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当轻型建筑遇见城市

When Lightweight Architecture Encounters Cities

←
南昌鄱阳湖保护区访客中心外景
Facades of the Workstation for Poyang Lake Nanji Wetland Reserve

在重型建筑项目建设明显放缓的情势下，越来越多的建筑师在考虑开发轻型建筑产品。这一设计领域不应该是职业危机时的应激反应，而可成为持久努力的研究方向。建筑的轻型化不仅带来变化多端的产品形态，还能产生新的设计、组织与施工方式，兼备社会与生态方面的多重价值。而对于资源庞大的制造商、开发商和有远见的城市管理者，它还能发掘出意想不到的隐蔽资源。

传统的使用钢筋混凝土与砖石的重型建筑自重很大，因而需要强壮的骨架作为支撑，它呈现为明显的梁、柱或剪力板，以抗弯、承压为主。重型建筑的致密结构会带来防火与刚度的优势，便于建造多层或高层建筑，它往往需要精密的地质勘查、复杂的基础设计和谨慎的工程实施。对重型建筑来说，结构的明确与填充物的轻简之间的对比通常比较明显。

With the notable slowdown of construction of heavyweight structures, the number of architects who intend to develop lightweight structures is constantly on the rise. Such domain shouldn't serve as a stress response against the professional crisis. Instead, it has the potential to become the major direction for lasting research. Not only does it bring about more diverse products, new design, systems and construction methods, it also presents values both socially and ecologically. For manufacturers and developers with abundant resources as well as visionary city planners, it could also unearth hidden resources.

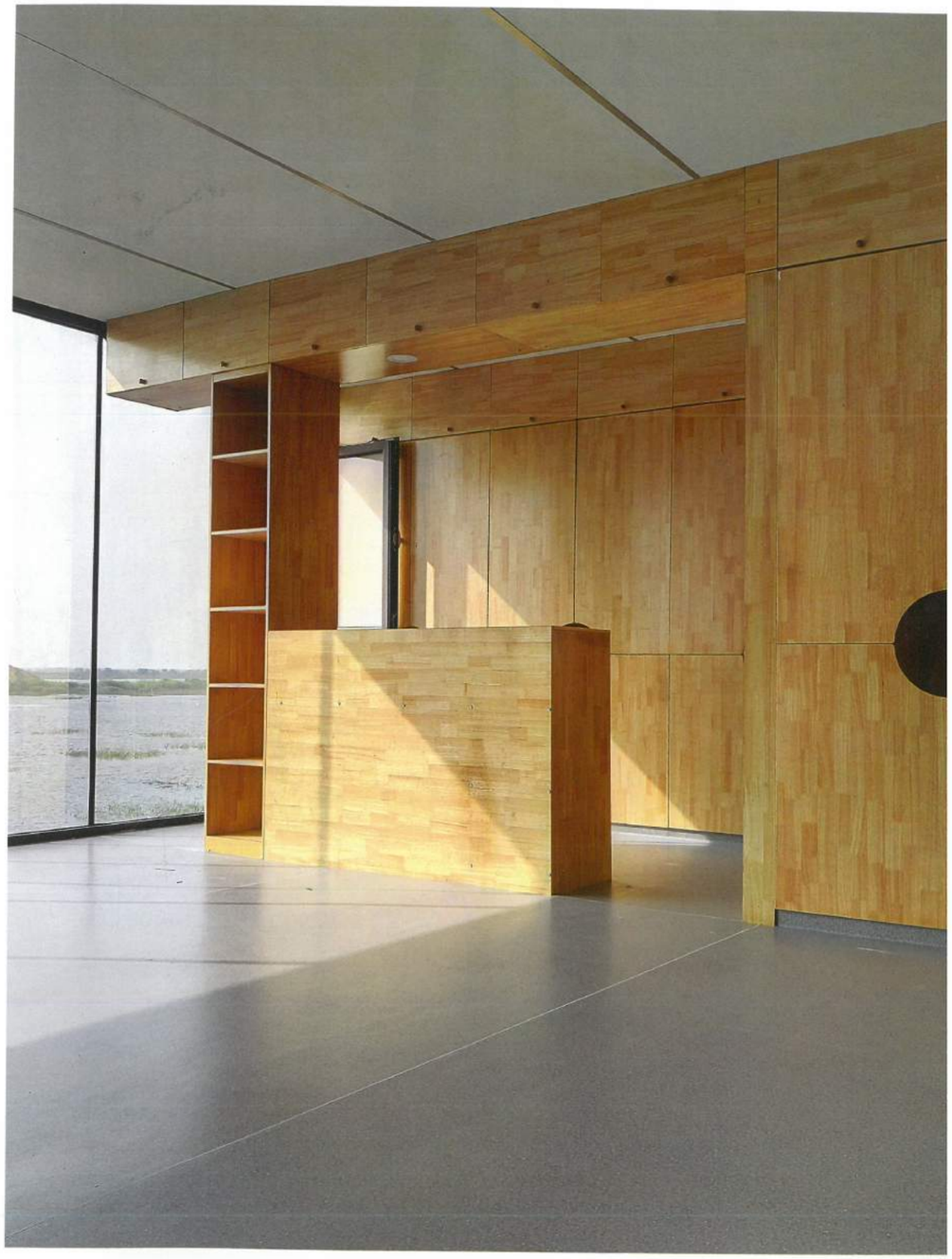
Due to the giant self load, heavyweight buildings made of reinforced concrete and bricks need sturdy frameworks notably composed of girders, columns or shear plates with good bending rigidity to bear the weight. The excellent fireproofing capacity and rigidity that come with the compact structure of such buildings make it more convenient to build high-rises or multi-storey structures. It requires precise geological survey, complex basic design and prudent construction. There is a clear difference between specific structures and the simplicity of lightweight infills in terms of heavyweight buildings.

型建筑与之相反。由于自重小，骨架可以是集中立柱或梁架，但更多
合下会使用密肋、密梁或板式构件；它们除抗弯、承压外，还能提供
大的平面刚度。轻型建筑的构件到底是起到承重作用，还是仅作填充
用，这种分别其实并不显著。轻型建筑的总体柔性决定了结构在低层
为适合，因此仅需要简单的基础设计和快捷的施工准备。

型建筑可以被建造在重型建筑的旁边、上面甚至里面。有些地区由于
质条件（例如地震、地层承载力等）、建造技术或者政策的影响，使
轻型建筑成为城市建成环境的主体，例如洛杉矶或者里约热内卢的大
地区。这突破了人们常有的印象，即轻型建筑只在荒郊野地或者灾后
建的场合中建造。城市的总体趋势是逐步致密化，在可用地表面积的
量有限的条件下，如何获得可用地对于城市的可持续经营非常重要，
以建筑的轻型化可以帮助开发者或管理者找到潜在的资源。

In contrast, frameworks of lightweight buildings could be column clusters or beams, but mostly ribbed slabs and beams or plates with great bending and plane rigidity, able to bear weight. Whether the components serve as load-bearing structures or infills doesn't matter. It's more appropriate to construct such buildings in the form of low-rises due to their flexibility. Low-rises require simpler design and allow rapid construction on foundation part.

Lightweight structures can be built next to, above, even inside the heavyweight ones. In some areas affected by specific geological conditions (such as earthquake and bearing capacity of stratum), construction techniques and policies, lightweight buildings have become the mainstream in the built urban environment, for instance, in large areas of Los Angeles or Rio de Janeiro. It subverts the common impression that lightweight structures can only be built in the wilderness or post-disaster reconstruction areas. Most growing cities are becoming increasingly compact. Acquiring plots is thus vital to sustainable urban development despite limited land supply. A smart application of lightweight architecture could help city planners or developers discover potential resources.



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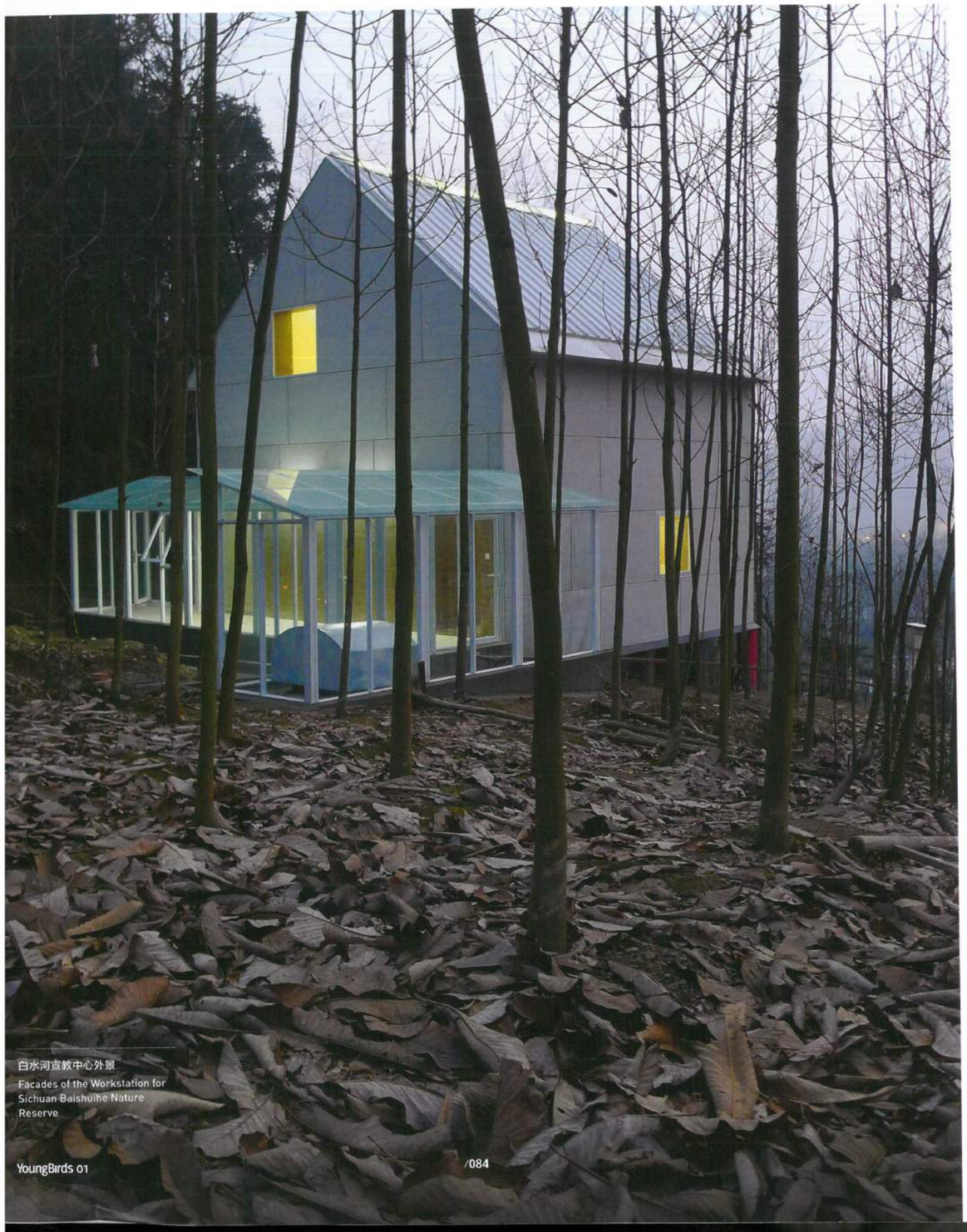
甘肃会宁厍去幼儿园内景，由板材组合形成的凹凸空间成为小孩子们的游乐活动场所。

Interiors of Huining Shequ Kindergarten composed of boards provide a venue for children to play games.

