hui, 2019)

B. The creation of atmosphere

As is known to all, Chinese people pay special attention to the concept of family, and the image of home is particularly profound. During ordinary times, people of several generations gather to create a lively living atmosphere, and there are also intensive exchanges between neighbors. This phenomenon is very prominent in China's rural areas. Therefore, the author will take "warm big family" as the clue to create

the atmosphere of the architectural environment of Hougou New village and construct a warm and harmonious community environment through active environmental design.

First of all, the environmental atmosphere creation of Hougou New Village relies on its natural geographical conditions, which itself is a huge advantage. The natural environment could always touch people. Therefore, the author did not make more intervention in the surrounding environment of the new village but just carried out conventional design processing and tried to bring the surrounding environment into people's sight, which is also the author's point of view on the environmental atmosphere construction. The author believes that environmentally friendly design is a low-carbon design approach, an attitude of architects, and a kind of reverence for nature. （*Fig. 29*）

Fig. 29. The surrounding environment of Hougou New Village.
(Source: Photo by CAO Hui, 2019)

Fig. 30. Interior environment design of Hougou New Village.
(Source: Photo by CAO Hui, 2019)

Secondly, in terms of the internal environment design, the author designed the environment appropriately according to the characteristics of site planning and the aesthetic needs of contemporary people and took various factors affecting the public environment image and atmosphere as the reference for the design. The environment design of the new village is a modern and concise style. Meanwhile, the decorative elements of traditional architecture are integrated into the details of architectural decoration, making the whole architectural environment both friendly and modern. Proper landscape greening improves the atmosphere of the entire environment to a higher level, makes the atmosphere of home

clearer, and brings a sense of security and belonging to the villagers. In addition, the sculpture exhibition area is designed at the entrance of the new village, whose theme is red farming culture. The vivid color design greatly enhances the artistic sense of the environment and the meaning of the site. (*Fig. 30*)

Thirdly, among 89 independent residential buildings, the author designed a series of residential forms with self-governed courtyards, and the design style coordinated with the design of the whole village. The exterior wall material of the building adopts the texture coating as the main wall decoration, which has a nice decorative effect and insulation effect and reflects the environmental image of unified style and clean and tidy. Although the architectural form and the adornment gimmick are unified, the author also fully considers the personalized needs of villagers. In the early stage of planning, the author left the design of the courtyard of each unit to the villagers and let them participate in the construction of their homes, to form a more diversified and personalized environment and make their homes have a variety of possibilities. (*Fig. 31*)

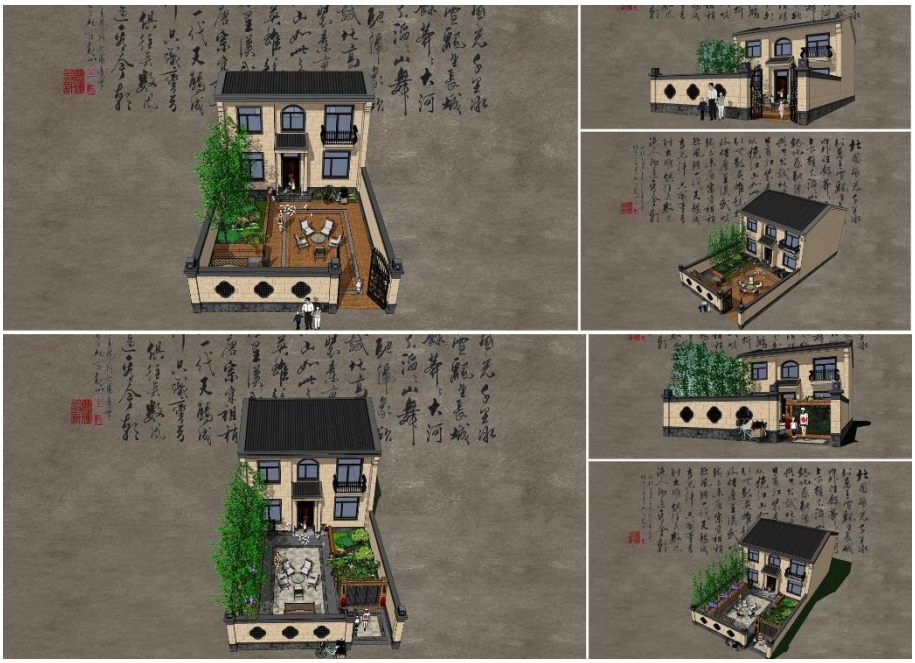


Fig. 31. Hougou New village residential building design scheme.
(Source: Designed by CAO Hui, 2019)

Finally, the team installed shared facilities such as garbage collection, solar lighting, and public toilets in the common areas. The information billboards are also added near the public parking lot. Through the design of site nodes, the connection of each section is more orderly, and the atmosphere of the whole environment is more prominent, creating a clear spatial image. The atmosphere of the built environment of Hougou New Village provides a new community form for the villagers, which not only interprets the modern lifestyle but also has the memory of the history. (*Fig. 32*)

Fig. 32. Public facilities in Hougou New Village.

(Source: Photo by CAO Hui, 2019)

C. Design of man-land relationship

The design of the man-land relationship plays a significant role in the Hougou New Village project. As mentioned above, Chinese people pay special attention to the concept of family, so the author has made a particular design on this aspect.

First, a particular feature of human society is concentration and gathering, which reflects in the people collecting, human activities, and sites. In the overall planning, the layout of the new village is relatively tight. Its purpose is to create a kind of clustered living environment so that villagers can gather and have more exchanges and activities. However, density does not mean crowding. Scientific regional division and smooth traffic flow lines can be well connected to each region. On the premise of ensuring personal space, the three-fork road network design makes villagers' activities on the site more convenient and enhances their territoriality. It causes villagers and their living environment to form a harmonious interactive relationship. A beautiful living environment brings villagers a good sense of experience, and villagers also pay more attention to the maintenance and construction of the living environment. (*Fig. 33*)

Fig. 33. Design concept of architectural environment of Hougou New Village.

(Source: Designed by CAO Hui, 2019)

Secondly, in the design of public areas, special emphasis is placed on the relationship between site organization and villagers' behavior. The author hopes that orderly site construction will provide villagers with more possibilities for face-to-face communication and increase meaningful social activities to enhance the social cohesion of villagers. The following is an interpretation of these design contents:

A themed sculpture installation and information board were designed at the community entrance in collaboration with the local government and the village committee. It reflects forceful social cohesion and can well convey the latest party and government information. At the same time, it can increase the opportunity for villagers and village committee cadres to meet, which is conducive to the equal information exchange between managers and villagers. At the same time, it is conducive to the formation of landmark images to show the image of Hougou New Village to the society. （*Fig. 34*）

Fig. 34. The environmental design of the entrance area of Hougou New Village.
(Source: Photo by CAO Hui, 2021)

Fig. 35. Design concept of Hougou New Village Central Square.
(Source: Photo & designed by CAO Hui, 2019-2020)

The central public square is a representative section in the planning of Hougou New village, which is in the center of the community. It is connected to each area by a three-fork road. People can easily reach wherever they want to go, with a definite way of finding their way. It provides villagers with a place for daily leisure and fitness, which makes up for the regret of living in the ancient village. The favorable site atmosphere increases the frequency of villagers' daily social interaction, on the one hand, provides an environment for children to play, and on the other hand, helps villagers form healthy living

habits. The existence of the central square also offers a shared community living room for visitors to Hougou New Village. （*Fig. 35,36*）

Fig. 36. Real scene of Hougou New Village Central Square.
(Source: Photo & designed by CAO Hui, 2019-2020)

Fig. 37. Real scene of Hougou New Village Day Care Center for the elderly.
(Source: Photo & designed by CAO Hui, 2019-2020)

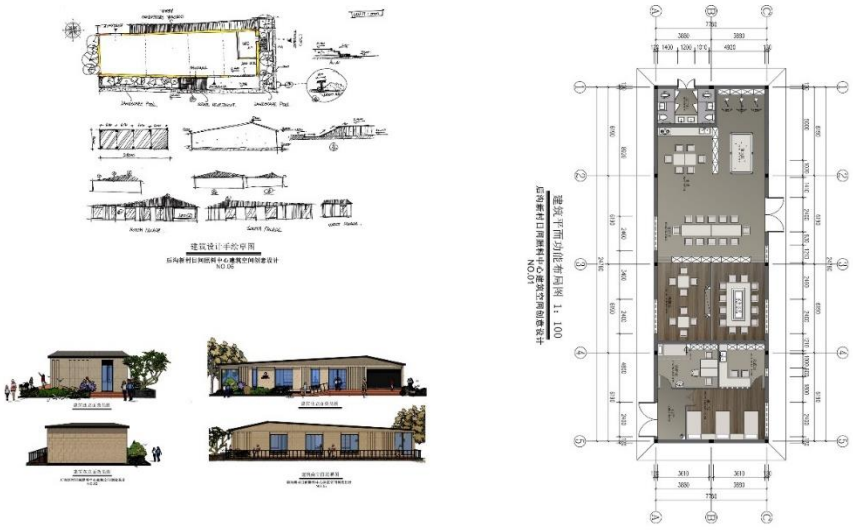


Fig. 38. Design concept of Hougou New Village Day Care Center for the elderly.
(Source: Photo & designed by CAO Hui, 2019-2020)

The design of the daycare center for the elderly provides a more comfortable environment for the elderly group. It mainly offers basic daycare and entertainment services for the elderly in the new countryside. Its location in the Longmen river, close to the Gushan scenic spots, the geographical condition is superior, the beautiful natural environment, rational construction function design for elders provide a modern experience. It responds well to the aging problem of the community, improves people's attention to the elderly group, and endows the site with more social significance. （*Fig. 37,38*）

D. Environmental integration

In the path planning of the whole area, the design team organically connected the public sections such as the entrance of the new village, the theme sculpture, the central square, the daycare center for the elderly, and the riverside landscape belt through the three-fork road planning. Allows villagers to form interaction opportunities in their daily activities and increases the possibility of their meeting. Especially in the post-screen era, people are eager to face all kinds of electronic products every day, so this kind of communication with a sense of temperature and reality is particularly precious.

The site organization and planning of the new village meet the requirements of the villagers on comprehensive building environment, the field of invisible power to guide people in social activities actively, through social activities to form meaningful information exchange and emotional communication, to form the sustainable relationship between man and site and contribute to the energy transfer between them.

E. Environmental evaluation

The overall planning and architectural environment design of Hougou New Village reflect the characteristics of co-construction by architects, developers, and villagers. The design team scientifically planned the built environment and built a very harmonious new rural model based on improving the relevant infrastructure construction. The author made a comprehensive evaluation of the project design through the path of a survey, interview, behavioral observation, and questionnaire. The project evaluates through the four-point scale of environmental assessment, and its performance was as follows: (*Table. 4*)

First, in terms of aesthetic evaluation, the villagers gave an " Excellent " rating on the aesthetic evaluation of the new dwelling environment. They consider it a beautiful home that completely overturns their perception, in stark contrast to the dilapidated surroundings of the ancient village, and use adjectives such as beautiful, new, attractive, and pastel to describe the environment.

Secondly, the evaluation of environmental satisfaction was a "Good" grade. More than 85 percent of the villagers gave an " Excellent " rating, but 15 percent said they were not very satisfied. Some villagers believe that the new environment lacks space to raise large livestock because their previous way of life in the ancient village was related to the need for farming labor.

Thirdly, the evaluation of emotion, the villagers' evaluation of the new village environment is a "General" grade. This result is not abnormal and can be explained by the age of the villagers participating in the evaluation. Most of the villagers over 55 years old still retain the nostalgia of the old village life. Because it is their native environment, and it is hard to lose in the memory. On the contrary, young people have a higher emotional evaluation of the new village, and they prefer the modern living environment. In addition, most middle-aged people are neutral.

Finally, the ratings of the post-use evaluation showed consistency, and all the villagers' environmental evaluations reached a "Good" rating. BY comprehensive analysis, the new community environment makes up for many shortcomings of villagers living in the ancient village. In the specific

use, the new community meets the needs of most villagers, they have a better sense of environmental experience, and the new environment improves their quality of life and happiness.

In general, the overall planning and design of Hougou New Village have met the needs of villagers in all aspects and achieved the expected goals. But at the same time, it also reflects some specific problems, such as some adaptability problems of villagers in the transformation process of new environment and old environment.

Content	Order of evaluation				
	Very bad	Bad	General	Good	Excellent
Aesthetic aspects					√
Satisfaction aspect				√	
Emotional aspect			√		
POE				√	

Table. 4. Four - point scale for environmental assessment of Hougou New village.
(Source: Designed by CAO Hui, 2022)

Part II. Chinese folk Cultural Heritage Rescue Project memorial Hall

A. Site construction

The Memorial Hall project of the Chinese folk Cultural Heritage Rescue project is a very significant section of Hougou Ancient village. It is a national name project approved by the Chinese Folk Literature and art Association. Its purpose is to show the folk cultural heritage rescue achievements nationwide, including exhibits display, academic lectures, cultural exchanges, and other activities.

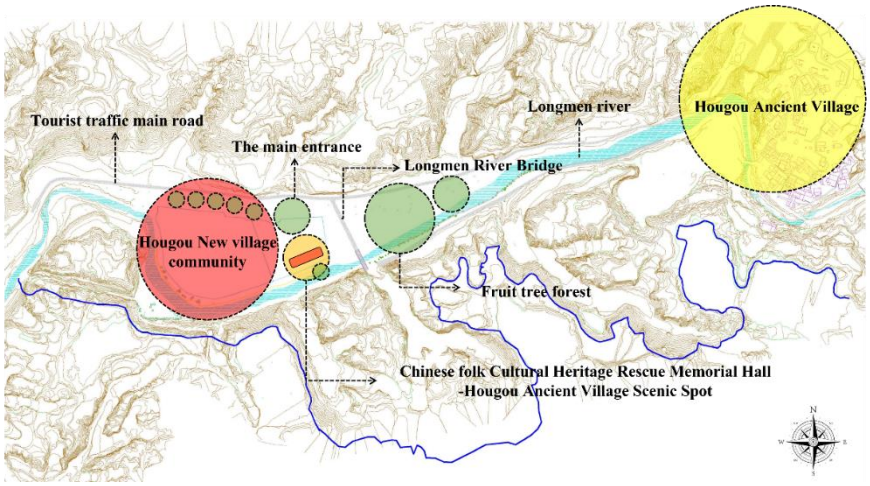


Fig. 39. Location analysis chart of Chinese folk Cultural Heritage Rescue Project memorial Hall. (Source: Designed by CAO Hui, 2018-2019)

The project is in the middle of Hougou New village and Hougou ancient village and is encircled by mountains. The south of the building is where the Longmen River passes through, the north is the primary traffic road, the east is the fruit trees forest, and the west is close to the Hougou New village community, which has significant geographical conditions. In the future, the tourist reception center will also

construct in this area, which will jointly form a comprehensive reception system, and for serving the tourists as a landmark building. The site selection of the project follows the concept of ecology. The author hopes that the completion of the project can make the architecture, people, and the surrounding natural environment form a good interaction and harmonious relationship. (*Fig. 39*)

The total construction area of the memorial hall is 2,850 square meters with four floors. The project is at the entrance to the Hougou ancient village scenic spot and the core of the traffic flow line. According to the preliminary construction plan, the project will construct as a landmark of the whole Hougou scenic spot, which has a momentous significance and value.

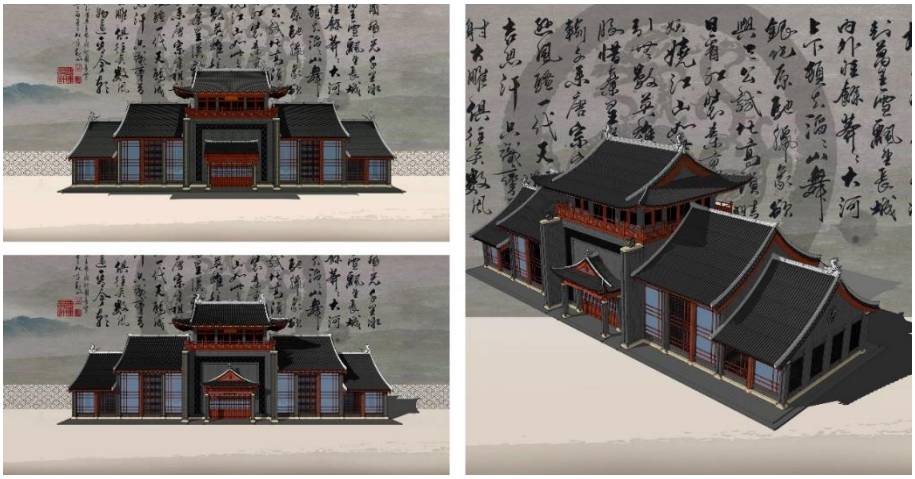


Fig. 40. Design concept of Chinese folk Cultural Heritage Rescue Project memorial Hall.
(Source: Designed by CAO Hui, 2017-2018)

First, as a cultural museum building of a national name, its existence helps to improve the social image and cultural connotation of the scenic spot; Secondly, as the central location of Hougou Ancient village and New Village, it plays a bridge connecting the past, present, and future. Through cultural exhibition activities, it transmits the achievements of cultural heritage protection to the public, which could contribute to the sustainable conservation and inheritance of folk cultural heritage. Finally, the memorial hall will become a spiritual fortress in the hearts of local villagers, acting as a record of the history of the ancient village and carrying more memories for the future. (*Fig. 40*)

B. The creation of atmosphere

According to the nature and characteristics of the Chinese folk cultural heritage rescue memorial hall, the author positioned the architectural design style as Chinese style and combined it with modern modeling language to create the atmosphere of the architectural environment. In terms of the concept of project design, the author emphasizes the principle of "locality" in architectural design. The expression of architectural design concepts should conform to local conditions and customs, and the form of architecture should be coordinated with the surrounding natural environment. In addition, the architectural form should not be exaggerated and flashy, focusing on the artistic, cultural and social nature of architecture.

The design inspiration of the architectural shape derived from the mountainous form around Hougou ancient village, hoping to form a harmonious "picture and bottom" relationship between the architecture and the environment through artistic treatment. The author extracts the design language and symbols

from the natural form and uses the "pictographic" design technique to encode relevant elements to interpret the relationship between architecture and the environment. In the specific design, the author deconstructs the image of the Chinese character "山" and creates a positive architectural image through design techniques, reflecting the spirit of striving and enterprising. Through the construction of the clear architectural form, it accurately constructs the visual focus of the site, realizes the adaptive symbiosis between the building and the surrounding environment, and conveys the emotional and cultural connotation of the site to people. (*Fig. 41*)

Fig. 41. The real scene of Chinese folk Cultural Heritage Rescue Project memorial Hall.
(Source: Designed by CAO Hui, 2017-2018)

Fig. 42. Material application of Chinese folk Cultural Heritage Rescue Project memorial Hall.
(Source: Photo by CAO Hui, 2021)

In the building materials section, the author chooses materials consistent with the traditional architecture of the ancient village, mainly blue slate, gray tile, cypress wood, and others. In addition, the author recycled some abandoned building materials from Hougou village and processed them for the curtain walls' decoration. The use of decorative materials reflects the principle of "locality" in the design. Materials rich in local texture give the building a local atmosphere and temperature. The author uses the low-carbon construction method to ingeniously add the genes of the ancient village to the new building and strengthen the social image of the project. (*Fig. 42*)

In the design of the external environment of the whole building, the author hopes to continue the traditional architectural construction techniques and construct an architectural image with a sense of intimacy. In terms of the decorative design of the roof and wall, the author optimized the traditional Chinese wooden structure, retained the classical modeling language and cultural symbols of conventional architecture, and created a contracted and spell-able artistic effect. With the surrounding green landscape atmosphere, from the front, the memorial hall seems to be a mighty general guarding the ancient village

of this fertile soil; From the back, the building seems to become a wise elder who is telling people about the past life of Hougou village. Such architectural imagery enhances the visitor's perception of the environment and empathic experience. (*Fig. 43*)

Fig. 43. Front and back display of Chinese folk Cultural Heritage Rescue Project memorial Hall.
(Source: Photo by CAO Hui, 2021)

Fig. 44. Facade decoration of Chinese folk Cultural Heritage Rescue Project memorial Hall.
(Source: Photo by CAO Hui, 2021)

In the decoration of the external environment of the building, the author adopts the combination of traditional and modern ways to create, highlighting the innovative design idea of making the past serve the present. For example, in the design of the curtain wall of the building, the author uses a large area of insulating glass curtain wall as the main decoration of the building facade, which plays a good role in heat insulation and heat preservation, which has a good light transmittance. In the design of the building gable, the author draws on the treatment of ancient buildings and designs air vents on both sides of the gable wall, which are decorated with traditional round brick artistic components. The design approach of low carbon and low technology improves the quality of air circulation inside the building and reduces the energy consumption of the building as much as possible. (*Fig. 44*)

C. Design of man-land relationship

Fig. 45. Aerial view of the Chinese folk Cultural Heritage Rescue Project memorial Hall.
(Source: Photo by CAO Hui, 2021)

In terms of human-earth relationship design, the author makes an extraordinary design for the external environment of the building, especially emphasizing the interaction between people, buildings, and the environment, as well as the organic integration of the built environment and the natural environment. On the premise of satisfying people's needs and realizing organic integration with the environment, the author makes a reasonable plan for the peripheral area of the memorial hall on the principle of low intervention in the ecological environment.

Fig. 46. The launching ceremony of "Visit Shanxi, read history and visit Jinzhong" was held in the central square.
(Source: Photo by CAO Hui, 2020)

First, the author plans an ecological parking lot on the east side of the memorial hall. On the one hand, it provides flexible parking space for temporary large-scale activities. On the other hand, it alleviates the influence of dust weather on this area to a certain extent and plays a fantastic greening effect. (Fig. 45) Secondly, the author also plans the square area at the main entrance of the scenic spot and adds the urban public transport platform area. Usually, it is used as a regular parking lot in the scenic

area, and it also has the function of hosting large-scale cultural events, creating a flexible man-land relationship through a low-technology approach. (*Fig. 46*)

It is worth mentioning that there was an episode during the construction of this project, which eventually became the highlight of the author's design process. In the construction stage of the early stage of the project, there are five native jujube trees scattered in a row in the south of the memorial building. The author specially reserved them as part of the architectural environment during the design because they are witnesses of environmental changes here. Unfortunately, three trees were removed by mistake. Therefore, the author creates a shared ecological landscape based on the site characteristics. When jujube trees blossom in spring, many tourists stop to watch them. Especially in the mature season of jujube trees, children like to play here, which forms a positive interaction between people and the environment and lets the cold building in the surroundings more warmth. (*Fig. 47*)

Fig. 47. Interaction between people and the environment. (Source: Photo by CAO Hui, 2021)

D. Environmental integration

As a public building with cultural and educational significance, the Memorial Hall of Chinese folk cultural heritage rescue project is endowed with special meaning in Hougou ancient village scenic spot. Its very existence is an interpretation of the man-earth relationship. As the landmark area of Hougou Ancient Village scenic area, every visitor here is invited to visit the memorial hall. By displaying the achievements of the protection of folk cultural heritage, people can have a clearer understanding of the value and significance of cultural heritage, reflect on the present and imagine the future to arouse the attention and resonance of tourists to the protection of Chinese folk cultural heritage, which is the significance of this building.

