

Hillside Architecture Design and Chinese Traditional Cases

山地建筑设计与中国传统建筑案例

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A. Geomorphic Environment and Hillside Architecture Design

一. 地貌环境与山地建筑设计



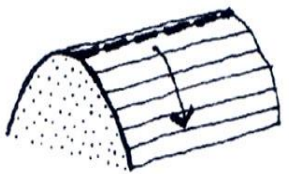
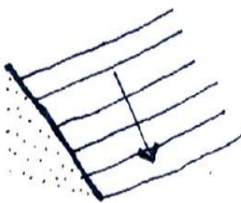
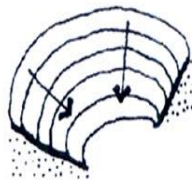
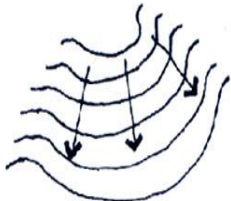
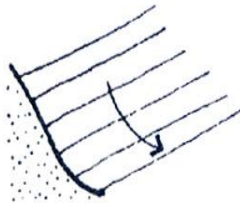
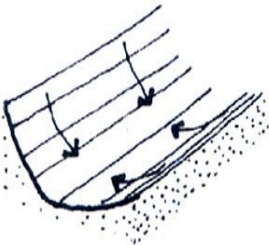
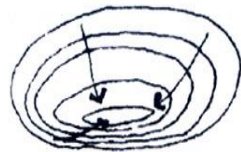
1. Topography
地貌形态

2. Single Building and Landform
单体建筑与地形

3. Human, Architecture and Natural Environment
人、建筑与自然环境

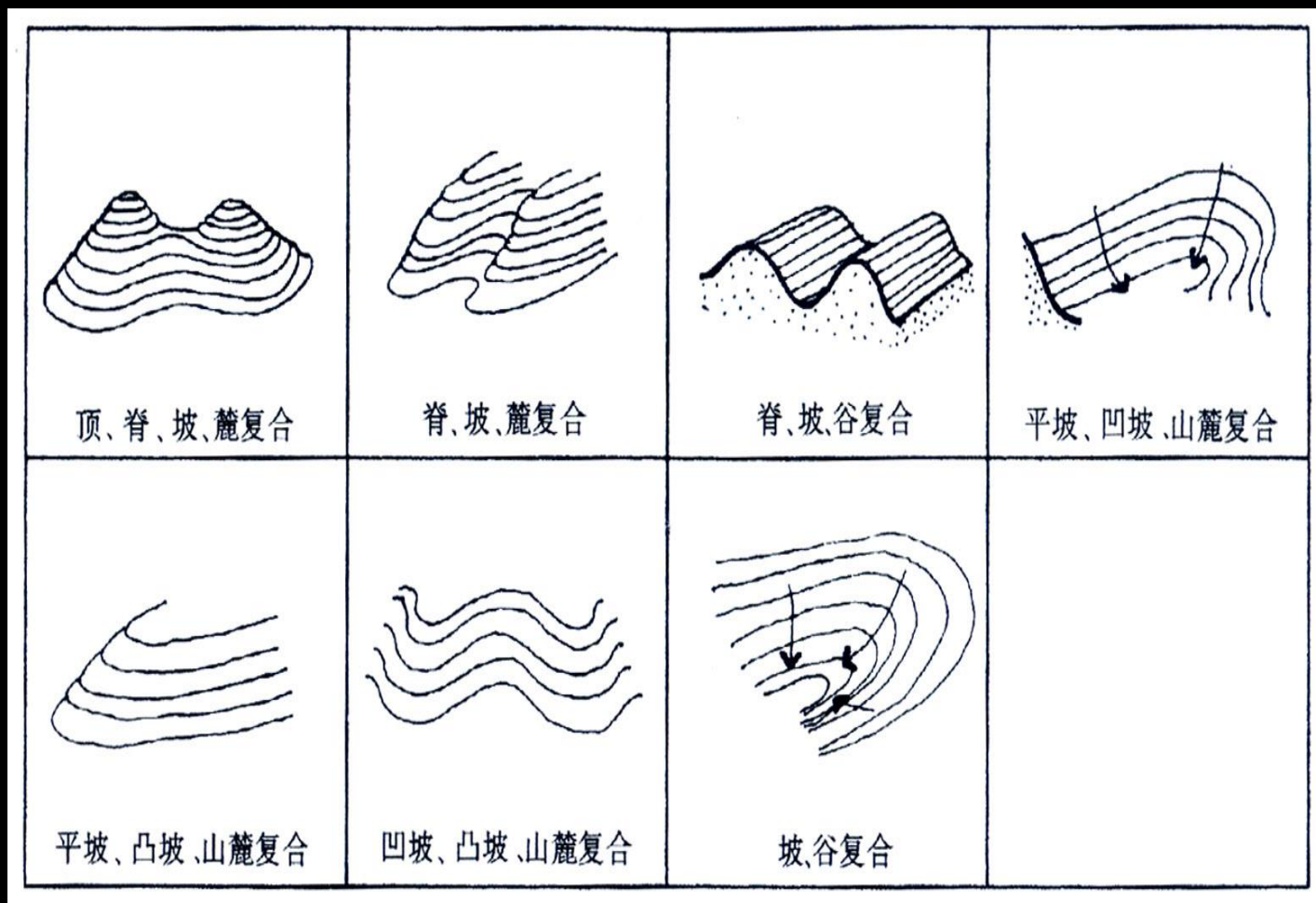
1. Topography 地貌形态

●Single Landform 单一地貌形态

山位	单一地形分类		
山顶、山脊 (坡顶) mountain tops	 <ul style="list-style-type: none"> • 山顶,有四个方向的视景,中心感强 	 <ul style="list-style-type: none"> • 山脊,有三面视景,体现地形延伸方向 	 <ul style="list-style-type: none"> • 山脊,有两面视景,山地空间被分割
山腰、山崖 (坡顶) mountainsides	 <ul style="list-style-type: none"> • 平坡,有一个方向的视景,山体成为背景 	 <ul style="list-style-type: none"> • 凹坡,山地空间呈内向性,容易构成视觉联系 	 <ul style="list-style-type: none"> • 凸坡,山地空间呈外向性,容易使建筑形体突出
山谷、山麓、盆地 (坡底) valleys	 <ul style="list-style-type: none"> • 山麓,平坦 	 <ul style="list-style-type: none"> • 山谷,视觉联系紧密 	 <ul style="list-style-type: none"> • 盆地,空间内敛,视觉联系向心

1. Topography 地貌形态

●Composite Landform 复合地貌形态



The significance of analyzing topography:

分析地貌形态的意义:

- Find the basis for processing architectural form
寻找处理建筑形态的依据
 - Material rationality
 - Human psychology
 - Artistic conception
 - 物质理性 人文心理-----意境
- Coordinate the landscape and viewing, orientation, internal and external space environment
协调景观与观景、朝向、内外空间环境
 - Space and landscape composition
 - Concept generation
 - 空间与景观构成-----概念的产生
- Preparation of functional departments and internal space organization
功能部局及内部空间组织的准备
 - Unique characteristics of the base
 - Uniqueness of architecture
 - 基地的唯一特征-----建筑的唯一性

Landform analysis combining land use scope and building volume 结合用地范围与建筑体量的地貌分析

(base)internal & external----scenes & feelings----big & small----the meaning of human psychology
(基地)内外----场景与感受----大与小----人文心理的意义











2. Single Building and Landform 单体建筑与地形

●The grounding form
of the building
建筑的接地形态

Adapt to the landform 适应地貌

●Terrain treatment
(site preparation)
地形的处理 (整地)

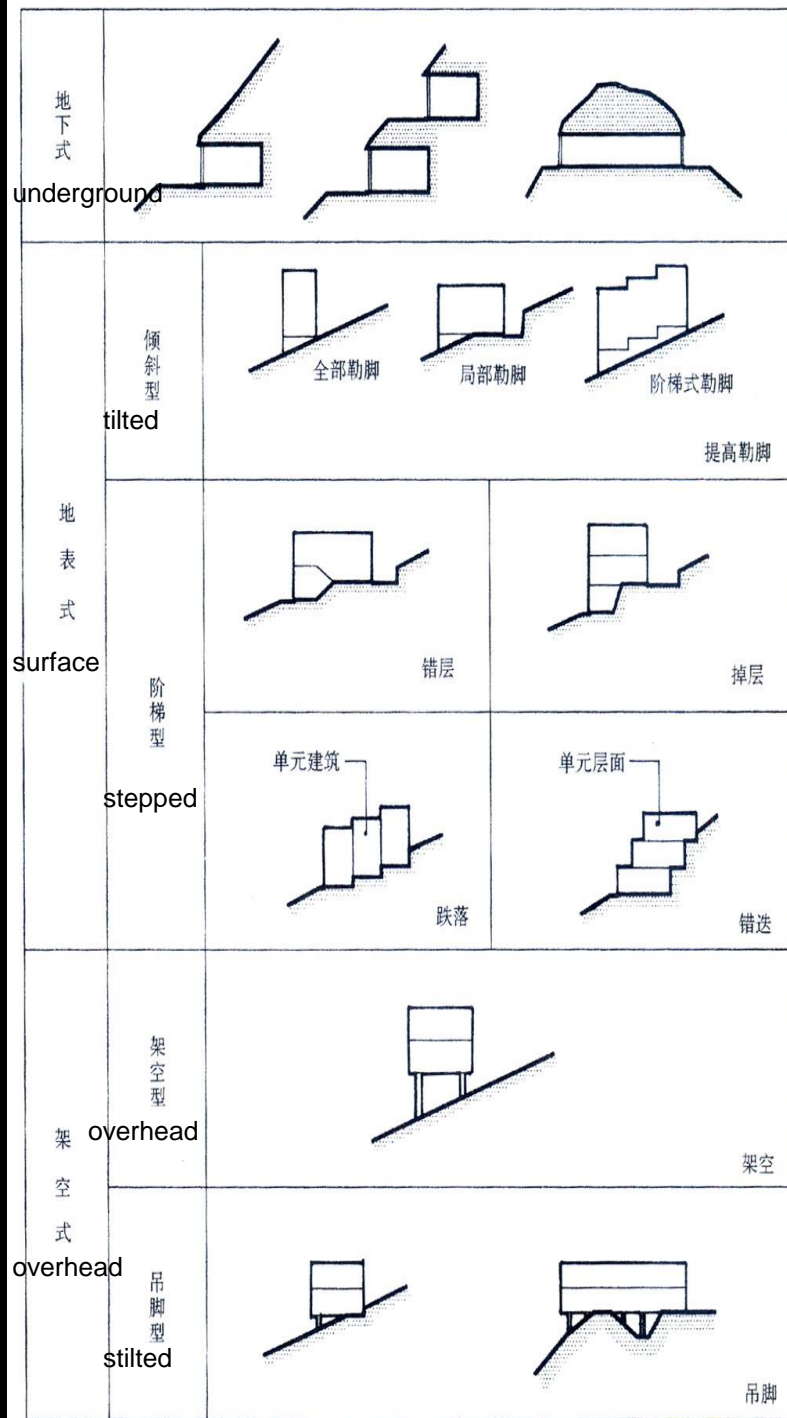
Change the landform 改变地貌 (利用地
貌特征/破坏地貌)

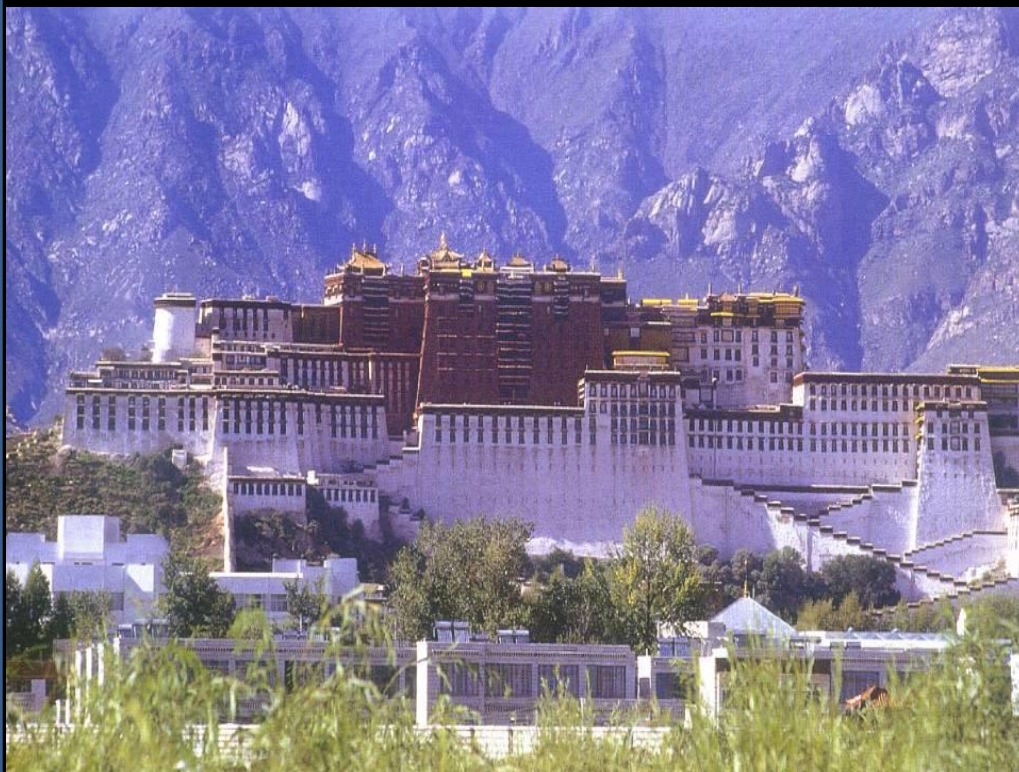
Beyond the landform 超越地貌

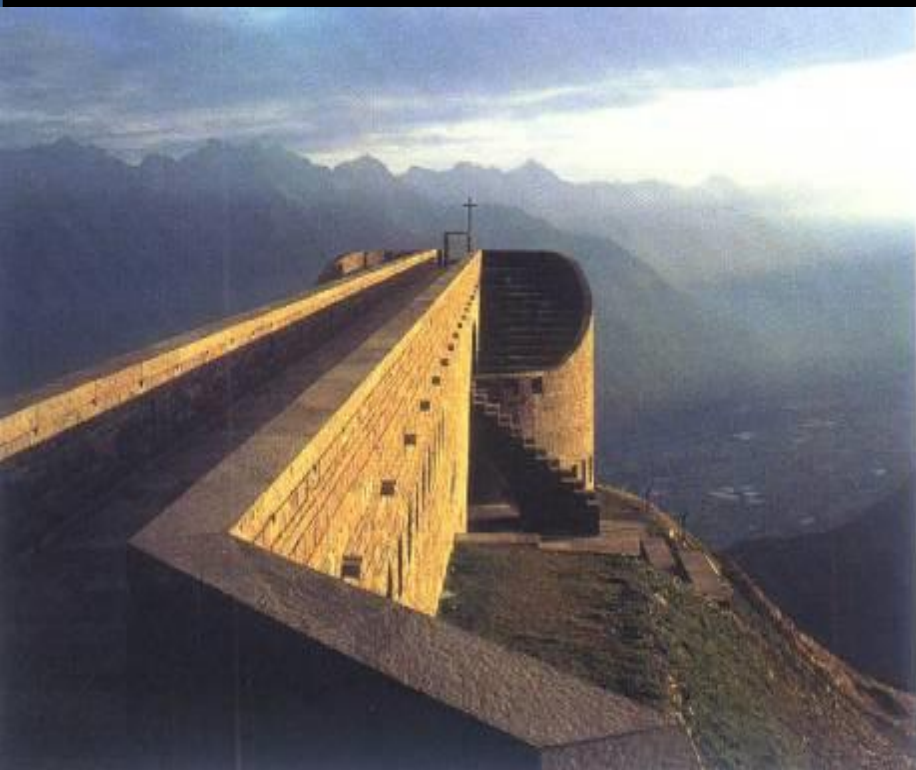
●Buildings and contours
建筑与等高线

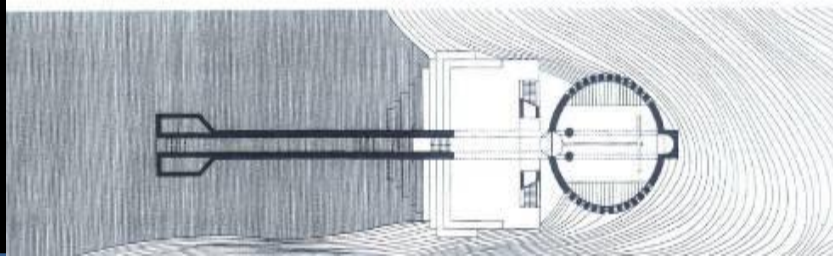
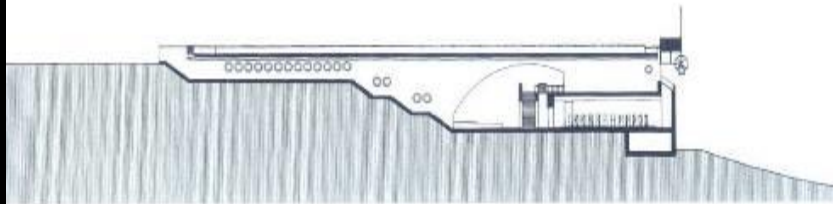
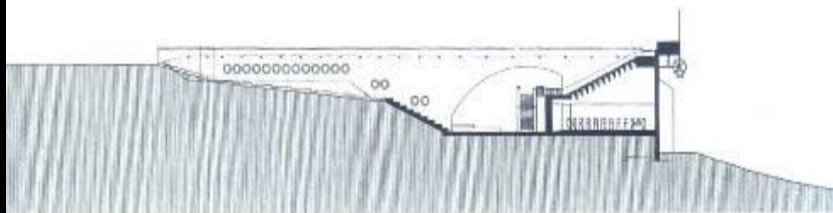
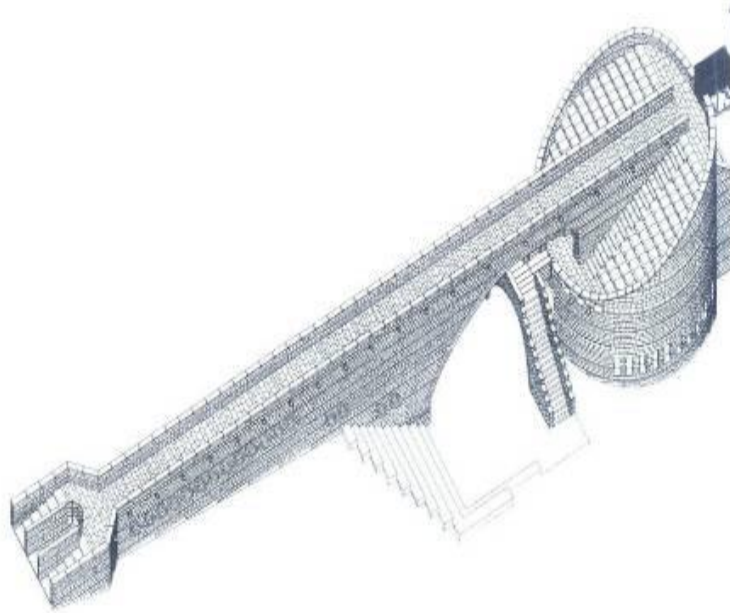
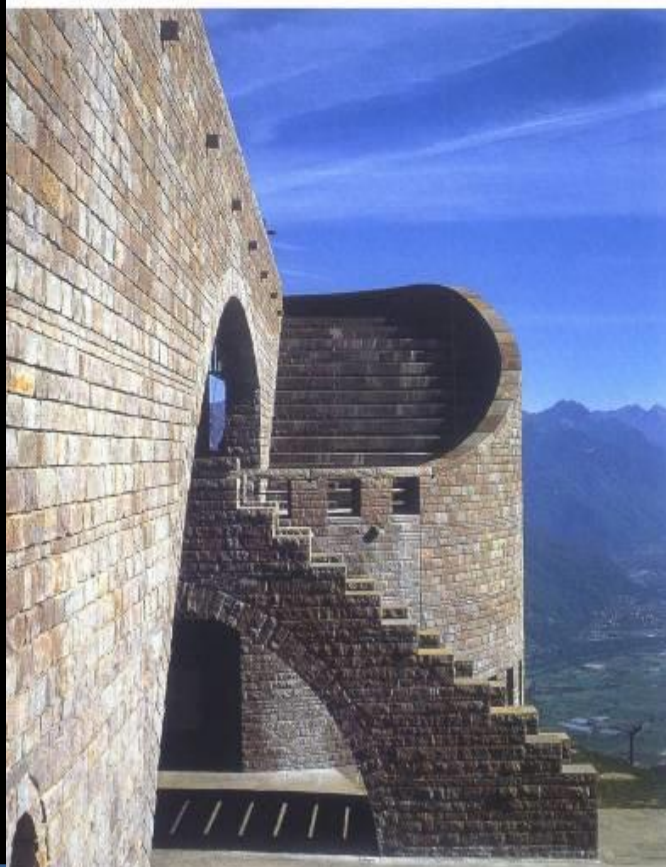
Vertical contour 垂直等高线