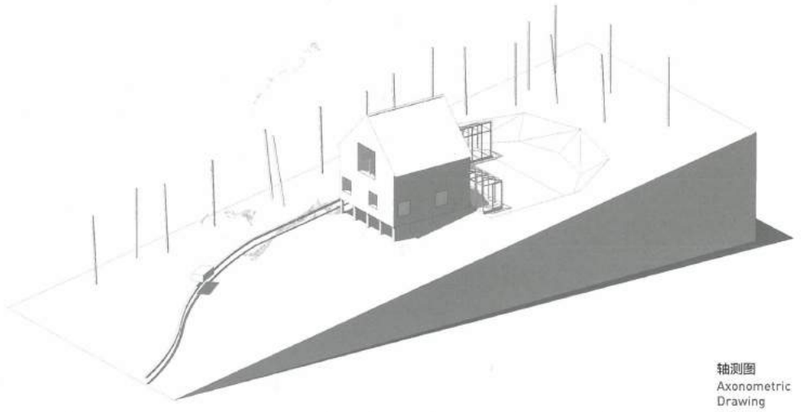
→

鄱阳湖自然保护区访客中心，透过大面玻璃眺望湿地景观与候鸟。

Large windows in the Workstation for Poyang Lake Nanji Wetland Reserve enable visitors to overlook wetland landscape and migratory birds.



白水河宣教中心外景
Facades of the Workstation for Sichuan Baishuihe Nature Reserve



轴测图
Axonometric Drawing

坡地开发

多数的城市开发者会将"土地"简单地等同于"平地"。坡地或者不被重视，或者被简单地削平。无法开发的理由在于地质的复杂性、雨水的经常侵蚀以及基础设施架设费用的昂贵。这些理由在缺乏手段的古代可以理解，但在技术手段充满可能性的当代并不成立。轻型建筑使得坡地开发时不再那么棘手：基础准备简单、材料易于运达、自重轻、平台基础或者撑脚基础对环境压力小，这些是建筑物适应场地的被动方面。而从主动角度来看，轻型建筑甚至可以扮演基础设施的部分功能：例如利用屋顶有系统地收集雨水，并将其引导至水箱或水池存储供旱季之用；精确的基础及屋顶规划甚至能减小雨水对附面土层的无序冲刷，这时建筑物就如同帮助护坡的灌木一样。同时，轻型建筑的建造也可以结合机械获得上下坡的便利性。最后，坡地建造还会带来指向明确的景观和稳定的主导风向，易于形成宜居的场所。

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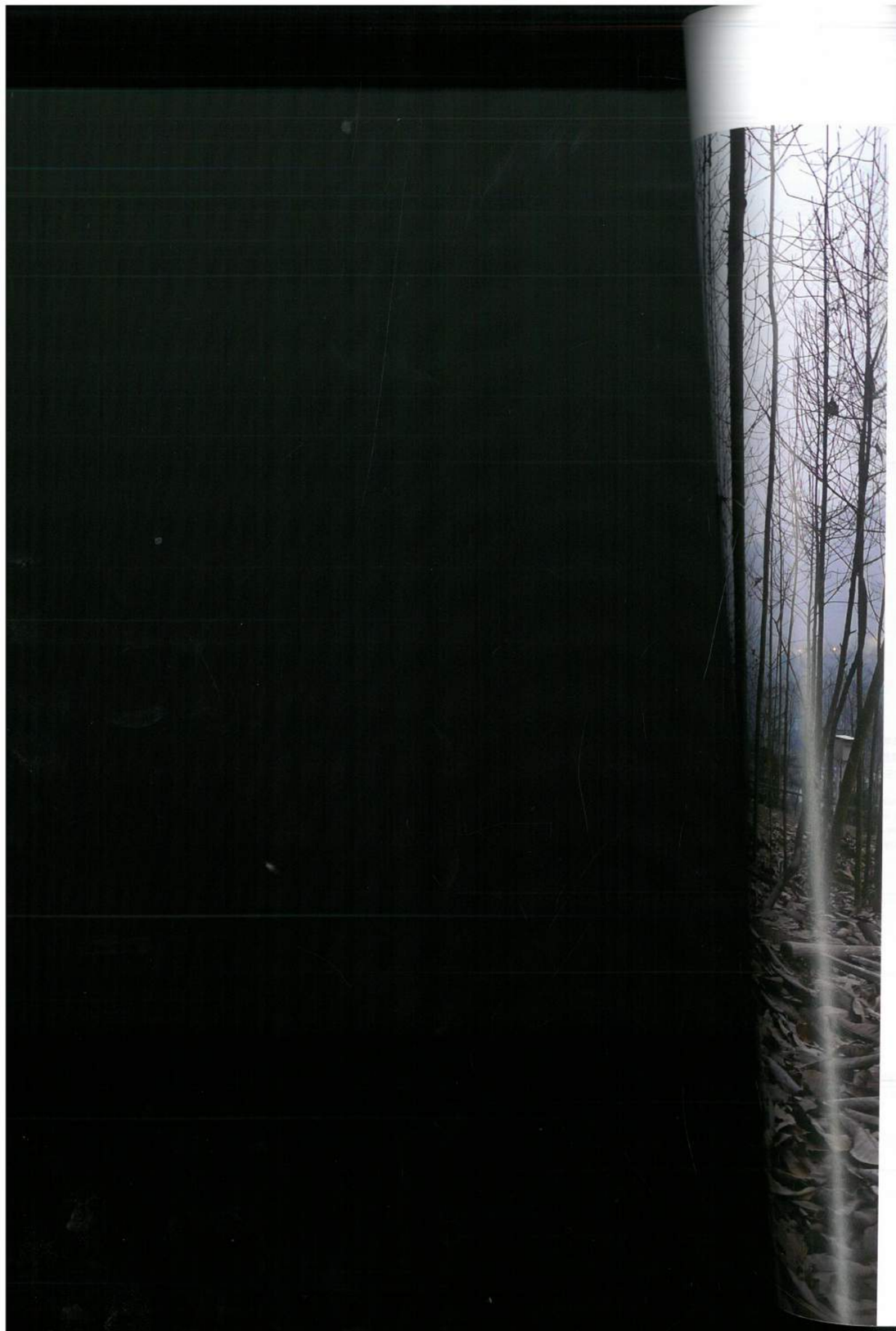
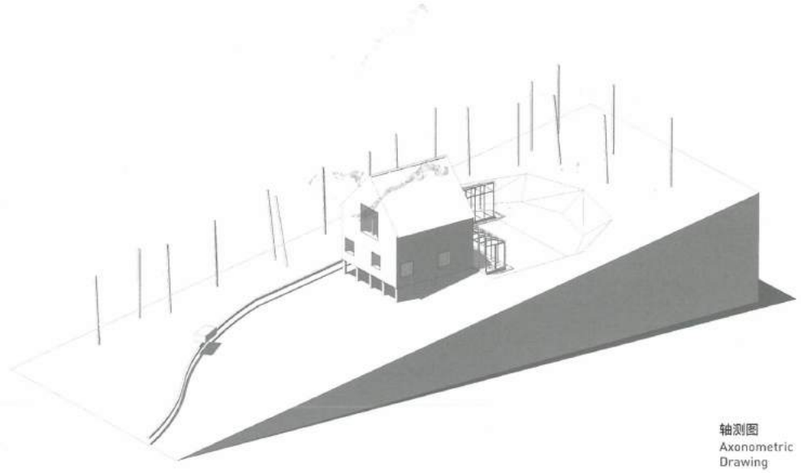
上/山地缆车帮助工人运输建筑预制构件，有效降低坡地施工难度。
Above: The monorail system helps workers transport prefabricated components, making it easier to construct buildings on the slope.





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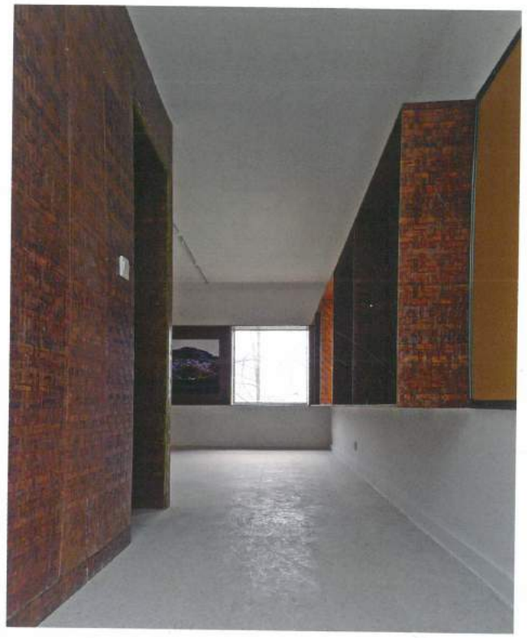
Above: The monorail system helps workers transport prefabricated components, making it easier to construct buildings on the slope.

Slope Development

In most cases, "land" is considered as equivalent to "flat grounds". As a result, slopes are often neglected or levelled. The reasons slopes cannot be developed lie in the complex geology, the severe erosion of rainwater as well as costs of infrastructures. It's understandable in ancient times when there was a lack of techniques, but not in this age full of technological potentials. Lightweight architecture has its unique advantages in slope development with ease of material transportation, rapid basic preparation, tiny self load as well as terrace and stilt foundation that pose little threat to the environment, which demonstrate that buildings may be adaptive to a plot. In the positive respect, they play part of the role of infrastructures: rainwater can be collected through roofs and channeled into tanks and pools for the dry season; precise basement and roof design can protect the surface soil from the arbitrary erosion of rainwater-in this case, buildings resemble bushes safeguarding the slope. Meanwhile, by using lightweight mechanical system, transporting materials along the slope will not be a challenge any more. Finally, slope development will bring about stable dominant wind direction and panoramic landscapes for a habitable neighborhood.