Different people come here and gather together to visit and accept education, to experience the charm of the traditional folk cultural heritage, with beautiful memories back to their life, and share this memorable experience with friends around. In this project, the author relies on the actual architectural environment to promote the energy transformation between people and the environment. It tries to transform the appeal of the environment and people's emotions into creativity for the future, realizing the maximization of the meaning of the site and the sustainable development of people and the environment.

E. Environmental evaluation

Chinese folk cultural heritage rescue memorial hall is an important landmark building in Hougou ancient village scenic spot, and its design reflects the design concept of environmental friendliness. At the initial stage of the project design, the author carefully analyzed the relationship between people, architecture,

site, and environment and constructed an environmentally friendly architectural environment. The author conducted a comprehensive environmental evaluation of the project in the form of a survey, interview, behavioral observation, and questionnaire. Evaluated the design of the project through the four-point scale of environmental evaluation. The specific performance is as follows:（*Table. 5*）

Content	Order of evaluation				
	Very bad	Bad	General	Good	Excellent
Aesthetic aspects					√
Functional aspect				√	
Emotional aspect					√
POE			√		

Table. 5. Four – point scale of environmental assessment for Chinese folk Cultural Heritage Rescue Project memorial Hall. （Source: Designed by CAO Hui, 2022）

First, this project received a rating of " Excellent " in aesthetics. Tourists and villagers have shown a high degree of recognition of the design of the memorial hall, using adjectives such as grand, spectacular, distinctive, traditional, and charming to describe their love for the building.

Second, it received a "Good" rating in terms of functionality. After completion, the memorial hall will provide exhibits, academic lectures, and cultural exchange activities on folk cultural heritage. It has the functions of a museum, collection, and archive that will provide a high-quality cultural place for Hougou ancient village scenic spot in the future. As a result, people think highly of the memorial in functionality.

Third, it received a rating of " Excellent " in emotional evaluation. Since the Hougou Ancient Village scenic area is far from the city, there are few facilities for museums or memorials around it, so the project has great emotional significance for locals and visitors. In addition, the design concept contains the sincere emotion of the architect toward the native place. The artistic expression and cultural connotation of the architectural design are generally accepted by the public, realizing the empathy between the site and people. Therefore, the evaluation in the emotional aspect has obtained satisfactory consequences.

Finally, because the interior part of the project is still under construction and not fully open to the public, visitors can only visit parts of the ground floor. As a result, it received a low score in post-use evaluation, achieving a "General" rating. The design team hopes to provide visitors with a complete experience in the future when its whole functions are improved.

In general, the design of the Chinese folk cultural heritage rescue Memorial Hall project has achieved the expected goal, and the architectural design has realized the organic integration of art, technology, culture, emotion, and environmental friendliness. The formal operation of the project in the future will further highlight the historical status and realistic role of Hougou Ancient Village, hoping to make a positive contribution to local tourism and cultural renaissance.

Part III. Comprehensive project of Tourist Reception Center of Hougou Ancient Village Scenic Spot

A. Site construction

The comprehensive project of the tourist reception center is a significant infrastructure to improve the tourism function of Hougou ancient village scenic spot. The project is on the west side of the memorial hall, which presents the "T" shaped architectural layout with the surroundings. These two buildings constitute the image project of Hougou ancient village scenic spot.

In the tourist reception center section, the author broke the traditional design thinking, divided the tourist reception area into three blocks according to the site characteristics, and constructed a modular service system. In the specific design, the author takes the tourist service center as the core area to create three different functional areas, namely the tourist reception center, the ancient village scenic spot ticket gate, and the theme hotel. The project covers a total area of 9,000 square meters, among them, the total construction area of the tourist reception center is 1300 square meters, and the construction area of the Hougou Ancient village theme hotel is 4500 square meters. (*Fig. 48*)

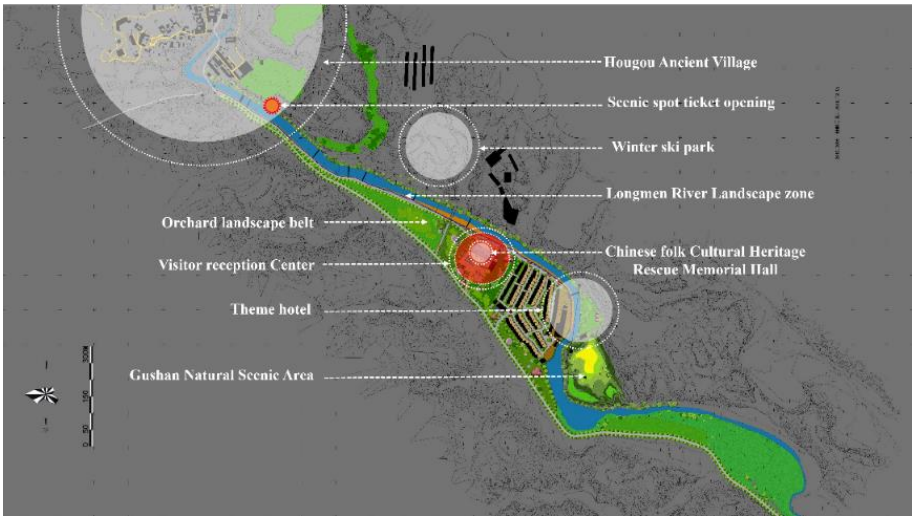


Fig. 48. Schematic diagram of Hougou Ancient Village Tourist Reception Center.
(Source: Designed by CAO Hui, 2021)

B. The creation of atmosphere

The scenic area visitor center is a systematic service framework, which is different from the design of similar projects in the past. According to the characteristics of the scenic spot and the needs of tourists, the author innovatively divides the tourist service functions into reasonable sections and organically connects them through the riverside landscape belt, forming an environmentally friendly and ecological design mode.

The visitor center is a single-story building with rows of buildings. Because it is adjacent to the memorial hall, they are unified with the central square area in the specific design. In the design process, the author is inspired by vernacular architectural form, deconstructs the architectural image of the traditional quadrangle courtyard, retains the architectural shape and decorative characteristics of the quadrangle courtyard, and reorganizes its formalization according to the features and functional requirements of the site and constructs a semi-open site environment. （*Fig. 49*）

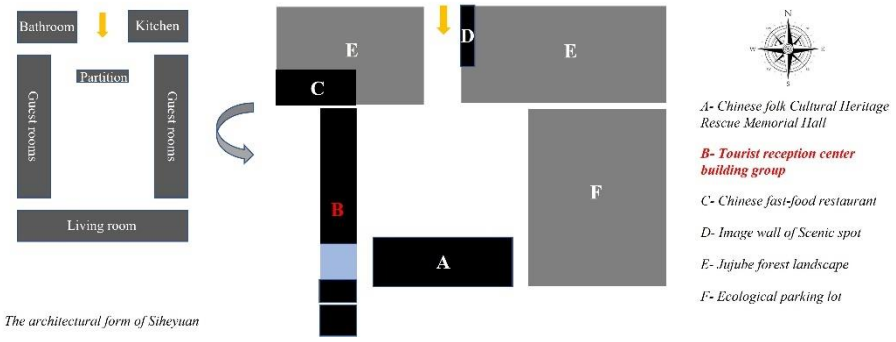


Fig. 49. Site organization diagram of Hougou Ancient Village Tourist Reception Center.
(Source: Designed by CAO Hui, 2021)

The tourist reception center is a row building composed of a tourist reception area, local specialty supermarket and restaurant, public toilet, maternal and child room, outdoor smoking area, police room, and clinic. The building is arranged in sequence according to the combination, forming a continuous service system. The design clearly shows the function Settings of the service area to tourists, improving the experience of tourists and enhancing the service quality of the scenic spot. （*Fig. 50*）

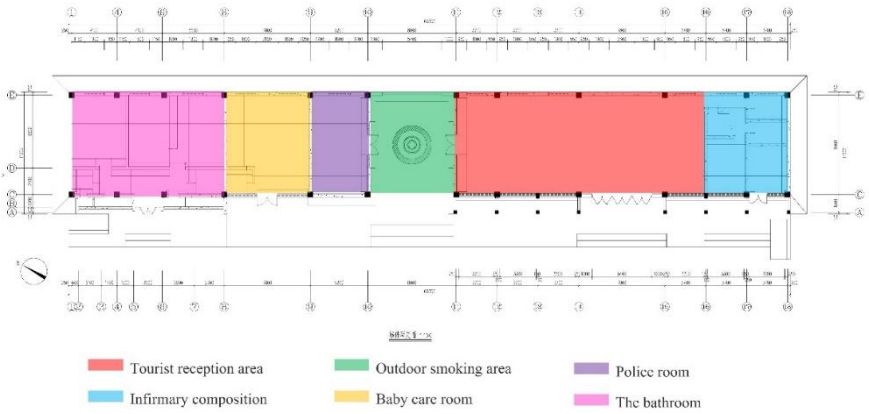


Fig. 50. Function layout of tourist center of Hougou Ancient Village Scenic spot.
(Source: Designed by CAO Hui, 2020)

Fig. 51. Design concept of tourist center of Hougou ancient Village scenic spot.
(Source: Designed by CAO Hui, 2020)

The architectural design of the visitor reception center is based on the classic vernacular architecture style. The main structure is a concrete frame consisting of a pitched roof structure and two flat-roofed

buildings. In terms of the decoration of the external environment of the building, the author optimized the traditional architectural decoration symbols to create a modern Chinese architectural form, which not only caters to the aesthetic orientation of contemporary people but also does not lose the classical implication. (*Fig. 51*)

In the building facade's decoration, the author uses traditional sloping roof decoration, gray brick wall surface, brick wall parquet structure, glass curtain, and other elements to reflect the contemporary image expression of Chinese architecture. Tries to make the building form a harmonious atmosphere with the surrounding natural environment. (*Fig. 52*)

Fig. 52. Real scene of tourist center of Hougou ancient Village scenic spot.
(Source: Photo by CAO Hui, 2020)

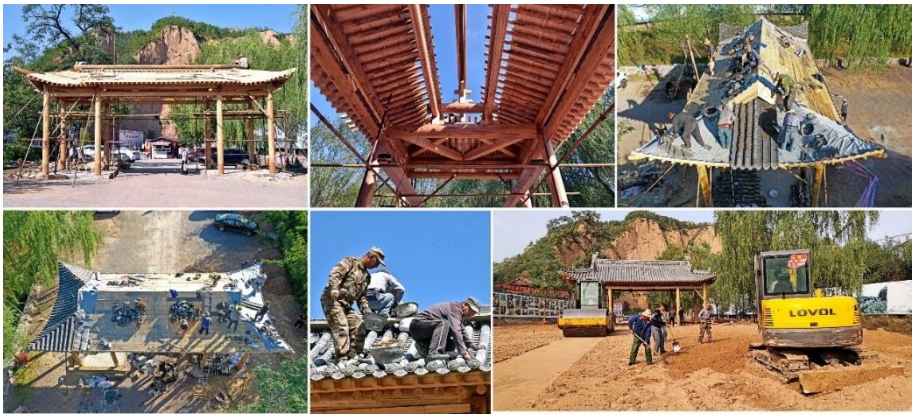


Fig. 53. The construction process of the ticket barrier at the entrance of Hougou Ancient Village.
(Source: Photo by CAO Hui & Wang Yonggang, 2021)

In addition, located at the entrance of the ancient village, the ticket gate is another branch of the reception center section. In keeping with its surroundings, the building is designed following the shape and form of a traditional building, using local materials and artisans. Although it is a new antique building, it adopts classic construction techniques to construct it, which endows it with the genes of Hougou ancient village. (*Fig. 53*)

The new building blends smoothly with the surrounding environment, becoming another small landmark of Hougou Ancient Village and contributing to the modern inheritance of traditional architectural techniques. It seems like a newly married girl looking back at the ancient village, expressing her feelings for her hometown, and realizing the empathy between people and the environment through

the site atmosphere creation. As a transitional building, the check-in building connects the central square of the scenic spot with the inside environment of the ancient village, forming a natural transition in the senses and providing a space-time clue for visitors. It builds an immersive experience environment with the natural landscape along the Longmen River, which integrates the natural environment, people, and tourism services. (*Fig. 54, 55*)

Fig. 54. Hougou ancient village scenic spot ticket gate building and riverside landscape area.
(Source: Photo by CAO Hui & Wang Yonggang, 2021)

Fig. 55. Longmen River - Waterfront landscape reconstruction project.
(Source: Photo by CAO Hui, 2021)

Hougou Ancient Village theme hotel is another branch of the reception module of the scenic spot. This project improves the integrated reception capacity of the Hougou Ancient Village scenic spot. In the design process, to avoid the visual pollution of the natural environment caused by the excessively modern architectural forms, the author proposed an "eco-friendly" design concept for the hotel environment design. Under the premise of meeting the functional requirements of the hotel, the architectural appearance of the building is consistent with the architectural style of Hougou New Village, which is visually very unified. (*Fig. 56*)

Fig. 56. Hougou ancient village cultural tourism theme hotel.
(Source: Photo by CAO Hui, 2021)

In addition, the design team considered the value of the natural geomorphic features of Longmen River in constructing the atmosphere of the built environment. The design team plans an ecological riverside garden on the bank opposite the hotel, relying on the landform of surrounding mountains and the natural water body of Longmen River to create a pleasant landscape. The two sides are connected by a specially designed chain bridge, creating a quiet and exclusive garden for the tourists staying in the hotel. (*Fig. 57*)

Fig. 57. Hougou ancient village cultural tourism theme hotel - riverside ecological landscape.
(Source: Photo by CAO Hui, 2021)

C. Design of man-land relationship

The design of the Hougou Ancient Village Reception Center is a breakthrough and innovation in the author's design work. The design team hopes to use spatial reorganization to establish interaction and communication between people and the environment, form an active environmental atmosphere, and create a positive human-land relationship through relationship design. Therefore, the author pays special attention to the processing of site details in the design.

First, in the design of the tourist reception center area, the original ecological environment is continued. In the site planning stage, the author retained a group of wild small white pear trees located in the southeast of the tourist reception center and designed an original ecological sightseeing bus riding area based on the characteristics of the original site and the needs of tourists. Tourists can enjoy the

natural scenery along the riverfront while walking in groups to the ancient village ticket area or directly take sightseeing electric vehicles. （*Fig. 58*）

Fig. 58. Ecological landscape design of tourist reception center in Hougou Ancient Village scenic spot.
(Source: Photo by CAO Hui, 2021)

Because small white pears and red dates are the unique agricultural products of Hougou ancient village, they are very popular with the local people, so the author and the planning staff of the scenic spot jointly planned the Hougou Sharing Picking Festival. Several fruit tree landscape areas along the riverbed provide free picking services to tourists during the fruit ripening season. The low-carbon design approach shortens tourists' cognitive distance to the environment and emphasizes the interactive relationship between tourists and the environment. The immersive experience enables visitors to feel the natural charm of the Hougou ancient village and sets up the ecological image of local agricultural products, forming a mutually beneficial human-land relationship.

Fig. 59. Public area of tourist reception center of Hougou Ancient Village scenic spot.
(Source: Photo by CAO Hui, 2021)

In the design of the tourist reception center building, the author pays special attention to the shared space section, hoping to promote information sharing and face-to-face communication between visitors through flexible space organization. First of all, the main body of the building is a sloping roof form with the verandah function, which connects the fast-food restaurant, police room, bathroom, maternal and child room, medical clinic, and other areas, and through the form of the verandah to build a reasonable tourist service path. Secondly, the author designed continuous rest areas in the verandah area and used

reasonable distance control to increase the opportunity for visitors to have face-to-face communication. In addition, a semi-open outdoor space is designed in the middle of the building complex to provide tourists with an exclusive outdoor smoking area, creating a civilized image of the scenic spot and giving the solemn Chinese-style buildings humanistic care. （*Fig. 59*）

Fig. 60. Ecological garden of Hougou ancient village cultural tourism hotel.
(Source: Photo by CAO Hui, 2021)

Finally, in the Hougou ancient village theme hotel section, the author tries to strengthen the adaptive coexistence between the building and the natural environment by weakening the shape of the building. The design team also made full use of the inherent advantages of the surrounding environment and planned a small ecological garden opposite the hotel so that every visitor can have a dialogue with nature as soon as they enter the hotel and stimulate their desire to explore the place. Through the proper design of the site to create a natural environment, and actively enhance the value and significance of the site, because such a form not only lets visitors feel the nature but also lets them experience the nature. （*Fig. 60*）

D. Environmental integration

In the design of the visitor reception center, the author aims to stimulate a dialogue between visitors and the natural environment. Through low-carbon and ecological ways to create a harmonious environmental image, to help the tourists in the process of entering the scenic spot establish a positive environmental evaluation ability and deepen their comprehensive impression of the place.

The author puts the theory of place into practice in the project, emphasizes the inner performance of people in the physical environment, pays attention to the innovative organization of the form of service, and establishes a clear goal of place through systematic path planning. Based on the environmental motivation, the systematic integration of scattered sites forms a complete service framework. In the specific design, try to design rhythmic spatial nodes to construct positive site information and the humanized environmental atmosphere from the perspective of relational design. Integrate the complex environmental message to strengthen the dialogue and interaction between people and the environment. Moderate environmental integration enhances the site's significance, and the most important thing is to provide users with a high-quality space experience. (*Fig. 61*)

Fig. 61. Hougou ancient village tourist reception Center battery car ride point.
(Source: Photo by CAO Hui, 2021)

E. Environmental evaluation

The tourist service center project is a case of synthesizing the use of the site. In the project design process, the author emphasizes the systematic construction of the site, based on Environmental psychology, through the direct and indirect environmental atmosphere to promote the positive impact of the environment on the physical and mental health of visitors. The author conducted a comprehensive environmental assessment of the project through on-site visits, behavioral observations, and questionnaires and evaluated the project through a five-point scale of the environmental evaluation. The specific performance is as follows: (*Table. 6*)

Content	Order of evaluation				
	Very bad	Bad	General	Good	Excellent
Aesthetic aspects				√	
Functional aspect				√	
Emotional aspect					√
Ecological aspect					√
POE				√	

Table. 6. Five-point scale of Tourist Reception Center project.
(Source: Designed by CAO Hui, 2022)

The visitor reception center received a "Good" grade in the aesthetics section. Respondents generally believe that the design of the visitor reception center meets the aesthetic requirements of the public and achieves high quality in architectural form, environmental atmosphere, decorative arts, and other aspects. However, tourists' evaluation of the visual design of scenic spots has declined, and it is necessary to further strengthen its quality in terms of aesthetics and identification, such as the artistic design of road signs and signs.

The visitor reception center received a "Good" grade in the functionality. The new visitor center has a brand-new image to provide visitors with a full range of travel services, to meet visitors' needs. However, the fly in the ointment is that the planning of supporting facilities for new energy vehicles is not fully considered. For example, the design of the charging system in the parking lot is ignored, and the exclusive area for new energy vehicles is not reserved.

The project was rated "Excellent" in both emotional and ecological aspects. The design team made reasonable use of the site's characteristics to create an immersive environment, leaving visitors with a good impression and sense of experience. Especially in the aspect of ecological landscape design, the site construction based on environmental behavior motivation makes tourists feel the affinity of nature, and the interactive landscape brings tourists an unforgettable farming experience, which not only protects the local ecological environment but also improves tourists' experience and achieve a win-win situation between people and the environment.

In the post-use evaluation, the design received a "Good" rating. The system design and perfect function services enhance the integrated reception capacity of the scenic spot so that tourists get a better experience. However, although modern facilities provide systematic services, some tourists prefer to experience local traditional cave buildings in terms of accommodation which offers more possibilities for the reuse of vernacular buildings in Hougou Ancient Village scenic spot. In the future, the design team will conduct in-depth research and development on the sustainable development of vernacular architecture based on the feedback of visitors and the characteristics of the project, and the behavioral motivation of users.

Part IV. Restoration and renewal of Hougou Ancient Village

A. Site construction

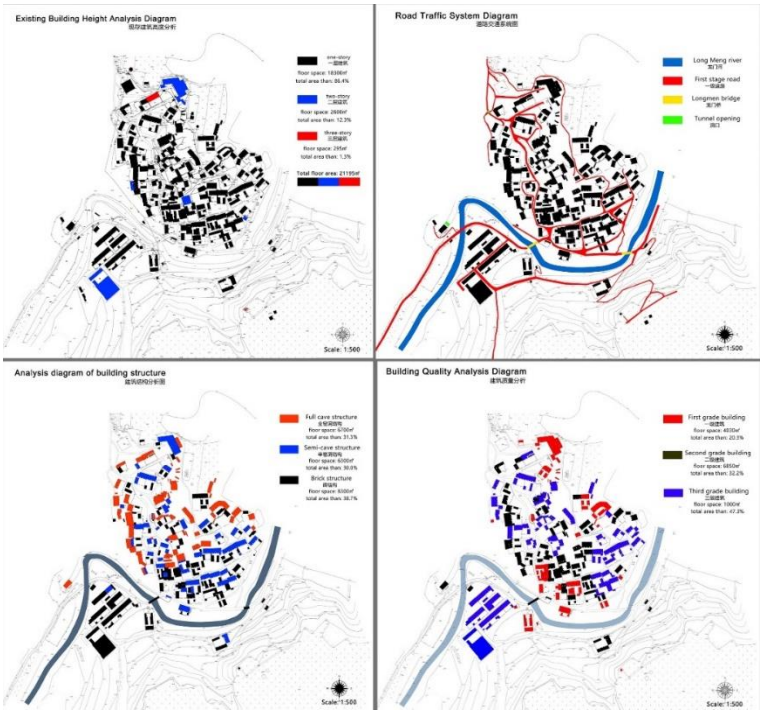


Fig. 62. Architectural environment quality analysis diagram of Hougou Ancient Village.
(Source: Designed by CAO Hui, 2021)

After the infrastructure of the scenic spot and the construction of Hougou New Village have been improved, the local government and developers have collectively relocated the villagers of Hougou Ancient Village to live in Hougou New Village through the way of property rights replacement. Subsequently, an overall restoration of the built environment and tourist facilities inside the ancient

village was carried out. Under the premise of respecting the original landform and environmental texture of Hougou ancient village, the design team carried out a comprehensive restoration of Hougou ancient village based on the design principles of restoring the old as the old and protecting the local nature. Due to the enormous volume of the Hougou ancient village scenic area, the design team will only aim at a part of the units.