Parallel contour 平行等高线









3. Human, Architecture and Natural Environment

人、建筑与自然环境

Human 人

The attitude of human to nature
人对于自然的态度

Human's emotions and human's desires
人的情感与人的欲望

Life situation, future vision
生活情境 未来愿景

Respect nature, revere nature, be kind
尊重自然 敬畏自然 潜心善待

Technical rationality-----Lifestyle-----Situational wishes-----?????
技术理性-----生活模式-----情景愿望-----?????

Activity – Move line - Scene
活动-动线-场景

Comprehensiveness - Uniqueness
综合性-独特性





B. General Principles of Architectural Design in Hillside Environment

二、山地环境中建筑设计的一般原理

1. Architectural conception combined with geomorphic environment
结合地貌环境的建筑构思与立意
2. Architectural organization and composition design
建筑组织与构成设计

1. Architectural conception combined with geomorphic environment 结合地貌环境的建筑构思与立意

- Image positioning of architecture
对建筑的意象定位
- Morphological positioning of landform analysis
对地貌分析的形态定位
- The layout positioning of the functional organization of the building
对建筑功能组织的布局定位

1. Architectural conception combined with geomorphic environment 结合地貌环境的建筑构思与立意

- Image positioning of architecture
对建筑的意象定位

Style and form
风格与形式

Expression of local style
地方风格的表现

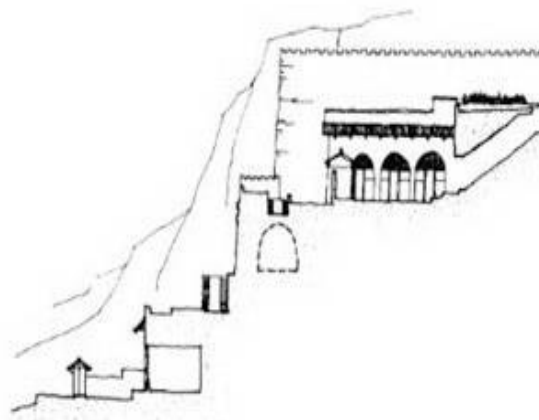
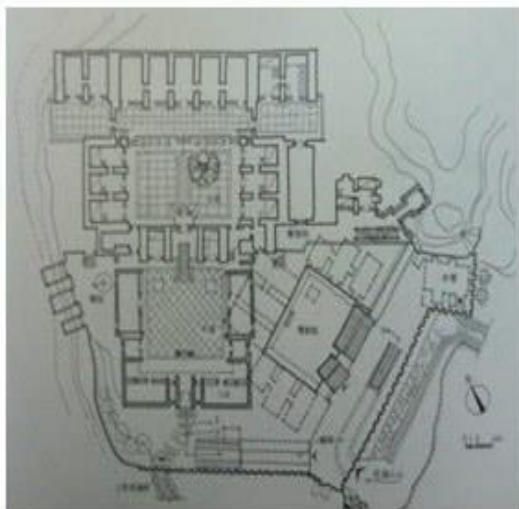
Representation of formal concepts
形式概念的表现

The sight stirs up your feeling – The feeling stirs up the meaning – The meaning forms to shape – The shape forms to image
因景生情-因情生意-因意成象-因象成形





刘家峁姜宅





1. Architectural conception combined with geomorphic environment 结合地貌环境的建筑构思与立意

Morphological positioning of landform analysis
对地貌分析的形态定位

Shaping: Conform to the landform - Integrative
塑形： 顺应地形——融入型

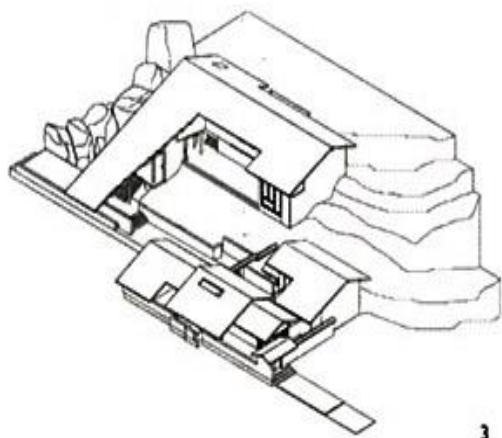
Enhance the landform – Co-configurative
强化地形——共构型

Beyond the landform – Superior
超越地形——超越型

Group Scene: scenic spot, scenic area, landscape move line
组景： 景点， 景域， 景观动线

landscape & viewing (active & passive)
景观与观景(主动与被动)

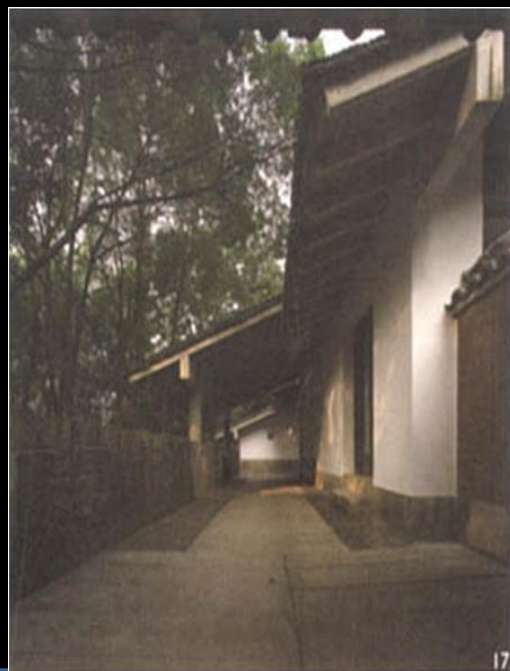
The artistic conception of Chinese landscape
中式景观的意境



3



5



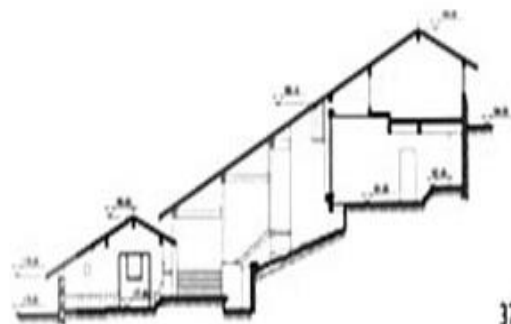
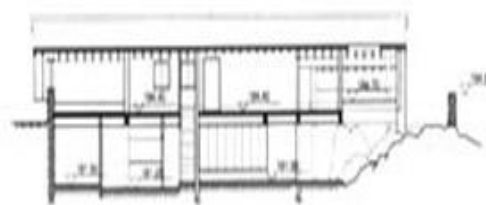
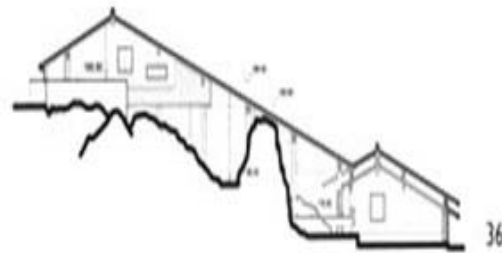
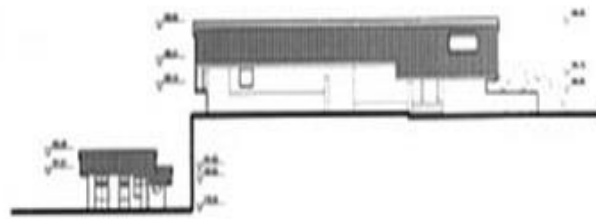
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18



19



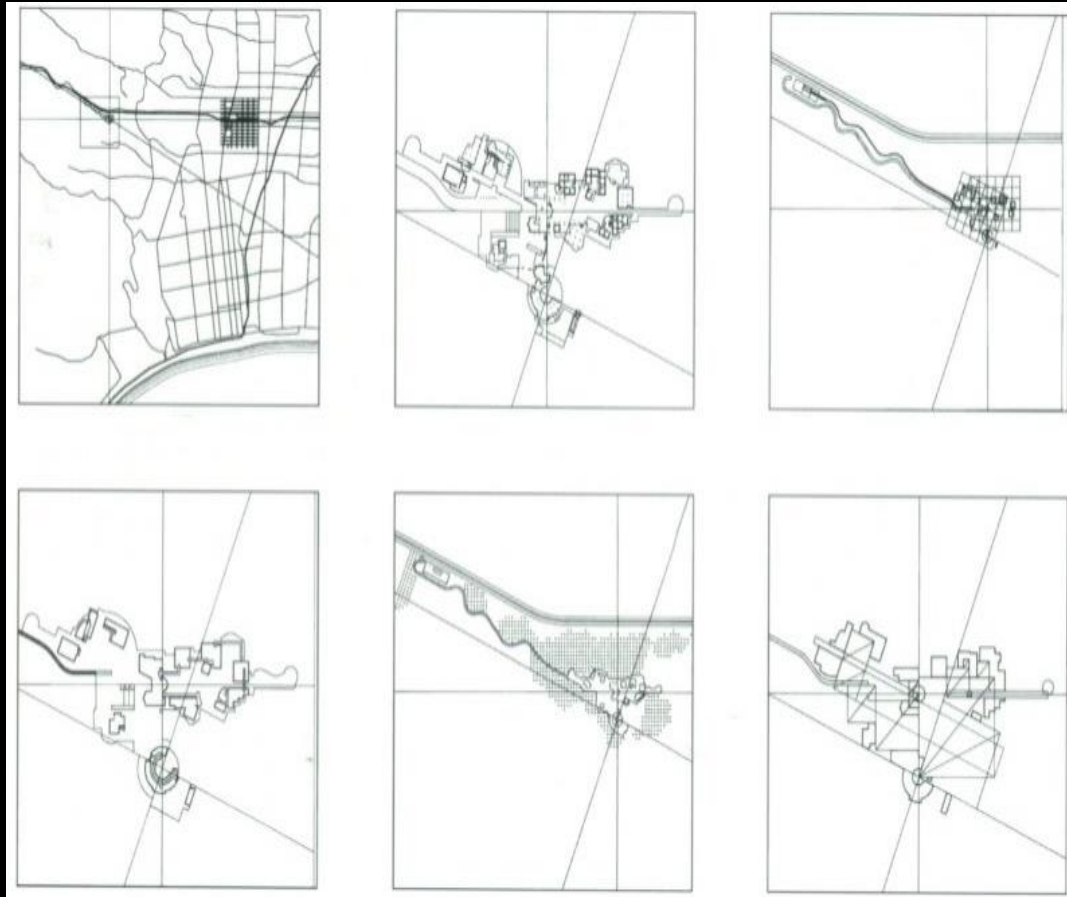
1. Architectural conception combined with geomorphic environment 结合地貌环境的建筑构思与立意

- The layout positioning of the functional organization of the building
对建筑功能组织的布局定位

Function streamline
功能流线

Volume of space
空间体量

Chinese space concept
中式空间理念

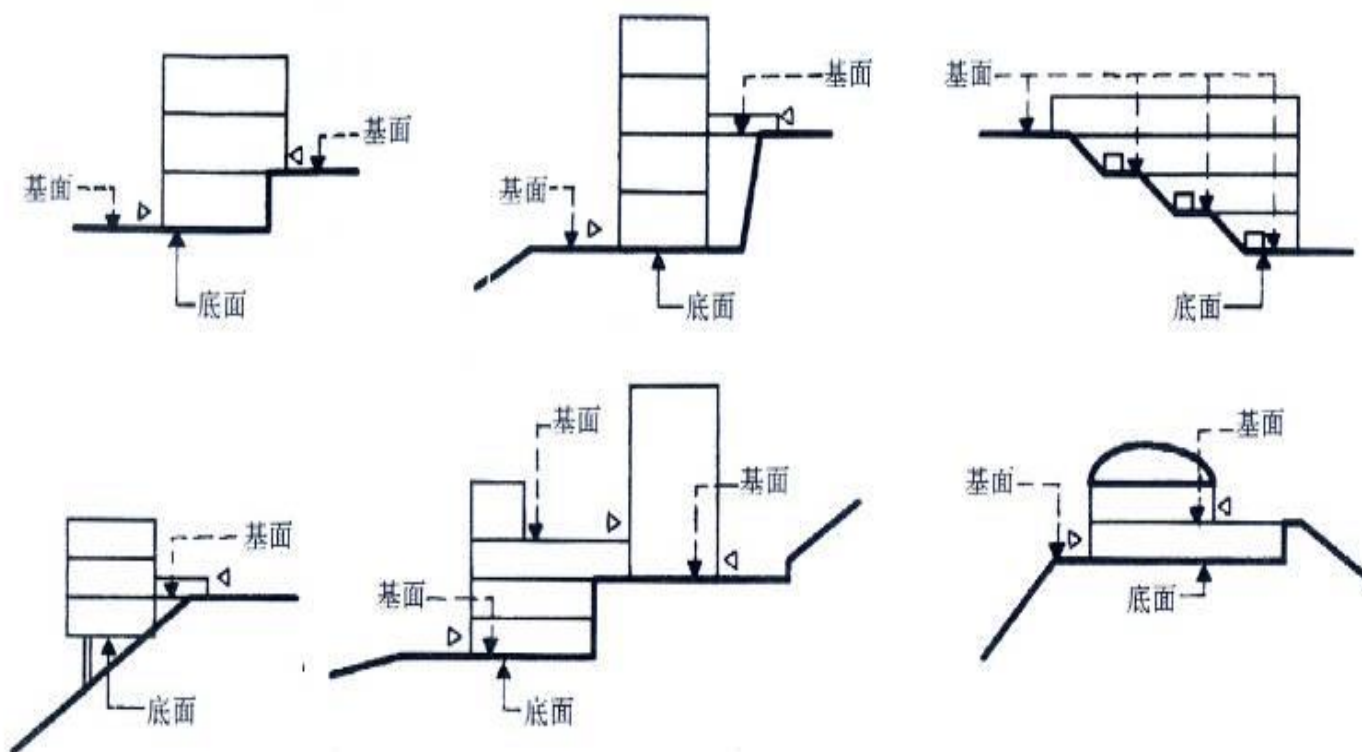


2. Architectural organization and composition design 建筑组织与构成设计

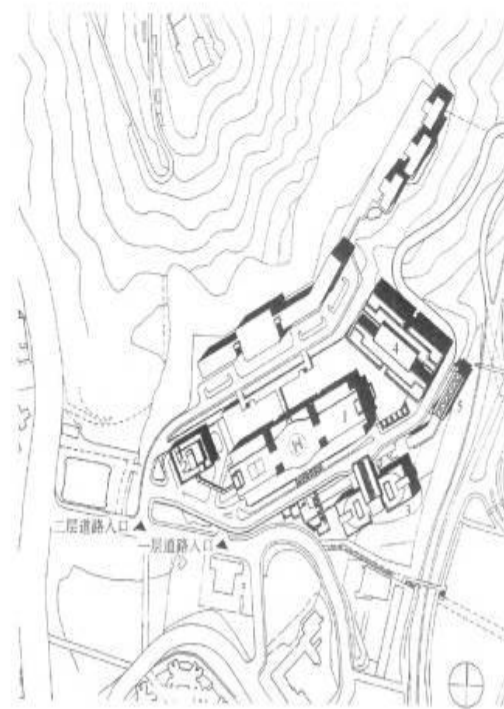
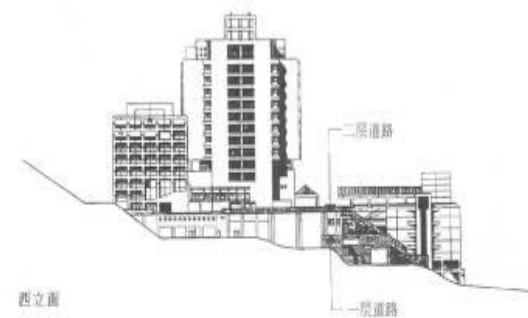
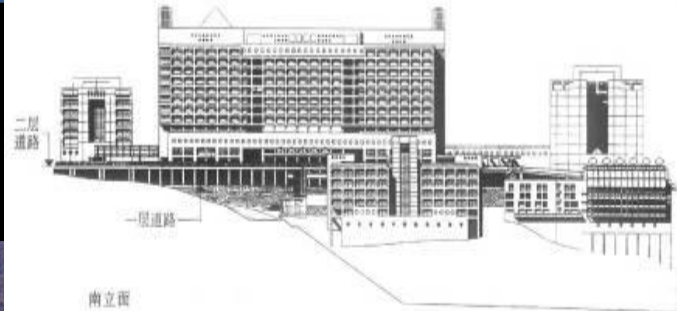
- Indefinite base surface, contact level, contact space
不定基面、联系层面、联系空间
- Spatial organization
空间组织形态