The Workstation for Sichuan Baishuihe Nature Reserve completed in 2011 by the research and design team at CUHK (hereinafter referred to as "CUHK Team") is an example of how and why to build on the slope.. The monorail transport system was first built for loading components during the construction. After the building was put into use, it made transport of furniture more convenient and brought distinctive experience to visitors. The interior service core creates varied experience when visitors go clockwise or counterclockwise. The small space seems more spacious cognitively as it takes more time to understand its structures. It's cold and snowy in winter in the valleys of Xiaoyudong Town while it's moist, rainy and cool in summer. The elevated structure can protect the building against humidity. The glass corridor in the east serves as a climate buffer area as the warm sunlight heats up the interior space in the morning. The combination of the suspension, corridor and its insulating layer that meets the architectural standards creates a cozy interior space. At the intersection of the sloping roof and the walls, the two right-angle sides of the triangular prefabricated part were hollowed out to strengthen the ventilation of the upper interior space through heat and air pressure.

The building is supported by 16 short culverts above the ground. The rapid construction of foundation reduced the concrete curing difficulty in winter period. It solves many problems: the level difference between the front and rear side of the site became insignificant; the issue of earth excavation and its roughness can be ignored; the surrounding micro-ecological environment remains unchanged; the floors no longer get damp. The lower space can accommodate tools and daily necessities. The station boasts a unique style by being elevated over the site. Despite the small volume, the Workstation design probes into the site selection, design and structures of lightweight buildings, especially the integration of construction and the mechanical transport system: construction and machinery no longer serve as techniques for implementing the drawings but the key elements for inspiring ideas, even deciding the form and details. The team has participated in the preliminary work such as site selection, budget planning as well as formulation of performance index. In addition, it has got all the work done with low budget as it did before and come up with innovative ideas by constantly discussing with clients and users over the relationship between infrastructures and the building. Compared with conventional ideas of occupying the precious rice fields in valleys as displayed in other reconstruction projects after disasters, the station undoubtedly presents a peculiar but more eco-friendly and economical potential of development.



一层展览空间内景
inside view of first floor

完成于2015年的四川西昌美姑学校是另一个大规模山地房屋规划与实施的实例。场地靠近西昌美姑县大桥镇，属于强地震区域，地下有军用光缆，耕地属于彝族村落，场地坡度变化多端，大型卡车无法进入，校园内部的村委会房屋存在产权争执。如果使用重型多层建筑物，一系列技术与社区协同问题难以解决。团队为此规划修建了十幢采用两种不同系统的新建筑物，改造了两处老建筑物。历时两年时间的建造提供了一个完整寄宿学校的全部功能。除却轨道车对施工的帮助与首层架空基座的构想，团队还试验了螺旋桩在缓坡上的基础实施。这些措施将空间丰富的现代建筑群落带进了复杂的山地乡镇，为失依儿童提供了宜人的居所，为周边的村落自主加密提供了示范，帮助它们逐步融入附近蔓延过来的现代市镇。

Xichang Meigu School in Sichuan province, completed in 2015 after two years' joint efforts, is another example of planning and implementing large-scale buildings on the slope. The site is located nearby the Daqiao Town, Meigu County, part of the meizoseismal area. There are military communication cables underground. The arable land belongs to the villages, home to the Yi people. Large trucks cannot gain access to the sil with various slopes. Inside the plot, there is property dispute as to buildin for the village committee. The construction of heavyweight multi-storey buildings would render a string of technical and community issues unsolved. The team provided a package of comprehensive facilities for th boarding school by designing ten new buildings with two distinctive syste and renovating two old ones within two years. In addition to the monorail system and elevating buildings, it managed to apply screw pile technolog on the gentle slope. These measures bring the modern architecture with various spaces into towns and villages on the hills, providing children wit comfortable living spaces. They serve as a model for surrounding village blend into adjacent modern towns.

虽然轻型建筑对于山地的扰动较小，但仍需细致的规划控制与施工管理。如果自发建造与空间恶性竞争，外界环境将不能承载更多建筑，而更高的密度也会带来疫病与火灾的风险。建筑群落此时会逆行演化，良好的社区会退化失序。例如五十年代曾有数以十万计的难民涌来面积只有一千多平方公里的香港，住屋不足成为严重的社会问题，无力负担昂贵租金的市民唯有在山脚旁搭建木屋。当时香港的山头满布这些僭建木屋，政府未能及时处理，结果种下祸根：1953年圣诞日，石硖尾木屋区发生大火，敲响了房屋问题的警钟。大火横扫六条挤在方圆45英亩土地的木屋落，烧毁木屋一万五千多间，无家可归的灾民超过五万名。这次火灾迫使政府改变政策，一方面修建迁徙置区公屋，另一方面开始登记斜坡棚屋、规管私搭乱建的现象。从这一案例中可以看出，轻型建筑可以帮助坡地开发，但需高度尊重坡地特有的生态容量以及基础地质，并且需要与有效的规划、使用及管理相配合。

↑

鸟瞰效果图
Aerial view plan

↗

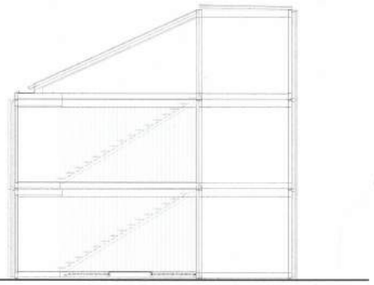
美姑小学三期平面布置图
围绕山脊的中心礼堂，教室与宿舍错落布置，并结合场地围合不同高差的院落。

Plan of the Xichang Meigu Elementary School (Phase III)
The central auditorium, classrooms and dormitories surrounded by ridges are laid out scattered; courtyards of varied levels are enclosed in accordance with features of the site.

Lightweight architecture still needs meticulous plans and construction management despite its little interfe ence with the landscape. Once unauthorized construction is out of control, the environment will be unable to bear more buildings and higher density would cause risks of epidemic and fire, leading to the disorder in communities. For instance, some 100,000 refugees flocked into Hong Kong, a city of only about 1,000 sq.km 1950s. Lack of housing was one of the major social issues. Citizens had to build wooden huts next to the foot the mountain. Such huts became ubiquitous on the hills as the government was clumsy in its response to th situation. The disaster followed. On the Christmas Day in 1953, a major fire that happened at around nine thi p.m. ripped through the Shek Kip Mei squatter area, ringing the alarm for housing issues. It swept six swath huts crowded on the land within 45 acres radius, leading to over 15,000 huts burned down and more than 50 residents homeless. The accident propelled the authority to make reforms: constructing houses for relocati people affected on one hand, putting the slope huts on records and prohibiting unauthorized construction or other hand. This case shows how lightweight buildings contribute to the slope development. However, it req high respect for the ecological capacity and basic geological conditions along with effective planning, land u and regulation.

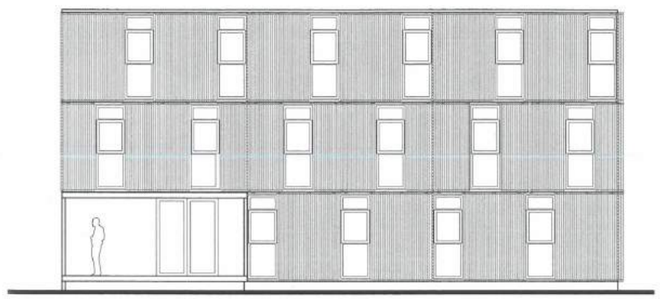
由27个标准箱体组成的媒体中心，通过一天组装搭建即可完成，提供400平方的办公场所。

The Media Center that consists of 27 standard containers could be assembled in a single day, providing an office space of 400 sqm.



←
媒体中心剖面图
Section Plan of the Media Centre

↓
媒体中心立面图
Elevation of the Media Centre



基础设施的民用化

城市内部存在大量的基础设施用地——道路、停车场、堆栈、高架路部荒地等等。在规划容量尚未达到前或者用地需要根据城市功能做出活变化时，轻型建筑可以利用这些空间或表面做出恰到好处的安排。

深圳低碳国际会议媒体中心即是利用停车场快速修建办公用房的出色例。2013年夏季，中大团队联合深圳集成房屋公司研发设计建造了深国际低碳城媒体中心，为龙岗低碳城市论坛提供场所。这座三层的箱大楼具有施工快捷的特点，同时加工品质也相当精良。它能够提供敞、灵活的大型空间，能够满足办公、商业、展览、住宿等多种功能求。它被定位为“多功能移动总部”，适用在温带和亚热带气候下的大地区。这一项目属于框架式的轻量建筑系统，其自重仅为传统房屋三分之一，因而易于被放置在停车场上，只用少量埋地螺栓加以固定它在会议之后被连续使用了两年才被工厂收回，经历了两季台风的验，取得了良好的社会、经济以及传播效益。

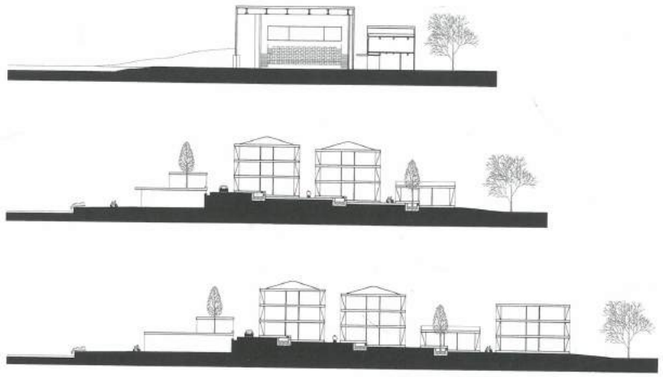
Infrastructures for Civil Use

Infrastructures occupy large amount of land and plots in cities, such as roads, parking lots, warehouses, wilderness under the elevated highways When the planned capacity hasn't reached its limit or the plots need to be adjusted to underpin urban functions, appropriate arrangement can be made in the form of lightweight buildings.

The Media Center for Shenzhen Low-carbon International Conference is a outstanding example of how to rapidly build office buildings with parking lots. In the summer of 2013, CUHK Team and Shenzhen Yaghee Modular designed the Media Center for Shenzhen International Low-carbon City. T three-storey box-shaped building that features convenient construction, high quality as well as flexible and spacious interior is able to meet such demands as offices, business, exhibitions and accommodation. It's positioned as a "multi-function mobile headquarter", applicable to most areas under the temperate or subtropical climate. The project falls into th category of frame-type lightweight architectural system. It can be easily installed in the parking lot, fixed with a few bolts as its deadweight is only one third that of traditional buildings. It was not relocated by the manufac turer until it had been used for two consecutive years after the forum. The building that survived severe typhoons is seen as a valuable model for society, business and communication.