First, the design team conducted a systematic investigation and analysis of the current situation of the ancient village's internal architectural environment and determined the objects and quantities of architectural restoration through field research and field mapping. It includes the repair of dilapidated buildings, the demolition of damaged shantytowns, the renovation of toilets, the repair of road surfaces, the treatment of various public pipelines, and the upgrading of garbage and sewage systems. Restore the original features of ancient villages by optimizing various disharmonious factors in the scenic area and try to create an immersive farming culture scenic spot. (*Fig. 62*)

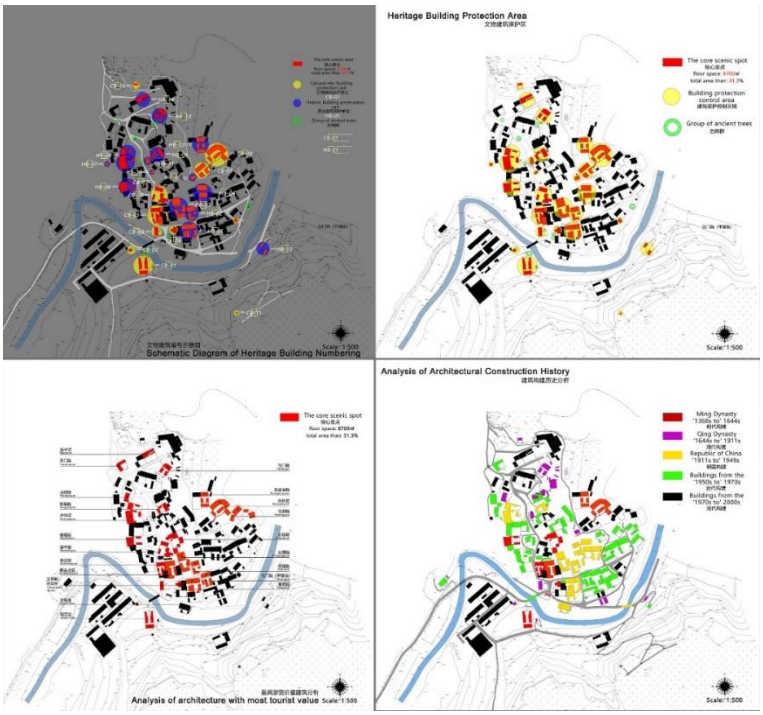


Fig. 63. Architectural value analysis diagram of Hougou Ancient Village.
(Source: Designed by CAO Hui, 2021)

Secondly, the tourism value of vernacular architecture in ancient villages is analyzed and summarized. According to statistics, there are 29 scenic spots along the scenic area. After evaluating them, the design team determined a total of 6 courtyards for priority protection and repair and restructured them according to their characteristics and tourism value. In addition, the team also renovated other areas of the ancient village that are worth visiting, especially the collapsed buildings in core areas, and restored the surrounding mountain environment. (*Fig. 63*)

Finally, according to the future development of the scenic spot and tourism needs, a new site planning scheme was developed. The design team divided the scenic spot into six theme modules, including the homestay area, the traditional culture and craft exhibition area, the business and cultural area, the artist workshop, the folk courtyard, and the others. Try to use the narrative design method to

organically connect the scenic spots through the positive site organization to build a reasonable tour line, forming a new ancient village tourism system. (*Fig. 64*)

Fig. 64. Hougou ancient village internal site planning scheme.
(Source: Photo by Hougou ancient village scenic spot & CAO Hui, 2022)

B. The creation of atmosphere

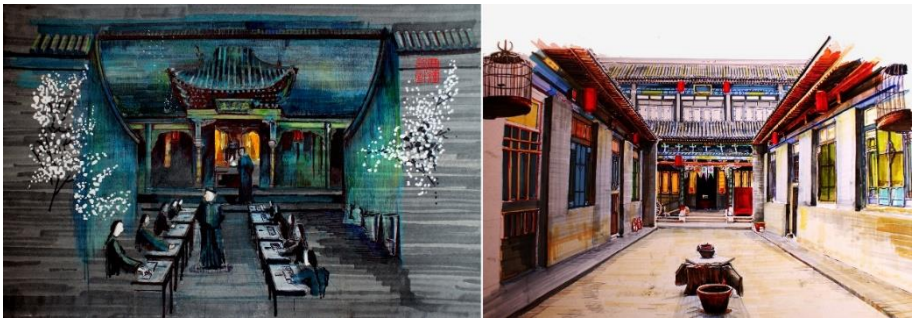


Fig. 65. Schematic diagram of restoration image of ancient building environment.
(Source: Photo by CAO Hui, 2020)

The construction of the environment in the ancient village is the focus and difficulty of the whole project. How to restore an original village scene within the established framework is a practical problem faced by architects and investors. On the one hand, the construction of the site atmosphere should be marked by history and time; on the other hand, it should reflect the inherent characteristics of the site; on the third hand, it should have situational space experience; in addition, it should embody the commercial value of tourism products. The author tries to simulate the environment atmosphere in ancient times by

drawing sketches and creating the environment atmosphere of the village with a narrative design idea. (*Fig. 65*)

First, the architect should pay attention to multi-dimensional thinking from materiality to construction techniques [20]. Based on the principle of "locality" of vernacular architecture, the author employs local craftsmen to repair the damaged building environment and adopts traditional building construction techniques in northern China. Through low carbon construction process to minimize the energy consumption and environmental pollution. In the construction process, the design team used the original ecological building materials to make the restored building atmosphere warmer and more memorable, reflecting the eco-friendly construction process. Based on the traditional construction techniques, the old buildings are protected and repaired, realizing the inheritance of the traditional local culture of the ancient village. (*Fig. 66*)

Fig. 66. Restoration process of Hougou Ancient Village.
(Source: Photo by CAO Hui, 2021)

Fig. 67. Farming landscape in Hougou ancient village.
(Source: Photo by CAO Hui, 2021)

Secondly, by constructing the traditional farming atmosphere to render the farming situation of the ancient village, the goal is to improve the environmental image of the project and optimize the material

properties of local resources. In the design process, the design team recreated the architectural environment of the ancient village with the artistic method of spatial narration and designed several landscape modules with the theme of farming culture, which changed to restore the original farming scene. Based on the stimulus theory, a more authentic site atmosphere is used to enhance the experience of tourists and achieve empathy between people and the environment. (*Fig. 67*)

Thirdly, in the construction of interior space, the author emphasizes the concept of returning to the origin, restores the atmosphere of interior space to the living condition of ancient times, reduces the use of modern electrified equipment appropriately, and encourages people to have a dialogue with history. Create the actual space atmosphere, reduce people's dependence on the virtual world in the post-screen era, and let visitors immerse themselves to feel the site's power. In addition, the team restored some of the representative thematic Spaces and designed them as an experiential folk house museum, continuing the concept of the visitor service center. Try to build a continuous place framework rather than just putting them together. (*Fig. 68*)

Fig. 68. Hougou ancient village retro interior space atmosphere.
(Source: Photo by CAO Hui, 2021)

In addition, in the creation of the external environment atmosphere of the scenic spot, the author takes the experience of nature as the design theme, emphasizes the dialogue and communication between the human and natural environment, and tries to repair the relationship between the environment and human with the design concept of the unity of nature and man.

C. Design of man-land relationship

Under the background of primitive farming culture in Hougou Ancient village, the design of the man-land relationship should take the experience of farming culture as a clue to reflect the development process and regional culture of traditional Chinese farming society. Therefore, the design team planned an outdoor farming experience site in the ancient village based on the classic Chinese concept of the unity of heaven and man, namely the harmonious coexistence of people, the site, and the environment. It tries to spatially encode the traditional farming cultural elements and combine them with the natural environment of the ancient village to provide a site for tourists to experience and interact.

Hougou Ancient Village farming research base is a typical example. According to the development history of farming culture, the design team planned a situational farming experience site and research base southwest of the ancient village. The site was originally an actual farming site, mainly for wheat and vegetables. After the re-planning, it is divided into four experience areas. The area is designed with the visitor experience as the primary goal, creating a harmonious man-land relationship through the original farming atmosphere, giving the site more educational significance.

Fig. 69. Hou Gou ancient village farming research base.
(Source: Photo by Hougou ancient village scenic spot, 2020)

First of all, the design team designed a farming and livestock experience area in the southwest. The traditional farming and livestock raising site completely restored the scenes of ancient farming and livestock raising, allowing visitors to interact with various types of livestock while also learning about farming knowledge. Secondly, a farming experience area is planned in the northwest of the site, where visitors can personally experience the actual farming process under the guidance of local farmers. In addition, a display area for agricultural products is designed in the southeast of the site to show visitors the knowledge of various crops and plants from real planting sites. Finally, a farming culture research base is planned in the northeast area of the experience area. The original residential buildings of the ancient village are transformed into an indoor farming culture experience site to show the processing process of various kinds of food to tourists, who can participate in and share the results. (*Fig. 69*)

Traditional farming sites have been revitalized by proper planning. Visitors can not only experience farming culture but also enhance information exchange and emotional interaction with each other. Most importantly, the design of the man-land relationship deepens their feelings towards farming culture and reconstructs the sustainable relationship between man and local culture, man and natural ecological environment.

D. Environmental integration

Uses heritage and traditions to offer experiences [21]. By integrating vernacular architecture and traditional culture, constructing a virtual space bridge by spatial narration, freeing people from modern and complicated urban life and returning to nature. In the design, local conditions and practices should be fully respected, and the original building environment should be orderly integrated through low-carbon construction approaches and traditional construction techniques. In planning, architects should

pay attention to the dominant rendering of the architectural environment and the mining of the hidden value of local culture. Try to realize the energy balance between the site environment and human activities through the man-land relationship organization.

In the preliminary planning, the author puts forward the design concept of local integration, making full use of the existing building conditions to connect them reasonably, forming a new spatial pattern and giving new vitality to the old building. Due to a large number of houses in the ancient village, the author chooses the design of the village history hall as an example to analyze the environmental integration of the project.

Fig. 70. Hougou ancient village history Museum.

(Source: Photo by CAO Hui, 2021)

The village history museum used to be an old courtyard in the ancient village. After the villagers moved out, the author connected them, restored the interior spaces, and formed a comprehensive exhibition place and traditional folk house museum. Visitors can have an overall understanding of the history of Hougou Ancient Village through the village museum and can enter the real residential houses for an immersive experience. Reasonable space integration enables the old buildings to continue to grow in a new way. Similar cases will be popularized in the future planning of the ancient village. (*Fig. 70*)

E. Environmental evaluation

The restoration and tourism development of ancient villages should be based on the original ecological environment of the countryside and scientifically planned in the dimension of authenticity and regionalism. Architects need to innovate design approaches to build a harmonious man-land relationship through low-technology and ecological design approaches to achieve sustainable development of ancient villages. In the process of the project design, the authenticity of the historical fabric should not be compromised by the set sustainability goals for the development of inclusive and responsive reconstruction [4]. It is necessary to constantly innovate the utilization mode of cultural heritage to realize the sustainable relationship between cultural heritage, users, and the natural environment [24].

In the restoration of Hougou ancient village, based on the sustainable development of the scenic spot and the needs of tourists, the design team carried out targeted restoration and integration of vernacular buildings on the premise of respecting the natural environment texture, reshaping the local ecosystem and historical features. During the design process, the team maximized retained the spatial sequence of the old building and the site atmosphere, emphasizing the symbiotic relationship between

the old building and its surroundings. Through low-carbon and traditional construction approaches to rebuild the harmonious man-land relationship, so that hougou ancient village coruscated with new vitality. (*Fig. 71*)

Fig. 71. A panoramic view of Hougou Ancient Village under restoration.
(Source: Photo by WANG Yonggang, 2021)

The restoration and renewal of Hougou Ancient Village get the highly appraised in all aspects of environmental assessment. The successful design is based on the actual ecological environment of the place and people's feelings for the hometown, and the architect only integrates these factors artistically. When we talk about vernacular architecture, perhaps architecture without architects is the most original expression of the human-earth relationship. (*Table. 7*)

Content	Order of evaluation				
	Very bad	Bad	General	Good	Excellent
Aesthetic aspects					√
Functional aspect					√
Emotional aspect					√
Ecological aspect					√
POE					√

Table. 7. Five - point scale for environmental assessment of Hougou ancient village.
(Source: Designed by CAO Hui, 2022)

5.1.4. Summary

For the protection and development of ancient villages, we should respect history in consciousness, adapt to nature in strategy, adapt to local conditions in technology, advance with The Times in planning, achieve harmonious coexistence between people and the environment through sustainable approaches, and promote active dialogue between users and the environment. The architect should pay attention to the atmosphere of the environment and the expression of space artistic conception and establish an ideal environment that meets the comprehensive needs of contemporary people through low-carbon

construction methods.

The redesign of the vernacular architectural environment should pay more attention to the organization of the relationship between people and the site and actively explore the new paradigm of its protection, development, and application.

First, according to the actual needs of contemporary people, the space environment is redesigned to create a friendly atmosphere through the intervention of artistic design to stimulate people's motivation to experience the environment. Secondly, the occurrence of experience events promotes the effective interaction between people and the environment so that experiencers get a positive sense of participation and establish the emotion and desire for the protection of ancient villages. Finally, through the interaction between humans and the environment, people's attention to local culture is aroused, and the harmonious human-environment relationship is re-established to achieve a win-win situation between humans and the environment.

Whenever I recall the scene of playing in my hometown when I was a child, the harmonious man-earth relationship is still deeply impressed in my mind. It is a kind of home memory.

5.2. Kindergarten renewal Project, Jing Zhong no.1 Kindergarten, Jingzhong, Shanxi, China, 2020-2021.（Masterworks）

With the reform of China’s childbirth policy in recent years, a unique baby boom phenomenon has emerged, and the number of newborn babies has increased rapidly in China. In the transformation and development of contemporary cities, the past kindergarten architectural design aesthetic experience can no longer adapt to the social development needs. The complex urban environment has a significant impact on the psychology and physiology of child groups, and the quality of the built environment plays a crucial role in this regard. Therefore, the sustainability and adaptability of architectural design have become the core issue of contemporary educational architectural design, and it is also a social category.

Kindergarten life is every child's best memory of childhood that records people's most simple happiness. Maybe when you become a parent, you'll still have vivid memories of your kindergarten days. The happiest moments are always impressive. The memory of kindergarten life condenses children's impression of childhood, including the cognition of social life and the perception of social activities. The study found that a positive sensory experience plays a vital role in evoking children's visual, tactile and auditory responses. Therefore, creating a high-quality educational environment has become the focus of kindergarten construction.

The design of the preschool education environment should pay attention to the particularity of children groups, emphasize the active environment to stimulate children's cognition, and include its

psychological and physiological effects. For the analysis of the following project, the author will interpret the design of the kindergarten architectural environment from a rational and perceptual perspective based on the characteristics of children's environmental behavior and environmental psychology. This project is the author's masterpiece of DLA research, which mainly studies how relevant theories of environmental psychology are applied to architectural design projects and explores innovative expressions of educational architectural design from a sustainable perspective.

5.2.1. Historical overview

Project Background

As the material carrier of early childhood education, kindergarten plays a significant role in modern cities. In essence, kindergarten is a ‘space for children’s life, growth, and entertainment. It is a comprehensive place for young children to develop cognitive, emotional, social connections, and individual skills [24]. Kindergarten reflects the complicated relationship between the individual and collective of children in emotional cognition and social perception, and infant space plays a vital crucial role in their growth development. According to statistics, the consumption of infants and young children in China accounts for 18 percent to 30 percent of the total household consumption, among which the investment in early childhood education occupies the primary position [25].

With the advancement of urbanization, the renewal and development of kindergartens have become a significant issue. City expectations for kindergartens have soared as well. However, most of the functional design in kindergartens does not meet the needs of children's physical and mental development in current times, and there is little interaction between children and the environment.

Moreover, there is a common phenomenon that in specific design projects, architects only provide conventional design schemes to solve the environmental problems of kindergartens, and the administrators of kindergartens only passively put forward some design requirements. In most cases, the architectural environment of kindergartens is not designed from the perspective of children's experience, resulting in the architectural environment of most kindergartens looking unfriendly to children. The stereotypical cartoon symbols and the abuse of colors form habitual design thinking. Architects rarely pay attention to the analysis of the psychological and physical quantities of the design subjects, and the combination of architectural environment design and educational concepts is even rarer.

Origins Of the Project

The author's architectural practice in China is mainly engaged in Environmental Psychology study and interactive architectural design research, completed some actual construction projects in recent years, including the field of between children's behavior and building environment, through positive architectural practice has made some practical results, accumulated some experience in this field.

Jinzhong No.1 Kindergarten has a very long history. The author studied here when he was a child and was full of emotional affection for kindergarten. In early March 2020, the author received an invitation from the head of Jinzhong No.1 Kindergarten, hoping that I could offer some suggestions for the renewal of the kindergarten environment. After the on-site investigation and evaluation, the author puts forward some advice based on the school-running philosophy of the kindergarten, including the complete transformation of the park entrance building and the entrance image of the core teaching building. Subsequently, the principal of the kindergarten formally entrusted the author to be responsible

for the design and management of the project and awarded the author as the honorary teacher of the kindergarten. The author also had the honor to participate in the teaching activities of the kindergarten and communicate with the children in the actual teaching environment and obtained a lot of positive design materials. (*Fig. 72*)

Fig. 72. The trophy for celebrating the 70th anniversary of Jinzhong No.1 Kindergarten and the title of honorary teacher - based on the design of the entrance building of the kindergarten.
(Source: Designed by CAO Hui, 2020)

5.2.2. Project features

Project Operation Overview

Fig. 73. The development of Jinzhong No.1 Kindergarten from 1950s to 1990s.
(Source: Photo by Jinzhong No. 1 kindergarten, 1950-1994)

Jinzhong City's first kindergarten was founded in 1950, located in Yuci District Garden Road 112, and the whole garden covers an area of 6670 square meters. It was the only nursery institution in the Jinzhong area at the beginning of the founding of new China. (*Fig. 73*)

In November 2013, the kindergarten moved to No. 138 Jinlun South Road, Yuci District. With the strong support of the local government, a modern kindergarten with first-class hardware facilities was built. After years of development, at present, Jinzhong No.1 Kindergarten Park covers an area of 17.35 acres, with a construction area of 11,924 square meters. It is the first provincial-level demonstration kindergarten directly under Jinzhong city. (*Fig. 74*)

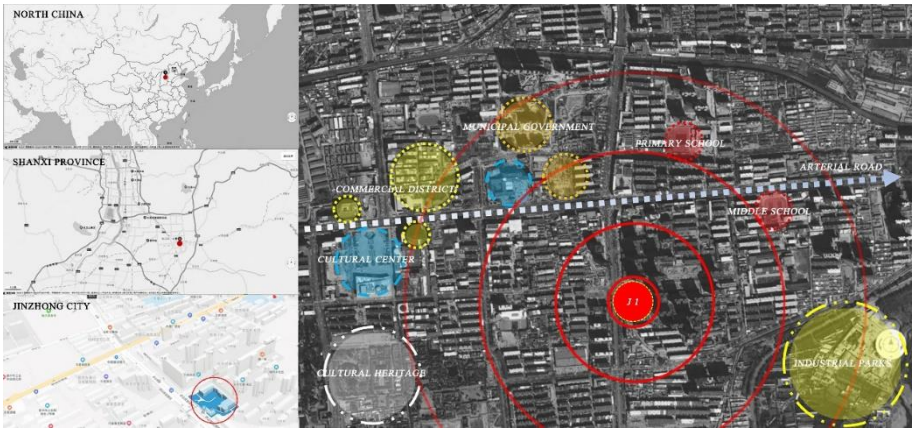


Fig. 74. Location analysis chart of jinzhong No.1 Kindergarten.
(Source: Designed by CAO Hui, 2020)

After moving into the new park in 2013, Jinzhong No.1 Kindergarten ushered in new development opportunities. After its rapid development in recent years, it has become an excellent model for local kindergartens in school philosophy and the educational environment construction field. The social experience theme activity course is the most characteristic mode of running the kindergarten, emphasizing the concept of returning to life, complete experience, diversified interaction, and happy growth, and has made gratifying achievements in the curriculum system construction. The outdoor environment of the kindergarten is well coordinated with the social experience theme activity courses, creating an environment with a strong sense of experience. (*Fig. 75*)

Fig. 75. The development of Jinzhong No.1 Kindergarten from 2013 to 2020.
(Source: Photo by CAO Hui, 2020)

Planning and design related issues

With the deepening of educational reform and the renewal of teaching concepts in Jinzhong No.1 Kindergarten, the original site environment has been unable to meet the needs of current teaching activities. Therefore, kindergarten needs an adaptable educational environment to improve the quality of early childhood education. Through preliminary investigation, the author found that some old building facilities in the kindergarten were in sharp contrast to the constantly developing environment, resulting in a disharmonious visual experience. In addition, their functions could not good meet the current demand, which affects the social image and education quality of kindergartens. Related environmental problems are embodied in the renovation of the kindergarten gate building and the image design of the main entrance of the teaching building.

Before the design work, the author systematically analyzed the current situation of Jinzhong No.1 Kindergarten from the perspective of environmental cognition. Through environmental assessment to dissect the place information of the project, the target site environment for information decoding processing, and mapping out the relevant technical problems. Correlation analysis of the kindergarten architectural environment mainly focuses on psychological and physical quantitative analysis.

Physical quantitative analysis:

A. The form of the building is relatively single, and the degree of integration with the surrounding environment is not ideal, which cannot form high-quality visual visibility to the public.
B. The main structure of the building has been damaged, and the phenomenon of top surface leakage and wall peeling has produced a safety hazard.
C. The application form of architectural decoration materials and colors is relatively simple, the construction process is rough, and the connection between various materials is not beautiful.
D. The relationship between the volume of the building and the scale of children is vague, especially the processing of some details does not meet the requirements of children's ergonomics, mainly reflected in the large scale of the building, which does not create a child-friendly environment.