2. Architectural organization and composition design 建筑组织与构成设计

- Indefinite base surface, contact level, contact space
不定基面、联系层面、联系空间

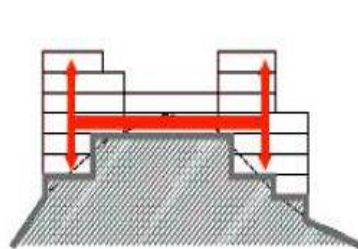


Indefinite base surface
不定基面

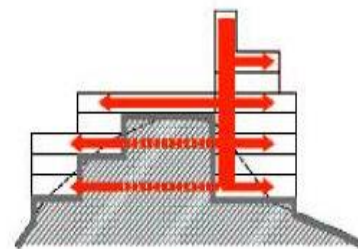


2. Architectural organization and composition design 建筑组织与构成设计

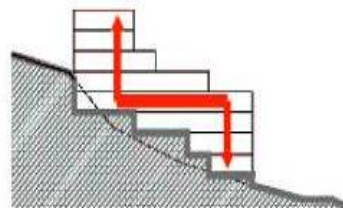
- Indefinite base surface,
contact level, contact space
不定基面、联系层面、联系
空间



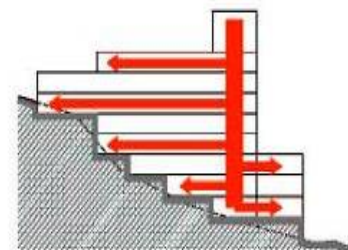
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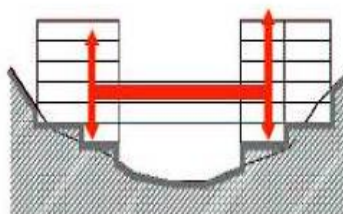
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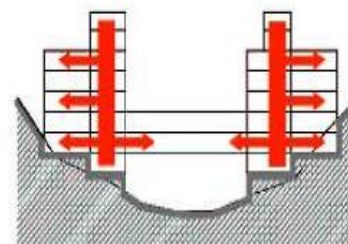
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b-2



a-3

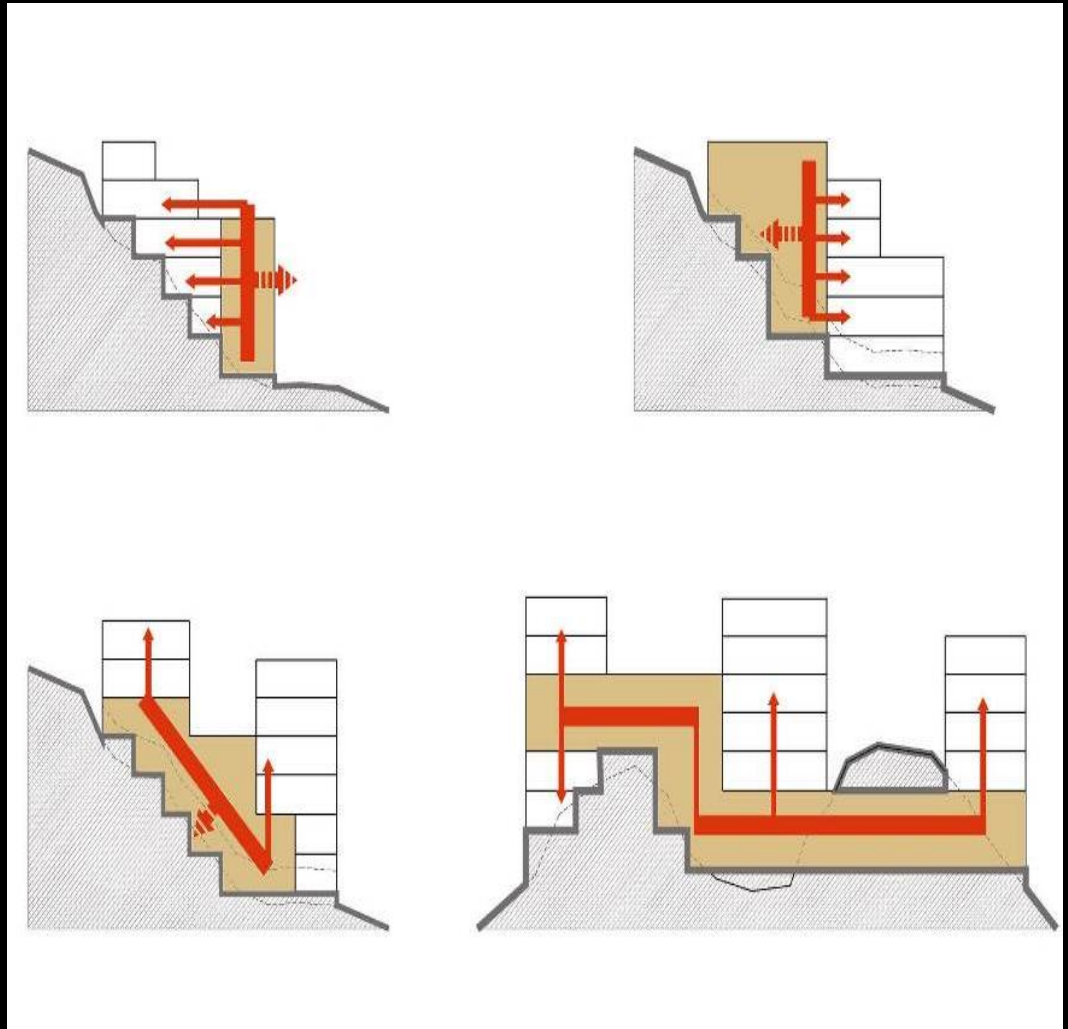


b-3

Contact level
联系层面

2. Architectural organization and composition design 建筑组织与构成设计

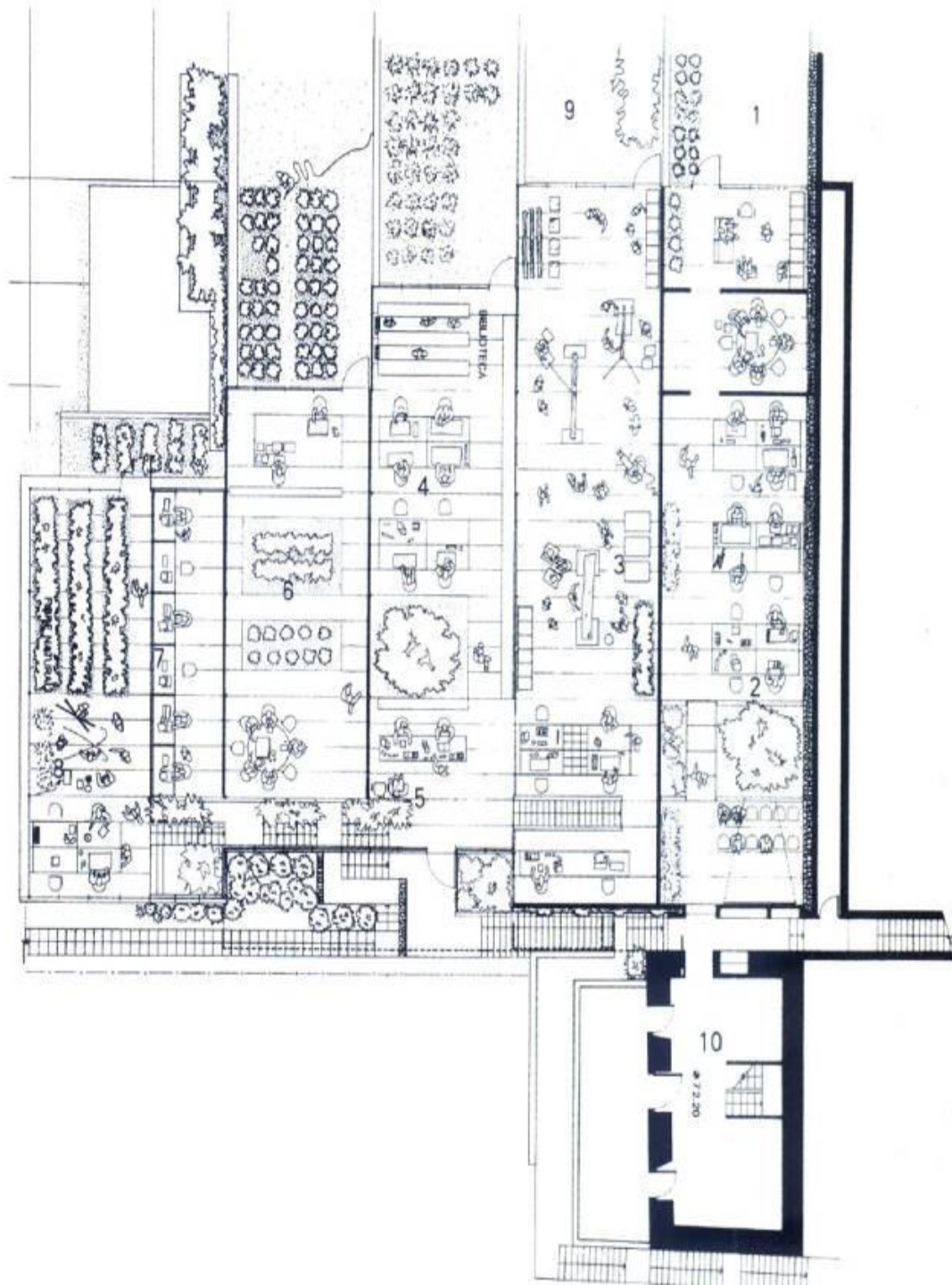
- Indefinite base surface,
contact level, contact space
不定基面、联系层面、联系
空间

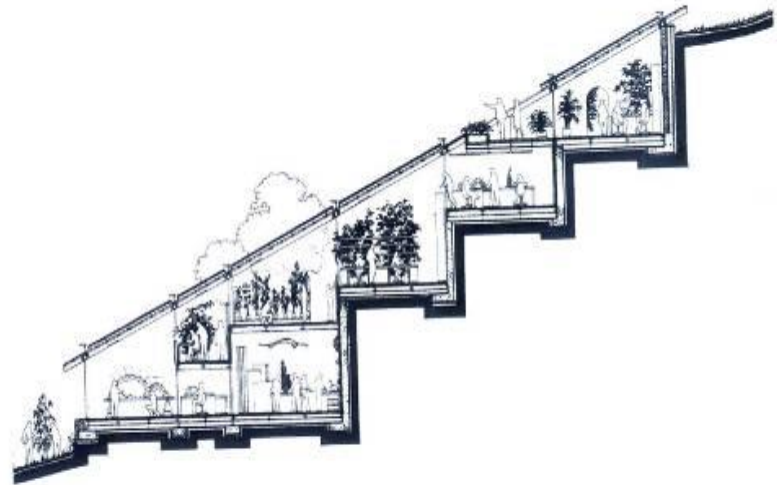
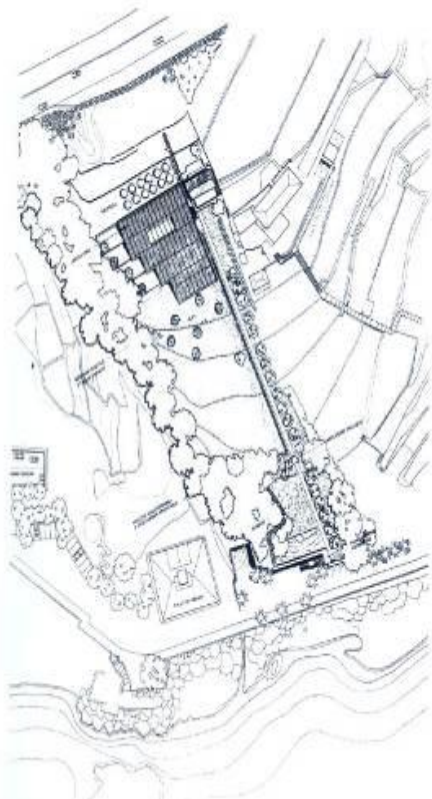


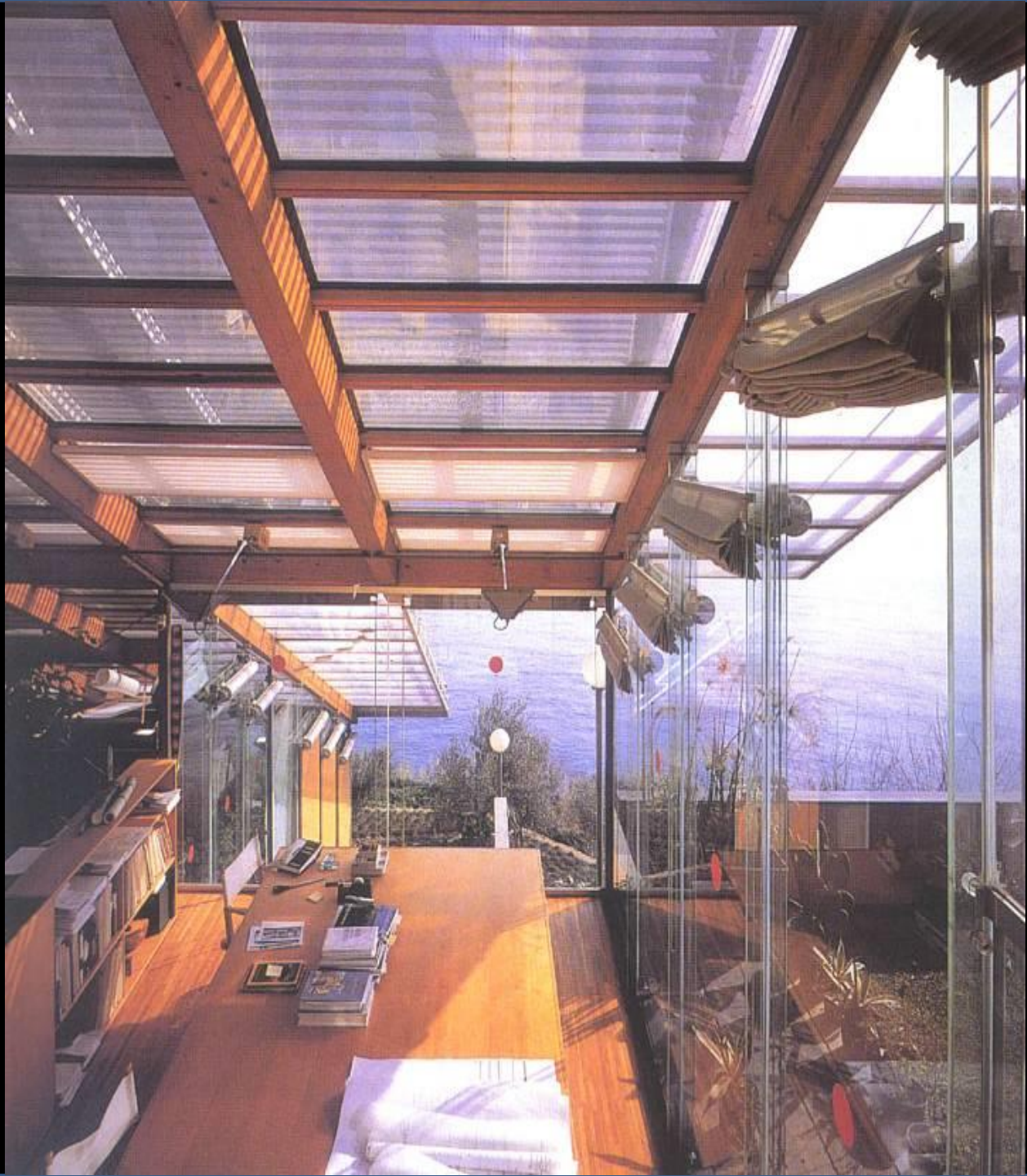
Contact space
联系空间









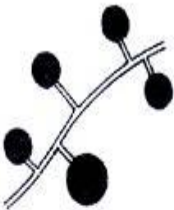

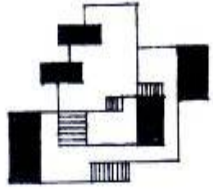
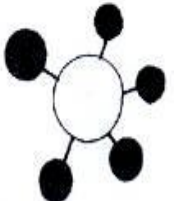