在2014年，中大团队提交了大运会场馆再利用项目竞赛方案。方案提出利用停车场增建商业设施的构想，以帮助提供大型体育设施进入日常使用所需要的配套设施。建筑采用模块方式修筑，尺寸便于公路运输并根据使用转化布局。设计团队采用了异型折板支撑作为结构（三层建筑物每层自重加荷载约为每平方米800公斤），并加设了宽大的基础筏板。在此情况下一般土层（按承载力每平方米8吨计算）大约可以承载10层的建筑物，而户外停车场的设计承载力通常大于这一数值。由于上层建筑总体质量较轻，并且建筑层数少，所以只要建筑物平面司具备强力拉结（后张钢索），便可以不必做基础或者使用最少开挖，建筑物可以直接置放在原有停车场上，再凭借形体、自重以及一定量螺旋桩或者钢扦、销钉的帮助稳固固定、抵抗台风。这将降低建造费用与周期，利于功能调整并且减少生态破坏。

n 2014, CUHK Team submitted its proposal for the 'Competition of Reusing the Stadium for 2011 Summer Universiade". It came up with the idea of expanding the commercial facilities with the parking lot to provide supporting facilities necessary to transform the stadium nto daily use. The building was constructed in a modular way because its size made it easier to transport and change he layout according to actual needs. The team used regular-shaped folded plates as the framework. As the eadweight and live load per storey is about 800 kg/sqm, it esigned spacious raft foundations. In this case, the general ayer of soil can bear the weight of a 10-storey building, as er its bearing capacity of 8,000 kg/sqm. But a well-de-igned outdoor parking lot usually has better capacity. The pper structure with few storeys is relatively light. herefore the building can be constructed above the parking ot without building foundations or with minimum xcavation of earth, as long as there is cohesive strength ost-tensioning steel cable) between planes of the uilding. With its shapes, deadweight, a certain number of crew piles, steel bars, dowels fixing the structure, it could esist the hit of typhoon. It will reduce the costs, shorten the onstruction cycle, ease the function modification and cause ss damage to plantation.



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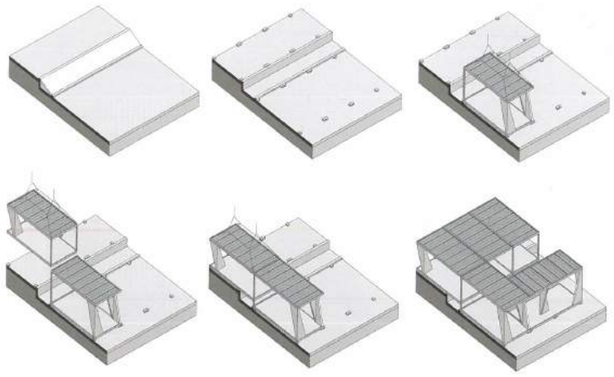
结合现有台阶式场地与两侧景观，布局不同高度的建筑量体，丰富的剖面关系带来差异性的街巷空间。

In addition to existing terraced site and landscape along either side, structures of varied levels could bring diversified street spaces.



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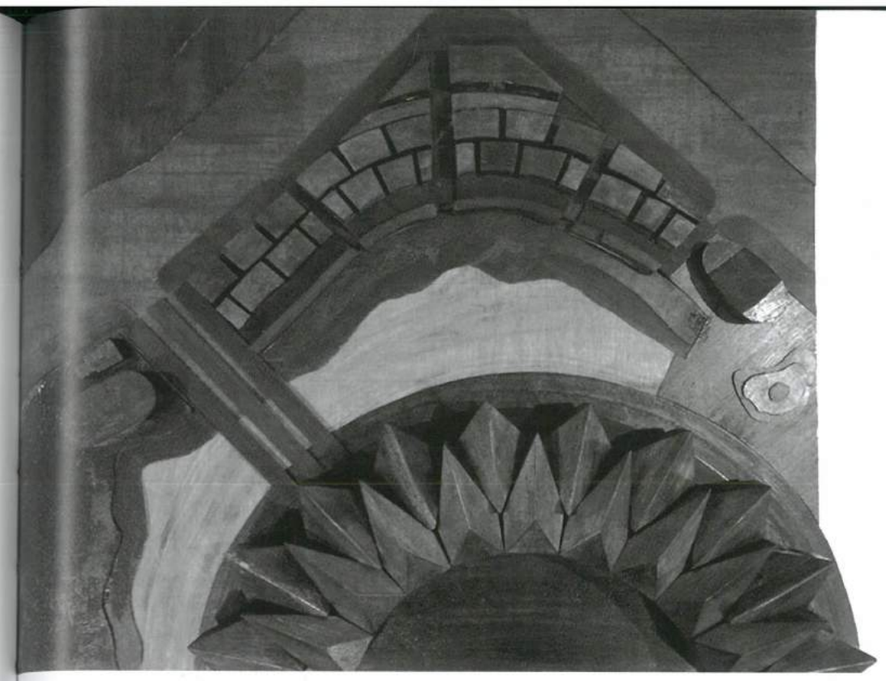
由于建筑总体质量较轻，可以不必做基础或者使用少量开挖，建筑物可凭借自重以及一定量螺旋状或者钢钎、销钉的帮助稳固地搁置在已有的地坪上。

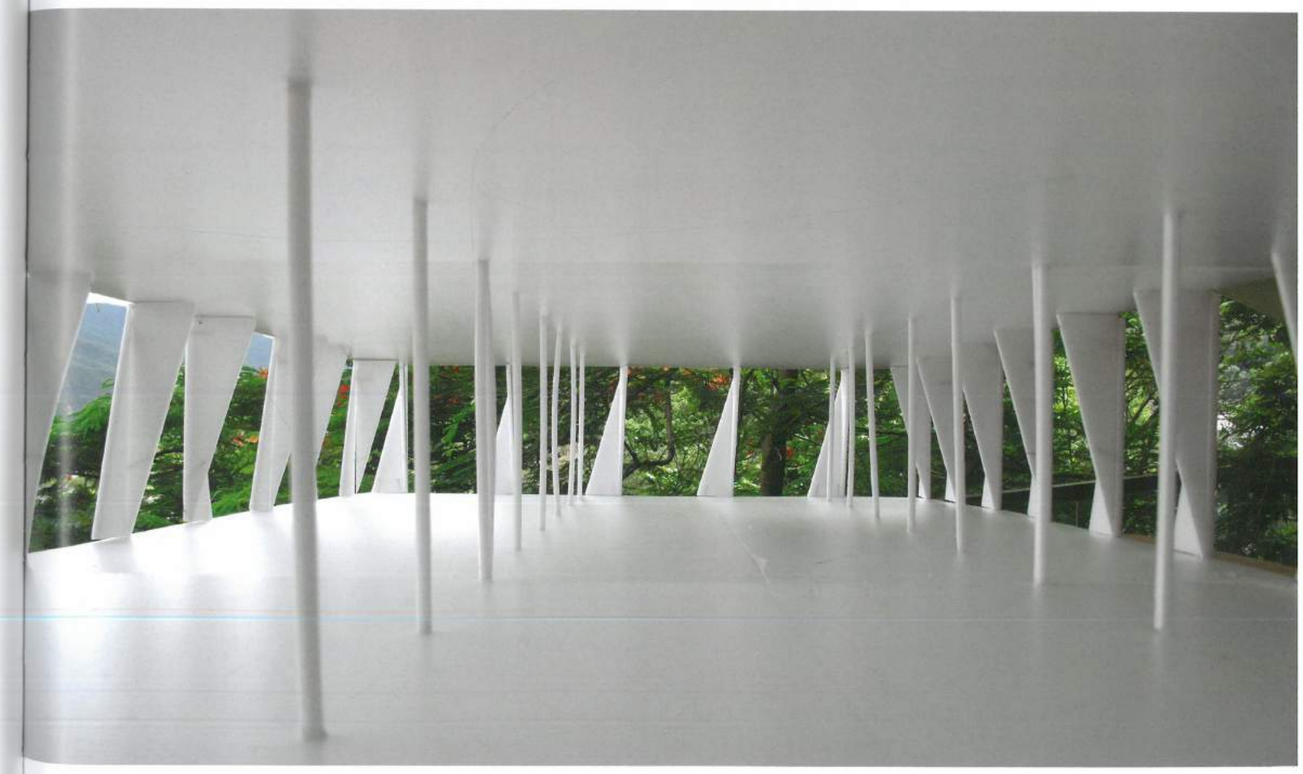
Without building basement or with minimum excavation, the building with tiny self load can be constructed and fixed on the existing basement with screw piles, steel bars and dowels.



←

圆弧接方框的平面几何逻辑接续着既有
划，城市街面、内湖以及地块内街形成了
空间变化的层次。

The mix of arcs and square frameworks al
with the existing planning has created
diversified spaces of urban streets, lakes a
inner streets within plots.



生态敏感用地上的栖居

平原城市还拥有湿地一类的缓冲区，它们出现在河陆或者海陆交界处，以洪泛区或者潮间带的形态经受水文周期变化。这类地区修筑落地的重型建筑是十分不合适的，原因是水文变化经年累月极易削弱基础。但如果建筑物轻量，从地面架空，废物能够自行净化处理，能源也自给自足，那么修筑轻型建筑不仅可行，还能够吸引旅游者与观光客。从渔民的捕鱼小屋到当代的高级度假屋，都显现出这种生态敏感用地建筑的技术可能性与前提条件。

高楼林立的香港有着大澳渔村棚屋这样独特的景观。大澳是百年来的渔盐业重地，也曾是香港的主要渔港和驻军乡镇。世代以来，大澳都是渔民疍家人的聚居地。渔民认为在平实的土地上居住缺乏安全感，所以就在岸边建造棚屋住下来。棚屋就建在渔村中间一条河道的两旁，户户相连，部分通道会穿过邻居的客厅或厨房，造就了亲近的邻里关系。传统棚屋依据渔船的概念设计，棚头是渔民日常作息的地方，棚尾则用来晒咸鱼、海带等。密密麻麻的棚屋、纵横交错的水道与桥梁，构成大澳吸引游客的独特面貌。

上海南汇东滩野生动物禁猎区工作站位于都市东南角广阔的滨海湿地上，于2011年由中大团队完成。建筑面积约100平方米，包括一个30平方米的多功能展厅、工作空间以及整套厨卫设施，屋顶设有观鸟平台。房屋允许多种功能变化，不仅帮助改善禁猎区巡护人员的工作生活条件，也提供了湿地环保教育的场所。建筑物基于团队研发的箱式预制房屋系统进行了定制设计，由江苏小型工厂和地方木匠制造，再运输到建筑现场组装。现场工作包括3天的基础实施和1天的吊装，建成后房屋可以整体移动或者拆解而不产生建筑垃圾。多种被动式环境设计保证了夏热冬冷气候下的室内舒适性，同时自然光运用、通风机关、太阳能板以及雨水收集都结合在构件或构造设计中，污水污物经过分流、降解后再排放。这个全离网工作站提供了舒适、现代的工作条件，实现了对环境影响极小的建造和使用，也让人联想到"沪"这一水上房屋原型和上海的本源。

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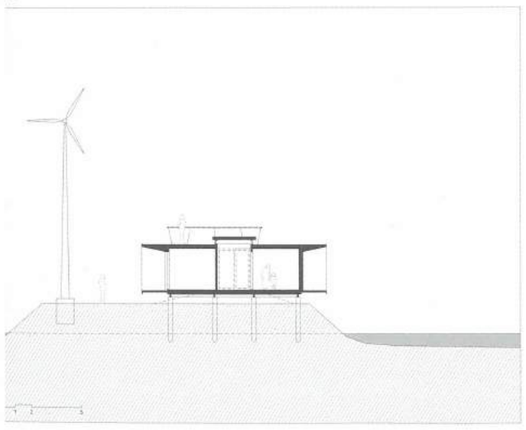

由16个桩基支撑悬浮于湿地地面，两侧出挑的阳
水平屋顶平台可以提供不同的湿地景观点。

as elevated above the ground with 16 steel
ts; the cantilevered verandas on either side and
horizontal roof can provide a panorama of the
land landscape.