Psychological quantitative analysis:

A. The existing environment design is relatively direct in the expression of the site atmosphere, and its planning is only reflected in the use of elementary functions, without the formation of communication and interaction between people and the environment.
B. The connection between the building and the surrounding environment is rigid, and the factors affecting children's environmental perception and spatial cognition are not fully considered in the planning of the outdoor landscape of the kindergarten.
C. As the primary visual form of kindergarten decorative elements, outdated cartoon images have poor timeliness and symbolism, which cause aesthetic fatigue and lead to low-grade emotional expression.
D. The design of the built environment lacks multiple concerns of humanity, art, and aesthetics and does not fully consider the expression of the building in the aspect of social significance.
E. The value orientation of architectural design is not clear, the cultural connotation is single, and the social value reflected in the community is limited.

Planning Target

Creating a new paradigm of kindergarten architecture design is the core goal of this project. Architects needed to create a physical space based on a child-friendly design perspective. In project planning, the architect should break the shackles of tradition and think like a psychologist. Through innovative thinking to establish a positive site system to form a child-friendly man-land relationship, create high-quality environmental visual effects for children, more importantly, stimulate their positive emotions and healthy behavior.

Based on the children's environmental behavior and psychology to carry out the design work, this project mainly aims to transform and upgrade the built environment of the kindergarten through cross-boundary research. Through the organization of the site and the space atmosphere creation, the author tries to establish a child-friendly architectural environment so that children can grow up in a happy environment. In addition, through the implementation of the project, the author hopes to promote the integration of the built environment and the kindergarten teaching philosophy, that is, the creation of the social experience architecture environment so that the built environment can better serve the process of children's teaching.

The main objectives of the project are as follows:

A. According to the teaching concept of kindergarten and children's environmental behavior characteristics, explore the possibility of combining a kindergarten architectural environment with a social experience curriculum.
B. Research on sustainable design strategies of preschool education buildings through active architectural practice.
C. Optimize the current educational environment through scientific design approaches, strengthen the sense of site experience of children, parents, and teachers, and improve their perception of the kindergarten architectural environment.
D. Through architectural design and organization of relationships, strengthen the interaction and communication between the kindergarten and its community, and build a harmonious human-land relationship.
E. Explore the new paradigm of contemporary kindergarten architectural environment design and try to improve the public's attention to early childhood education.
F. Provide an adaptable architectural design scheme to promote the diversified development of children.

Architectural programming

To improve the social image and realize the sustainable development of the educational environment, Jinzhong Municipal Government began to upgrade and renovate the old building based on the existing construction conditions in early 2020. The author discussed closely with the relevant administrators of Jinzhong No.1 Kindergarten and formulated the building plan. The specific content includes the following two sections:

A. **Optimal design of kindergarten entrance building area environment.** To improve the current situation of the entrance building of the kindergarten, enhance the social image of the kindergarten, and make the environment more suitable for the teaching concept of the kindergarten, the kindergarten plans to invest 500,000 yuan in upgrading the existing built environment. Specifically, it includes demolishing the damaged building components, optimizing and integrating the

surroundings of the entrance area of the kindergarten, sorting out the relationship between the design of the kindergarten's architectural environment and the community, and creating a brand-new social image.

B. **Environmental optimization of kindergarten teaching building area.** Optimize the environment around the entrance area of the teaching building, improve the visual image of the existing building environment, enrich the functional Settings of the building, and better integrate it into the environmental atmosphere of the whole kindergarten. The kindergarten plans to invest 550,000 yuan in upgrading this area, including the renovation of the entrance hall and the optimization of its surrounding environment, to create a child-friendly environment and improve children's sense of experience and security. In addition, the redevelopment of this area will better integrate current teaching concepts into the design of the environment and use it as a spiritual fortress for the kindergarten, creating a positive educational image.

5.2.3 Problems and Solutions

In the kindergarten's environment renovation design project, architects must first change the inertia of thinking of building environment design. The design of the architectural environment of the kindergarten is different from other types of space design. The designer faces the use object of children, which is a unique group. Therefore, before starting the design work, the architect should determine the focus and difficulty of the project.

Kindergarten architectural space refers to the physical environment created to serve kindergarten education. The modeling factors of design mainly include physical form, spatial organization, color composition, and other aspects. Without a doubt, the analysis of the building type of kindergarten not only relates to the feelings brought by itself but also the multi-faceted needs of uses and recipients for the building functions [26]. Generally, kindergarten architectural design is including modeling, empathy, and convey [27]. On the one hand, it shows how the environment affects children’s behaviors; and on the other hand, how the kids affect their surrounding environment. The process reflects the interrelationship between people and the physical environment and is consistent with the relevant field of Environmental Psychology research.

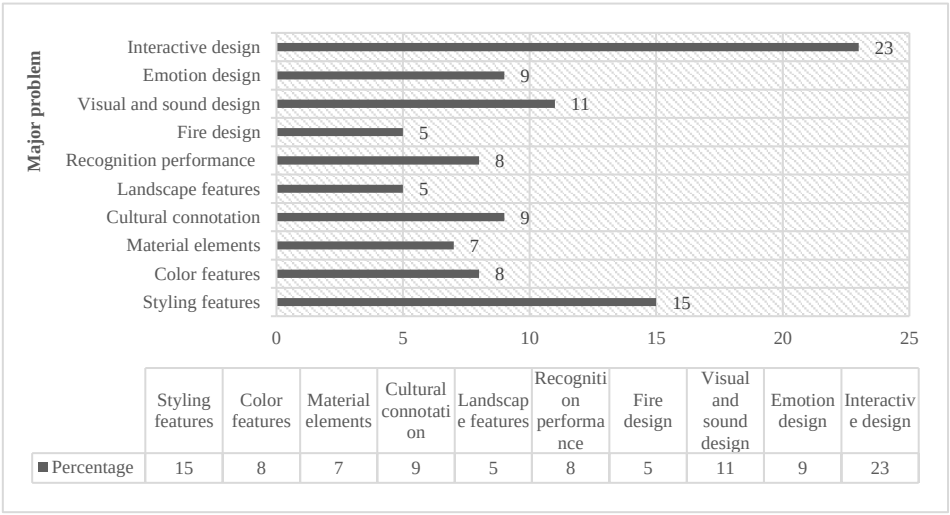
According to the characteristics of Jinzhong No.1 Kindergarten and the conditions of the existing site, the author tries to integrate the concept of the social experience-themed activity curriculum into the process of architectural design, hoping to create an educational environment suitable for children's all-round needs through innovative architectural design methods. Through the integration of the environment, the power and emotion of space are transferred to the children, providing them with a healthy, safe, adaptable, and flexible learning environment.

At first, the author starts with an extensive literature review, and the successful concrete cases and relevant studies are analyzed. Secondly, the author and his team conducted a targeted urban survey in Chinese cities, using the method of mapping to collect the research image data, and record the children's behavior, to make a qualitative analysis of the current situation of the community kindergarten building. Then the author applied the participatory action research method to the field survey and discussion of community kindergartens and obtained valuable data through the statistics of the questionnaire survey. Besides, cross-border collaboration with the stakeholders, educational institutions, and urban authorities is a breakthrough in this study. Finally, based on the preliminary comprehensive research, the design concept of experiential architecture is proposed, and the author summarized the perceptive object system

of kindergarten experiential architecture. Finally, based on the previous research, the author puts forward the core elements of experiential architectural design.

In the preliminary investigation, the author conducted a participatory action research method. The team selected a total of 60 urban residents for this questionnaire survey. Participants included: children, teachers, community residents, parents, and education experts. The public has chosen the five aspects of the kindergarten building that most need improvement. The five items with the highest selection ratio contain interactive design, styling features, visual and sound design, emotion design, and cultural connotation. These results will support specific design practices. (*Fig. 76*) (*Table. 8*)

Fig. 76. Project demonstration process and participatory action study - report design proposals to local government officials. (Source: Photo by CAO Hui, 2020)



	Styling features	Color features	Material elements	Cultural connotation	Landscape features	Recognition performance	Fire design	Visual and sound design	Emotion design	Interactive design
Percentage	15	8	7	9	5	8	5	11	9	23

Table. 8. Data collection of participatory action research.
(Source: Designed by CAO Hui, 2020)

The social environment and social interactions are significant when it comes to children's learning [28]. Therefore, the author puts forward the experience-oriented kindergarten design strategy and conducts two-way research on the relationship between early childhood education and the built environment.

Experiential kindergarten architecture is a kind of child-centered space that emphasizes the sensory experience of architecture, especially the significant role of physical space in stimulating children's visual, tactile and auditory responses. Essentially, participation and emotional experience are the basis of design, and the interaction between infants and physical space is the design approach. Through space creation, create a healthy atmosphere for the kids, and let the children can easily immerse themselves in the

dialogue with the environment. The process reflects dialogue and information exchange between the place and the user. (Table. 9)

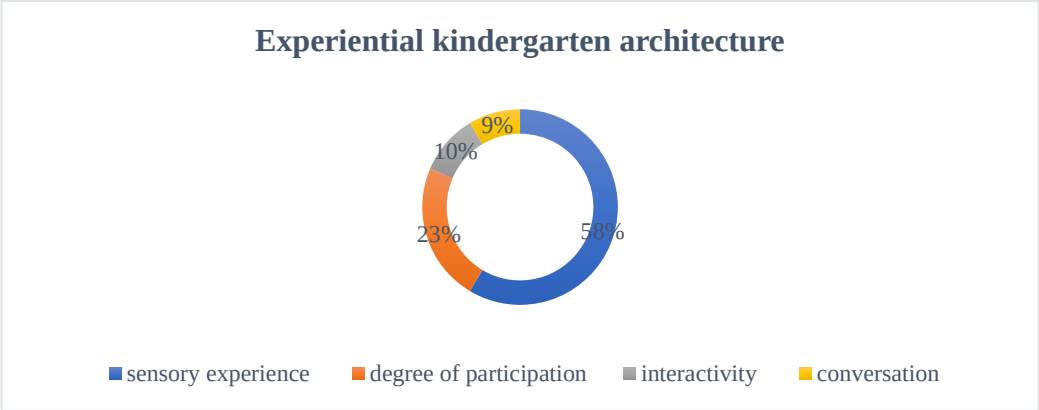


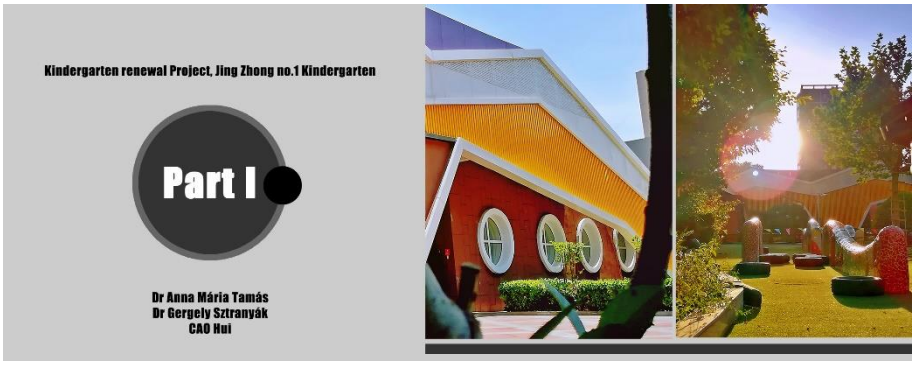
Table. 9. Elements of experiential kindergarten architecture.
(Source: Designed by CAO Hui, 2021)

Creating the space atmosphere, people-oriented design, and the interaction between people and space is the core content of experiential architectural study. The sense of belonging to the environment space is the goal of the design, which reflects the procedure of physical space developing and responding with time. Meanwhile, the sense of belonging to the environment can stimulate children to form specific spatial memories, and it also reflects the demands and characteristics of preschool architectural design. The author summarizes the perceptive object system of kindergarten experiential architecture to guide the actual design practice (Table. 10), including visual elements, other elements, perception elements, and cognitive elements, which embody the systematic thinking in the architectural design process.

The perceptive object system of kindergarten experiential architecture			
Visual elements	Other elements	Perception elements	Cognitive elements
Styling features	Shade control	Unique appearance	Physical needs
Color features	Fire design	Harmonious color	Mental needs
Material elements	Visual design	Proper scale	Emotional Needs
Landscape features	Touch design	Space atmosphere	Experience
Greening design	Insulation design	Aesthetic demand	Spatial innovation
Recognizability	Emotion design	Natural harmony	Children's Behavior
Symbolic features	Interactive design	Life force	Communication

Table. 10. The perceptive object system of kindergarten experiential architecture.
(Source: Designed by CAO Hui, 2020)

In the following chapters, the author will make a specific analysis of the design of this project based on the relevant theories of Environmental psychology and interpret the design process of this project from six aspects: site construction, atmosphere construction, human-earth relationship design, environment integration, environment evaluation, and design reflection. Through this project, the author hopes to provide more possibilities for the design of educational buildings in the future and hopes to break through the understanding of architectural design.



Part I. Kindergarten entrance architectural design project

A. Site construction

The landscape construction of Jinzhong No.1 Kindergarten reflects a very ecological environment. The landscape organization in the kindergarten takes social theme experience activities as the background and consists of ten different theme experience areas, full of natural atmosphere everywhere. The gate building of the kindergarten is on the west side of the site, in the central axis area of the kindergarten landscape. The building area is 380 square meters, and it is composed of a group of connected buildings and porches. The whole building provides security services for the schoolyard.

Fig. 77. Schematic diagram of overall planning of kindergarten park.
(Source: Designed by CAO Hui, 2020)

The internal functions of the building are mainly security rooms, toilets, utility rooms, medical rooms, and some spare space. The design of the porch is crude, and the whole structure is visually enormous, with a length of 30 meters and a height of 6 meters. Its visual form does not match the image of the kindergarten, and its connection with the street environment is not natural, so it does not form a child-friendly environment and positive environmental atmosphere for the kids. （*Fig. 77*，*78*）

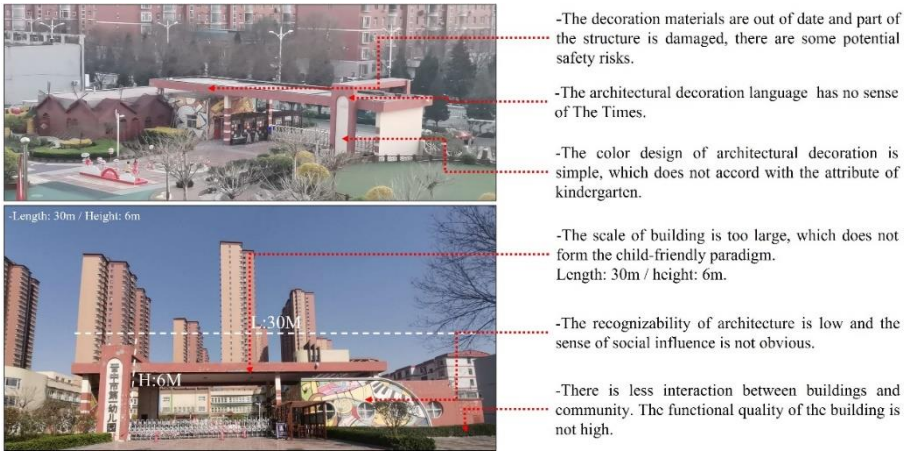


Fig. 78. Analysis of current situation of entrance building.

(Source: Photo by CAO Hui, 2020)

According to the characteristics of the entrance area and the surrounding environment, the author replanned the district, taking the safety, functionality, and interactivity of the building as the core of the site construction and paying attention to the connection between the building itself and the community, hoping to build a compound entrance building environment.

The design starts from the renewal of architectural spatial patterns based on the old entrance building. Under the problem-oriented design approach, the design team systematically planned and adjusted the existing layout to enhance the building's comprehensive functionality. For example, we reprogrammed the approach route; some unique functional areas in line with epidemic control have been designed, including the observation room, isolation area, disinfection room, medical room, and other spaces. The efficient connection between each functional area ensures the rationality of spatial planning and enriches the architectural function and use-value of the site. (*Fig. 79*)

Fig. 79. Functional plan of the entrance building.

(Source: Designed by CAO Hui, 2020)

The author purposely sets up a semi-open exhibition area in the center of the porch, which will display all kinds of artworks made by kindergarten children, providing a possibility of interaction with people passing by, making the area more functional and social. In addition, this extraordinary site organization makes full use of the gray space of the site, which can form a positive environmental identity.

Excellent artworks can enhance children's confidence and shape a wide range of environmental empathy. (*Fig. 80, 81*)

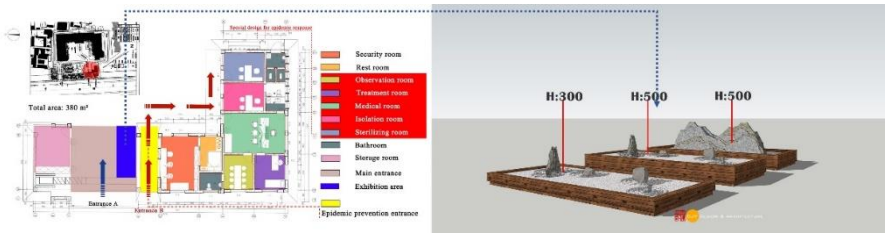


Fig. 80. The entrance building's outdoor shared exhibition area.

(Source: Designed by CAO Hui, 2020)

Fig. 81. Outdoor shared exhibition area real scene photo display.

(Source: Photo by CAO Hui, 2020)

In addition, the author also plans a mini urban shared landscape belt in the peripheral area of the entrance building, which becomes an extension of the entrance building through reasonable site construction, making a qualitative leap in the visual form and using the function of the area. It also improves the environmental atmosphere and artistic sense of the community. The shared landscape is composed of green landscape, urban sculpture, and public rest area, which connects the kindergarten and the community. At the same time, it also beautifies the city street environment, building a harmonious community environment. (*Fig. 82*)

Fig. 82. Mini urban shared landscape belt design scheme.

(Source: Designed by CAO Hui, 2020)

B. The creation of atmosphere

The author pays special attention to creating a positive architectural image and a child-friendly environmental atmosphere. Based on repairing the original building frame, a tailor-made aluminum

curtain wall form is adopted as the new frame of the building, and it is modular processing. Through the geometric analysis and graphic decoding of the original building facade, the author redesigned a metal device with symbolic significance to combine with it, which well optimized the original architectural image, formed a new environmental visualization image, and reinforced the properties, timeliness, and safety of the building. It's like giving a boy the mechanical suit of his dreams. It's inspiring. (*Fig. 83*)

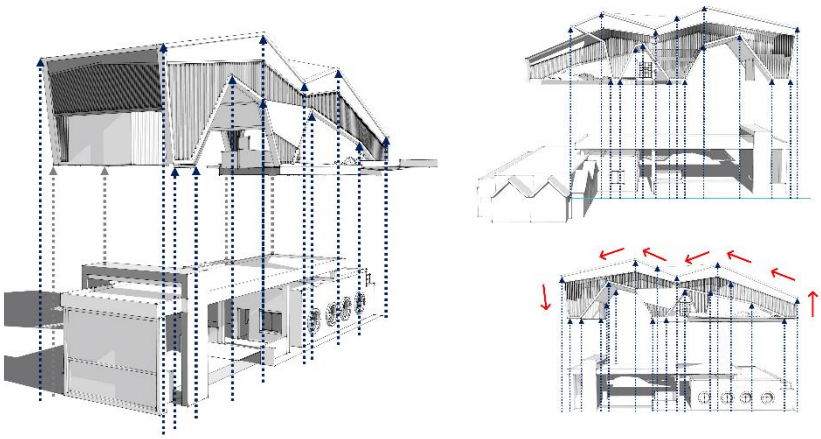


Fig. 83. K1 kindergarten entrance building architectural design concept schematic diagram.
(Source: Designed by CAO Hui, 2022)

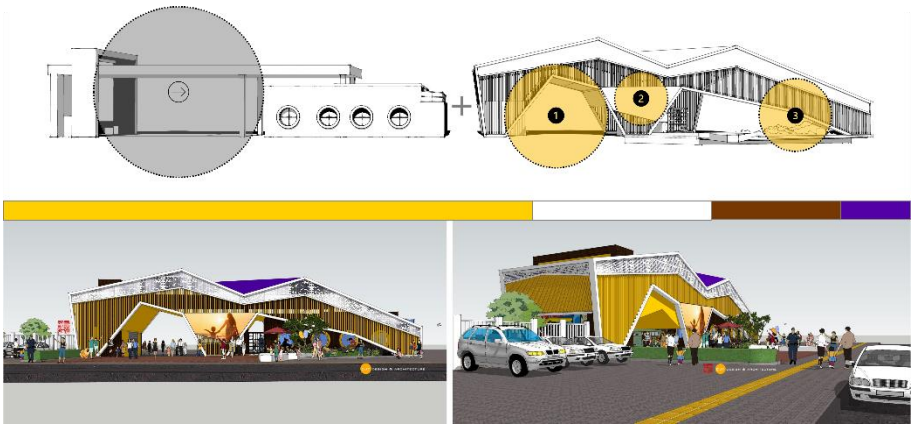


Fig. 84. Perspective rendering of the entrance building.
(Source: Designed by CAO Hui, 2020)

In the specific design process, through the principle of people-oriented design, a positive visual perception process is created based on the physical and mental needs of the infants, with a unique emphasis on color design and sight control. The color of architecture plays an irreplaceable role in inspiring imagination. According to the characteristics of kids' perception, the author chose white, yellow, coffee, and purple as decorative colors. These hues play different personality characteristics, which could arouse an individual emotional response. Also, the author sets a particular design on the relationship between the visual organization and architecture through the anchoring effect [29] by translating desirable feelings into architectural concepts [30] and forming belonging in space. The architectural form is graphically processed and endowed with symbolic features, which provide a specific anchor point for

people's sight and also promote the correlation between individual visual movement and spatial organization. (*Fig. 84*)

In the architectural atmosphere construction of the kindergarten, architects should fully consider the characteristics of the perceived object, especially the research on the psychology, behavior, and emotion of the group of children. In the specific design, architects should strengthen the analysis of visual elements, perceptual elements, cognitive elements, and other aspects of site design. From the perspective of system design, it tries to comprehensively plan decoration color, space modeling, and the interaction between the site and kids.

Through the intervention of the design, the physical space is endowed with artistic and emotional expression, creating an immersive atmosphere and strengthening the interaction between people and the environment. The author modularized the creation of architectural images from the children's perspective, constructing a flexible, environmentally adaptable, and child-friendly architectural form that makes the relationship between architecture and the environment full of fun and changes. (*Fig. 85*)

Fig. 85. Real photo display of the public area outside the kindergarten park.