2. Architectural organization and composition design 建筑组织与构成设计

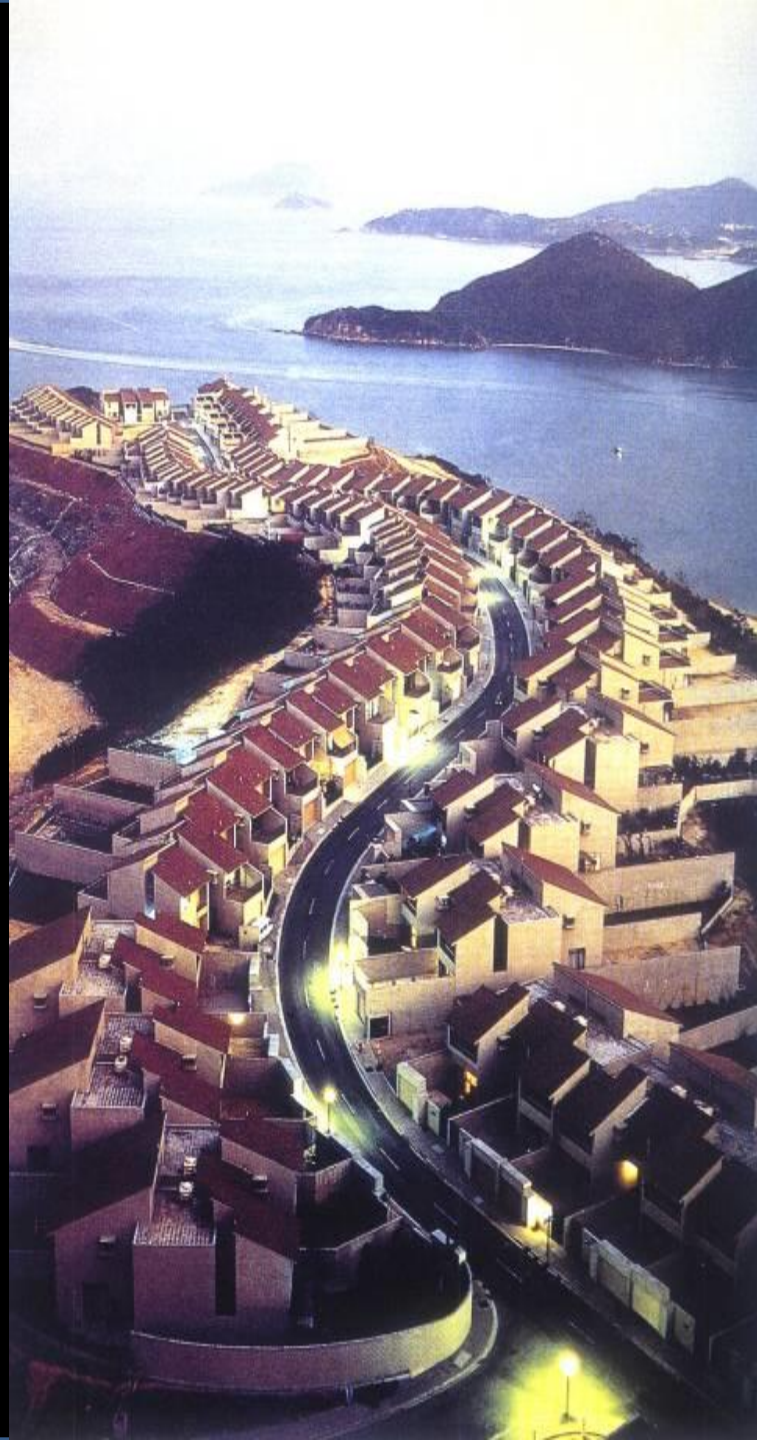
- Spatial organization
空间组织形态

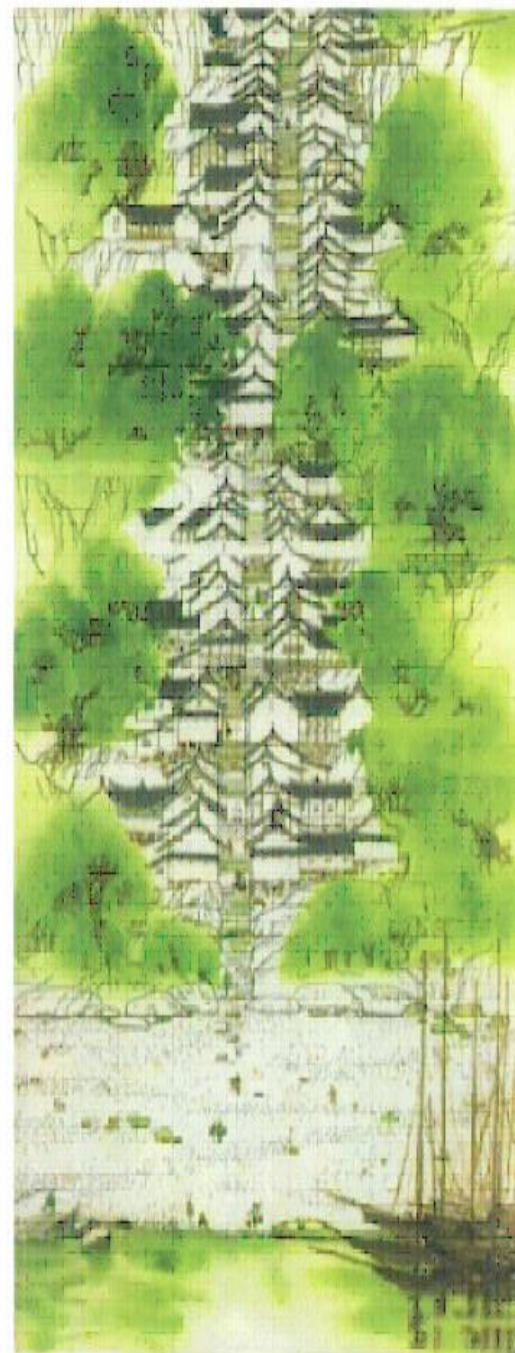
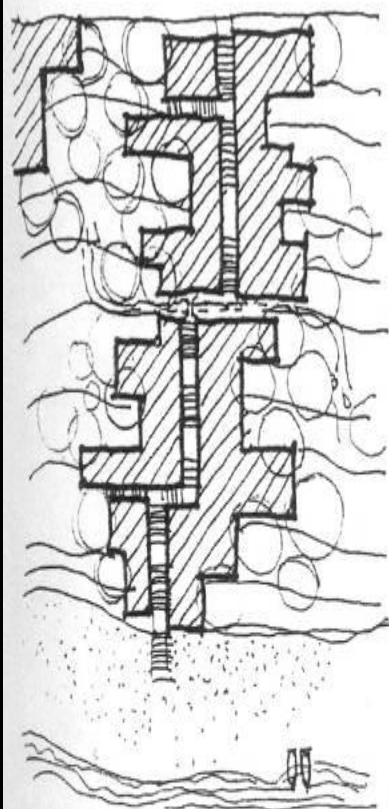
山地建筑的空间形态

表 2-2-1

 <p>线网联系型</p>	 <p>踏步主轴型</p>	 <p>层台组合型</p>
<p>主要联系要素为道路、廊道或枢纽建筑,几乎适合所有的山位</p>	<p>联系方式为大踏步,适用于坡中,内部交通以步行为主,车行在外围或交叉解决</p>	<p>由不同标高的平台组织空间,适合于所有的山位</p>
 <p>空间主从型</p>	 <p>空间序轴型</p>	 <p>空间穿插型</p>
<p>以广场、内院为空间核心,适用于坡顶、坡底处盆地,在坡中则需有较为平缓的用地或人工基面</p>	<p>以内院组合形成空间序列,多位于坡中,使空间序列的形成与地形的升降相结合</p>	<p>空间流线立体交叉,适用于地形与功能复杂的山地建筑</p>







长江沿岸的西陀镇

Summary:

总结:

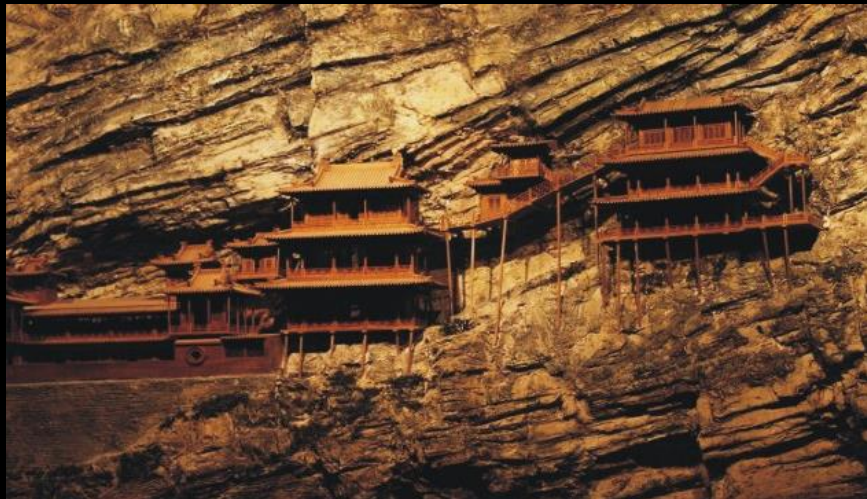
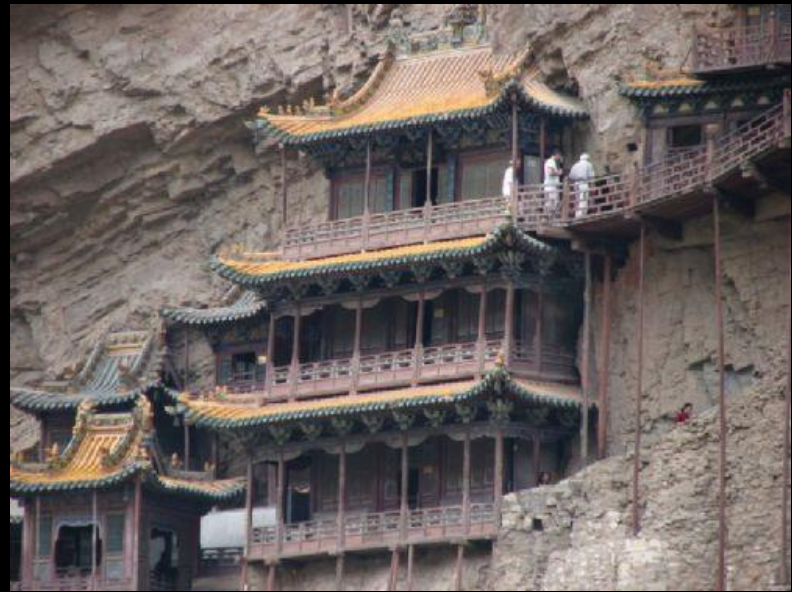
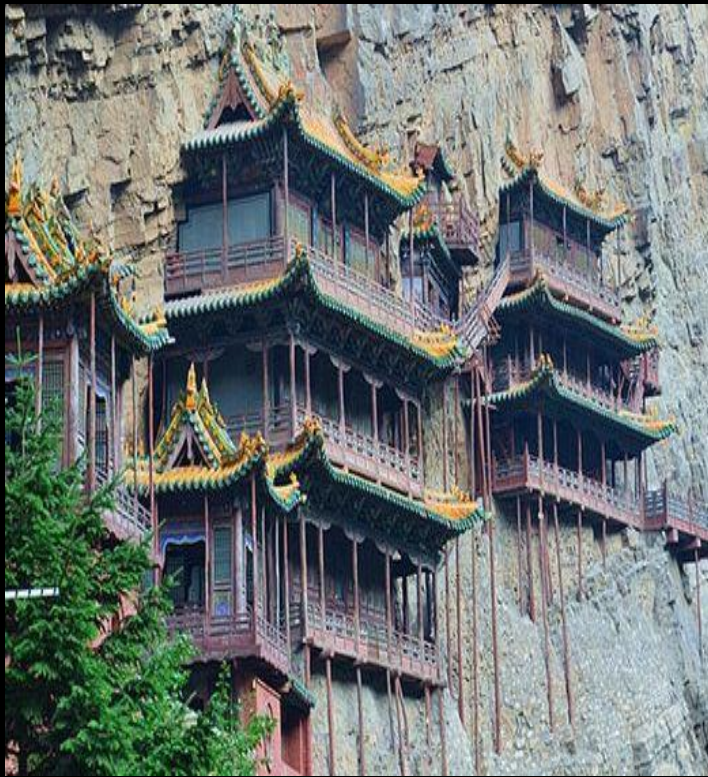
Analyze landform—Find the best appropriate location to build—Build
相地--点穴--建造

Cognize landform—Shaping and grouping—Artistic conception—Build
认知地形--塑形（组织）与组景--意境（形象） --建造

C. Chinese Traditional Cases in Hillside Environment

三、山地环境中的案例

1. The Hanging Temple 悬空寺
2. Thousand Miao Villages 千户苗寨
3. Cave Dwelling 窑洞
4. Xixi Mountain Villa 习习山庄

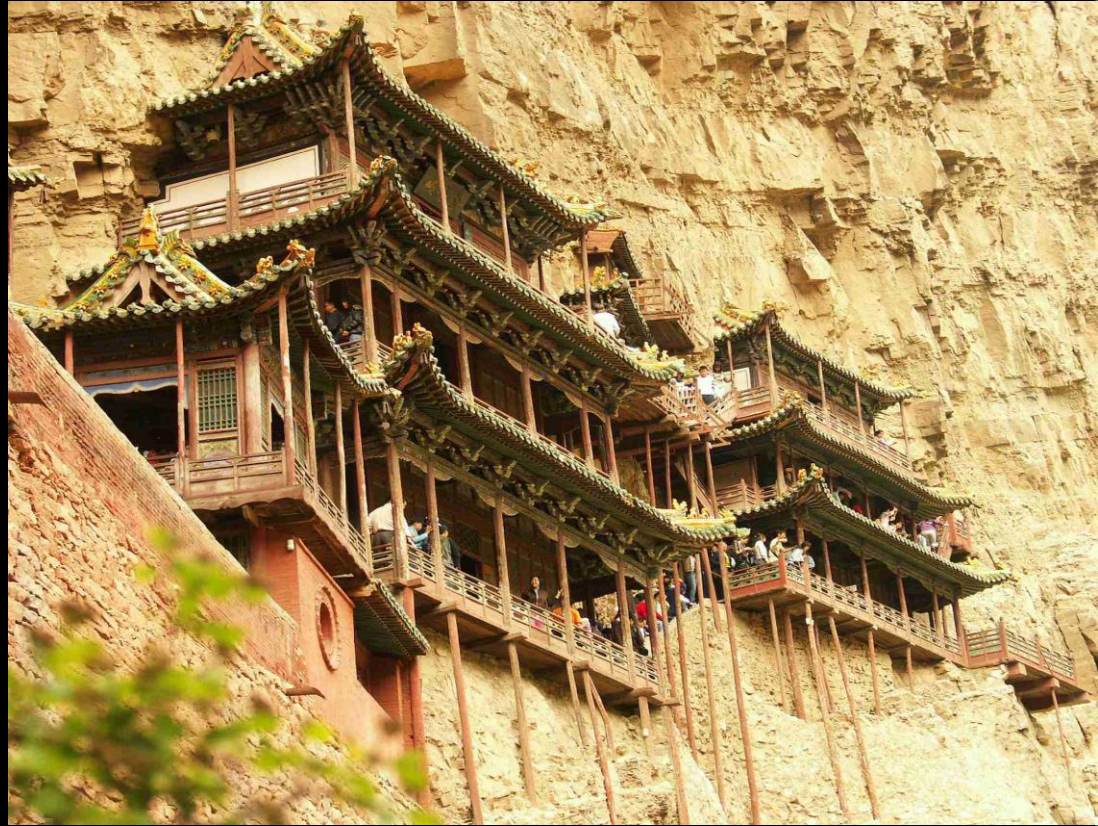


The Hanging Temple was founded in the late Northern Wei Dynasty (approximately between 471 and 523 AD). It has experienced more than 1,400 years. It is the only unique temple in China that combines Buddhism, Taoism and Confucianism.

悬空寺创建于北魏后期（约在公元471——523年间），已经经历了1400多个年头，是国内仅存的佛、道、儒三教合一的独特寺庙。

The Hanging Temple, located in Hunyuan County, Shanxi Province, is 65 kilometers away from Datong City. It is suspended on the half cliff of Cuiping Peak on the west side of Jinlong Gorge in Beiyue Hengshan Mountain. It is a national key cultural relics protection unit.

悬空寺，位于山西浑源县，距大同市65公里，悬挂在北岳恒山金龙峡西侧翠屏峰的半崖峭壁间，是全国重点文物保护单位。



The Hanging Temple has a layout like "one courtyard and two floors", with a total length of about 32 meters and 40 pavilions. At first glance, the whole temple was supported by only a dozen wooden pillars about the size of the mouth, and the highest point was 50 meters above the ground. The mechanics principle is based on the semi-inserted beams. With the support of the rock, the corridor railings, the upper and lower beams are closely connected to the left and right to form a whole wooden frame structure, which also increases the seismic resistance.

悬空寺呈“一院两楼”般布局，总长约32米，楼阁殿宇40间。全寺初看去只有十几根大约碗口粗的木柱支撑，最高处距地面50来米。其中的力学原理是半插横梁为基础，借助岩石的托扶，回廊栏杆、上下梁柱左右紧密相连形成了一整个木质框架式结构，也增加了抗震度。



The Hanging Temple is located on a cliff that is more than 200 meters above the ground. It continues the traditional architectural style of our country. Its architectural features can be summarized as "odd, hanging, and ingenious".

悬空寺坐落在距离地面200多米的峭壁之上，延续了我国传统建筑风格，其建筑特色可以概括为“奇、悬、巧”三个字。

Odd 奇



The design and location of the Hanging Temple is located in a small basin in a deep mountain canyon. The whole body is suspended in the middle of the rock cliff. The protruding part of the rock cliff peak is like an umbrella, which protects the ancient temple from rain washing and flooding under the mountain. The surrounding mountains form a hug, reducing direct ultraviolet radiation. The advantageous geographical location is one of the important reasons for the well-preserved Hanging Temple.