Dwelling on the Ecologically-sensitive Land

Cities on the plain have "buffer zone" such as wetland, situated at the intersection of rivers and land or that of oceans and land, subject to the changing hydrologic cycle in the form of flooded areas or intertidal zones. It's rather inappropriate to build heavyweight structures on the ground in such areas because the hydrologic changes tend to damage the foundations as time goes by. But if a lightweight structure is elevated above the ground with self-supply of resources and waste being disposed, it is practical to build such structure that could attract tourists. There are so many buildings ranging from fishing houses to luxury resort hotels that demonstrate the technical potential and prerequisite of building structures on the ecologically-sensitive land.

Hong Kong, a metropolis of skyscrapers, boasts the unique landscape of Tai O fishing village, once a major port where troops were stationed. It has been a strategic village for the fishing and salt industry over the last century. For centuries, fishermen have been living on the soil. They built huts along the coast and settled down because living on the flat ground brought them no sense of security. The huts are built along the either side of a river in the center of the village. They are all connected with part of hallways crossing the neighbor's living room or kitchen, which forges a close relationship within the community. A traditional hut is designed in accordance with a fishing boat, with its front for daily life and its back for exposing things such as salted fish and kelp to the sun. The numerous huts, intertwined waterways and bridges constitute the unparalleled eye-catching landscape.

Situated at the sprawling coastal wetland in the south-east of Shanghai, the Workstation for Dongtan Wildlife Sanctuary with a building area of some 100 sqm was completed in 2011 by the team. Within the station, there is a multi-function exhibition hall of 30 sqm, a work space, a set of kitchen and bathroom facility as well as a viewing platform on the roof. It not only helps the patrol officers improve their work and living conditions, but it provides the venue for education on wetland preservation as well. The structure is customized on the basis of the prefabricated box-shaped building system by the team, with its components produced by small workshops in Jiangsu province and local carpenters and transported to the site to be assembled. The work on the site includes three-day foundation construction and one-day hoisting and assembly. The entire structure is movable or detachable without producing any waste. Various environmental solutions ensure the coziness inside both in summer and winter. Nature light, ventilation equipment, solar panel and the rainwater collection equipment have been integrated. The sewage and waste are separated, degraded and discharged. The station provides modern and pleasing work conditions with its construction and use having few negative effects on the environment, reminding us of "Hu", the prototype of stilted houses and the origin of Shanghai.

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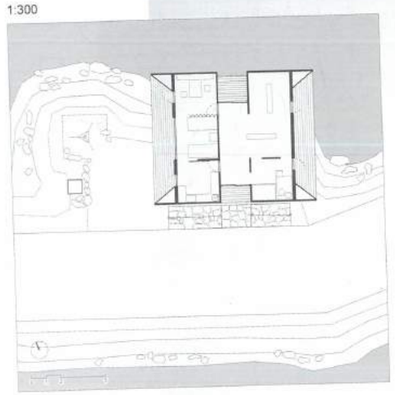

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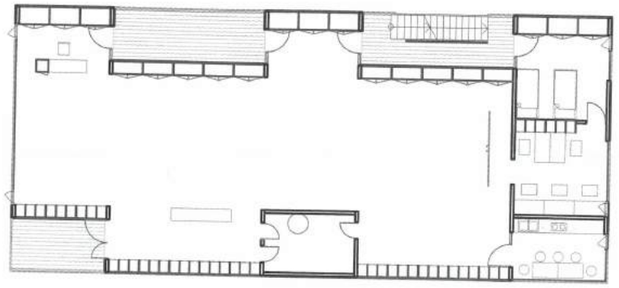
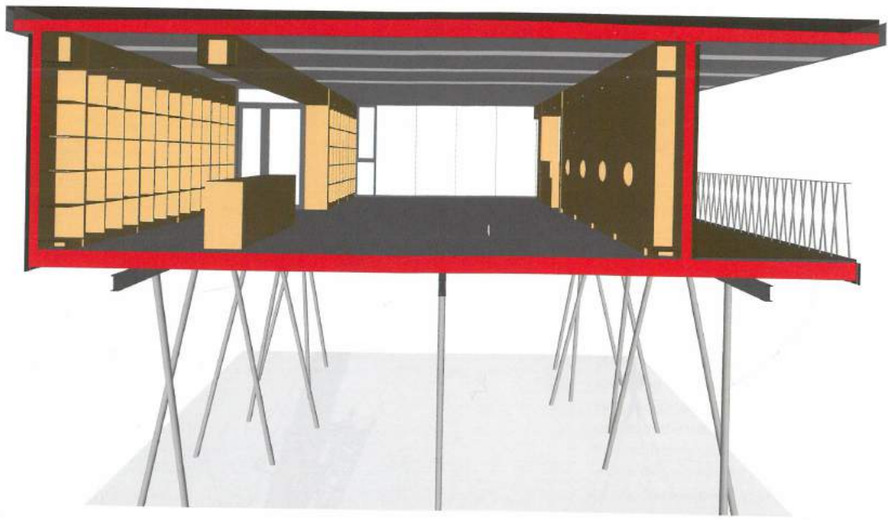
建筑由两个标准箱体模块和两个阳台箱体模块组成，集成了离网发电系统和雨水收集、排水处理系统；房屋提供工作人员日常生活、工作空间及展览宣教空间。

The structure composed of two standard container modules and two veranda modules, with the off-grid power generation system as well as rainwater collection and drainage system, not only helps the patrol officers improve their work and living conditions, it also provides a venue for education on wetland preservation.



平面图 →
Floor Plan

剖面图 ↓
Section Plan

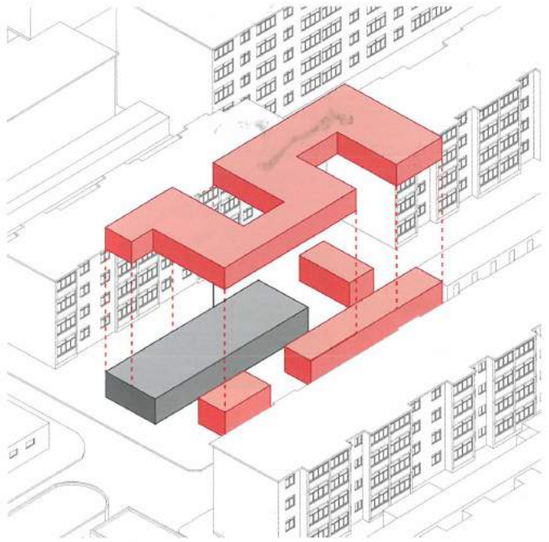


长江流域更多的自然保护区与禁猎区注意到上海南汇东滩工作站这一先进的设计成果，由此诞生了鄱阳湖南矶湿地保护区工作站。它完成于2015年，位于南昌城郊南矶湿地保护区的入口处。使用钢质撑脚将建筑物架空，规避一年一度的变化莫测的长江洪水。工作站建筑面积约500平方米，包括一个300平方米的多功能展厅、多组工作空间以及整套厨卫设施。屋顶设有大型观鸟、观星平台，多处阳台展示湿地不同方向的景色变化。这座站点帮助改善了科学考察、监护人员的工作生活条件，在洪水季节成为进出湿地岛屿的渡口码头，也提供了非洪水季节对访问者进行环保教育的理想场所。

More and more nature reserves and wildlife sanctuaries along the Yangtze River have come to notice the outstanding achievements of Dongtan. The Workstation for Poyang Lake Nanji Wetland Reserve, Nanchang thus came into being. Located at the entrance of the reserve, it was completed in 2015. It was elevated above the ground with steel stilts to resist the changeable flood from the Yangtze each year. With a building area of 500 sqm, the station has a multi-function exhibition hall of 300 sqm, work spaces, a set of kitchen and bathroom facility as well as a bird observing or star-watching platform on the roof. The balconies display various landscapes of the wetland. It helps the scientific research personnel and supervisors improve their work and living conditions, serves as a ferry dock leading to the wetland islands during the flood season and provides an ideal venue for education on environmental protection during the rest of the time.

↑ 鄱阳湖自然保护区访客中心中庭内景，挑
大空间满足展览与宣教活动功能，通过
模块之间的间隙优化室内采光。

Interiors of the atrium in the Workstation
Poyang Lake Nature Reserve that provid
spacious venue for exhibition and educat
on wetland preservation, with excellent
lighting due to clearance between roofin
modules.



建成区平屋顶的增建

城市化进程和人口的大量涌入促使城市密度不断增高，这在内地往往通过拆除旧建筑与建造高层建筑这样费时费力、污染浪费巨大的方法来解决。而在欧洲，通过轻型结构增加使用面积也是城市更新的常见手段：它可以是使用大型轻结构覆盖传统的庭院空间；可以是在平屋顶增建轻型建筑；可以是使用原有的屋面木制结构下的阁楼；甚至可以是在建筑立面附加、悬挂轻型建筑或组件。

这个针对中国北方社区长者照护中心的研究方案由中大硕士研究生南天做出。方案基地位于河北邢台的一个典型居住社区内，人口老龄化十分明显且缺乏配套养老服务设施。此方案就是利用轻型建筑自重轻、易建造的优势，在社区内一处平房的屋顶上加建，扩充其空间容量，成为新的社区老年中心。空间与功能上，轻型建筑可灵活布置，将原有平房包裹在内来提高其热舒适性。首层以老人的公共活动娱乐为主，空间体块为东西走向，结合原有平房围合中间的通道式公共空间。二层则是新加建的供老人居住休息的空间，体块上挖出三个南北走向的院落空间供老人在室外静养活动，通过院落利用当地阳光、气候提高居住舒适性。结构与建造方面则采用预制家具模块的组合形成家具墙，既是承重、围护结构，也吸收了衣柜、书柜等家具功能，同时高度的预制化使现场施工变成家具模块快速而精确的互相拼接，避免了通常的大拆大建，也使得养老企业的更多资源得以运用在人力与日常看护上。

Densification in the Built Area

The urbanization drive and influx of population lead to increasing density cities, which is usually solved by demolishing old buildings and building high-rises in mainland that costs much time and energy and pollutes the environment. In Europe, a common approach to urban renewal is to increase the net area through lightweight structures: for instance, replac a traditional courtyard with a large-volume lightweight structure; buildin such structure on the flat roof or the attic under the wooden roofing; eve attaching or hanging structures or components to the facades.