(Source: Designed by CAO Hui, 2020)

C. Design of man-land relationship

In man-land relationships design, redesign the relationship between environment and children according to emotional needs and cognitive processing, endowing buildings with unique emotional connotations and creating an architectural space paradigm suitable for children. The concept of architecture facade is inspired by the Tangram, a traditional Chinese puzzle, and the overall modeling mainly includes three different design expressions. (*Fig. 86*)

For instance, the facade of the west side of the building, which faces the community, takes design elements from an abstract variation of the English words "Man" and "Woman" to represent hope and vitality; on the eastern side of the building, the facade is from the image of Tuanzi, a famous Chinese cartoon character; on the north side of the building, the facade design is inspired by the cartoon character Garfield. The empathic power generated by the space could bring a child-friendly feeling of experience. Due to the rich content of symbols, the extraordinary contemporary architectural form was resulted [31] and by using the bionic design approach to create a strong sense of spatial involvement and enrich the emotional needs of children. (*Fig. 87, 88*)

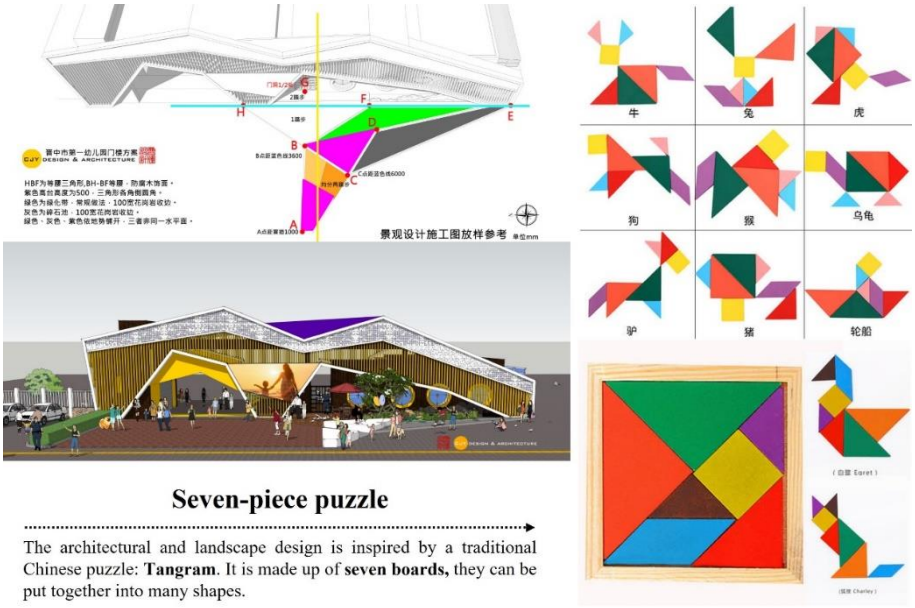


Fig. 86. Interpretation of design concept - the application of "Tangram" elements.

(Source: Designed by CAO Hui, 2020)

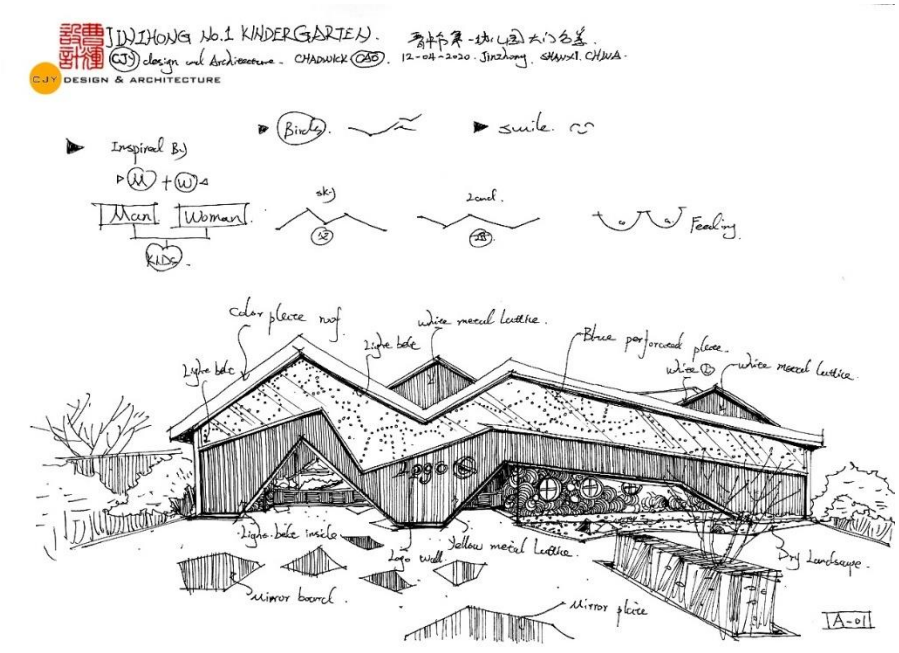


Fig. 87. Hand-drawn concept sketches of the entrance building design.

(Source: Designed by CAO Hui, 2020)

Fig. 88. Perspective rendering of the entrance building.

(Source: Designed by CAO Hui, 2020)

According to the behavioral characteristics of young children, the positive interaction between kindergarten and society is formed through the construction of physical space, and the degree of interaction and experience between people and surroundings is improved. The main starting point in early childhood education is both to view children as active agents and stakeholders for the future and to ensure their involvement [32]. In this part, based on the characteristics of children's behavior, the author strengthens the flexibility of the entrance area through the design approach, with the innovative path planning increasing the opportunities for people to communicate with each other in the process of entering the kindergarten. For example, shared landscaping facilities create opportunities for community residents and children to communicate face-to-face; the children's art display area provides children with an active social opportunity. Through rational path planning, an orderly connection of multiple space nodes is formed, creating a stronger sense of atmosphere and building a positive relationship between people and place. (*Fig. 89*)

Fig. 89. The real scene displays of the shared area outside the kindergarten.

(Source: Designed by CAO Hui, 2020)

The author takes children as the center of the design, seeks inspiration for the architectural design from the game, and integrates local culture into the project, emphasizing the importance of children's behavior and psychology. The representative cartoon images are decoded and coded, and different spatial

nodes are created through artistic transformation to construct the child-friendly architectural form, which promotes the interaction between children and the environment and forms a positive site relationship.

In addition, the building image with high recognition enhances the social attention of the area, reduces the incidence of criminal activities in the community to a certain extent, and forms a child-friendly community environment.

D. Environmental integration

As the first space module entering the kindergarten, the design quality of the entrance building directly affects people's first impression of the kindergarten. It is not only a functional architectural unit but also a balanced embodiment of its functionality, artistry, culture, and sociality in the design. The image of the entrance building should be in harmony with the surrounding environment and form a positive relationship. Different from other building types, as the safety barrier of the kindergarten, on the one hand, the entrance building plays a role in protecting the internal environment; on the other hand, it is also a bridge connecting the kindergarten and the outside world, and perhaps even a bridge connecting social emotions. (*Fig. 90*)

Fig. 90. Real scenes display of the front entrance of the kindergarten.
(Source: Designed by CAO Hui, 2020)

The meaning of architectural design includes many aspects. A good architectural design can connect people with the environment organically, and people can have a dialogue with the space, just like with friends. In the design of the entrance building of Jinzhong No.1 Kindergarten, the author skillfully uses the site environmental conditions of the building itself, emphasizing the architectural space pattern, children's physical and mental needs, children's cognitive characteristics, and the expression of the features of children's behavior in the design. The author transformed the original simple entrance building into an architectural form with synthetic functions, which can be well connected with kindergarten teaching and become a part of the classroom, promoting children's active perception of the environment, and increasing the possibility of their interaction with the environment. (*Fig. 91*)

Fig. 91. The interaction between kindergarten and the built environment.

(Source: Designed by CAO Hui, 2020)

Fig. 92. Dialogue between kindergarten teaching activities and the built environment.

(Source: Designed by CAO Hui, 2020)

Fig. 93. Organic integration of the entrance building with the surrounding environment.

(Source: Designed by CAO Hui, 2020)

In this project, the author is child-oriented and closely combined with the teaching philosophy of the kindergarten. Through the rational integration of each unit in the environment, the educational

environment with playfulness is actively constructed. The three main facades of the building interact well with the surrounding environment, and each building facade is shaped to form a graceful background, with great adaptability and flexibility. To the author's delight, many teaching activities of the kindergarten are carried out around the building, which verifies the author's assumption in the early stage of the project. The building environment conveys positive environmental energy to children, inspires children to take the lead in social activities, and enables children to form a positive sense of belonging and security. (*Fig. 92, 93*)

The vivid and lively architectural image creates a positive spiritual fortress for the children, which makes the children establish a sense of trust in the kindergarten and cultivate the children's positive learning motivation. Through environmental integration, the power of space is transformed into individual perception, which enhances the value of architecture and the meaning of the site.

E. Environmental evaluation

Content	Order of evaluation				
	Very bad	Bad	General	Good	Excellent
Aesthetic aspects					√
Social aspect				√	
Functional aspect				√	
Emotional aspect					√
Man-land relationship					√
POE				√	

Table. 11. Six - point scale of environmental assessment for entrance building design.
(Source: Designed by CAO Hui, 2022)

This project is an active attempt of the author for educational architectural design, which innovatively combines architectural design with kindergarten teaching concept and emphasizes children's sense of experience and sociality. In the context of Environmental psychology, it constructs a new paradigm of educational architecture design to intervene in children's experience in the environment through appropriate space creation. Through investigation, interview, behavior observation, and data analysis, the author conducted a comprehensive evaluation and evaluated the entrance building design of Jinzhong No.1 Kindergarten through a six-point scale of environmental assessment. The specific performance is as follows: (*Table. 11*)

First, it received an " Excellent " rating in terms of aesthetics. The design of the new entrance building is in line with contemporary people's aesthetic needs for children's educational architecture. The form of the building has good recognition and clear image expression, the use of yellow and white color decoration collocation is full of sunshine and vitality, has a positive symbolic meaning. Interviewees used words such as brightly colored, rich in color, easy to understand, vibrant and lifeless, attractive, relaxed, and dynamic to describe the architectural design.

Second, it received a " Good " rating in terms of social. The new building forms a harmonious relationship with the community, creating a high-quality environment. It not only improves the social image of the kindergarten but also improves the public quality of the community, which is generally well-received by the surrounding residents. The new form of the building becomes a landmark for the

community, raising the social profile of the community in the city. The community residents generally believe that the project adds vitality and social attention to the community. However, as the multimedia information device of the building facade cannot be permitted in the later period, the sociality of the building is not fully reflected.

Third, it was rated "Good" in terms of functionality. The new design enriches the use function of the building and maximizes the use-value of the site, especially in response to the current local epidemic prevention and control. The reasonable function division makes the entrance building controllable in dealing with health emergencies. In addition, through innovative design, the author designs the facade of the building as an art form of different themes according to the school philosophy of the kindergarten, which makes the function of the building stretchable. However, the shared landscape designed in the periphery of the park occupies part of the urban road system, so it cannot be fully realized in the later stage, which makes the urban shared function missing, and this factor affects the functional evaluation of the building.

Fourthly, it was rated " Excellent " in terms of emotions. The design of the entrance building expresses the author's tribute to Jinzhong No.1 Kindergarten as if the author had gone back to his childhood. In the expression of architectural image, the author's personal emotional factors are integrated, especially in the design of the three main facades of the building, showing the interpretation of humanism, which makes the building emotionally warm and realizes the empathy between kids and the environment. Most importantly, the interviewees also felt a strong resonance and felt the emotion emanating from the building. This emotional resonance is more prominent in children and their parents, forming a positive environmental image.

Fifthly, the evaluation of the man-land relationship was rated "Excellent" grade. Respondents believe that the appropriate environmental scale and bionic architectural form make the entrance building more child-friendly and ease the previously awkward relationship between man and site. The combination of environment design and kindergarten curriculum system makes the architecture and kindergarten's daily teaching have a positive interaction, creating a very positive human-ground relationship, in this aspect has been praised by kindergarten teachers and children. The optimized built environment was highly appraised by the kindergarten and the local government and became a benchmark for the design of the local kindergarten. It was promoted to the society as an excellent case, forming good social communication and interaction. The residents in the community also use it as a new landmark for their area, realizing a win-win situation in many ways.

Finally, it received a "Good" rating in the post-use evaluation. From a comprehensive perspective to evaluate the new entrance building, it has realized the expected design concept well in architectural form, functional organization, and moving line planning. Respondents widely believed that the project created a high-quality built environment for the kindergarten and received favorable comments. However, there are also some problems with the late maintenance of the building. For example, heavy rain caused by extreme weather will lead to poor drainage on the surface of the architecture that is easy to form water stains on the surface of the aluminum plate. In addition, due to the defects of the early structural design, some decorative components fall off in the process of use, which increases the workload of the later maintenance of the building.

Part II. Environment optimization of main entrance area of teaching building

A. Site construction

The teaching building of Jinzhong No.1 Kindergarten covers an area of 3,600 square meters. It is a 3-story comprehensive building with a "C" shape. Its primary function is to provide daily teaching space and indoor activity space for early education and preschool education. The teaching building is composed of a comprehensive classroom, lounge, theme activity room, art studio, meeting room, dining room, performance hall, office, and other spaces. There are seven entrances and exits throughout the building. The main entrance is in the central area on the west side of the building. There are two auxiliary entrances and exports on the north and south sides of the building and four fire exits on the east side of the building. The primary purpose of this project is to optimize the architectural environment of the main entrance area of the teaching building to make it more in line with the teaching environment requirements of the kindergarten on the theme of social experience. (*Fig. 94*)

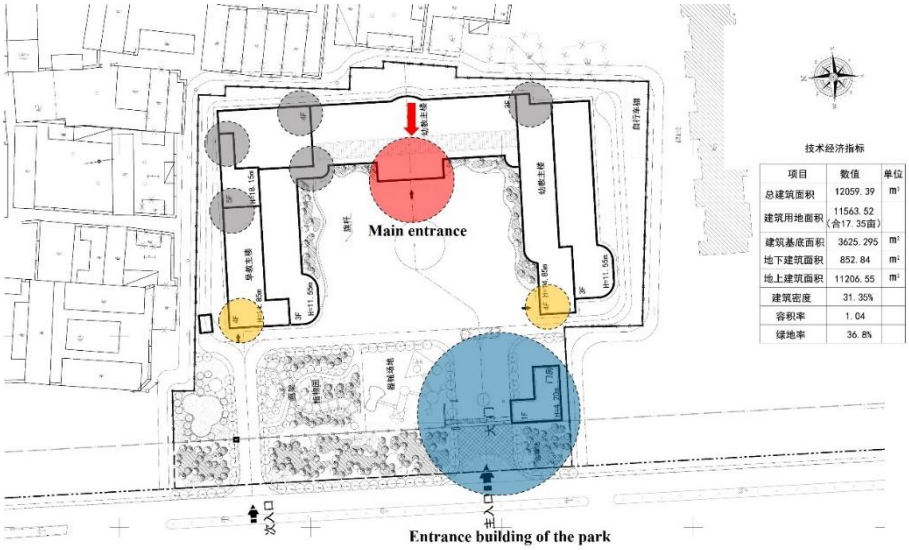


Fig. 94. Jinzhong No.1 Kindergarten teaching building master plan.
(Source: Designed by CAO Hui, 2020)

The main entrance of the teaching building is on the east side of the park square. The volume of the original entrance area is too large for children, and the decoration of the building facade is too formal, which is not in harmony with the atmosphere of the kindergarten. For the children who have to pass through the building every day, the building looks boring and invisibly creates negative emotions.

Especially for kids just starting school, they are full of fear for the unfamiliar environment, a full of childlike fun and pro-child environment for them is eager. Therefore, according to the existing conditions of the building, the author redesigned the area, hoping to enhance the overall image of the site and give it new life through artistic treatment under the premise of the minimal impact on the building structure and surroundings. (*Fig. 95*)

Fig. 95. Status quo of entrance area of teaching building.

(Source: Designed by CAO Hui, 2020)

Considering that the project is only a renovation of the entrance area, the architects needed to focus on the adaptive coexistence of the new building form with the kindergarten's environment, with minimal damage to the surrounding infrastructure. Therefore, based on the study of children's psychological and environmental behavior, the author carried out an artistic spatial reorganization of the original architectural environment. In the specific design, based on retaining the original architectural structure and surrounding green landscape, the author divides the area into five different units, which are the entrance buffer zone, semi-open foyer area, outdoor activity area, art graffiti wall, and entrance hall display area, outdoor sharing area. The new spatial organization optimizes the existing site condition, making full use of the grey space and creating a systematic channel area that enriches the functionality and usability of the place. (*Fig. 96*)

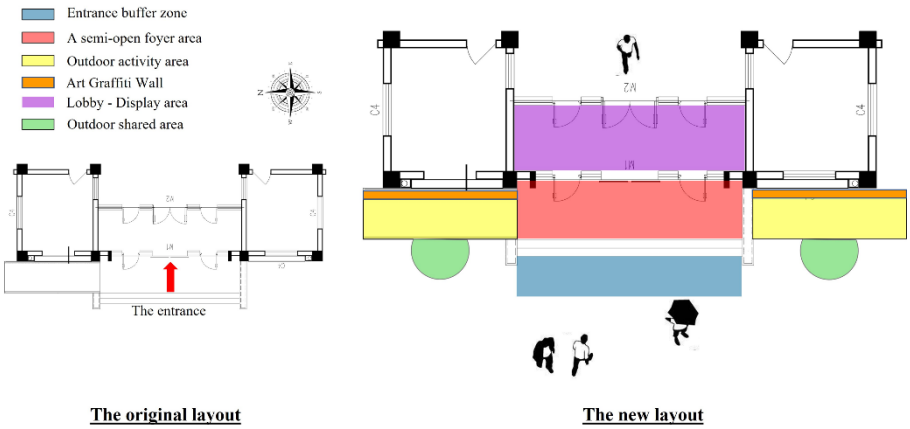


Fig. 96. Schematic plan of entrance area of main teaching building.

(Source: Designed by CAO Hui, 2020)

Creating a big toy for children instead of an uninteresting square box is the author's conceptual interpretation of the project. The core idea is to build a flexible and adaptable architectural environment and organically combine it with the teaching concept of the kindergarten, endowing the limited space with more functions and making the site full of positive educational significance. The most important thing is to make the architectural space with the attributes of children. (*Fig. 97*)

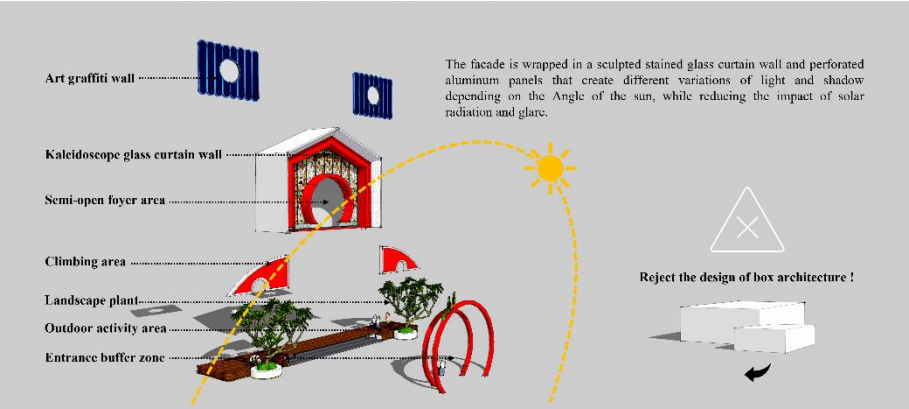


Fig. 97. Interpretation of site construction design concept.

(Source: Designed by CAO Hui, 2022)

B. The creation of atmosphere

In terms of the creation of a kindergarten environmental atmosphere, the author pays special attention to the intervention effect of the spatial atmosphere on early childhood education, hoping to build a positive site atmosphere to shape an environment paradigm with a sense of The Times and create an educational atmosphere with flexibility and positive energy.

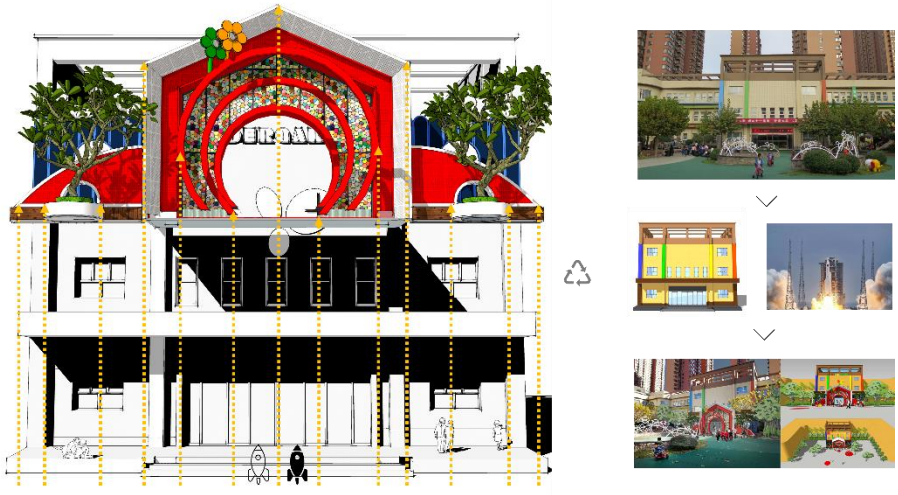


Fig. 98. Jinzhong No.1 Kindergarten teaching building's entrance design concept idea.

(Source: Designed by CAO Hui, 2020)

In the architectural design, the author breaks the previous understanding of architectural design and innovatively designs the entrance area of the teaching building as an art installation, rather than treating

it as a simple space design. Inspired by the rocket launch tower, the design transforms children's love of aerospace technology into the architectural design language. According to the characteristics of the original facade structure of the teaching building, the author combined the shape of the rocket launch tower with the site environment of the entrance area of the teaching building, forming a symbolic space form. (*Fig. 98*)

Through the artistic space reorganization, the architectural symbols with rocket characteristics create a funny "picture and bottom" relationship with the background, which enhances the environmental image of the site and endows the place with positive symbolic significance. It is like a large-scale space toy waving to children. The fantastic architectural shape enhances the visual quality of the entrance area and the atmosphere of the environment, conveying the concept of child-friendly design.