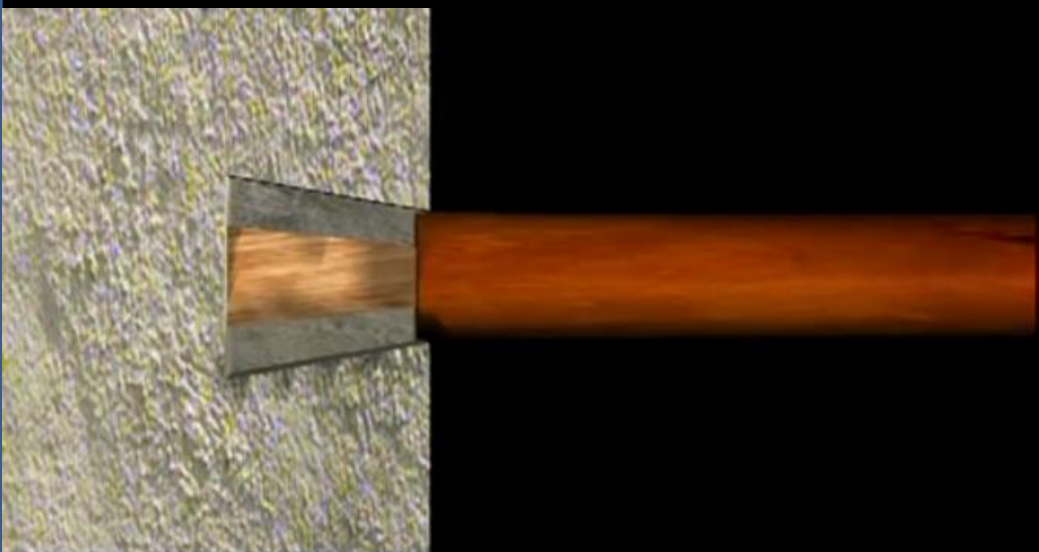
悬空寺的设计与选址处于深山峡谷的一个小盆地内，全身悬挂于石崖中间，石崖顶峰突出部分像一把雨伞，使古寺免受雨水冲刷，山下洪水泛滥时也免于被淹。四周的大山形成合抱之势，减少了紫外线的直接照射。优越的地理位置是悬空寺能够保存完好的重要原因之一。

Hanging 悬

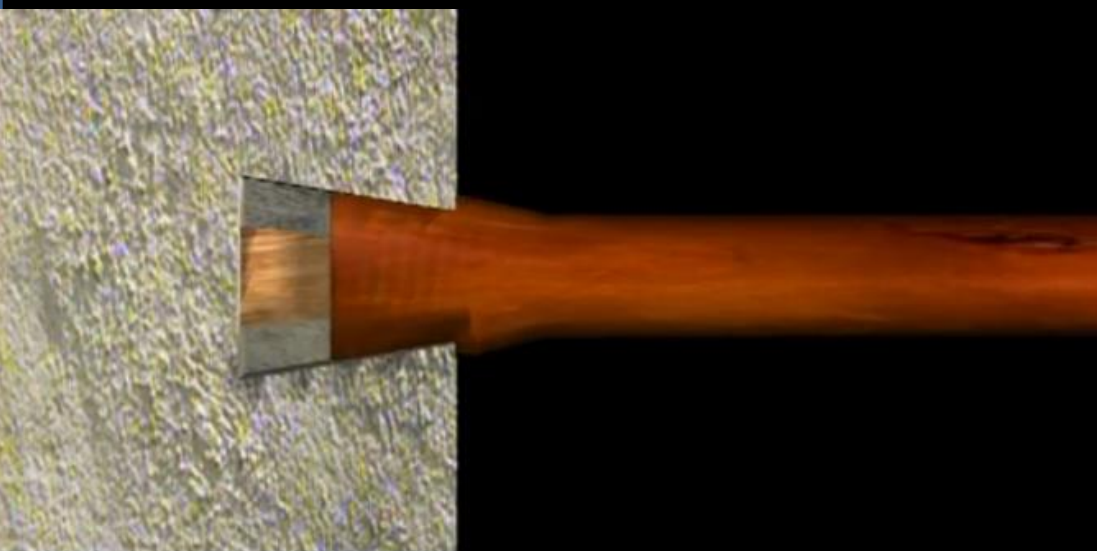


"Hanging" is another major feature of the Hanging Temple. There are 40 halls and pavilions in the whole temple. On the surface, they are supported by a dozen wooden pillars with thick bowls. In fact, the wooden pillars are not subject to force. It is said that when the Hanging Temple was built, these wooden stakes were actually absent, but people saw that it did not seem to have any support, and they were afraid that they would fall when they walked up to the temple. In order to make people feel at ease, some wooden pillars were placed under the temple. "The Hanging Temple, half a day high, three horsetails hanging in the sky" is used to describe the Hanging Temple.

“悬”是悬空寺的另一大特色，全寺共有殿阁40间，表面看上去支撑它们的是十几根碗口粗的木柱，实际上木柱并不受力。据说在悬空寺建成时，这些木桩其实是没有的，只是人们看见悬空寺似乎没有任何支撑，害怕走上去会掉下来，为了让人们放心，所以在寺底下安置了些木柱，所以有人用“悬空寺，半天高，三根马尾空中吊”来形容悬空寺。



What really supports the weight of the Hanging Temple is the bottom beam. The rock is chiseled into a right-angled trapezoid. A wedge is placed on one end of the stone hole, and the beam is inserted into the hole. The wedge will open the beam and be firmly stuck on the stone wall. With the current expansion bolts, the deeper the bolt, the tighter the fixing.

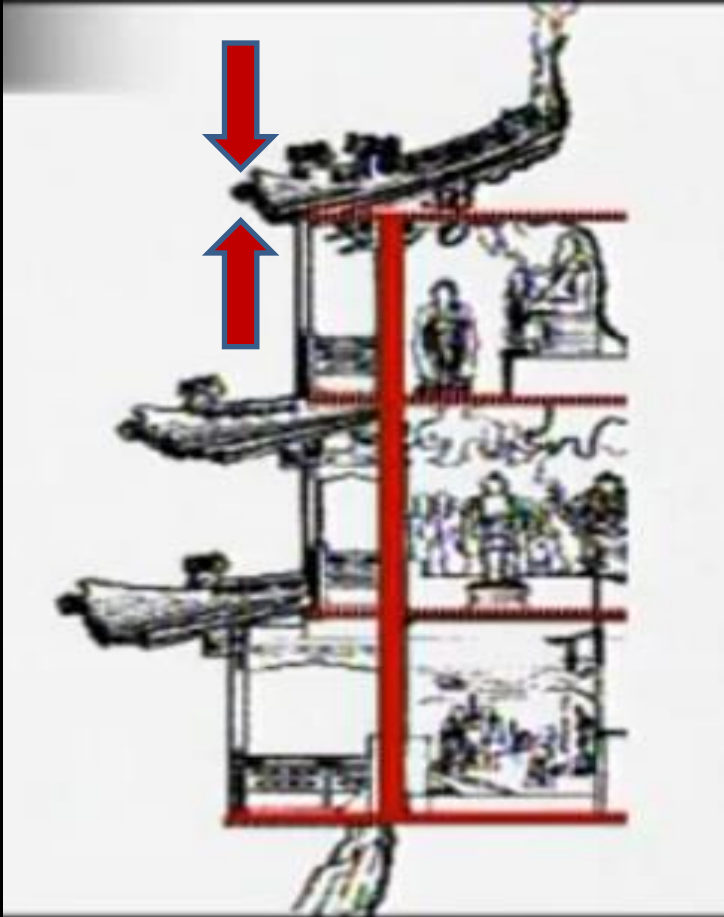


In addition, the wood used for the beams of the Hanging Temple is processed from the local specialty hemlock. It is said that it has been soaked in tung oil, so it is not afraid of termites and has an antiseptic effect.

真正支撑悬空寺重量的是底部横梁，岩石凿成了形似直角梯形的样子，石孔一端打上楔子，插入横梁打入洞内，楔会撑开横梁，牢牢卡在石壁之上，作用类似于现在的膨胀螺栓，打的越深，固定越紧。

另外，悬空寺横梁所用的木料是当地的特产铁杉木加工而成，据说用桐油浸过，所以不怕白蚁，也有防腐的作用。

Hanging 悬



The frame structure is formed by the cooperation of the beams and the columns. The beams are placed first, and then the columns are driven. This will give the beams a certain upward bending stress, and finally erect the roof to balance the bending stress. All the forces will be loaded on the bottom beams. Only a small part of these beams protrudes out of the rock and will eventually form a complete system.

This approach is in line with the prestress in modern engineering mechanics, and this concept has only been formed for more than a hundred years. The ancients had already taken such measures thousands of years ago.

通过横梁与立柱的配合形成框架结构，先放置横梁，再打入立柱，这样会首先给予横梁一定向上的弯曲应力，最后架设屋顶，平衡弯曲应力，所有力会加载到最底部横梁，而这些横梁只有少部分伸出岩石之外，最终会构成一个完整的体系。

这种做法符合近代工程力学中的预应力，这种概念仅仅形成一百多年。而古人早在千年之前就已经采取这种措施。

Ingenious 巧



The “ingeniousness” of the Hanging Temple is reflected in the fact that the temple is built according to local conditions, and the natural distribution of the cliffs is fully utilized to build the various parts of the temple. The layout and shape of the general temples are built in a three-dimensional space, such as the gate, the bell and drum tower, the main hall, and the auxiliary hall. When everything is available, there are more than 80 Buddha statues in the temple, which are very ingenious.

悬空寺的“巧”体现在建寺时因地制宜，充分利用峭壁的自然状态分布来建造寺庙各个部分，将一般寺庙平面建筑的布局、形制建造在立体的空间上，山门、钟鼓楼、大殿、配殿等一应俱全，寺内有佛像80多尊，造型十分巧妙。



Night Scene of Thousand Miao Villages

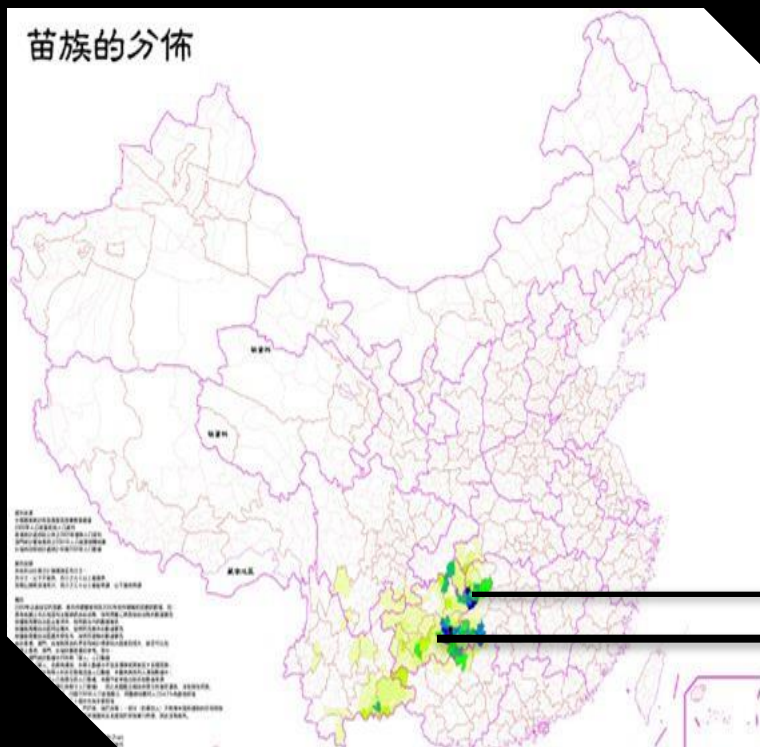
千户灯夜景





Distribution 分布情况

苗族的分佈



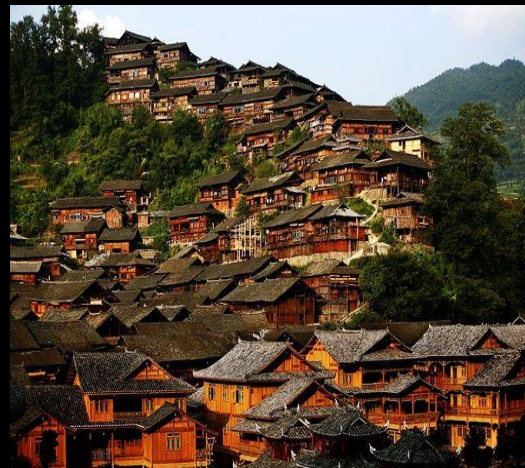
The traditional settlements of the Miao villiages are distributed in the three provinces of Guangxi, Hunan, and Guizhou. Most of them are in southeast Guizhou and Xiangxi, with Guizhou being the most typical.

Southeset Qian

Most of the Miao settlements are in the form of mountainous stilts, and the most typical places are Jianhe, Taijiang, Leishan etc.

黔东南州

苗族聚居的形式
大多为山地吊脚楼依山而上，
以剑河、台江、雷山等地最为
典型。



Miao in Xiangxi

There are both mountain stilts and waterfront stilts in this area. Taking the Phoenix as a typical example, it is located on the bank of the Tuojiang River. Half of the stilt building is suspended above the water and half is built on the ground.



湘西苗族

该地区既有山地吊脚楼，也有水岸吊脚楼。以凤凰为典型，位于沱江之畔，吊脚楼一半悬于水面，一半筑于地面。

苗族传统居住聚落分布于广西、湖南、贵州三省交接地，黔东南州和湘西地区较多，以贵州最为典型。

Village Location

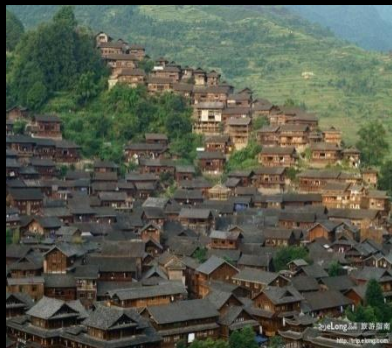
村寨选址



- **Back mountain and broad back** on the mountain, keep out the wind, and face the sun
背山面阔

- **Convenient water source**
convenient for life and production
prevent disasters
meet the needs of fire
水源方便

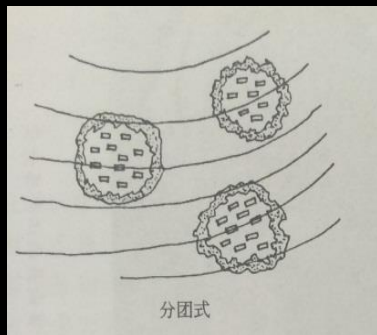
- **Arable soil**
most of the buildings are located in the rocky areas, so that good land is released
有土可耕



- **Feng Shui and environment**
“Feng Shui Treasure Land”:
surrounded by mountains and rivers. The location of the residence is also often based on the owner’s birth date.
风水与环境兼顾

Grouping 分团式

1



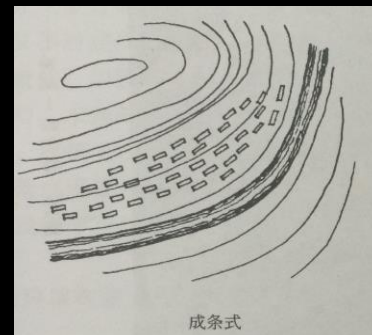
Sliced 成片式

2



Striped 成条式

3



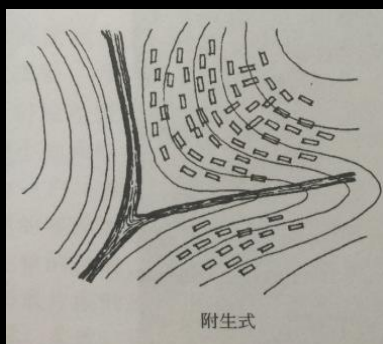
String 成串式

4



Adnascent 附生式

5



Cluster 群集式

6



Village Characteristic Space

村寨特色空间



- Bridge
桥



- Village gate
寨门



- Entertainment
ground
游方场



The layout of Miao traditional buildings is generally built around public places, adopting the form of clusters living in groups. And the relationship between the mountains and rivers of the outside world reflects the cohesion of an introverted family group.

苗族传统建筑的布局一般围绕着公共场所进行建设，采用聚族而居的组团形式，在整个聚落内部建筑群、周边草木田地、及外界山川风貌之间的关系中都体现出一股内向的家族抱团的凝聚力。

Main Types of Existing Miao Houses

现存苗族民居主要类型

Floor House
落地房



Stilt House
全干栏式



Stilted Half Building
吊脚半边楼



Analysis of Miao's Architectural Features

苗族建筑特色分析

Sloping Roof
坡屋顶



Bucket Structure
穿斗式构架



Screen Door
退堂

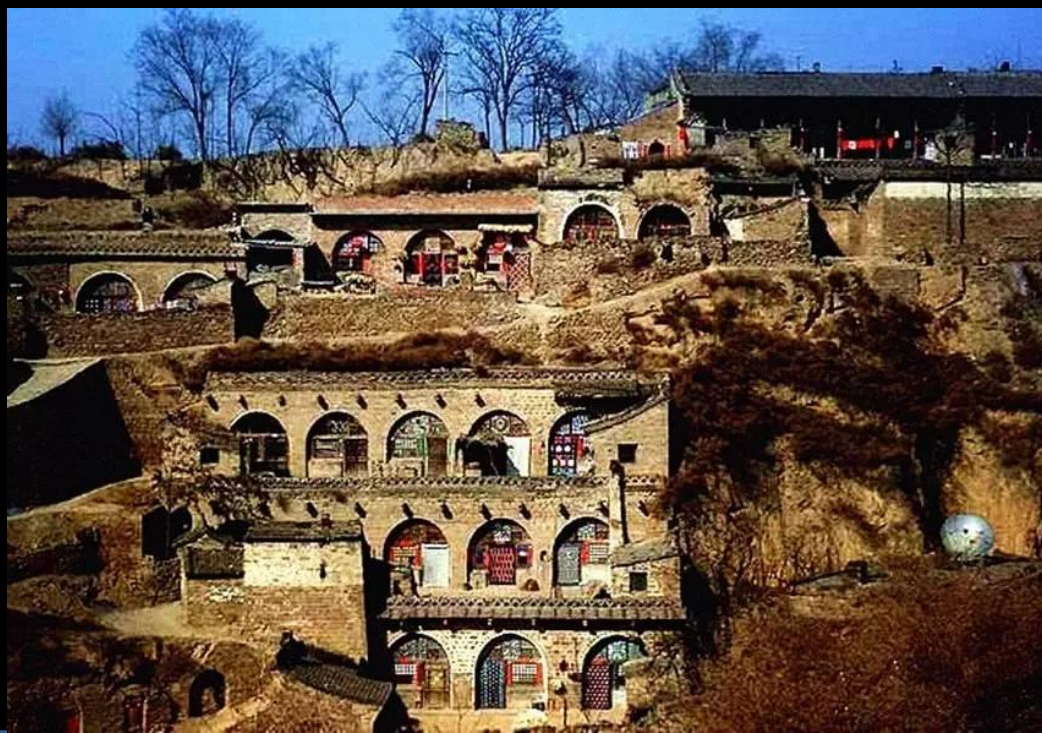
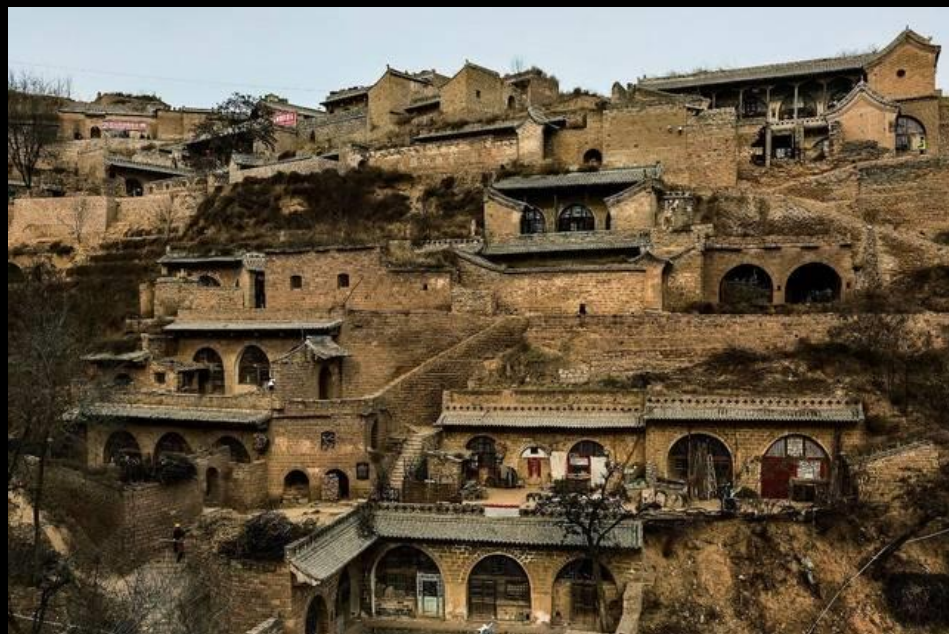