The proposal for elderly's nursing center for the existing community in northern China was made by Nan Tian, a graduate from the School of Architecture, CUHK. The site is located in a typical community in Xingtai, Hebei province, where the aging of population is notable and there is a la of supporting facilities for the seniors. According to the fact that highligh lightweight buildings of light deadweight, easy to build, a new building is be constructed on the roof of one of the bungalows to serve as the new center for the old. It will wrap up the original bungalow to promote the thermal comfort. In terms of the space and functions, lightweight buildir are flexible in arrangement. The first floor that encloses the central publ space (a hallway), running west-east, is for public recreational activities. The second floor is the extended space for the seniors to live and rest wi three courtyards running south-north for them to relax outdoors. The sunlight and local climate felt through the courtyards make the building more comfortable. As for structures and construction, the walls are assembled with prefabricated furniture modules to bear the weight, encl the space and serve as wardrobes, bookshelves, etc. In addition, the prefabrication turns the site into rapid and precise assembly of furniture modules, preventing the otherwise painful actions of demolishing and constructing. More resources could thus be channeled into recruiting personnel and raising the quality of daily care.

↖ ↑

用轻型结构在小区住宅楼之间的附属用房上加建，围合出不同的院落，丰富城市空间。

The extension of subsidiary buildings between residential buildings with light structures enriches urban spaces.

↑

用轻型结构在工业大厦屋顶加建试验型农场及其上的村落，还原原有村落空间。

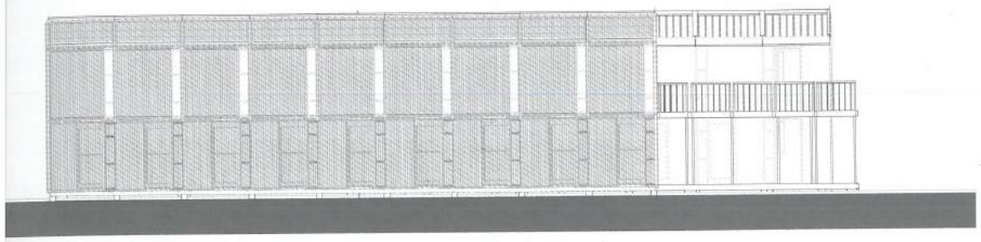
Building experimental farms and villages on the roofs of industrial buildings with light structures could restore the original countryside spaces.

中大硕士研究生杜琼玮呈现了轻型建筑帮助解决社会问题的可能，她利用轻型建筑将香港常见的工业大厦屋顶转变为香港潜在的用地。这一项目选址在香港新界粉岭地区，新用地可以帮助安置即将因为市区扩展而拆迁的村落及其自耕农民。由于粉岭地区的居住形态十分多样，所以留住原有的村落空间对于保持其城市空间多样性很有意义。设计者以工业大厦屋顶作为剪切板，去剪切原有的村落，并将其移植到相应的工业大厦的屋顶，同时有机农场、无土栽培等新型农业生产场所可以进入工业建筑内部或顶层。轻型建筑的参与使工业大厦变得诗意与宜人，不仅留住了空间记忆与原有产业，也为原来的居住者提供了更佳的的宜居性；在减少土地紧张引发的社会、产业冲突的同时，也立体化了城市空间的多样性。

Du Qiongwei, a graduate from the School of Architecture, CUHK proves that lightweight buildings can mitigate social conflicts. She transforms the common roofs of the industrial blocks in Hong Kong into potential plots with such structures. The site is situated in the Fanling District, New Territories. The new plots could help relocating the villages to be demolished because of the urban extension and their peasants. Retaining the original villages is significant for keeping diversified urban spaces as living patterns in the district are quite diverse. The designer intends to remove parts of the villages onto the roofs in the downtown. Meanwhile, emerging agricultural sites such as organic farms and soilless cultivation are allowed to enter the industrial buildings and their top. Such move not only retains the spatial memories and the original activities, it also makes the building more pleasing for the original peasants. Lightweight structures make industrial buildings more poetic and agreeable, reducing risks of social and industrial conflicts caused by lack of land and diversifying urban spaces.

加建轻质结构房屋在工业大厦的屋顶，利用主体结构强度活化工厦建筑，增加香港用地面积。

Building light structures on the roofs of industrial buildings; the high density of main structures can vitalize such buildings and increase the amount of plots in Hong Kong.



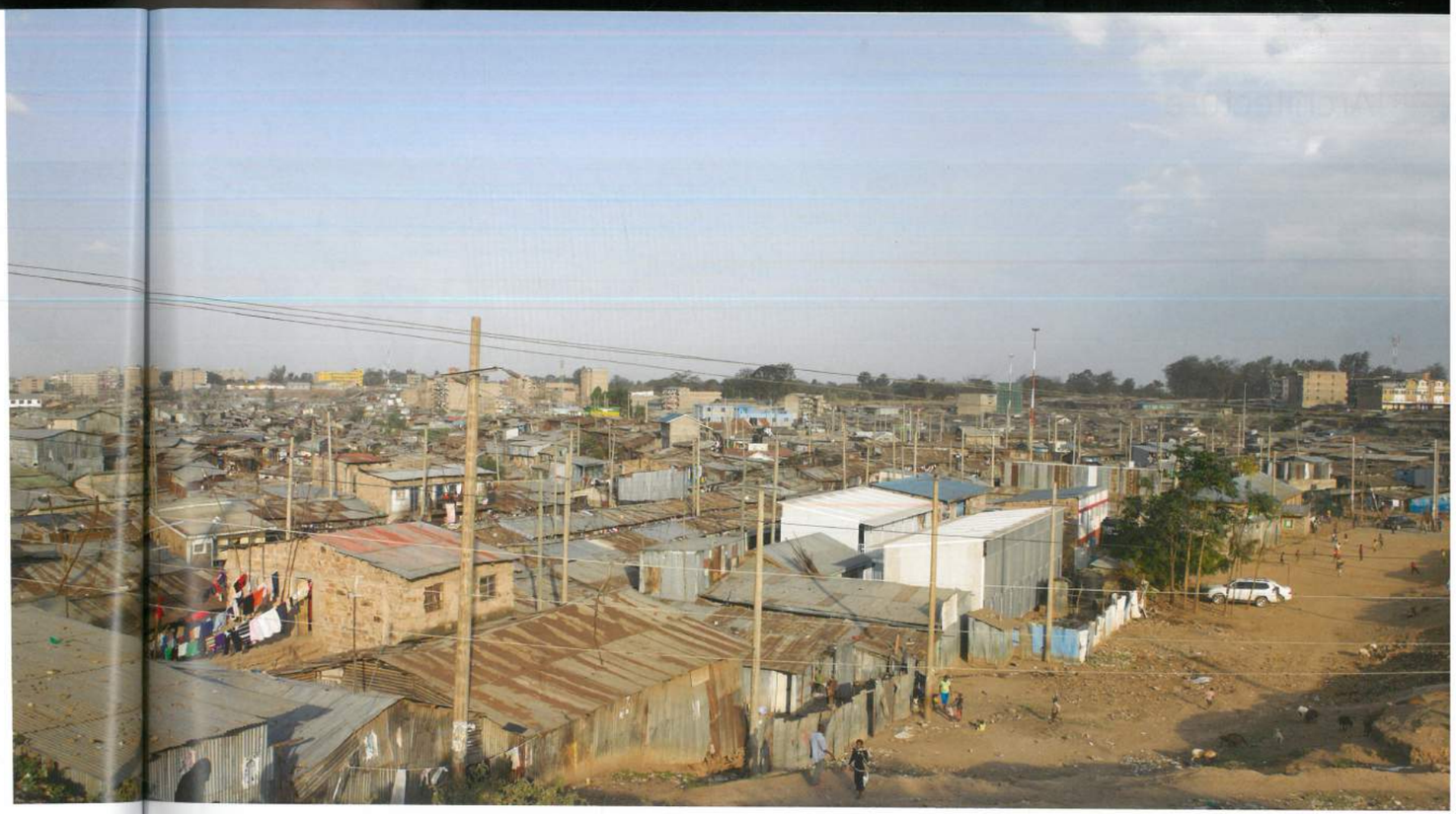
面可推拉的金属铝格栅遮阳构件，具
热和一定的防护作用。

des with adjustable solar-shading
inum gratings can insulate heat and
ct the building.

益复杂用地的更新

民窟又称为贫民区（slum），可以说是各国都市化过程中的
现象。联合国人类居住规划署将它定义为"以低标准和贫穷
基本特征之高密度人口聚居区"。贫民窟常有犯罪、毒品、违
建筑、垃圾、饮水等问题，无论发达国家或发展中国家都面
这种困扰。贫民窟数目近年因第三世界市区人口膨胀而大幅
加，一份联合国人居署于2006年发表的报告称英联邦国家的
民窟住有3.27亿人，接近当地六分之一的人口。在四分之一
联邦国家之中（11个非洲国家、2个亚洲国家、1个太平洋国
），超过三分之二的市区人口居住在贫民窟中。根据最新的
界银行报告，2007年到2009年间，肯尼亚的城市人口增加了
7万人，其中36.6万人住在所谓的"贫民窟"中；尼日利亚城市
口增加587.6万人，其中241.7万人去到了贫民窟；而中非共
国城市人口增加7.5万，贫民窟人口却增加了9.1万。如果以
客的眼光来回顾历史，自1978年联合国人居署成立以来，全
的"贫民窟"伴随着都市化或者街区的"绅士化"（Gentrifica-
n）有增无减，"未来的半个世纪里20-30亿人最有可能的去
是贫民窟"。由于自然的力量角逐，贫民区存在非常复杂的地
社会组织，而由于许多国家还在急速城市化的过程当中，倘
没有外部组织的有力干预，改变贫民区，哪怕只是提供基本
公共设施都是非常困难的。