In the decorative design of the building facade, the author chose bright red and white as the primary decorative colors of the entrance area, dark blue as the decoration of the graffiti wall, and dark gray as the decoration of the ground, creating a pro-nature color system. Red, white, and blue represent the blue sky, white clouds, and the sun; solid wood colors and dark grays represent forests and rocks. The natural color collocation forms a space-time echo with the color of the entrance building of the kindergarten, constructing a vivid and clear activity path and a positive space image. (*Fig. 99*)

Fig. 99. Jinzhong No.1 Kindergarten teaching building's entrance design scheme A.
(Source: Designed by CAO Hui, 2020)

In addition, inspired by the kaleidoscope, the author skillfully uses colored latticed glass and white perforated aluminum plate as the building curtain wall's decoration. Bright color collocation and vivid light and shadow changes bring children a very joyful feeling in vision, touch, and psychology, forming a childlike and dreamy site atmosphere. （*Fig. 100*）

Fig. 100. Jinzhong No.1 Kindergarten teaching building entrance glass curtain wall real scene.
(Source: Photo by CAO Hui, 2021)

In terms of the symbolic meaning of the architectural environment, the author integrates the words of the kindergarten teacher to encourage the children and translates them into the language of space design, making this area have the function of psychological suggestion. First, the shape of the rocket based on the main building frame conveys a positive symbolic meaning, which shows the implied symbol of being positive and climbing mountains. The ring shape in the buffer zone is intimate, symbolizing the mother's warm embrace, matching with warm colors to give children a sense of intimacy and security. In addition, the shape of the ring combined with the rocket also symbolizes the meaning of time travel, increasing the interest in the entrance area and catering to children's desire to explore. Finally, the landscape trees specially reserved by the author also play a good role in creating the site atmosphere, symbolizing a healthy and positive outlook on life. （*Fig. 101*）

Fig. 101. Jinzhong No.1 Kindergarten teaching building entrance design scheme B.

(Source: Designed by CAO Hui, 2020)

C. Design of man-land relationship

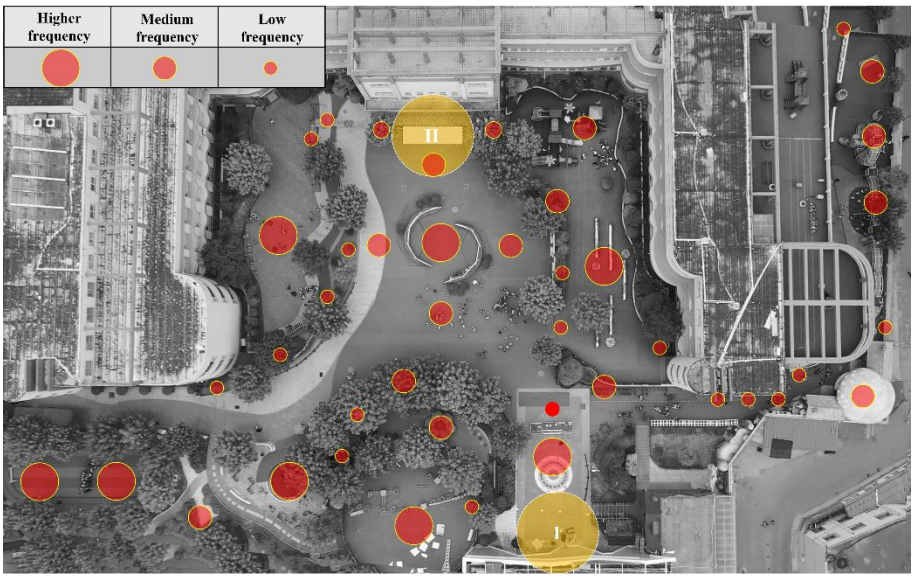


Fig. 102. Dot map-Diagram of area frequency of children's outdoor activities.

(Source: Designed by CAO Hui, 2022)

The entrance area of the building is the beginning of the whole architectural sequence, which is a transitional area connecting the outdoor environment and the interior space. In terms of the design of the man-land relationship, the author takes the characteristics of children's environmental behavior as the starting point of the design work, with extra emphasis on children's interaction with the architectural environment and their sense of experience. Based on children's daily behavior, the author analyzes their ability to respond to environmental stimuli and constructs multiple interactive Spaces with the concept of games to form a positive man-earth relationship. （*Fig. 102*）

First, to create a safe passage environment, the author specially designed a ring device in the entrance buffer zone to build a passive spatial form in the form of obstacle design so that the children who are about to enter the area can slow down and construct a safe path. At the same time, the three gradient red ring shapes create a vivid spatial pattern, which together with the bionic form of the rocket constitutes a highly elastic environment combination. Such spatial organization constructs a high-quality architectural image that virtually provides the kindergarten with a venue for holding grand celebrations and builds a spiritual fortress for the kindergarten. (*Fig. 103*)

Fig. 103. Jinzhong No.1 Kindergarten held the 2022 International Women's Day celebration with the teaching building entrance area as the background. (Source: Photo by Jinzhong No.1 Kindergarten, 2022)

Fig. 104. Jinzhong No.1 Kindergarten teaching building entrance area landscape design scene. (Source: Photo by CAO Hui, 2021)

Secondly, the semi-open form of the building provides a transitional area, resulting in a very flexible site environment. Based on analyzing the phenomenon of children's stress response, we innovatively established a physical buffer zone in the entrance area of the teaching building, creating a psychological adaptation area for children, breaking the traditional way of entering the entrance area of the kindergarten building, and creating an immersive space atmosphere, reduce young children's negative feelings about enclosed spaces. (*Fig. 104*)

In addition, taking full advantage of the site conditions, outdoor activity areas and sharing areas are designed on both sides of the foyer, which organically integrates the entrance area with the surrounding environment and forms a good transition. According to the observation of children's daily behavior, children generally like to go into hiding games, random graffiti, and climbing activities. Therefore, the author designed an area for playing and graffiti according to their behavior characteristics. (*Fig. 105*)

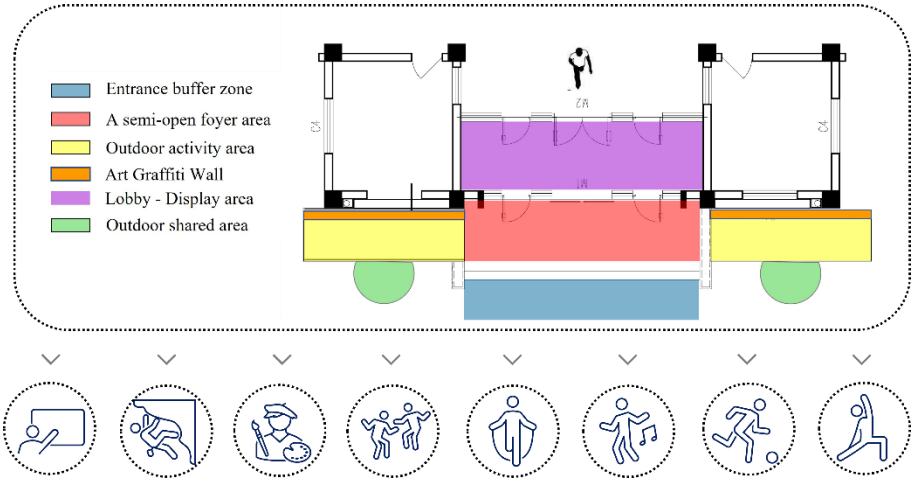


Fig. 105. Functional organization analysis diagram of outdoor activity area and sharing area.
(Source: Photo by CAO Hui, 2022)

For example, the blue background wall provides a place for children to doodle on, where they can express their ideas in chalk; A platform made of preservative wood allows them to climb freely; The specially designed red low wall creates a play environment for children to go into hiding, making it possible for children to share games. (*Fig. 106, 107*)

Fig. 106. Real scene of outdoor interactive area of teaching building of Jinzhong No.1 Kindergarten A.
(Source: Photo by CAO Hui, 2022)

Fig. 107. Real scene of outdoor interactive area of teaching building of Jinzhong No.1 Kindergarten B.
(Source: Photo by CAO Hui, 2021)

D. Environmental integration

During the design process, the author changed roles many times to analyze how to effectively integrate the environment, hoping to build an ideal kindergarten environment through different perspectives. In the design process, the author talked with the children and the kindergarten teachers many times and switched his role to analyze how to effectively integrate the environment, hoping to build an ideal kindergarten environment through different perspectives. (*Fig. 108*)

Fig. 108. Jinzhong No.1 Kindergarten teaching building outdoor area real scene.
(Source: Photo by CAO Hui, 2021)

First, think like children, they wish all places to be strange, colorful, playable, shared, and distinctive, and they expect exploration and curiosity. Secondly, think like psychologists, architects should fully consider the impact of the built environment on children's physical and mental aspects, especially the impact of different environmental emotions on children's behavior, and whether the environment can provide a lasting sense of security for children. Third, they think like preschool teachers, they believe that everything in kindergarten can be friends with children, and they can play together. At the same time, the beautiful architectural environment can also be a part of classroom teaching activities so that children

can experience and feel the environmental information. Finally, back to the architect's perspective, the design of this area should consider the building's function, artistry, symbolism, safety, and other factors to create a child-friendly environment. (Table. 12)

Based on the interpretation of different roles, the author makes a systematic analysis of the site conditions of kindergartens. In the process of environmental integration, making full use of the existing conditions of the outdoor areas of the kindergarten, the author takes the entrance building and the entrance area of the teaching building as the two visual centers of the environment and forms a kindergarten environment with strong experience through reasonable integration of the surrounding outdoor facilities. During the implementation of the project, the author emphasized the sensory experience of the architectural environment, hoping to stimulate children's comprehensive feelings of vision, touch, hearing, and perception through the art's physical space. Create a high-quality architectural environment to encourage children to form a positive experience process and release children's instincts so that children could get a positive feeling and happy growth in every interaction. (*Fig. 109*)

Analysis of related factors of environmental integration

Exploration	Physical aspect	Emotion	Security	Education	Artistry	Sensory experience
Curiosity	Mental aspect	Behavior	Games	Function	Symbolism	Visual center

Table. 12. Analysis of related factors of environmental integration.
(Source: Designed by CAO Hui, 2022)

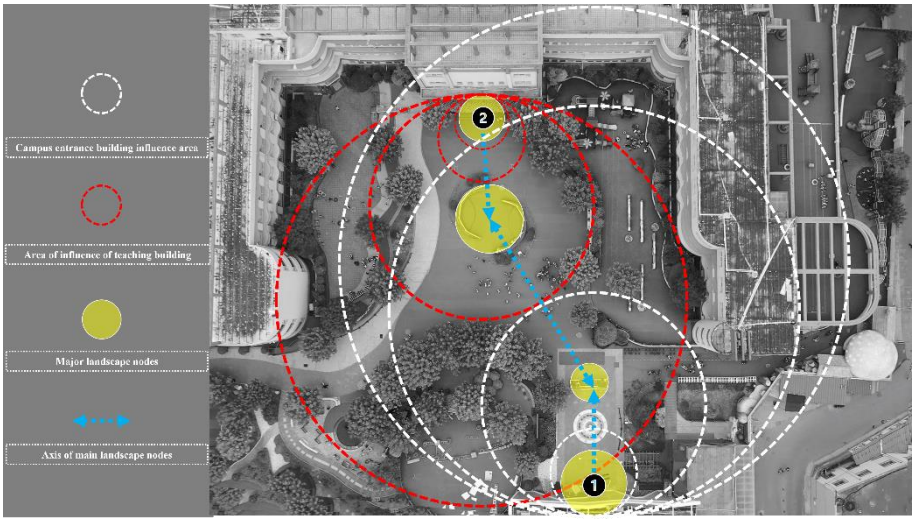


Fig. 109. Overall planning analysis chart of the Project of Jinzhong No.1 Kindergarten.
(Source: Photo by CAO Hui, 2022)

E. Environmental evaluation

In the design of this project, inspired by the kindergarten teaching concept and based on the content of the social experience subject course, the author innovatively transformed the architecture design into a fun toy for children, making a significant breakthrough between design thinking and design concept.

During the design process, the author conducted close communication and cooperation with kindergarten children and education experts to understand the project from a non-architect perspective and achieved a relatively successful design result. The specific performance is as follows: (Table. 13)

Content	Order of evaluation				
	Very bad	Bad	General	Good	Excellent
Aesthetic aspects					√
Functional aspect					√
Emotional aspect					√
Man-earth relationship					√
POE				√	

Table. 13. Five - point scale of environmental assessment for teaching building entrance design.
(Source: Designed by CAO Hui, 2022)

First, it received an " Excellent " rating in terms of aesthetics. The new design is child-friendly in the form of the building. The fantastic architectural shapes and bright colors make the entrance area of the teaching building show a dynamic and lively artistic effect. The optimized architectural form is well integrated with the surrounding architectural environment, creating a very eurythmic visual experience and constructing the logo image of the kindergarten in the hearts of children. Respondents thought the new building was more than just a work of art, and it could be a friend to children.

Second, it was rated " Excellent " in terms of functionality. The new design actively expands the use function of the building on the premise of meeting the basic needs, and the rich function Settings give the site a more comprehensive significance. Among them, the reuse of grey space in the entrance area is an innovative design of the author, which makes the area obtain new vitality through scientific space organization. The bland environment is created into a dreamy parent-child space, realizing the organic combination of functions and needs.

Third, it was rated " Excellent " for the emotional aspect. Symbolic architectural shapes endow the architectural environment with unique emotions, such as red rings to express love for children, the image of the rocket conveying the active expectations for young children, and the area of blue graffiti wall providing a place for children to vent their emotions. Through symbolic artistic processing, the physical environment is emotionalized, presenting a kindergarten space paradigm with a sense of temperature.

Fourth, it was rated " Excellent " in terms of man-land relations. The author combines the architectural design with the curriculum system of the kindergarten and designs multiple interactive areas according to the behavioral characteristics of children and site conditions, making the everydayness entrance area full of vitality. The positive spatial organization increases the opportunities for children to communicate face to face, encourages them to form meaningful social activities, and builds a positive person-place relationship. Especially in the teaching process, the area plays an active role as a teaching venue.

Finally, it received a "Good" rating in the post-use evaluation. Respondents gave a high appraisal of the optimized design of this area and generally considered it to be a very successful design work or artwork. However, due to the poor sealing performance of the perforated aluminum plate of the building curtain wall, there is a phenomenon of rain leakage in the later period, which affects the aesthetics of the building to a certain extent and increases the difficulty and workload of building maintenance. In addition,

according to the information feedback from the kindergarten management staff, some children often use their hands to dig the carved aluminum plate, which has a certain degree of security risks. This feedback made the author reflect on the design, and the characteristics of building materials and safety in use should be fully considered in the future design project.

5.2.4 Summary

Architecture should be endowed with more humanistic factors to establish a sustainable development paradigm between humans and the environment and create more possibilities for activities. Each building has vitality, continuously grows in its specific environment, and has a subtle relationship with the surroundings. A high-quality environment stimulates people's creativity, and people will also give play to their subjective initiative to carry out outstanding cooperation with the environment. The interaction between architecture and kids makes the physical space have an emotional sense of temperature. Architects should use design elements to stimulate the emotional connection between the environment and kids intelligently and then make full use of the environment to enhance the child's subjective initiative. (*Fig. 110*)

Fig. 110. Jinzhong No.1 Kindergarten teaching building vestibule area real scene.
(Source: Photo by CAO Hui, 2022)

The paradigm of experiential architecture reflects the active involvement of environmental psychology in environmental construction. It is full of exploration of the possibility for future architectural design, also restructures the process of perception and cognition, and creates positive experiences for people. In the author's opinion, the architectural design of kindergartens should focus on safety, functionality, image, experiential, creativity, and sociality. As the material carrier of the early childhood education environment, it has the characteristics of particularity and typification. The architects needed to integrate the concept of education, the cognitive features of children, the kindergarten curriculum design, and site conditions. This design practice will become an effective way to evaluate the architectural environment design of kindergartens and form a new paradigm in the future.

5.3. Design reflection

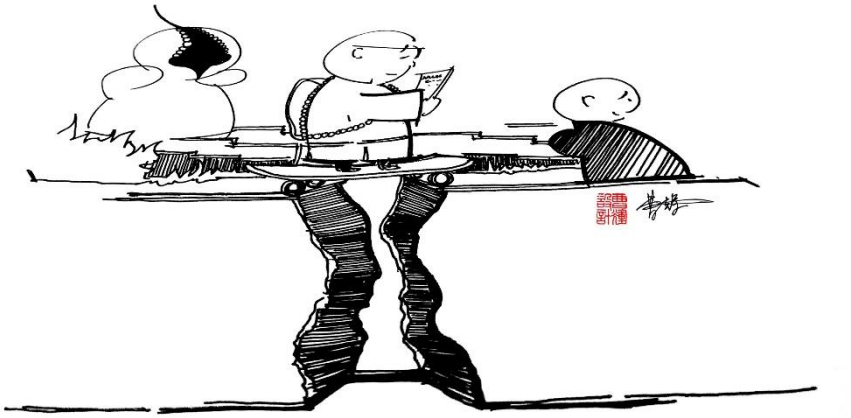


Fig. 111. Role transformation and transboundary research - Illustration expression.
(Source: Draw by CAO Hui, 2022)

Thesis_ VI.
Promote interdisciplinary interaction and communication and expand the possibilities of the architectural environment.

Architecture and its environment together constitute the place of human activities, and the site has practical significance because of human existence. Architectural design is a construction activity carried out by human beings to improve the quality of the dwelling environment in the dimension of technology and art. With the rapid development of China's urbanization construction, Architecture has been highly valued in China, and it has been comprehensively developed in both academia and industry.

In this context, the remarkable achievements of urban infrastructure construction have made new developments in aesthetics and construction technology. However, due to outdated educational concepts and social needs, the architectural environment design in most areas still stays on the construction of physical space. At present, architects are keen on personalized design creativity and high-tech architectural forms and seldom pay attention to the real feelings of users, let alone systematically consider the impact of the built environment on the physical and mental health of contemporary people. However, many environmental problems influence all aspects of society, especially people's mental health. Therefore, traditional design thinking has been unable to solve the issues now and in the future. Architects need to reflect on the misunderstandings of modern design and propose a design strategy that combines future development under the concept of sustainability.

Architecture is alive and needs to be endowed with a soul and value rather than a unique personality. A high-quality experience is the goal of architectural design. Architects need to redefine the concept of architectural design and change their role as architects. In the future design, based on modern aesthetics and construction techniques, architects need to pay more attention to the sustainable relationship between the environment and people, break the conventional design thinking, and strengthen the possibility of cross-border communication and cooperation. In the concrete design, try to establish positive site systems to create an adaptable and flexible built environment. It is significant to strengthen the interaction between people and the environment, to construct a positive man-land relationship. Through a scientific design approach to promoting environmental integration and site energy conversion, actively expand the value and significance of architecture.

PART IV: SUMMARY

Thesis

Thesis_ I.
Breakthrough the traditional barriers and blur the boundaries of architectural design, redefining the architects.

Architects should break out of closed-loop design ideas and think like psychologists, organizing the target environment in the dimensions of time, space, and emotion, rather than just focusing on designing within the framework of complex technologies and structures. Identify and optimize the attributes of the existing environment by analyzing the combined current and future impact of the physical environment on the user. The architectural design needs to face the characteristics of The Times, the needs of users, and the complexity of the environment, shaping a humanized site experience rather than outdated architectural solutions.

Thesis_ II.
Establish a positive site system and spatial atmosphere to create a flexible environmental experience for users.

Based on the analysis of users' environmental intentions and spatial characteristics, the target site is treated with low-carbon art to build a positive site framework and function organization. Create a high-quality environmental atmosphere to enhance users' comprehensive cognitive ability and perception level of the site and construct an adaptable spatial development path. A high-quality environmental atmosphere could bring profound environmental experience to users, help to strengthen users' spatial identification, sense of existence and security, and enhance the site's significance.

Thesis_ III.
Re-establish man-land relationships and stimulate social interaction and communication through a positive site organization.

Architects are not only builders of physical spaces but also the creator of human-land relationships. Architects solve the problems between people and the environment through design and re-establish the positive relationship between individuals and groups, humans, and the environment. Based on the site environment and human behavior motivation, build a bridge to stimulate the interaction between users and the environment to strengthen the exchange of more information between each other. Architectural design should meet people's behavior habits, physical and mental demands, and social demands to

achieve a balance and win-win situation between human activities and the environment.

Thesis_ IV.
Integrate the complex site environment to realize the energy transformation between people and the environment.

In the actual design creation, clear space image and reasonable functional organization are used to promote users to form empathy with the environment and convey positive space energy to users to improve the experience of the site. Architects should make full use of site conditions to decode and encode the environment to maximize the use of environmental value. Through the approach of artistic design to integrate people's emotion and space power, realize the energy transformation between people and the environment, and use it in the cognition and experience of the surroundings. Integrate the environment's strength and humans in responding to complex environmental problems and build an environment-friendly man-land relationship in a low-carbon way.

Thesis_ V.
To guide future design work through environmental assessment and design reflection.

Obtain comprehensive design feedback employing environmental assessment to form a summary and reflection on the project after completion and commissioning. Check the problems in the design process and clarify whether the design results meet the needs of customers and users. Architects form systematic design experience through objective environmental assessment and guide future design projects in the form of design reflection. It prompts architects to reflect on the relationship between people and the site, inspires innovative design methods, and promotes the new development of people and the environment through architectural means.

Thesis_ VI.
Promote interdisciplinary interaction and communication and expand the possibilities of the architectural environment.

The architectural environment and human health are interrelated, which shows the characteristics of diversity and growth. The complexity of contemporary human society determines that the architectural environment design needs to balance the needs of many aspects. Interdisciplinary communication and interaction are effective ways to deal with realistic problems, which can provide new possibilities for architectural environment design. Applying the relevant theories and methodologies of Environmental psychology to architectural environment design can enrich the design dimension of architects, which can provide more humane solutions and form a sustainable design framework. Most importantly, extending the attributes of the built environment contributes to constructing an affordable and sustainable living environment that shapes healthy environmental behavior.

Summary

Environmental psychology is the result of the rapid development of industrialization and urbanization, and the purpose of the research is to solve various problems between human beings and the environment. It is a subject that studies the relationship between humans and the environment, which is closely related to architectural design. It is of great significance to research them comprehensively. In the context of the current global outbreak, the relationship between people and the environment has become more complicated and uncertain. At present, environmental problems are not only about pollution, energy, climate, ecology, population, and other macro issues but also affect People's Daily life more widely. Contemporary architects must pay attention to the combined effects of the physical environment on physical and mental health.

It is a new attempt to apply relevant theories of environmental psychology to architectural design, which provides more possibilities for architectural design, especially for architects to provide design inspiration. In concrete architectural design, architects can solve the problem between man and the environment and optimize the relationship between man and site through psychological methods. In addition, applying insights from Environmental psychology to architectural design can help architects effectively communicate information with users and provide more rational design products to improve users' experience.

This research breaks through the traditional barriers and innovatively applies the inspiration and theories of environmental psychology to the actual design projects, emphasizing the cross-boundary interaction between different disciplines. Compared with the conventional design methods, it pays more attention to the two-way needs and win-win situation between people and the environment.