Handrail
美人靠









Formation Conditions of Cave Dwellings

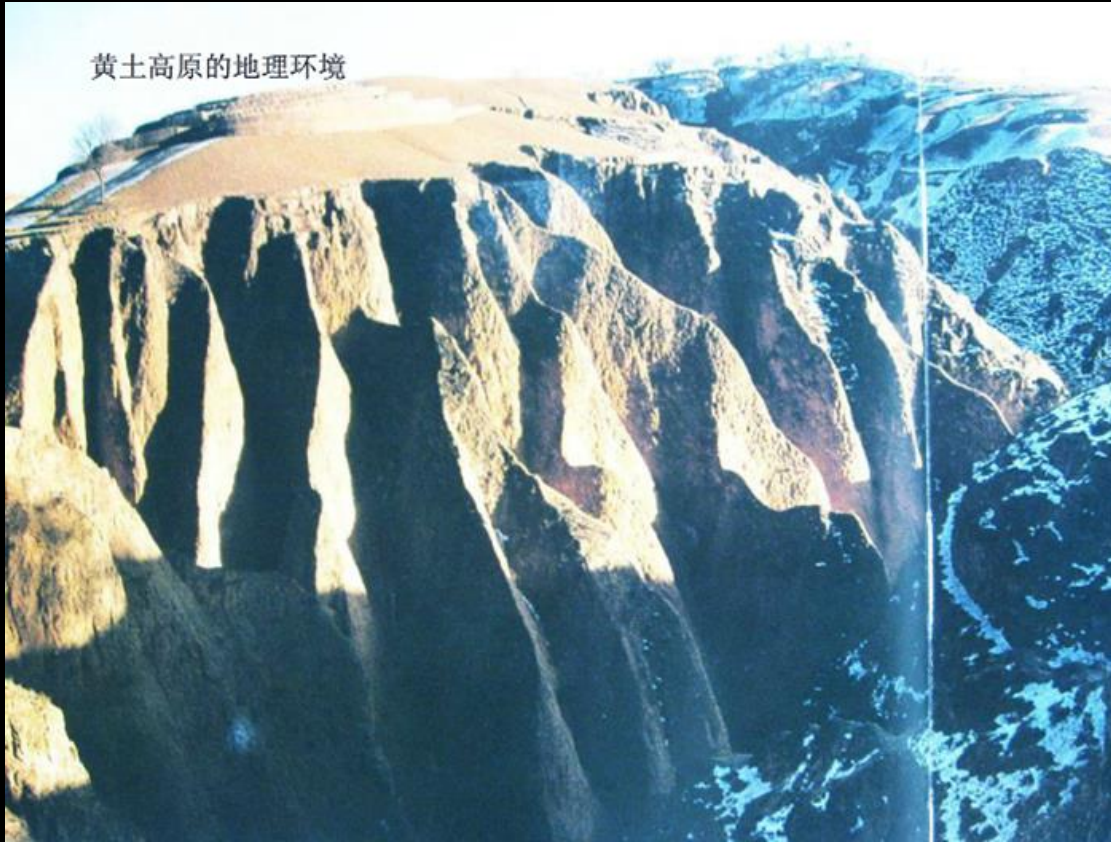
窑洞的形成条件

Cave dwellings are an ancient form of residence for residents on the Loess Plateau in northwest China. The history of this “cavern-style” dwelling can be traced back more than 4,000 years. In the Shaanxi-Gansu-Ningxia region of China, the loess layer is very thick. The Chinese people creatively used the favorable topography of the plateau to drill holes to live in and created cave buildings, which is called green buildings.

窑洞是中国西北黄土高原上居民的古老的居住形式，这一“穴居式”民居的历史可以追溯到四千多年前。在中国陕甘宁地区，黄土层非常厚，中国人民创造性利用高原有利的地形，凿洞而居，创造了被称为绿色建筑的窑洞建筑。



黄土高原的地理环境



Loess with a depth of one or two hundred meters, extremely impermeable to water, and strong verticality provides a good prospect for the development of cave dwellings.

深达一二百米、极难渗水、直立性很强的黄土为窑洞提供了很好的发展前景。

The dry climate and the lack of wood also create opportunities for its development and continuity.

气候干燥、木材少也为它创造了发展和延续的契机。

According to the form, it can be roughly divided into three categories:

按形式可大致分为三类：

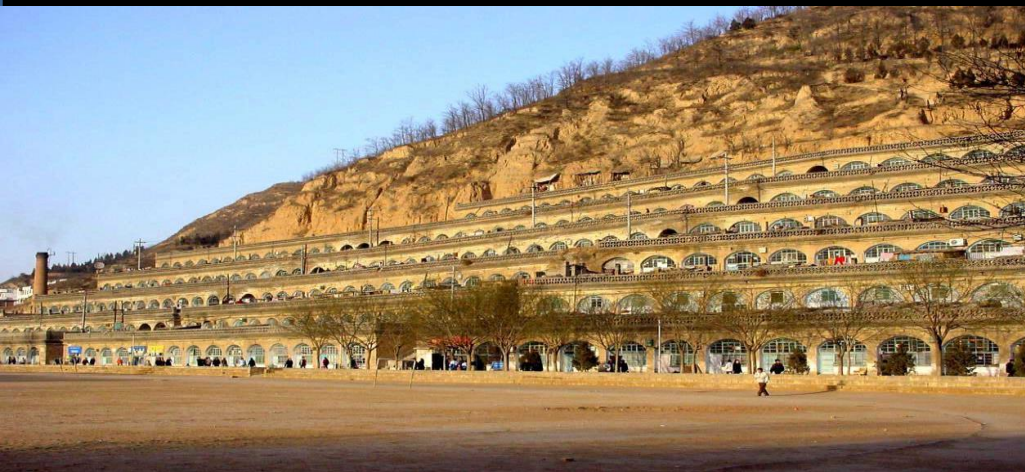


Cliff Dwellings

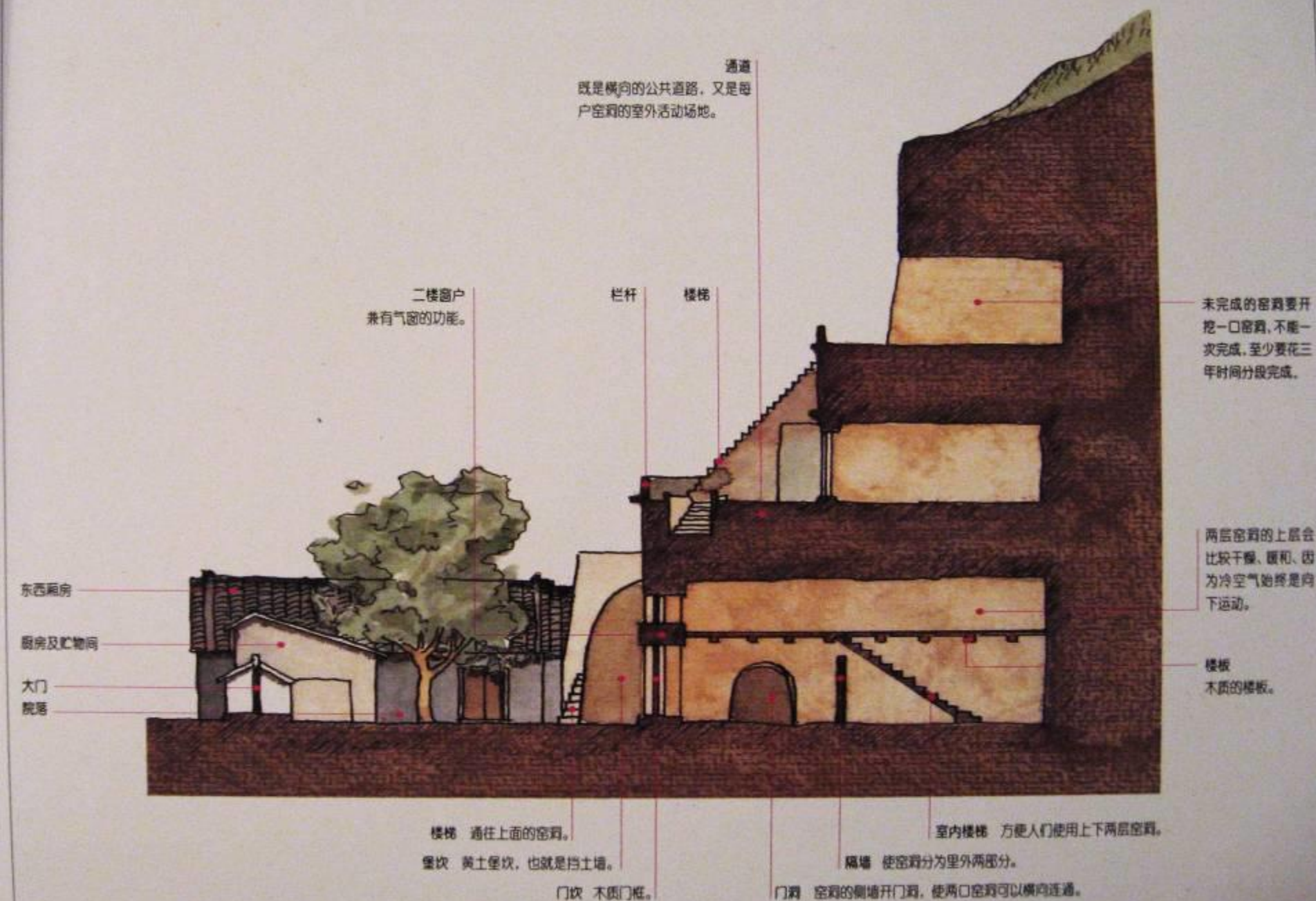
靠崖式窑洞（崖窑）

The cliff dwellings include backing type and along-ditch type. The cave dwellings are often arranged in a curve or broken line, which has a harmonious and beautiful architectural artistic effect. When the height of the hillside permits, sometimes several floors of terraced cave dwellings are arranged, which is similar to buildings.

靠崖式窑洞有靠山式和沿沟式，窑洞常呈现曲线或折线型排列，有和谐美观的建筑艺术效果。在山坡高度允许的情况下，有时布置几层台梯式窑洞，类似楼房。



靠崖式窑洞



Sunken Cave Dwellings

下沉式窑洞 (地窑)

Sunken cave dwellings are underground cave dwellings, which are mainly distributed in the loess plateau area-areas where there are no mountain slopes or ditch walls available. According to the sinking range of the cave dwellings, it can be divided into three types: flat, semi-sinking and full-sinking.

下沉式窑洞就是地下窑洞，主要分布在黄土塬区-没有山坡、沟壁可利用的地区。根据窑洞的下沉幅度可以将其分为平地型、半下沉型和全下沉型三种形式。



Sunken Cave Dwellings

下沉式窑洞 (地窑)



Disadvantages:

Moist. No plants can be planted above the cave dwellings, and the land is wasted.

缺点:

潮湿; 窑洞上方不能种植物, 浪费土地



Advantages:

Long building life. Warm in winter and cool in summer. Strong fire resistance. Good shock resistance. It is one of the most environmentally friendly and ecological building forms.

优点:

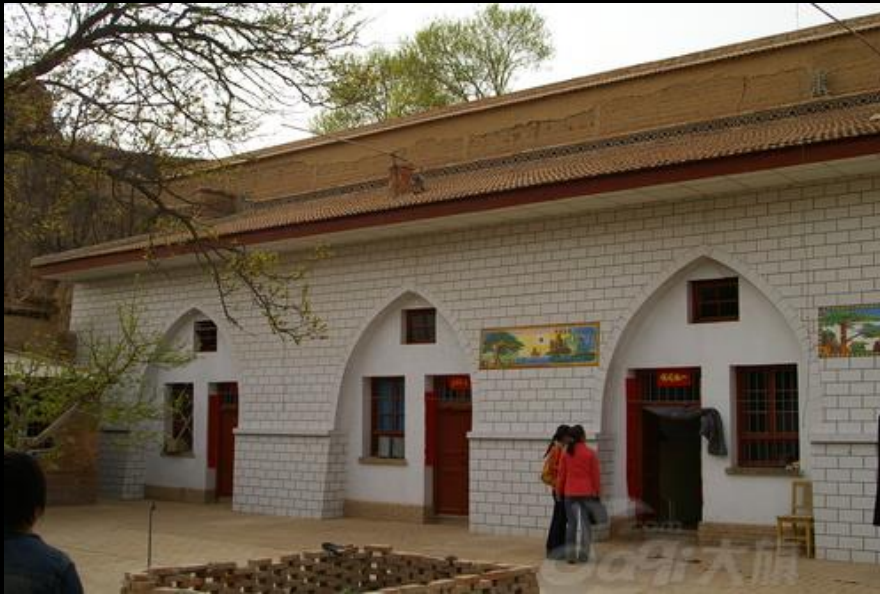
建筑寿命长; 冬暖夏凉; 防火性强; 抗震性好; 是最环保和生态的建筑形式之一。

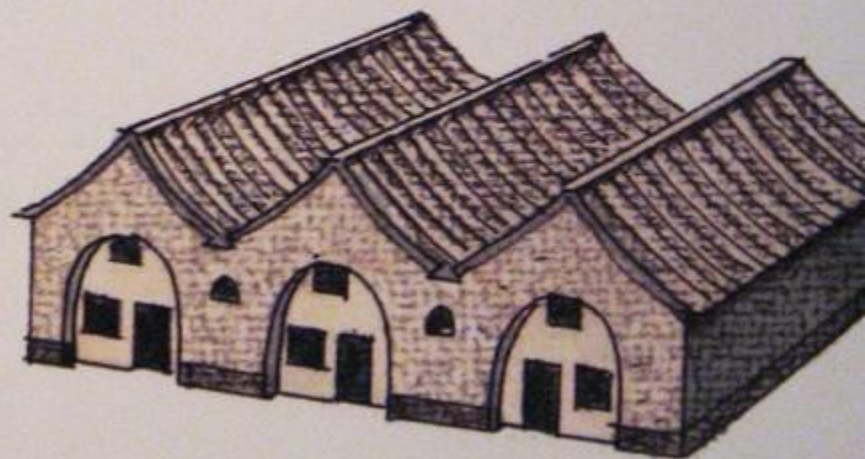
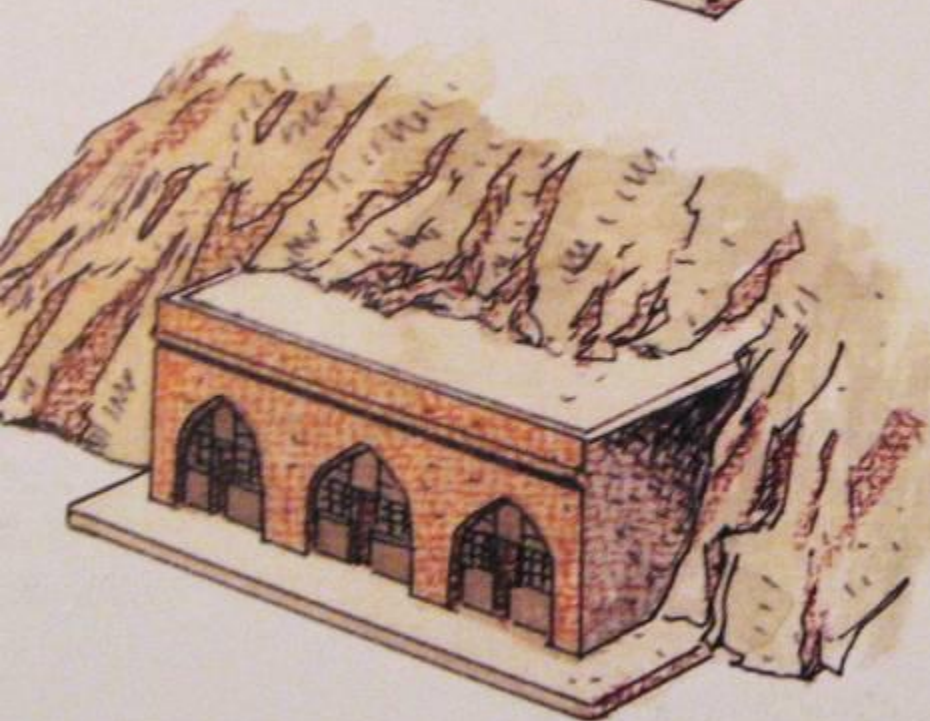
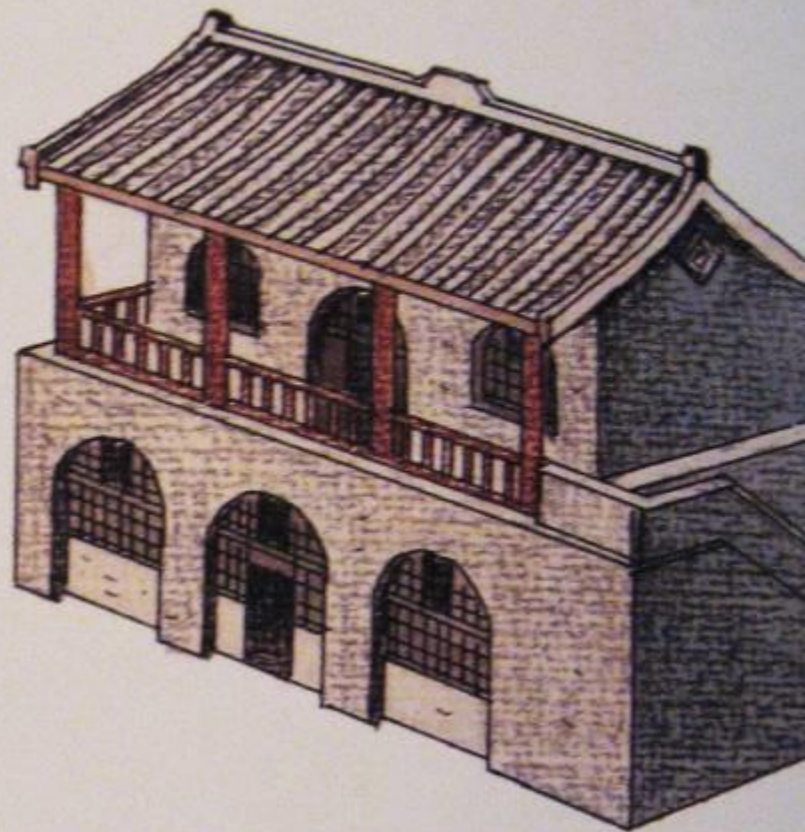
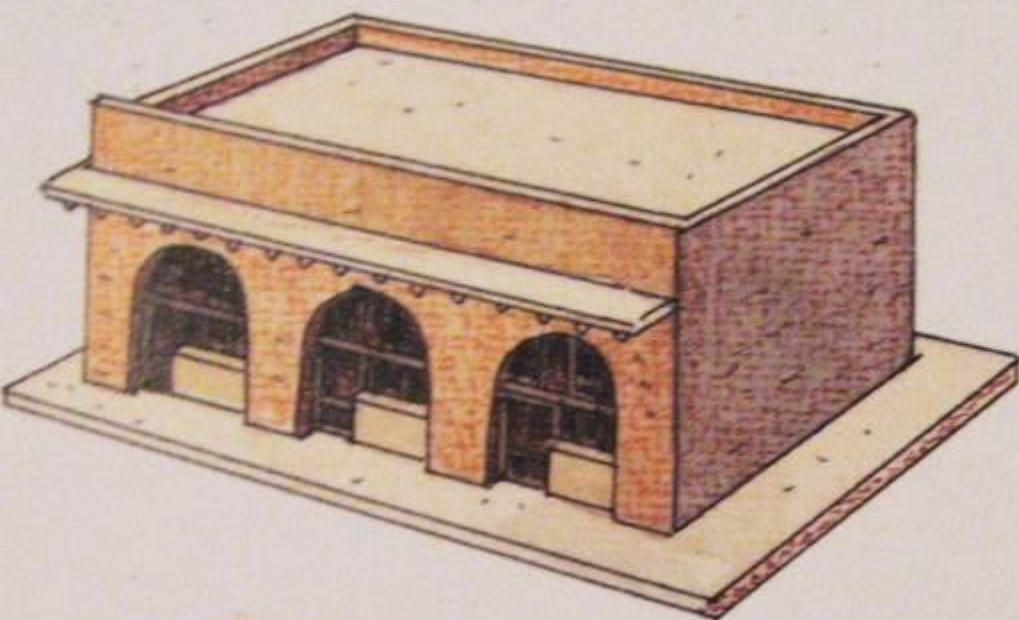
Freestanding Cave Dwellings

独立式窑洞 (箍窑)

Freestanding cave dwellings are arched houses that cover the soil. There are soil arch cave dwellings and brick arch stone or arch cave dwellings. This kind of cave dwellings do not need to rely on mountains and cliffs, and can be independent of themselves without losing the advantages of cave dwellings. It can be a single storey or a building.