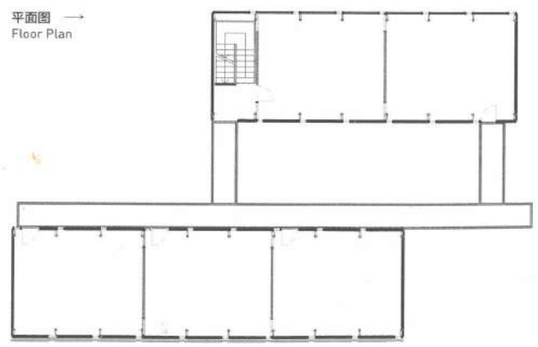
2014年中国驻肯尼亚经贸协会在内罗毕贫民区中援建一所小学，委托中大团队进行设计建造。由于预制系统在这一项目中面临高昂的海运成本，如何在装箱体积上减少浪费成为一个重要的设计议题。中大团队在这个设计中采用了一种新颖的可折叠或展开柱子的框架式体系。这样的设计主要源于几个方面的考虑：首先贫民窟的社会关系、土地权属比较复杂，学校放假时间不长，现场施工时间应越短越好，采用搭积木的方法将节省现场时间；主体结构在中国完成将解决肯尼亚产业不全带来的质量控制问题；为了节约货运的成本，建筑材料打包进入集装箱后要尽可能节约空间，货运中把房子压缩成板到现场后再很快的提升起来，无疑是节约运输空间的有效办法。上部结构的现场施工最后在两周内完成，现场施工人员除了两位来自中大和一位来自国企外派的吊车司机是中国人，其他十几名工人均来自当地贫民窟，甚至有学校学生的家长。这些工人并未接受过专业的施工训练，却不乏理解能力和好奇心，看着自己的劳动让原本一片一片的平板逐渐变成立体的结构，他们也异常激动，甚至主动要求周末加班。虽然Mathare Valley贫民区在地理上被分割为多个势力范围，但是左邻右舍们都将这座学校看成自己的财富，校长甚至说这座房子本身将成为内罗毕一个著名的景点。

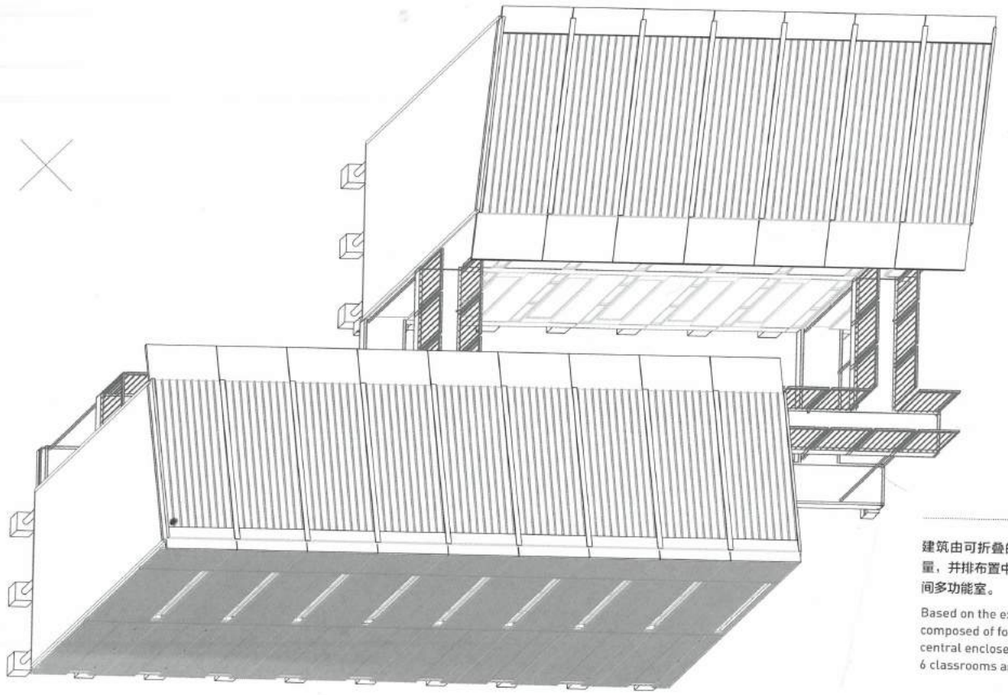


远眺贫民窟中的MCEDO北京学校，纯白的体量在杂乱无章的贫民窟中也非常醒目。

MCEDO Beijing School with white facades is rather notable in the disorderly slum. ↑

平面图 →
Floor Plan





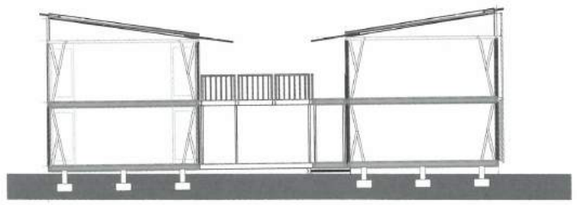
建筑由可折叠的模块箱体组成，延续现有学校体量，并排布置中间围合活动场地，提供6间课室与4间多功能室。

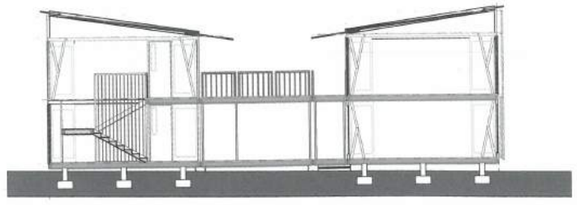
Based on the existing volume, the building is composed of foldabe modular components with central enclosed areas for activities side by side, 6 classrooms and 4 multi-function rooms.

Renewal of Land with Ownership Dispute

Ghetto, also called "slum", is very common in the urbanization drive across the world. It's defined by the United Nations Human Settlements Programme as "a densely populated area of extreme poverty". Issues such as crime, drug, illegal construction, garbage and the lack of potable water are ubiquitous in slums. All the countries, developed or developing, are confronted with such headache. The number of slums has been on the sharp rise as the urban population in the third world rockets. A 2006 report by the programme shows that 327 million people live in slums in the Commonwealth countries, accounting for nearly one sixth of the local population. In one fourth of such countries (11 African, 2 Asian and 1 Pacific), more than two thirds of the urban population live in slums. According to the latest report by the World Bank, the urbanites in Kenya rose by 767,000 in number between 2007 and 2009, of which 366,000 people live in so-called slums; the urban population in Nigeria rocketed by 5.876 million, of which 2.417 million moved to slums; in the Central African Republic, its urban population rose by 75,000 while the slum population increased by 91,000. If we review the past through statistics, since the programme was founded in 1978, the number of slums worldwide has been on the rise with the urbanization or the "gentrification" of communities; "in the next 50 years, it will be most likely for the 2-3 billion people to move into slums." There are extremely sophisticated illegal organizations in the slums because of the natural competition for dominance. Without powerful external forces to intervene, it would be rather hard to provide basic public facilities, not to mention transform these areas, as many countries are still undergoing rapid urbanization.

In 2014, Kenya China Economic and Trade Association in Nairobi intended to donate an elementary school and commissioned the task to CUHK team. The major subject is about how to make the best use of containers as shipping prefabricated structures could cost much. The team adopted a novel foldable framework system with columns that could be unfolded, for several reasons. First, the social connection and land ownership in slums are more complex. The construction cycle should be as short as possible due to fewer holidays for schools. Building blocks would save the time. The major structure produced in China could solve the problem of poor quality control caused by the underdeveloped industries in Kenya. To reduce the costs of freight, rooms should be saved as many as possible after the materials are packed into containers. It is undoubtedly the most effective way to save rooms by compressing the building into plates and restoring them upon arrival on the site. The construction of the upper structure was completed within two weeks in August by three Chinese builders-two from CUHK and another was a crane driver dispatched by a state-owned company as well as a dozen of workers from slums, some of which were even the parents. They had never been trained but were quick to understand things and excited when turning the plates into three-dimensional structures. They even wanted to work overtime on weekends. Despite the fact that Mathare Valley slum had been divided into several spheres of influence, the community regarded the school as their property; the School Principal even said that the building itself would make a well-known tourist attraction.





二层教室室内效果，两侧的Y型柱让人联想和意
到折叠箱体的搭建。

Interiors of a classroom on the 2nd floor with the
Y-shape columns on either side reminds us of th
assembly of foldable components.

↑←

化开发时序

建筑除了有助于发现潜在用地，促进城市化与
，它还可以瞄准土地使用的最终目标——创造
，在时间上见缝插针，帮助到用户、组织者、
者与管理者。农历7月来香港旅行的人们有机会
港各区的公共球场看到大规模的竹戏棚搭建，
暂密集的孟兰节活动之后，这些竹棚又会在两
内消失得无影无踪。在极为繁华、地价昂贵的
湾大坑，或者在相对偏远的新界北区或者离岛
，人们都能发现相似的搭建场景。在这个每年
复进行的活动中，政府出借各处的公共球场并
活动秩序，组织者、戏团、宗教团体、同乡
街坊通过筹措资金、提供服务及组织活动，在
的现代化都市中创造出稍存即逝的、充满文化
气息的场所。建筑结构、活动组织以及精神结
高度契合，使得香港潮人孟兰胜会在2011年被
第三批国家级非物质文化遗产名录。

Time Use in Development

Lightweight architecture is helpful in spotting potential plots and facilitating urbanization and development. Moreover, it is aimed at creating values-the ultimate goal of land development. It could help users, organizers, developers and city planners by seizing every opportunity. In July on the lunar calendar, visitors could witness the installation of bamboo sheds for plays on the public pitches across Hong Kong. But following the transient activities for the Ghost Festival, these sheds would vanish within two or three days. But such sites could be found in the most prosperous Tai Hang, Causeway Bay, where the land is dear, the remote North District of New Territories or Islands District. In this annual event, what the government needs to do is rent out the public pitches across Hong Kong and keep order. By raising funds, providing services and organizing activities, the organizers, troupes, religious groups, natives associations and the communities create the transient cultural site amidst the hustle bustle of the metropolis. The festival was added to the third batch of National Intangible Cultural Heritage List due to its perfect integration of architecture, events and culture.

孟兰节盛会期间每年都有大量市民参与其中，竹棚也成为香港一道独特的风景线。

Plenty of residents join in the activities at the Ghost Festival; the bamboo huts have thus become a unique landscape of Hong Kong.

↑ ↖

活动结束后，竹棚的屋面金属薄片与竹子都会细致的回收保管等待来年再次搭建。

After the festival, the metal roofing and bamboo components of the huts will be recycled and preserved for next year's activities.