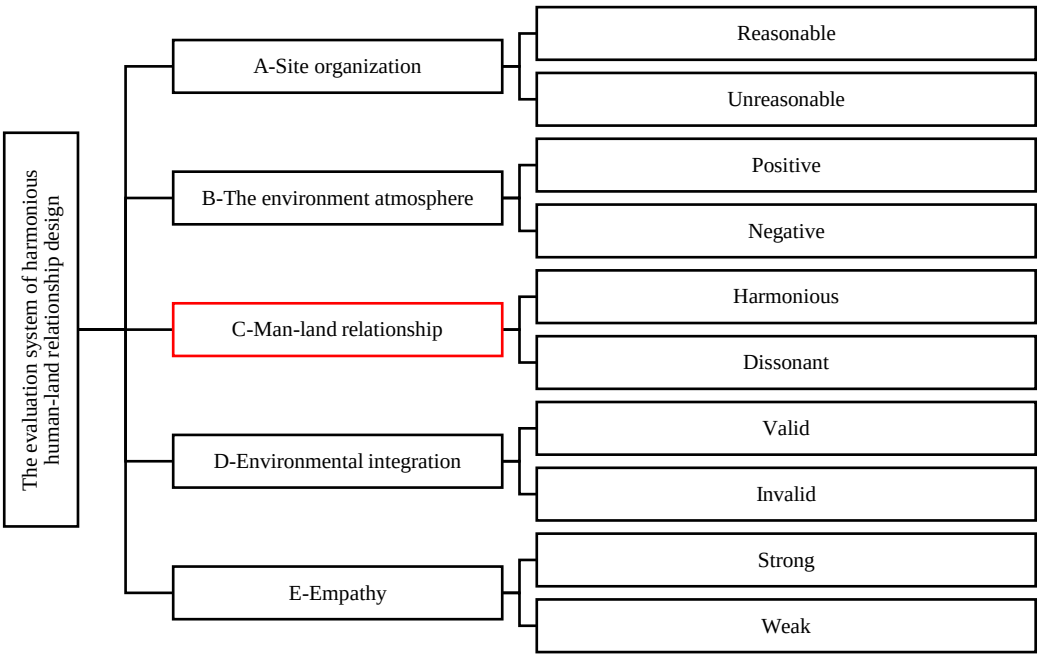
In the design practice, the author summarizes the approaches of architectural environment design into six aspects: site construction, the creation of atmosphere, man-land relationship design, environmental integration, environmental evaluation, and design reflection. Through the implementation of the project, explore more possibilities between people and the physical environment and discover the deeper connection between the physical environment and humans. Research on adaptive design techniques and low-carbon construction approaches to solve design problems to promote healthy environmental behavior. With the help of the artistic design approach to improve the quality of the environment and human well-being, promote the sustainable development between humans, the environment, and nature, and actively explore the theory of contemporary architectural environment research and design application of the new paradigm.

Recommendations And Future Research

The built environment carries the public's social cognition and social emotion, and this process reflects the coupling of the material environment and public spirit. The creation of architectural design should focus on rational design technology, assisted by artists' perceptual thinking, and at the same time draw lessons from psychological methods to create multiple possibilities and compound values for the development of human society and give spiritual power to the environment. In the future creation, architects should redefine the concept of architectural design and architecture, develop adaptive architectural plans and implementation schemes according to the characteristics of the project, provide customers with more scientific design products, and offer more basis and experience for future design work.

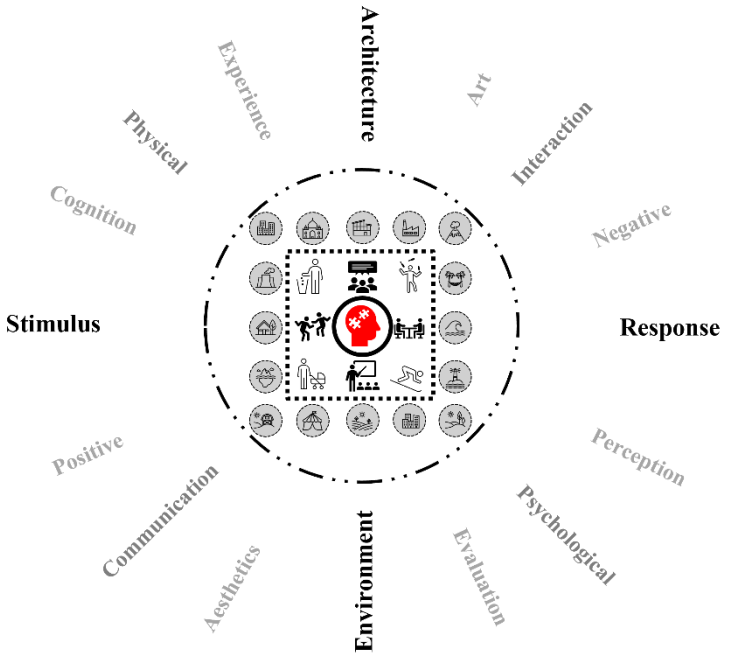
Combined the environmental psychology and architecture, the research actively explores the multiple possibilities of architectural design, integrates the context of interdisciplinary fields in practical design projects, and carries out cross-boundary research to further study the design approaches, guiding principles, and sustainable implementation plans of ideal living environment and positive man-land relationship suitable for contemporary people. In addition, in future research, following the way of nature, the design will be more closely combined with the sustainable development of the environment and life rules to explore the multiple possibilities of the actual project to create the ideal human habitat paradigm of harmony and compatibility.

Based on theoretical research and design practice, the author proposes an evaluation system for a harmonious man-land relationship design, hoping to create more possibilities for the built environment through cross-boundary research and a systematic evaluation system, helping architects create innovative design strategies to provide users with high-quality products.



Graph. 11. The evaluation system of harmonious human-land relationship design.
(Source: Designed by CAO Hui, 2022)

In the future, the author will continue to explore the application of Environmental psychology in architectural design based on the existing research framework. In the actual design, from the level of macro planning to the level of concrete application, actively explore the new path of architectural design. The author hopes to provide customers and users with high-quality design services through a compound design approach and ultimately transform the design into sustainable and affordable design products. In addition, the author hopes to explore a more popularize approach to architectural design, which allows architects, clients, and users to participate together and form a design paradigm that can be shared rather than an architect's monodrama. Finally, the author hopes to actively expand the value of physical space through the space design, especially in coping with the mental health of contemporary people, by creating a targeted physical space to cure people with cognitive impairment. (*Graph. 11*)



Graph. 11. Framework for future architectural environment design practice and theoretical research.
(Source: Designed by CAO Hui, 2022)

Perhaps architectural design can not only touch people, but it can also heal people.

Reference

[1] Jan Gehl, and translated by Yangwen Ou, Xu Zhewen. *Cities for People* (in Chinese). Beijing: China Architecture & Building Press, pp. 1–269, 2010,06.

[2] Jan Gehl, and translated by Jo Koch. *Life between buildings: using public space.* Washington: Island Press, pp. 1–211, 2011.

[3] Jan Gehl, and translated by Jo Koch. *Complexity and contradiction in Architecture* (in Chinese). Nanjing: Jiangsu Phoenix Science and Technology Press, pp. 1–263, 2017, 5.

[4] Gustave Le Bon, and translated by Xiaojia Ma. *The Crowd： A Study of the Popular Mind* (in Chinese). Changchun: Times Literature and Art Publishing House, pp. 1–339, 2019.7.

[5] Architecture (first-level discipline). 2022. [Online]. Available: https://baike.baidu.com/item/%E5%BB%BA%E7%AD%91%E5%AD%A6/228287. Accessed: January. 20, 2022.

[6] Environmental Design in Architecture. 2022. [Online]. Available: https://baike.baidu.com/item/%E5%BB%BA%E7%AD%91%E7%8E%AF%E5%A2%83%E8%AE%BE%E8%AE%A1. Accessed: January. 20, 2022.

[7] Le Corbusier, and translated by Zhide Yang, *Vers une architecture* (in Chinese), Nanjing: Jiangsu Phoenix Science and Technology Press, pp. 1–223, 2014, 2.

[8] Caves, R. W. Encyclopedia of the City. Routledge. 2004: 225. (Wikipedia)

[9] Jan Plamper, and translated by Keith Tribe. *The History of Emotions: An Introduction*, Oxford: Oxford University Press, pp. 1-288, 2015.

[10] Marcus Vitruvius Pollio, and translated by Lutai Gao. *Ten books on architecture* (in Chinese). Beijing: Intellectual Property Publishing House, pp. 1–300, 2001,3.

[11] Lei. Qing. Xu and Gong. Xia. Yang. *Environmental Psychology* (in Chinese). Shanghai: Tongji University Press. 2019.

[12] Downs, R. & Stea, D. *Images and Environment: Cognitive Mapping and Spatial Behavior*. Chicago: Aldine. 1973.

[13] Lynch Kevin, and translated by Yiping Fang and Xiaojun He. *The Image of the City* (in Chinese). Beijing: Huaxia Publishing House. 2017.7.

[14] Ping Shu, Tao Lian, Fan Yan, Youfang Li. *Fundamentals of Architectural Design* (in Chinese). Beijing: Qinghua university press. 2018,9.

[15] Altman, I. *Environment and Social Behavior*. Belmont, CA: Books/Cole. 1975.

[16] Sommer, R. Personal Space: *The Behavioral Basis of Design.* London: Prentice-Hall. 1969.

[17] Hall, E. T. *The Hidden Dimension*. New York: Doubleday. 1966.

[18] Kasmar, J. V. *The Development of a usable lexion of environmental descriptors.* Environment and Behavior, 2, 153-164. 1970.

[19] A. 弗雷德曼, K. 齐默宁, O, 左布. 薄曦, 韩冬青. S*tructure-process approach to environmental design assessment.* New Architecture, 1990(2)(3).

[20] Andrew Williamson, Stephen Finnegan. *"Sustainability in Heritage Buildings: Can We Improve the Sustainable Development of Existing Buildings under Approved Document L?*. Sustainability 2021, 13(7), 3620; https://doi.org/10.3390/su13073620. pp:1-29.

[21] Kastenholz, E.; Carneiro, M.J.; Marques, C.P.; Lima, J. *Understanding and managing the rural tourism experience—The case of a historical village in Portugal.* Tour. Manag. Perspect. 2012, 4, pp:207–214.

[22] Reyhan Sabri, Ha¸sim Altan, Danah AlGhareeb, Noora Alkhaja. *"Heritage Reconstruction Planning, Sustainability Dimensions, and the Case of the Khaz'al Diwan in Kuwait"*. Sustainability 2020, 12(21), 8805; https://doi.org/10.3390/su12218805. pp: 1–15.

[23] Zhang zhaozhi. *Cultural Heritage and Sustainable Tourism: Co-tolerance, Co-integration and Co-Prosperity -- Summary and reflection of "Cultural Heritage and Sustainable Tourism Summit Forum"*, (in Chinese). Study on Natural and Cultural Heritage, 2017,2(03).

[24] J. H. Wu, *"Kindergarten architectural design space - Study on children's space"*, (in Chinese), Building Structure, vol. 50, no. 9, pp. 159–159, 2020.

[25] G. Y. Qian, Y. Du, and S. J. Yang, *"The application of infants physiological and psychological development characteristics in the design of educational toys",* (in Chinese) Packaging Engineering, vol. 41, no. 10, pp. 37–41, 2020.

[26] L. J. Luo, *"Application of architectural semiotics in kindergarten architectural design",* (in Chinese) Chongqing Architecture, vol. 15, no. 155, pp. 8–10, 2016.

[27] Y. F. Wen, *"Architectural semiotics and prototype thinking",* (in Chinese) Architectural Journal, vol. 59, no. 5, pp. 87–92, 2012.

[28] B. Farhana, *"A case study of a green flag-certified preschool in Sweden"*, Hungarian Educational Research Journal, vol. 9, no. 4, pp. 607–627, 2019.

[29] W. C. Zhang, *Murphy's law* (in Chinese). Guwuxuan Publishing House, Suzhou, 2019.

[30] "How architects create emotional connections: Experimental designs by three raise the bar", 2020. [Online]. Available: https://csengineermag.com/how-architects-create-emotional-connections-experiential-designs-by-three-raise-the-bar/. Accessed: December 15, 2020.

[31] Q. Zhang and A. Hutter, *"From traditional symbol to new contemporary form",* Pollack Periodica, vol. 14, no. 3, pp. 3–10, 2019.

[32] E. B. Hacking, R. Barratt, and W. Scott, *"Engaging children: research issues around participation and environmental learning",* Environmental Education Research, vol. 13, no. 4, pp. 529–544, 2007.

Bibliography

[1] Hui CAO, Anna Mária TAMÁS, Gergely SZTRANYÁK. *Application of Environmental Psychology in Kindergarten Architectural Design*. Pollack Periodica, Pécs, Hungary, Print ISSN: 1788-1994, DOI: 10.1556/606.2021.00334, pp 1-6, 2021.

[2] Hui CAO, A.M. TAMÁS, G. SZTRANYÁK, Erqing ZHANG. *Regeneration and Sustainable Development of Vernacular Architecture.* Pollack Periodica, Pécs, Hungary, Print ISSN: 1788-1994, DOI: https://doi.org/10.1556/606.2022.00530, pp 1-6, 28 Apr 2022.

[3] Huang Zhenkai, Pan Haowei, Cao Hui, Gabor Zoboki. *Design and Development of Smoke-Free Homestay Inn in the Post-Pandemic Era*. Tobacco Regulatory Science, India, DOI: https://doi.org/10.18001/TRS.7.6.23, vol. 7, no. 6, pp. 5330–5339(10), 11. 3. 2021.

[4] Feng Jicai. *Chinese folk Cultural Heritage rescue project survey manual* (in Chinese). Beijing: Higher Education Press. 2003.2.

[5] Gans, H. J. *The Urban Villagers.* New York: Free Press. 1962.

[6] Arthur Ciaramicoli, Katherine Ketcham, and translated by Wang Chunguang. *The power of empathy* (in Chinese), Beijing: China Zhigong Press, pp. 1-272, 2019, 01.

[7] Sian Beilock, and translated by Li Pan. *How the Body Knows Its Mind: The Surprising Power of the Physical Environment to Influence How You Think and Feel* (in Chinese). Beijing: China Machine Press, pp. 1-182, 2020, 01.

[8] Alfred Adler, and translated by Wang Tongtong. *Educational psychology of children* (in Chinese). Beijing: China Federation of industry and Commerce press, pp. 1-203, 2020, 03.

[9] John Broadus Watson, and translated by Liu Xia. *Behavioristic psychology* (in Chinese). Beijing: Modern press, pp. 1-215, 2016, 11.

[10] Ashihara Yoshinobu and translated by Yin Peitong. *Exterior design in architecture* (in Chinese). Nanjing: Jiangsu Phoenix Science and Technology Press, pp. 1-169, 2017, 05.

[11] Richard Rogers, Richard Brown, and translated by Zhang Han. *A place for all people* (in Chinese). Haikou: Nanhai Publishing Co., pp. 1-337, 2020, 05.

[12] Bryan Lawson, and translated by Yang Qingjuan, Han Xiao, Lu Fang, Li Xiang. *The language of space* (in Chinese). Beijing: China Architecture & Building Press, pp. 1-257, 2003, 12.

[13] Hal Box, and translated by Jiang Weipin, Tang Wei. *Think like an architect* (in Chinese). Jinan: Shandong Pictorial Publishing House, pp. 1-241, 2012, 01.

[14] Frank Lloyd Wright, and translated by Yu Tong. *The dream of architecture* (in Chinese). Jinan: Shandong Pictorial Publishing House, pp. 1-291, 2011, 06.

[15] Liang Sicheng. *大拙至美：梁思成最美的文字建筑*. Beijing: China Youth Publishing House, pp. 1-211, 2019, 01.

[16] Jonathan M. Woodham, and translated by Zhou Bo, Shen Yin. *Twentieth-Century Design* (in Chinese). Shanghai: Shanghai People's Publishing House, pp. 1-305, 2017, 02.

[17] Lei. Qing. Xu and Gong. Xia. Yang. *Environmental Psychology* (in Chinese). Shanghai: Tongji University Press. 2019.

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Attachments

List of Publications

- **01.** Hui CAO, *Protection and tourism development of ancient villages from a sustainable perspective – Hougou Ancient Village as an Example*, Conference proceeding of the 6th international academic conference on Places and Technologies, Pécs, Hungary, ISBN: ISBN 978-963-429-401-6 (PDF), pp 146-153, 2019.

- **02.** Hui CAO, Anna Mária TAMÁS, Gergely SZTRANYÁK, *Application of Environmental Psychology in Kindergarten Architectural Design*, Pollack Periodica, Pécs, Hungary, Print ISSN: 1788-1994, DOI: https://doi.org/10.1556/606.2021.00334, vol. 16: no. 3, pp 169-174, 28 Sep 2021.

- **03.** Hui CAO, A.M. TAMÁS, G. SZTRANYÁK, Erqing ZHANG, *Regeneration and Sustainable Development of Vernacular Architecture*, Pollack Periodica, Pécs, Hungary. Print ISSN: 1788-1994, DOI: https://doi.org/10.1556/606.2022.00530, Volume/Issue: Accepted Manuscript / Online First, pp 1-6, 28 Apr 2022.

- **04.** Huang Zhenkai, Pan Haowei, Cao Hui, Gabor Zoboki, *Design and Development of Smoke-Free Homestay Inn in the Post-Pandemic Era*, Tobacco Regulatory Science, India, DOI: https://doi.org/10.18001/TRS.7.6.23, vol. 7, no. 6, pp. 5330–5339(10), 11. 3. 2021.

- **05.** CAO Hui, A.M. TAMÁS, G. SZTRANYÁK, Protection and renewal of Chinese ancient villages based on sustainable background, 15th Miklós Iványi International PhD & DLA Symposium Abstract Book, Pécs, Hungary, ISBN 978-963-429-449-8, Paper 18, 2019.

- **06.** Gu. Qiang, E.SZ. ZOLTÁN, CAO Hui, The North Printing House: An ecological architecture model of combining localization, traditionalization and modern technology, 15th Miklós Iványi International PhD & DLA Symposium Abstract Book, Pécs, Hungary, ISBN 978-963-429-449-8, Paper 3, 2019.

- **07.** Z.K. HUANG, H. CAO, H.W. PAN, G. ZOBOKI, Design and development of B&Bs in the post-epidemic era, 16th Miklós Iványi International PhD & DLA Symposium Abstract Book, Pécs, Hungary, ISBN 978-963-429-578-5, Paper 19, 2020.

- **08.** CAO Hui, Anna Mária TAMÁS, Gergely SZTRANYÁK, Application of Environmental Psychology in Kindergarten Architectural Design, 16th Miklós Iványi International PhD & DLA Symposium Abstract Book, Pécs, Hungary, ISBN 978-963-429-578-5, Paper 20, 2020.

- **09.** CAO Hui, The application of environmental psychology in architectural environment design, Online EDUC research seminar on Culture and Heritage, Seminar Programme and Abstract Book, pp 8, Paris, France, 2021.

- **10.** CAO Hui, The design practice of Chinese traditional space reconstruction in the context of health and well-being, Online EDUC research seminar on Lifelong Health and Wellbeing, Seminar Programme and Abstract Book - EDUC WP9, ISBN: 978-963-429-640-9, pp 12-13, Pécs, Hungary, 2021.

- **11.** CAO Hui, Anna Mária TAMÁS, Gergely SZTRANYÁK, Regeneration and sustainable development of vernacular architecture, 17th Miklós Iványi International PhD & DLA Symposium Abstract Book, Pécs, Hungary, ISBN 978-963-429-Paper 46 811-3, 2021.

List of Architectural Design Works

- **01.** *China National 4A Class Tourist Area Project-Hou Gou Ancient Village Scenic Spot Planning*, Jinzhong City, Shanxi Province, China, 2018-2022. (Completion)

  Part I. Hougou New Village comprehensive project
  Part II. Chinese folk cultural heritage rescue Memorial Project
  Part III. Hougou Ancient Village Tourist Reception Center project
  Part IV. Restoration and renewal of Hougou Ancient Village

  Designers: Dr Anna Mária Tamás**,** Dr Gergely Sztranyák**,** CAO Hui**,** Shanxi Zhenpeng Investment Co., LTD

- **02. Masterwork:** ***Jinzhong No.1 Kindergarten Renovation Project,*** Jinzhong City, Shanxi Province, China, 2020-2021. (Completion)

  Part I. Kindergarten entrance architectural design project
  Part II. Environmental optimization project for the main entrance area of the teaching building

  Designers: Dr Anna Mária Tamás**,** Dr Gergely Sztranyák**,** CAO Hui**.**

- **03.** *Leisure bar project design-Wu Shi Li Bar*, Jinzhong City, Shanxi Province, China, 2017-2018. (Completion). Designers: Dr Anna Mária Tamás**,** Dr Gergely Sztranyák**,** CAO Hui**.**

- **04**. *Vernacular architecture restoration project-Liang wang bie yuan,* Zaozhuang, Shandong, China, 2018-2019. (Completion). Designers: CAO Hui, ZHANG Erqing.

- **05.** *Wen Hua Jing Yuan Sales Center - Commercial Landscape Design*, Jinzhong City, Shanxi Province, China, 2020. (Completion). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui.

- **06.** *Gubei Yunzhu Homestay Inn Design-Yunzhu yard*, Beijing, China, 2021. (Completion). Designers: CAO Hui, HUANG Zhenkai.

- **07.** *18° Gray homestay inn design*, Wuhan, China, 2020. (Under construction). Designers: CAO Hui, HUANG Zhenkai, PAN Haowei.

- **08.** *Art installation of Riverside Landscape Belt in Zhangjiakou Yanghe New District: Landscape tower design*, Zhangjiakou, China, 2020-2021. (Design bidding). Designers: CAO Hui, HUANG Zhenkai.

- **09.** *Mr. Zheng's private villa project,* Budapest, Hungary, 2020-2022. (Under construction). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui.

- **10.** *Ouqiao planning and design of science and technology industrial park*, Budapest, Hungary, 2019-2022. (Under planning). Designers: CAO Hui, Shanxi First Construction Group Co. LTD.

- **11.** *Design bidding: Updated design project of Marriott Millennium Executive Apartment,* Budapest, Hungary. (Design bidding). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui, JJD design studio.

- **12.** *Vernacular Architecture Reconstruction Design Project-Zhangjia Old House*, Linshi, China, 2021. (Under construction). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui.

- **13.** *The design of the coffee shop in OUTLET square*, Jinzhong City, Shanxi Province, China, 2019. (Design bidding). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui.

- **14.** *Design of garbage recycling device in Pingyao ancient county*, Jinzhong City, Shanxi Province, China, 2018. (Completion). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui.