独立式窑洞是一种掩土的拱形房屋，有土壑土坯拱窑洞也有砖拱石拱窑洞。这种窑洞无需靠山依崖，能自身独立，又不失窑洞的优点。可为单层，也可建成为楼。





Characteristics of Cave Dwellings

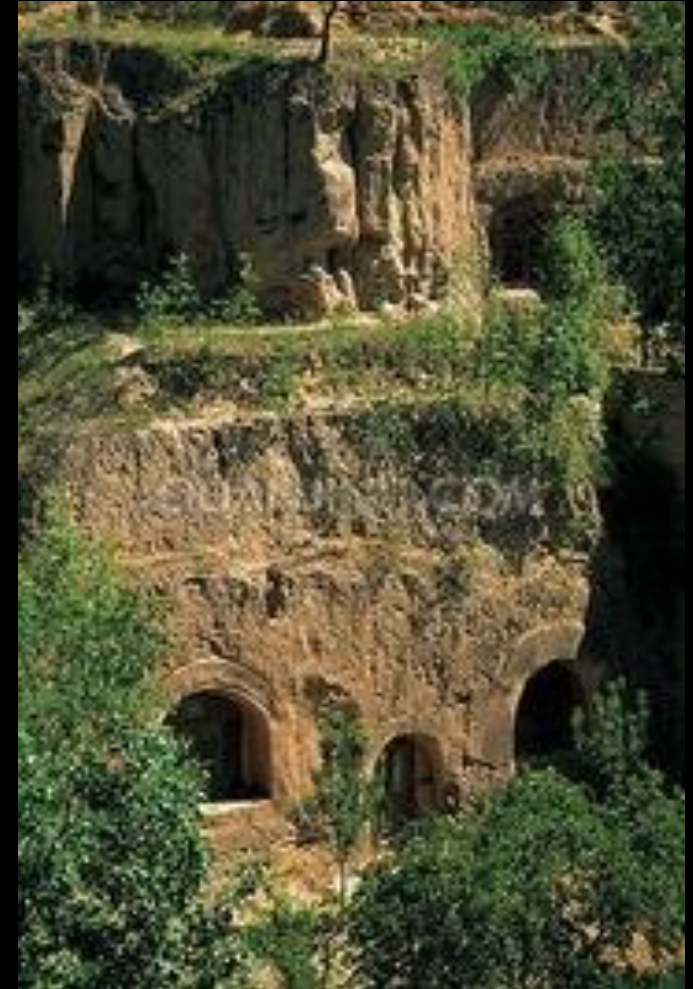
窑洞的特性

Economical:

Built along the mountains and underground of the Loess Plateau, it is a burrowing form in natural loess. Walls are built with excavated soil, saving materials; simple, easy to repair, and economical and cost-effective.

经济适用性:

建在黄土高原的沿山与地下，是天然黄土中的穴居形式，用挖出的土筑墙，省材省料；简单易修、经济省钱。





Comfortable and durable:

The vault-style construction of the cave dwelling conforms to the principle of mechanics. The pressure on the top is divided into two sides, the center of gravity is stable, the components of the force are balanced, and it has a strong stability. And the wall is thick, strong and durable.

The walls and ceilings of the cave dwellings are made of earthen walls or brick walls, which have the functions of warming in winter and cool in summer, preventing moisture and noise. It makes the cave dwelling durable and comfortable at the same time.

舒适耐用性：

窑洞拱顶式的构筑，符合力学原理，顶部压力一分为二，分至两侧，重心稳定，分力平衡，具有极强的稳固性。且墙身较厚，坚固耐久。

窑洞的墙和顶都为土墙或砖墙，具有冬暖夏凉，防潮，防噪音的功能。使得窑洞耐用的同时兼具了舒适性。

The ecology of cave dwellings:

窑洞的生态性:

The effective space of the cave dwelling is obtained from the underground loess layer, which does not damage the ecology and does not occupy good land; the building materials are mostly brick soil, which is ecological and environmentally friendly.

窑洞的有效空间是向地下黄土层索取的，不破坏生态，不占用良田；建筑材料多为砖土，生态环保。



It emphasizes the harmony between human and nature, the harmony between architecture and nature.

它强调人与自然的和谐，建筑与自然的和谐。

The Plane Combination of Cave Dwellings

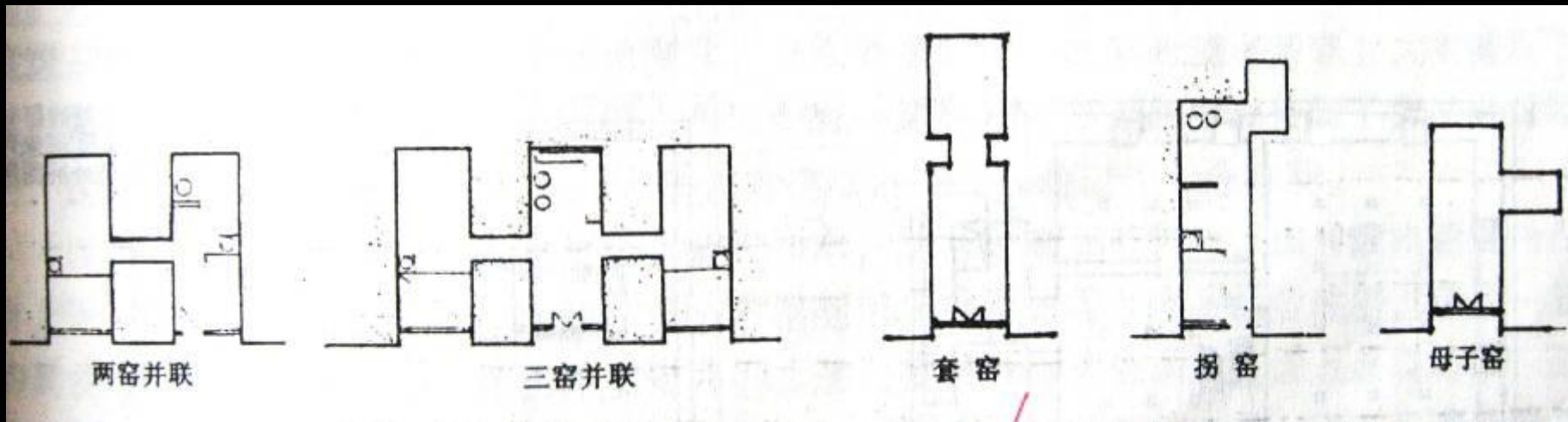
窑洞的平面组合

The cave dwellings are dominated by single-hole kilns, with two kilns in parallel, three kilns in parallel, double kilns, turning kilns, mother-child kilns and other forms.

窑洞以单孔窑为主，有两窑并联，三窑并联、套窑、拐窑、母子窑等多种形式。

Cave dwellings are based on single-hole cave dwellings. Cliff dwellings can only be arranged side by side. When multiple rooms are needed, deep development or horizontal drilling is required.

窑洞民居以单孔窑洞为基本单位，靠崖式窑洞只能平列，当需要多室时，则需要深向发展或横向打洞。



The Plane Combination of Cave Dwellings

窑洞的平面组合

The most reasonable layout is the parallel connection of three kilns. It mainly exists in freestanding cave dwellings. The most representative one is the freestanding cave dwellings in Pingyao, Shanxi and etc. This kind of cave dwellings are also called "one hall and two bedrooms".

其中最为合理的布局是三窑并联的形式。主要存在于独立式窑洞中，最具代表性的是山西平遥等地的独立式窑洞，这种窑洞也称为“一堂两卧”。

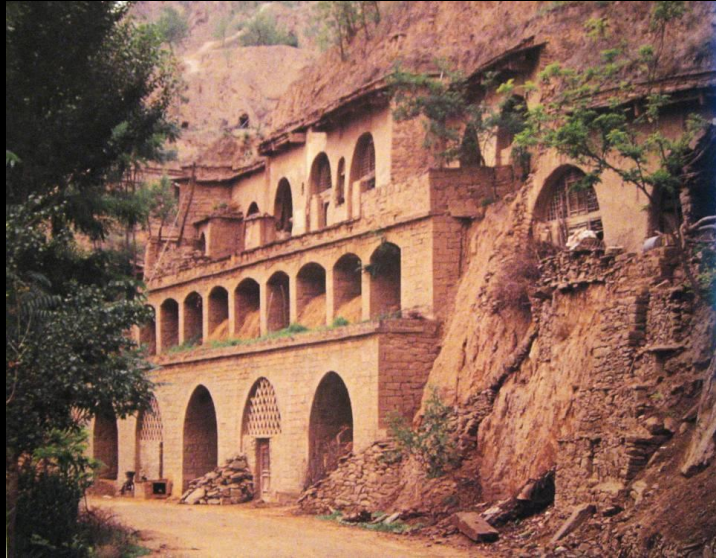


In the middle is the main house with living room and kitchen, and on both sides are bedrooms.

中间是起居兼厨房的堂屋，两边是卧室。

The Space Combination of Cave Dwellings

窑洞的空间组合



1. In the yard extending along the contour line, there is a flat field in front of the kiln as a courtyard.

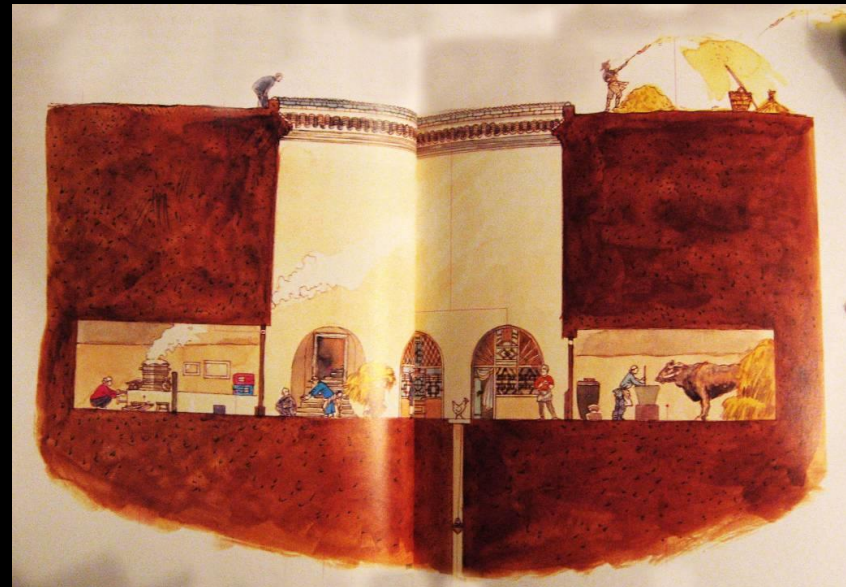
Its advantages are: the space is open and there is no enclosed sense of a courtyard.

1. 延等高线展开的窑院，窑前有一块平坦的场地做为院落。

其优点为：空间开阔，无四合院的封闭感。

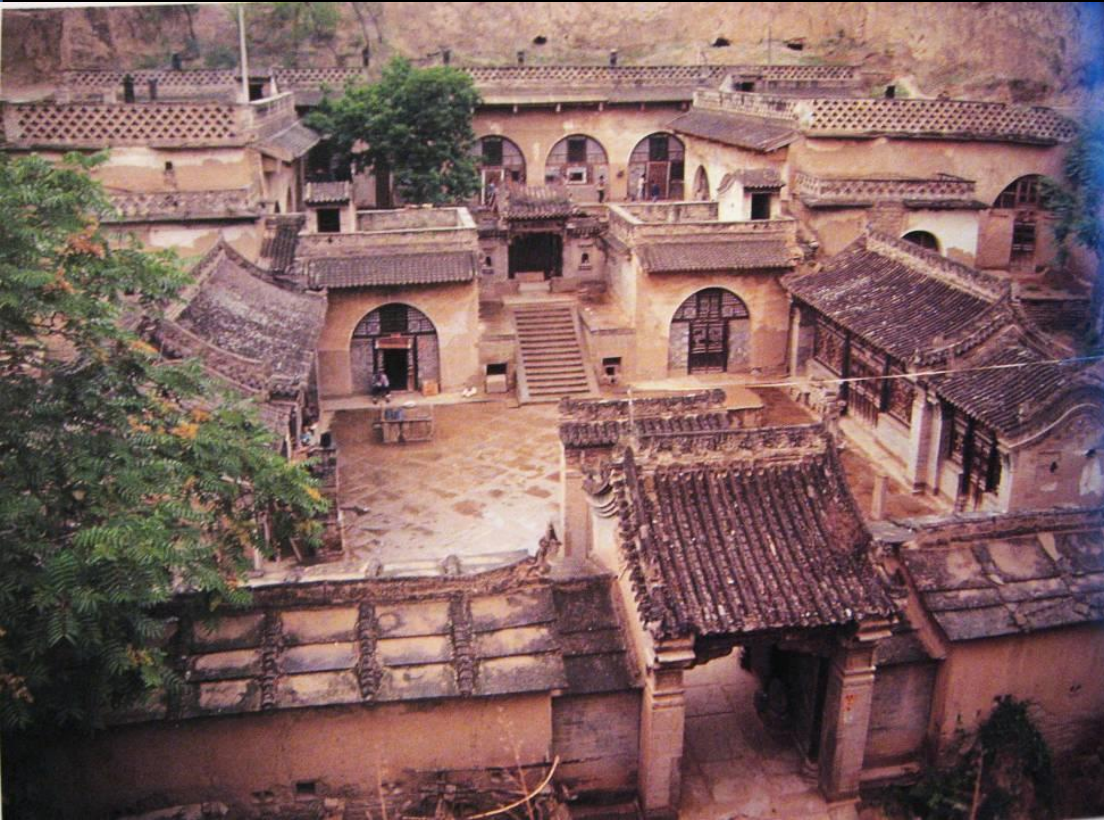
2. The underground courtyard is a sunken cave dwelling.

2. 地下四合院形式，既下沉式窑洞。



The Space Combination of Cave Dwellings

窑洞的空间组合



3. Mixed courtyard. The cave dwellings are warm in winter and cool in summer, but the light is poor, and spring and autumn are wet. The cave dwellers set up wing rooms in front of both sides of the cave dwellings, which form a courtyard with the inverted seat on the south side. People can choose to live in houses or cave dwellings and play their active role in adapting to nature.

3. 混合型院落。窑洞冬暖夏凉，但光线较差，春秋天潮湿。窑居者在窑洞两侧前设厢房，与南面倒座围成合院。人们可以自行选择住房屋或窑洞，发挥适应自然的能动作用。

The Space Combination of Cave Dwellings

窑洞的空间组合

4. The double-layer cave dwellings are the representative of the space combination of cave dwellings.

The upper floor is relatively dry and can be lived in, and the downstairs can be stored, and the functional layout is better. Most of the stairs are left outdoors.

There are many cave dwellings of this kind in Gongyi City, Henan Province, which are called "Tianyao" locally.

4. 双层窑洞，是窑洞在空间组合方面的代表。

楼上较干燥，可以居住，楼下可以储物，功能布局较好。楼梯多留在户外。

河南巩义市有很多这种窑洞，当地称为“天窑”。



The detailed decoration of the cave dwellings, from the facade to the plane, from the door to the interior, is actually a kind of craftsmanship. Stone work, brick work, wood work, and paper work are the main aspects. Stone work and brick work range from stone lions, drum stones, stone foundations, and shadow walls to the arches, eaves, and parapets of the facade. They are often carved into auspicious patterns with themes of luck, wealth, and longevity. The woodwork focuses on the carvings of the gate tower and the pattern of the window mullions. The paperwork mentioned here is a decoration that can be replaced temporarily, such as window grilles, kiln ceiling flowers, kang wall paintings, hanging curtains, and door gods. During the Spring Festival, red couplets and window grilles are interspersed with the blue-gray background, creating another scene.