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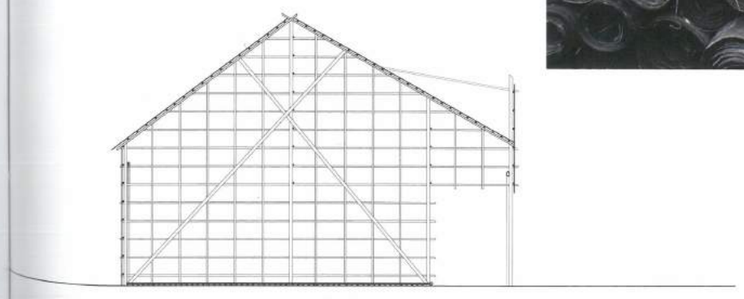

这是坐落在瑞士苏黎世劳申巴赫（Leutschenbach）的一处学校，它外部建筑风格简约，室内气候良好。作为瑞士布鲁姆·勒曼公司（Blumer-Lehmann）在过去的几年中完成的一系列学校建设项目之一，它用于在克里斯蒂安·克雷兹（Christian Kerez）设计完成的正式校舍落成前支持教学功能。这座功能完善的校舍施工快捷、安置简便，还可以重复使用。即使对于瑞士这样的先进国家，在新开发的城市街区也会有学校与办公建筑的设置需求，而另一些使用者（例如大学研究所）有时需要在短时间内产生额外的空间，模块化临时建筑成为这种任务合适的解决方案。现代模块房屋经由严格的工业制造与科学测试，可以满足严格的生态、能源、空调、结构和隔音要求。尽管名称临时，但它们其实可使用许多年，并且可以提供商业、工业、行政、教育、住宅和零售等不同功能。

↖ ↑ ↗

通过高度的预制化与优良的设计，房屋在快速完成搭建的同时也保证了极高的品质。

The prefabrication and excellent design ensure the rapid construction and outstanding quality.

This is a school located in Leutschenbach, Zurish, with simple facades and comfortable interior. It's one of the campus projec by Blumer-Lehmann in the past few years, designed to facilita teaching activities before the school building by Christian Kere implemented. It's convenient to construct the reusable buildin with complete functions and a short life span. Even in Switzer-land, such a rich country, the newly developed urban blocks st need school and office buildings. Other users such as college research institutes sometimes call for extra spaces within a sh span. Modular temporary buildings serve as an appropriate solution. After going through rigid industrial manufacturing an scientific tests, modern modular structures could meet the stringent demands in ecosystem, energy, air-conditioning, structure and sound insulation. They could be used for many years and provide a venue for businesses, industries, administ tion, education and retail, or serve as housing.

坐落在奥地利布雷根茨（Bregenz）附近小镇的学校建筑由奥地利建筑师胡戈·德沃扎克（Hugo Dworzak）于2012年设计。它为附近社区增加的人口提供了小学和幼儿园，施工快捷，预期使用大约5年。这座建筑一层钢结构使用了大量OSB板作为蒙皮材料，严格的设计带来了良好的的舒适性、能耗表现，也产生了重型建筑不易获得的亲切感与趣味性。

城市的终极产业是服务业与智慧产业（第四产业），它们或者配搭生产与需求，或者创造需求；它的人群对环境有高要求，对地段区位也十分敏感；它们间接促进了城市的宜居与人才吸引。但城市从第二产业向第三产业的转变并不能一蹴而就，在第三产业发展阶段，也不断会出现迭代更新的现象，这些演化都给轻型建筑的应用带来了机会。目前各地城市热衷举办艺术、建筑、城市双年展，往往选址于有待产业升级的工业区，通过提供轻型建筑获得中、小型空间。即使它们中的多数未必由有能力的建筑师主导，欠缺良好的热物理性，也不一定能在拆散后异地重建，但轻型建筑所制造的浪费与污染远远小于重型建筑，并且易于根据未来发展进行变更。如果设计师的技巧与管理者的远见能够更好地结合，轻型建筑在城市开发中将不囿于起到在初期聚集人气的短暂作用。根据发达国家的经验，轻型建筑的热物理性能以及外观精度可以达到和重型建筑相媲美的程度，可以提供长期的公共设施或者住房，因应社区的需求或短或长地存留下去，甚至形成产品对外输出的新兴产业。

Situated in a town nearby Bregenz, the school building was designed in 2012 by Hugo Dworzak, an Austrian architect. It houses an elementary school and a kindergarten for the additional population in the neighboring communities. It was constructed within a tight schedule with expected life span of about five years. The one-storey steel structure uses plenty of OSB as envelope materials. The elaborate design brings about comfort, energy efficiency as well as intimacy and interest for kids, which is unimaginable from heavy buildings.

The ultimate activity of a city will be the service activity and the "wisdom industry" (i.e. the fourth industry) which cater to a group sensitive to location, with higher demands for the environment. They either supplement production and demands or create the latter, indirectly making the city more livable and attractive to the talent. But the urban transformation from the secondary activity to the tertiary industry cannot be made within a short period. During the development of the tertiary industry, iterative renewal would constantly take place. Such evolution has brought opportunities for the application of lightweight buildings. Nowadays cities are keen on hosting biennales in art and architecture. The sites are often industrial parks to be upgraded. Small and medium-sized spaces could be created through construction of lightweight structures. Even if most of them, not designed by competent architects, have poor thermo-physical properties and less likely to be reconstructed in other sites, the waste and pollution caused is much less than that by heavyweight buildings. And they could be transformed according to future plans. If the know-how of architects could be integrated with visions of planners, such structures will play a far more significant role in urban development than just increasing popularity or population at the beginning of erection. The experience of developed countries shows that they are able to serve as long-term public facility or housing because their thermo-physical properties and accuracy of facades could rival the heavyweight structures. They should be maintained, either in the short run or long run, in accordance with the demands of the communities to shape an emerging industry exporting commodity.

→

整面的落地玻璃使得建筑拥有良好景观与采光，室内外得以紧密联系。

The large windows ensure beautiful landscape and lighting, integrating the interior with the exterior.

眺望美姑红丝带民生爱心学校教室与宿舍群，落
于桩基之上的红色与灰色量体漂浮于坡地。
lassrooms and dormitory complex in Meigu
harity School, with red and grey volumes
evated above the slope.

结语

上文阐述了建筑的轻型化如何帮助开发者或管理者找到潜在的土地资源与时间价值。当这两种方法被有效联合运用时，成效将是惊人的——新的物种与能量将会形成。如果城市是如同森林一样复杂的生态系统（Forest Ecosystem），当组织者看到了乔木主体的生物群落（高层建筑与重型建筑）时，看到了灌木与草本（轻型建筑与低层建筑）的重要性了吗？灌木是怎样与非生物环境（光、热、水、气、土壤等）互动，进行物质交换、能量传输的呢？灌木是怎样与乔木互依共存的，而非简单竞争的呢？这些议题既是有趣的，也开启了很多应用的新途径。

如果人们再用生命演化来比拟工商业活动，会发现生物所有的消耗其实围绕着两个目标：一是向在独特环境中具备优势或拥有环境适配能力演化，二是繁衍能够继承这种优势的后代。这两者不是分裂的前后关系，而是以迭代的、永无止境的方式进行着的。如果开发者、设计者、建造者都认可这一方向，那么建筑的每一次开发与设计投入将可以另类方式来计算，而不是低买高卖的简单数字游戏：1、产品能否被反复使用？如果答案为“是”，那么它的投入成本应该被分摊在全寿命次数当中来进行计算，产品也将呈现耐用品的特征，不再是一次性的廉价产品。2、所获得的产品是否是环境中独特的物种？答案是意味着试验的投入，但在激烈的工商业竞争中，它所带来的独特体验或者宣传价值，总体上是机会而非代价。3、产品能否拥有适应环境变化的能力？这里轻型建筑具有远超重型建筑的机会。如同草本、灌木的物种数量远多于木本一样，轻型建筑的系统类型多过重型建筑，材料选择、实施方式、几何级配、功能形态，这些维度上的细小变化都能带来产品样貌或者性能参数的巨大改变。当研究者和工厂联合工作时，当设计师能够深入材料供应端进行调节时，层出不穷的产品就会出现。

如前面的案例所描述的，轻型建筑的迷人世界已包括住宅、商业、学校和办公室。它可以出现在城市郊区，也可以位列核心。轻型建筑是可再生的，易于本地化的，也与传统有关。它不仅可以是居民自助搭建的小型棚屋，更可具有精湛的技术特性，来自于研究机构、事务所与工厂。它可以是美丽与感性的，也可以是耐久与精确的。全球领域内负责任的发展商、建筑师、研究机构、工业企业现在都开始选择轻型建筑，以金属结合真正环保的材料木材，高效利用资源，创造能够带来希望的财富，也创造复杂的产业体系。轻型建筑的技术研究方向将是针对节能与可持续性建造，应用研究方向则在于如何向包括城镇在内的场所提供多样性的产品。专业知识和创新方案需要与持久的管理和有远见的决策相结合，这样产业优势的确立与社会观念的更新才能同步发生。

Summary

The aforesaid projects shed light on how lightweight buildings can help developers or planners spot the potential land resources and time value The effective application of these approaches combined could produce outstanding achievements-the emergence of new "species" and energy. city resembles a complex "Forest Ecosystem", are the organizers able to realize the importance of bushes and herbage (i.e. lightweight buildings low-rises) after noticing trees as the main biota (i.e. heavyweight buildin and high-rises)? In what way do the bushes interact with the abiotic environment (such as light, heat, water, atmosphere and soil) and excha matter and energy? How can the bushes coexist, not compete with the trees? These intriguing subjects usher in many new paths to application.

If we compare industrial and commercial activities to life evolution, we w find that all the consumption of creatures is to achieve two purposes: gaining an edge or the adaptive capacity in a unique environment as well reproducing offspring that could inherit such advantages. They are not prerequisite to each other, but being achieved in an iterative and endless way. If the developers, architects and builders could recognize that, all th development and design phases could be calculated in a novel way, no longer a simple game of figures in which products are bought low and so high. First, could products be recycled? If the answer is "yes", their costs should be calculated by dividing the times of usage. In this sense, they w be no longer disposable products, but display the features of durable goo Second, are those products unique in the environment? It depends on repeated experiments. But amidst the fierce competition, the unparallele experience or publicity value brought about means opportunities instead costs. Third, could the products adapt to the changing environment? Lightweight architecture has created far more opportunities than the heavyweight. Just as bushes and herbage outnumber trees in species by huge margin, types of lightweight architecture outnumber those of heavyweight architecture. Tiny variation in material selection, constructio method, geometrical gradation and functions will make a huge differenc on product appearance or performance parameter. When researchers an factories work together, architects could communicate with material suppliers, diversified products will come into being.

As in the cases above-mentioned, the enchanting world of lightweight architecture includes housing, businesses, schools and offices. It could b seen either in the suburb or downtown. It is recyclable, site-specific and relevant to tradition. It could be either small huts installed by inhabitants buildings with advanced techniques by research institutes, design studios factories. It could be either beautiful and emotional, or long-lasting and accurate. The responsible developers, architects, institutes, industrial fir worldwide are committed to the efficient use of resources through lightweight buildings made of metal and eco-friendly timber in order to bring wealth and hope as well as sophisticated industrial systems. The technical research on such structures will zoom into energy efficiency an sustainability while the applied study will be about how to provide diversi products for cities, towns and so on. Expertise and creative proposals nee to be combined with long-term management and visionary decision-mak to establish advantages of industries and usher in evolution of social noti