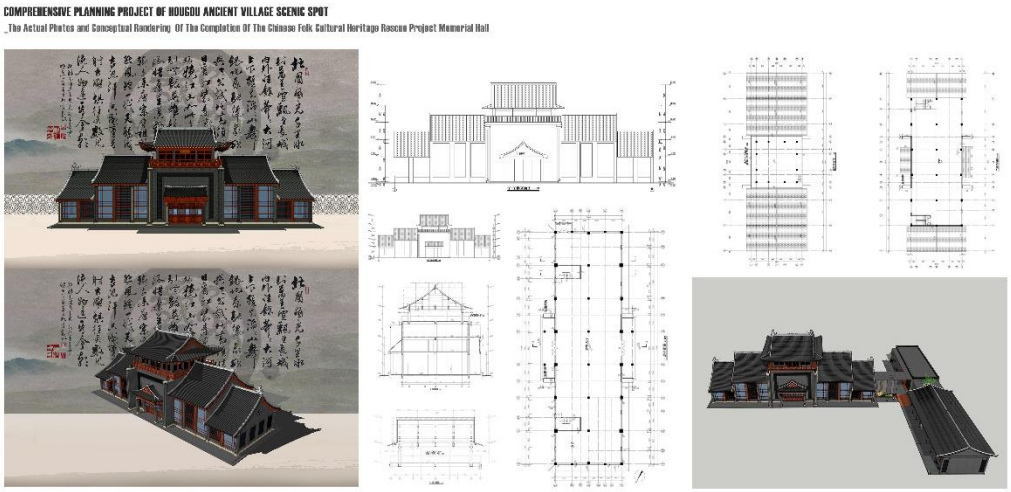
- **15.** *Pingyao County heating Company building renovation project*, Jinzhong City, Shanxi Province, China, 2019. (Design bidding). Designers: Dr Anna Mária Tamás, Dr Gergely Sztranyák, CAO Hui.

List of major project design concept drawings

Masterwork 01

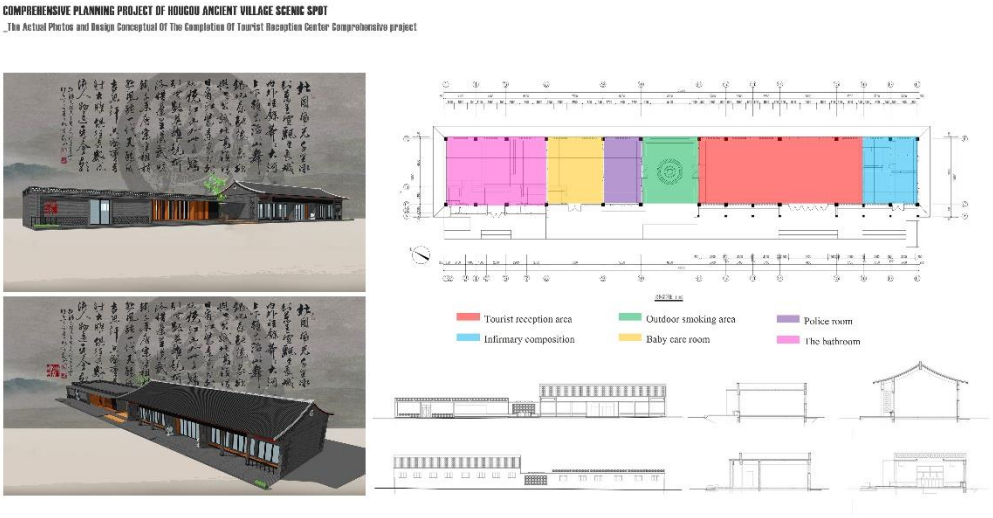
AAAA National Tourist Attraction Project, Hou Gou Ancient Village scenic spot planning- Part I. Hougou New Village Comprehensive Project, Jingzhong, Shanxi, China, 2018-2021.

Masterwork 02



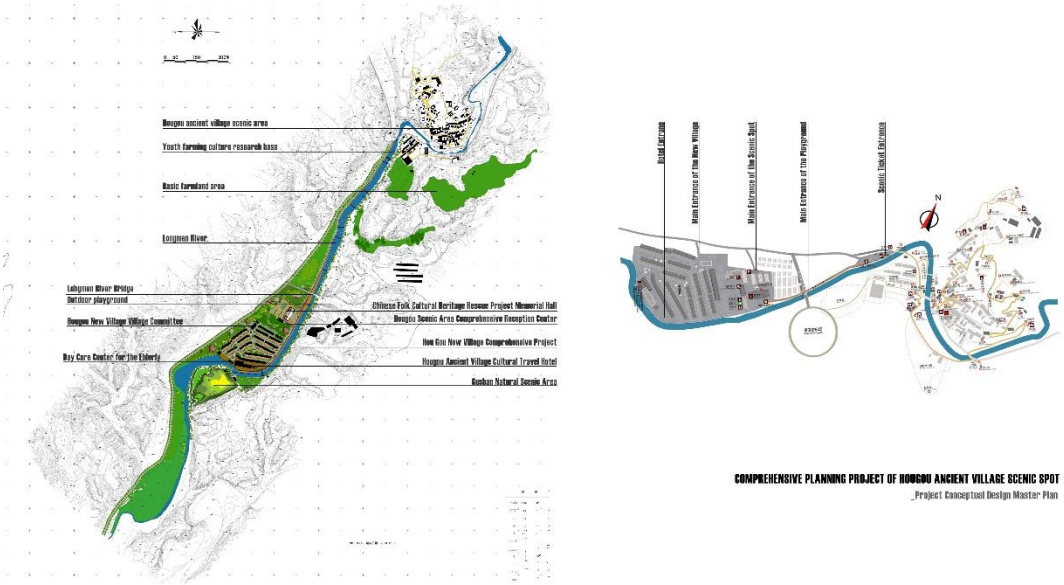
AAAA National Tourist Attraction Project, Hou Gou Ancient Village scenic spot planning- Part II. Chinese folk Cultural Heritage Rescue Project memorial Hall, Jingzhong, Shanxi, China, 2018-2021.

Masterwork 03



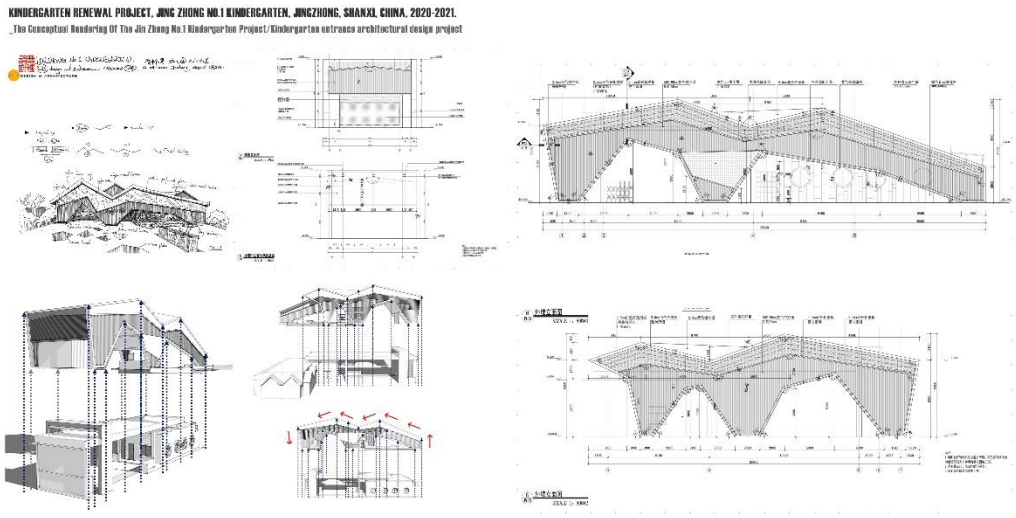
AAAA National Tourist Attraction Project, Hou Gou Ancient Village scenic spot planning- Part III. Comprehensive project of Tourist Reception Center, Jingzhong, Shanxi, China, 2018-2021.

Masterwork 04



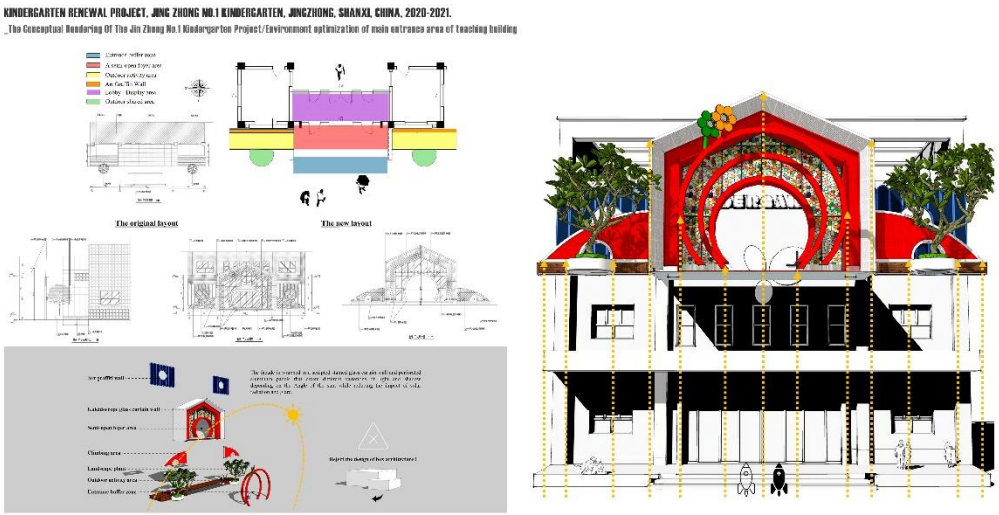
AAAA National Tourist Attraction Project, Hou Gou Ancient Village scenic spot planning- Project Conceptual Design Master Plan, Jingzhong, Shanxi, China, 2018-2021.

Masterwork 05



Jinzhong No.1 Kindergarten Renovation Project- Part I. Kindergarten entrance architectural design project, Jinzhong City, Shanxi Province, China, 2020-2021.

Masterwork 06



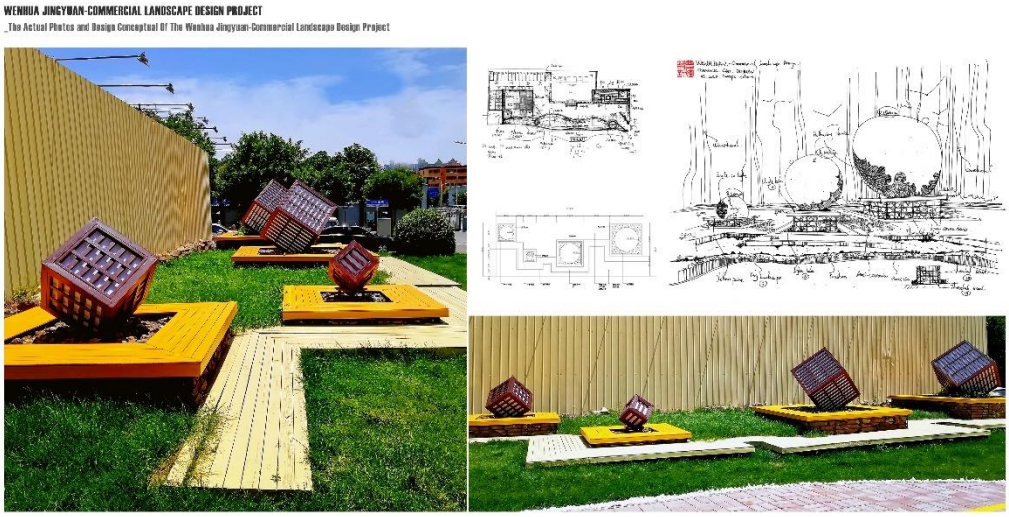
Jinzhong No.1 Kindergarten Renovation Project- Part II. Environmental optimization project for the main entrance area of the teaching building, Jinzhong City, Shanxi Province, China, 2020-2021.

Architectural Design Works 01

01. Wen Hua Jing Yuan Sales Center - Commercial Landscape Design

Jinzhong City, Shanxi Province, China, 2020

Project leader: CAO Hui



Introduction:

The project is a real estate commercial landscape project in Jinzhong, Shanxi Province, China. The sales center is in the core of the community street, adjacent to the main traffic road, which is the only way for community residents to pass through every day. This project is the public landscape of the real estate sales center, and the purpose of the project is to create a community-friendly landscape atmosphere to enhance the sociality of the commercial landscape, thus providing a better environment for the sale of commercial housing.

In the design, the author emphasizes the dialogue between the landscape and local community, studies the interaction between landscape and people, and designs an outdoor shared rest area for the community residents that increases the possibility of face-to-face communication between residents and gathers popularity for the sales center. The author realizes the win-win situation of business demand and social sharing through atmosphere creation and environment integration.

Architectural Design Works 02

02. Leisure bar project design-Wu Shi Li Bar

Jinzhong City, Shanxi Province, China, 2017-2018

Project leader: CAO Hui

Introduction:

WU SHI LI BAR is in the heart of a university town in Jinzhong City, Shanxi Province, China. It is a personalized bar jointly invested by two fashionable young people. Its primary customer groups are college students and residents in surrounding communities.

The project is an interior design project with a mixture of post-industrial and pastoralism styles, expressing a very fashionable design concept. In the specific design, the author emphasizes the dialogue between space and people and creates a warm and romantic indoor environment through the indoor atmosphere creation so that users can get a good sense of experience.

03. Vernacular architecture restoration project-Liang wang bie yuan

Zaozhuang, Shandong, China, 2018-2019

Project leader: CAO Hui, ZAHNG Erqing

Introduction:

Liang Wang Bie Yuan is in Shanting District, Zaozhuang City, Shandong Province, China. It is a rural housing reconstruction project supported by the government under the Chinese beautiful village construction policy. With more than 150 years of history, Liang Wang Bie Yuan is a typical traditional residential building in the south of Shandong province. The original building is an independent building of 70 square meters, with a local traditional stone house and an open courtyard. After the change of nearly half a century, the owner of the house has already moved to the city to live, Liang Wang courtyard, unfortunately, became an abandoned farmyard, lost the vitality of the past. As China attaches great importance to “culture and rural revitalization” in recent years, the local government has begun to carry out the large-scale protective restoration of traditional vernacular architecture.

The author's design team was fortunate to participate in the rural revitalization construction in this region, and Liang Wang Bie Yuan is one of the actual projects. In this project, the upgrade of vernacular architecture infrastructure and the creation of the site environment are the core contents of the design, and the difficulty is to realize the organic integration of local traditional architectural culture and vernacular architectural environment.

Architectural Design Works 04

04. Gubei Yunzhu Homestay Inn Design-Yunzhu yard

Beijing, China, 2021

Project leader: CAO Hui, HUANG Zhenkai

Introduction:

Yunzhu Yard Design Project is in Gubei Shui Zhen, Beijing, China. It is a renovation project of a parent-child homestay. The project was jointly completed by the design team and the homestay operator, reflecting the process of participatory design. Yunzhu yard is a parent-child homestay project. The author systematically analyzed children's behaviors and psychological characteristics in the context of infant psychology and constructed a child-friendly experience space, including the design of indoor space and the construction of an outdoor environment.

In the design process, the author transforms the concept of parent-child into the language of space organization, realizes better environment integration through rational functional planning and atmosphere creation, creates a low-cost parent-child space, and provides users with a high-quality space experience.

Statement of Participation Rate

I, the undersigned CAO Hui (birthplace, time: Jinzhong, June 14, 1983; Mother's name is CHANG Chun Lian) and declare that I have participated in the works proposed in my thesis in the following proportion:

- **01.** *China National 4A Class Tourist Area Project-Hou Gou Ancient Village Scenic Spot Planning*.

  Part I. Hougou New Village comprehensive project ……..... 75%
  Part II. Chinese folk cultural heritage rescue Memorial Project ……...…. 100%
  Part III. Hougou Ancient Village Tourist Reception Center project …….…… 100%
  Part IV. Restoration and renewal of Hougou Ancient Village ……... 65%

- **02. Masterwork:** *Jinzhong No.1 Kindergarten Renovation Project***.**

  Part I. Kindergarten entrance architectural design project ……..... 100%
  Part II. Environment optimization of main entrance area of teaching building …….……...……...…. 100%

- **03.** *Leisure bar project design-Wu Shi Li Bar* ……...……... 100%

- **04**. *Vernacular architecture restoration project-Liang wang bie yuan* ……. 30%

- **05.** *Wen Hua Jing Yuan Sales Center - Commercial Landscape Design* ……... 100%

- **06.** *Gubei Yunzhu Homestay Inn Design-Yunzhu yard* ……....…….…….... 50%

- **07.** *18° Gray homestay inn design* ……...……..…...……...……... 40%

- **08.** *Art installation of Riverside Landscape Belt in Zhangjiakou Yanghe New District: Landscape tower design* …….…….....……... 50%

- **09.** *Urban residential building design project-Mr. Zheng's villa renovation* …..……...….... 100%

- **10.** *Ouqiao planning and design of science and technology industrial park* …… 25%

- **11.** *Design bidding: Updated design project of Marriott Millennium Executive Apartment* ….…... 35%

- **12.** *Vernacular architecture reconstruction design project-Zhangjia Old House* ……...……... 100%

- **13.** *The design of the coffee shop in OUTLET square* ……...……100%

- **14.** *Design of garbage recycling device in Pingyao ancient county* ……...……...……100%

- **15.** *Pingyao County heating Company building renovation project* …….....……...……100%

Questionnaire

Questionnaire on jinzhong No.1 Kindergarten campus building environment survey

关于晋中第一幼儿园校园建筑环境调查问卷

1. 性别： □ A 男性 □ B 女性

2. 职业： _____

3. 年龄段： □ A 20 岁以下 □ B 20-30 岁 □ C 30-40 岁 □ D 40 岁以上

4. 孩子的性别： □ A 男性 □ A 女性

5. 孩子的年龄： _____

6. 您的宝宝平时的爱好是什么？ _____

7. 您的宝宝最喜爱什么类型的户外运动？ _____

8. 您的宝宝平时最喜欢看什么类型的动画片？ _____

9. 您的宝宝最喜爱什么类型的玩具？ _____

10. 您的宝宝最喜爱什么颜色？ _____

11. 您平时与孩子进行互动交流时间多么？[单选题]

□ A 特别充足 □ B 较多 □ C 一般 □ D 很少

12. 您的孩子平时参加的社会活动的频率多么？[单选题]

□ A 特别多 □ B 较多 □ C 一般 □ D 很少

13. 您认为幼儿园的建筑环境对幼儿的发展：[单选题]

□ A 很重要 □ B 重要 □ C 一般 □ D 不重要

14. 您认为幼儿园的建筑环境有哪些作用？[多选题]

□ A 美化环境 □ B 辅助教学活动 □ C 培养认知和感知能力 □ D 塑造社会行为

[2]

15. 您的孩子希望幼儿园的建筑环境是什么样的呢？ _____

16. 您对 K1 幼儿园的建筑环境的整体印象是：[单选题]

□ A 特别满意 □ B 满意 □ C 一般 □ D 不满意

17. 您的孩子喜欢目前幼儿园的建筑环境么？[单选题]

□ A 特别满意 □ B 满意 □ C 一般 □ D 不满意

18. 您对 K1 幼儿园在其所在社区的印象的如何？[单选题]

□ A 很好的印象 □ B 好的印象 □ C 一般的印象 □ D 不好的印象

19. 如果不满意，最大的原因是什么？ _____

20. 您喜欢下面哪组幼儿园建筑环境的风格？[多选题]

□ A 鲜艳的愉悦的 □ B 自然的纯真的 □ C 体验的互动的 □ D 创新的时尚的

21. 您认为目前 K1 幼儿园的建筑环境在哪些方面需要整改？[多选题]

□ A 功能方面 □ B 形式方面 □ C 艺术性方面 □ D 可持续性方面

22. 请您给出具体的整改意见。 _____

23. 请您将在为宝宝选择幼儿园时的重点考虑的因素从重要到次要进行排序：[多选题]

□ 幼儿园环境 □ 教学质量 □ 道勤质量 □ 硬件设施 □ 师资条件 □ 其它

24. 您认为未来的幼儿园的建筑环境应该是什么样的呢？请您用一段话来叙述：

_____

25. 其它意见： _____

_____

[3]

Questionnaire

1. **Gender:** □ A Male □ B Female

2. **Occupation:** _____

3. **Age bracket:** □ A Under 20 □ B 20 to 30 □ C 30 to 40 □ D Above 40

4. **The sex of the child:** □ A Male □ B Female

5. **Age of child:** _____

6. **What are your baby's hobbies?** _____

7. **What kind of outdoor activities does your baby enjoy the most?** _____

8. **What kind of cartoons does your baby like to watch most?** _____

9. **What kind of toys does your baby like best?** _____

10. **What is your baby's favorite color?** _____

11. **How much time do you spend interacting with your children?**

□ A Very sufficient □ B More □ C General □ D Seldom

12. **How often does your child participate in social activities?**

□ A Many □ B More □ C General □ D Seldom

13. **How much influence do you think the built environment of a kindergarten has on children's development?**

□ A Very sufficient □ B More □ C General □ D Seldom

14. **What do you think are the functions of the built environment of the kindergarten?**

□ A Beautify the environment □ B Auxiliary teaching activity □ C Develop cognitive and perceptual skills □ D Shaping social behavior

[2]

15. **What does your child want the built environment of the kindergarten to be?** _____

_____

16. **Your overall impression of the built environment of K1 kindergarten is as follows:**

□ A Special satisfaction □ B satisfaction □ C General □ D dissatisfaction

17. **Does your child like the built environment of the kindergarten?**

□ A Special satisfaction □ B satisfaction □ C General □ D dissatisfaction

18. **What is your impression of K1 kindergarten in its community?**

□ A Special satisfaction □ B satisfaction □ C General □ D dissatisfaction

19. **If not, what is the biggest reason?** _____

20. **Which of the following groups of kindergarten architectural environment style do you like?**

□ A Bright and cheerful □ B Natural and pure □ C Interactive and experience □ D Innovative and fashionable

21. **In your opinion, what aspects of the built environment of K1 kindergarten need to be improved?**

□ A Functional Aspect □ B Formal aspect □ C Artistic aspect □ D Sustainability aspect

22. **Please give specific rectification suggestions.** _____

23. **Please rank the most important factors to consider when choosing a kindergarten for your baby from the most important to the least:**

□ Kindergarten Environment □ Quality Of Teaching □ Commuter Quality □ Hardware Facility □ Teachers' Condition □ Other

24. **What do you think the built environment of the kindergarten should be in the future? Please describe it in one paragraph:**

25. **Other opinions:** _____

[3]