窑洞的细部装饰，从立面到平面，从大门到室内，实际上是一种匠工艺术。石作、砖作、木作、纸作是主要的几个方面。石作和砖作从石狮、抱鼓石、石础、影壁，直到立面的拱头线、挑檐、女儿墙等，多精雕细刻成以福、禄、寿为题材的吉祥图案。木作则集中于门楼举架雕刻、窗棂纹样等方面。这里所说的纸作是以窗花、窑顶花、炕围画、帘帘、门神等可临时更换的装饰。每遇春节，红色的对联、窗花等点缀在青灰色的背景间，另是一番景致。



Stone foundation
石础



Wood caving
木雕



Drum stones 抱鼓石



Window grilles
窗花



Xixi Mountain Villa

习习山庄



Xixi Mountain Villa is located in Jiande City, Hangzhou City, Zhejiang Province. Jiande City is one of the key scenic spots in the country. It is famous for its exquisite scenery of "exquisite mountains and clear waters" and cultural sites. The Lingqi Scenic Spot is an important part of the West Lake-Xin'an River Scenic Spot.

习习山庄位于浙江省，杭州市，建德市。建德市是全国重点风景区之一，以“奇山碧水”的旖旎风光和人文荟萃的名胜古迹闻名于世，拥有西湖——新安江、千岛湖——黄山等名山名水。而灵栖胜境风景区，正是西湖--新安江风景名胜区的重要组成部分。





The vegetation around the villa is very dense, unless you walk into the building, you will not feel the existence of the building at all, which fully reflects the integration of the building and the natural environment.

山庄周围植被十分茂密，除非走进建筑，否则完全感受不到建筑的存在，充分体现建筑与自然环境的融合。

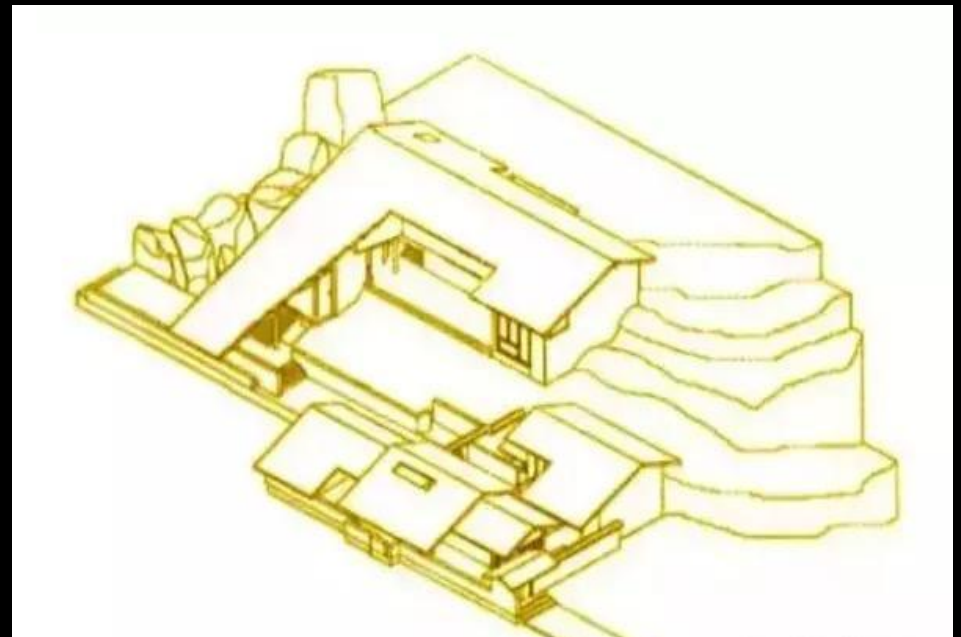
The Relationship between the Architecture and the Surrounding Environment

建筑与周边环境关系

1. Xixi Mountain Villa is surrounded by dense vegetation. slowly upward along the planned stone steps, it is hidden in a thick shade, as simple and low-key as an ordinary mountain house. It reflects the close integration of architecture and natural environment.
2. The building is closely integrated with the mountain and rock, that is, the original rock structure and the building are cleverly integrated.

1. 习习山庄四周植被茂密，沿着规划好的石阶徐徐向上，它就被掩映在一片浓荫之中，像一个普通山里人家一样朴素低调。体现了建筑与自然环境的结合得十分紧密。

2. 建筑与山体、山石结合紧密，即巧妙地将原有的山石结构与建筑融合。



Culture Recorded

文化载入

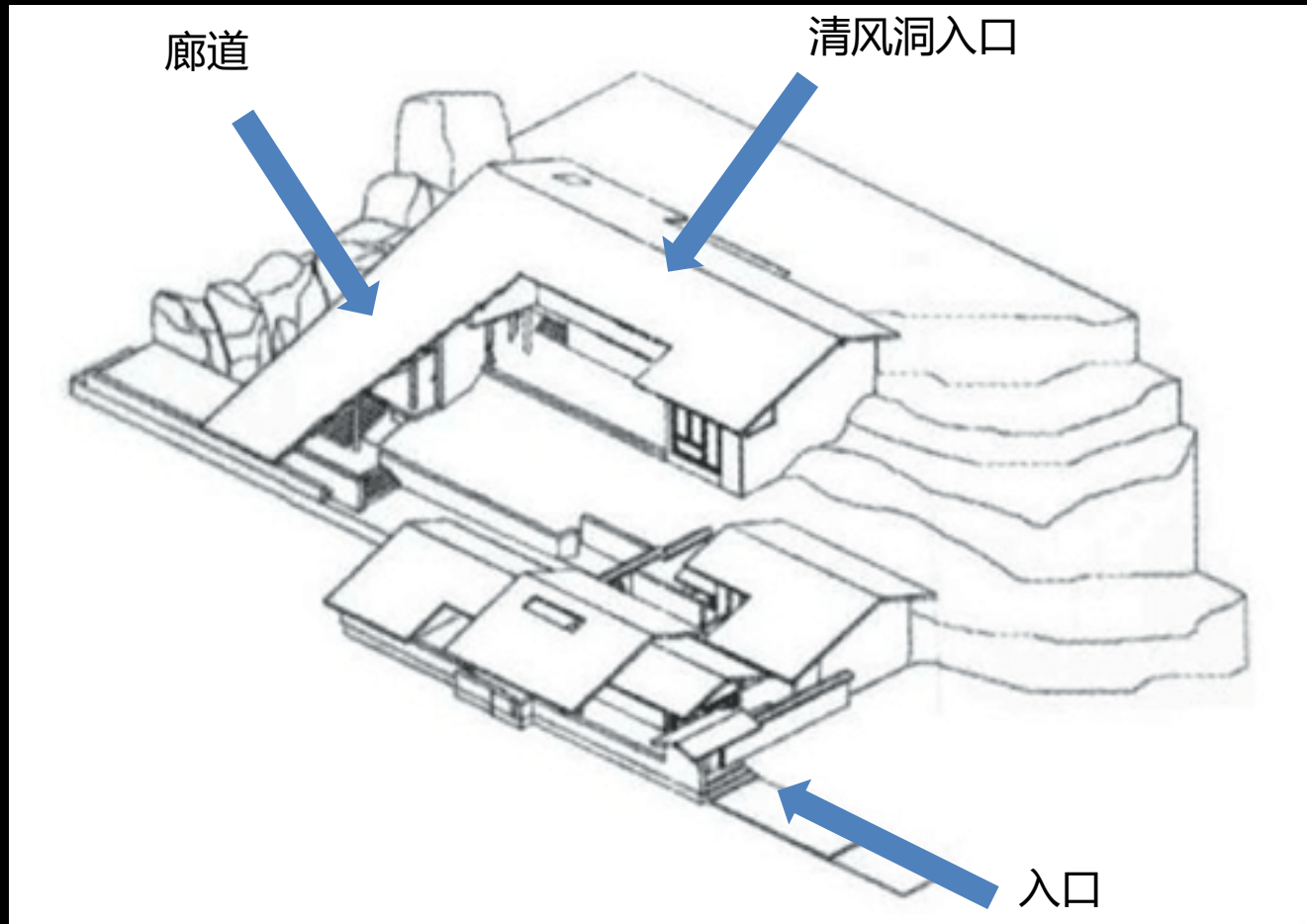
Xixi Mountain Villa is a typical representative of our country's "new vernacular architecture" in the 1980s. It uses regional cultural elements such as "courtyards" and Jiangnan dwellings, and ingeniously combines architecture with the natural environment.

习习山庄是我国八十年代“新乡土建筑”的典型代表，它将“院落”、江南民居”等地域文化要素运用其中，并将建筑与自然环境巧妙结合。



1. Analysis of Entrance

1. 入口分析



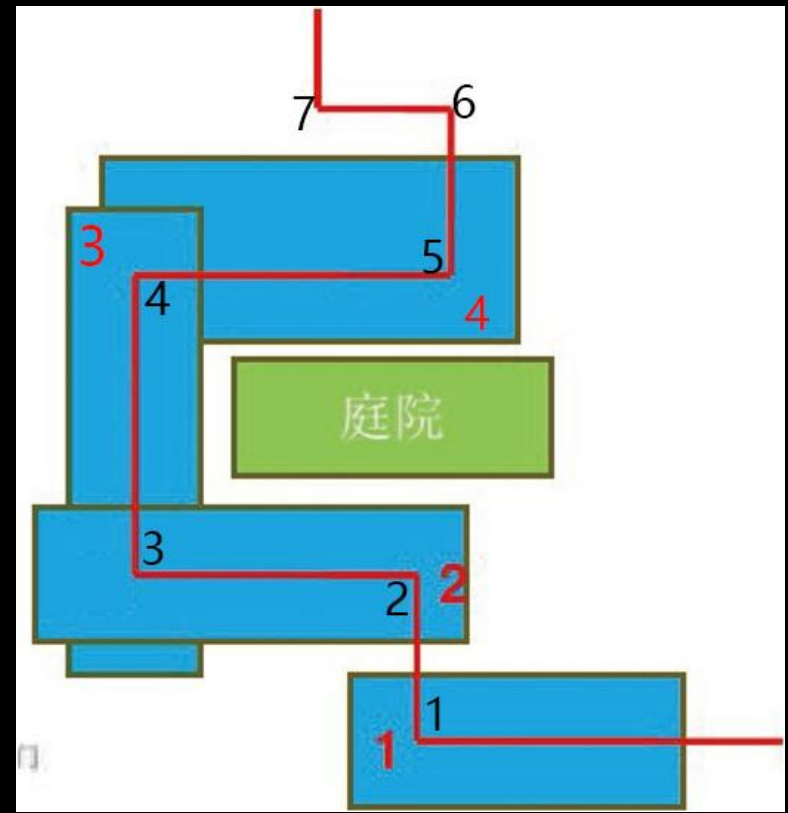
The layout of Xixi Mountain Villa conforms to the landform, and the two main functional spaces are parallel to the contour lines and connected by corridors. The architect used a combination of "L" shapes to surround the courtyard.

习习山庄的平面布局顺应了地形，两组主要功能空间与等高线平行，通过廊道连接。建筑师在形体上运用了“L”形的组合，围着院落。



The transition relationship is a commonly used technique in traditional Chinese garden architecture. The entrance of the villa and the continuous road are deflected into an L shape. The low entrance contrasts with the interior.

转折关系是中国传统园林建筑中常用的手法。山庄入口与一直延续的道路偏转成L形。矮小的入口与内部形成对比。



Xixi Mountain Villa can be seen as consisting of four rectangles. The streamline has gone through 7 turns from the entrance of the villa to the entrance of the cave. In the transitions, visitors continue to brew the mood of entering the cave, and their curiosity rises. The inexplicable expectation of the scenery gradually increased.

The route out of the cave is through the mountain road to the observatory, and the moon gate serves as the opposite scene to directly attract visitors to the tea room and then go out.

习习山庄可以看作由四个矩形组成，流线从山庄大门口到洞口一共经历了7次转折，在一次次的转折中，游人不断酝酿入洞的心情，好奇心大起，使得对洞内景色的莫名期待逐渐增强。

出洞的路线经山路到眺台，月亮门作为对景直接将游人吸引到茶室，而后出去。



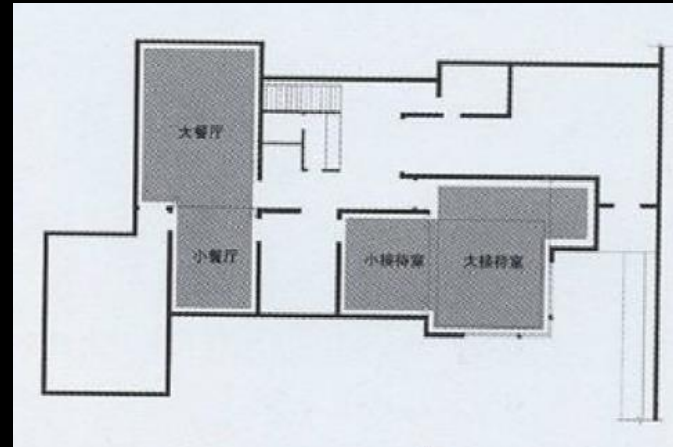
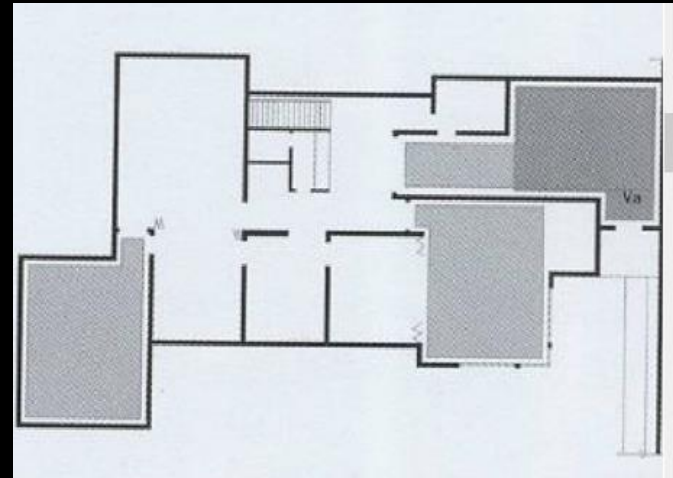
After entering the door, there is a wide and flat corridor, which can be divided into three sections in space, from bright to dark to bright, full of rhythm.

进入门之后，是一个宽扁的长廊，空间上可以分为三段，由亮——暗——亮，富有节奏感。



The function of the villa is mainly divided into two parts, the first part is the open public space, and the second part is the function room.

山庄功能主要分为两个部分，第一个部分就是开阔的公共空间，第二个就是功能房。



The building volume of Xixi Mountain Villa is relatively loose, and the space is relatively open. The L-shaped streamline is indoor and outdoor, half indoor and outdoor interspersed.

习习山庄建筑体量较为松散，空间相对开敞，L形流线在室内外，半室内外穿插。

L-shaped Space

L型空间

The L-shaped transition of Xixi Mountain Villa was influenced by the Guoqing Temple. Whether it is a transition or a scale, there is a very direct relationship. Mr. Ge Ruliang's in-depth research on the temple in the early stage of the design has a profound impact.

This type of L-shaped space is also used for many indoor transitions.

习习山庄的L型转折受到了天台宗祖庭国清寺的影响，无论是转折还是尺度，都有非常直接的关系。

葛如亮先生在设计前期对该寺庙进行的深度的调研，因而影响颇深。
室内的多次转折也是采用了这种L型空间。



The "new vernacular architecture" constructed with traditional white walls and black tiles, conforms to the artistic conception of the ink paintings of the mist and rain in the south of the Yangtze River.

采用传统的白墙黑瓦建造的“新乡土建筑”，符合江南烟雨的水墨画的意境



Ge Ruliang, who was influenced by Monterian's abstract paintings, combined these three colors into an abstract wall, which is modern and natural. This practice, called "Spiritual Masonry Method", is Mr. Ge's initiative.

受蒙特里安抽象画影响的葛如亮，将这三种颜色拼成抽象的墙面，现代又不失自然之趣。这种被称为“灵栖砌法”的做法，是先生的首创。



2. Façade Window

2. 立面开窗

The architect used extremely limited materials and funds to derive rich window patterns based on the combination of traditional styles and modern composition.

建筑师利用极有限的材料和资金，在传统样式与现代构图结合的基础上，衍生出了丰富的窗样。



Anteroom (plane partition)
入洞前室 (平面分割)



West side of the second floor
(Modern stained windows,
iron bars twisted, self-
contained decoration)
二楼西侧, (现代花窗, 铁条拧转, 自
成装饰)

3. Roof

3. 屋顶

The 22.8-meter-long "Long Tail Roof" is the iconic symbol of Xixi Mountain Villa. The long sloping corridor, wide at the top and narrow at the bottom, is jagged on the east side, descending rapidly from the heights along the mountain, showing the priority and order of the direction, making the building suddenly lively.

长22.8米的“长尾巴屋顶”，是习习山庄的标志性符号。长长的坡廊，上宽下窄，东侧成锯齿状，顺着山势从高处急泻而下，显示了方向主次，使建筑顿时生动了起来。

The roof shape is large on top and small on bottom, the oblique space under the roof is suppressed or enlarged, and the arrangement of cement rafters in the north-south direction makes the space directivity very strong.

屋面形状上大下小，屋面下被压制或扩大的倾斜空间，以及南北方向水泥椽子的排布，使得空间指向性十分强烈。

The roof ridge is also interesting. The beam on the roof ridge is connected to the decorative panel, as if the beam suddenly rises, transforming into a kiss beast, and biting the roof back. The appearance is simple and powerful, and has a strong traditional meaning.

屋脊的做法也有意思，屋脊位置的梁外接装饰板，仿佛梁突然升高，化身吻兽，反身咬住了屋脊，外观简洁有力，又具有很强的传统意味。



D. Basic Principles of Architectural Design in Hillside Environment

四、山地环境中建筑设计的基本原则

- Make full use of landforms to create a distinctive architectural image. Reflect the characteristics of the “mountain”, and prosper with the mountain (performance of power).

充分利用地形、地貌，创造富有特色的建筑形象。体现“山”之特色，与山共荣（势的表现）。

- Pay attention to the characteristics of landscape and viewing, and strengthen the characteristics of external space. Platforms and steps, overheads and retaining walls.

重视景观与观景的特点，加强外部空间的特色。平台与踏步、架空与挡土墙。

- Attach importance to the participation of landforms and natural environment in architecture to protect ecology. Rock, animals and plants.

重视地貌及自然环境在建筑中的参与作用，保护生态。山石与动植物。

- Reduce technical complexity. Cost and area, earthwork and engineering volume, economy and applicability.

减少技术上的复杂性。造价与面积、土方与工程量、经济与适用。

Thank you!