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# Mixed-Use Supertall Building as the Approach to Shaping Dense Vertical Urbanism | 超高层综合体作为高密度垂直城市的实现途径



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## Abstract | 摘要

In the pursuit of denser, more concentrated sustainable cities which reduce the loss of open space and energy-intensive transport and infrastructure networks, tall buildings have an opportunity to reinvent themselves as the typology for a sustainable urban future. As we face the challenges of the future population explosion, urban renewal and climate change, tall buildings can become focused centers of live, work, play and even transportation activities, through innovative forms, technologies and environments. Based on the above thinking, this paper explores the new paradigms of tall buildings, inspired by local environmental factors and cultural/vernacular traditions. It also shares and reflects upon the research achievements of the joint studios between Tongji University and CTBUH in Chicago, 2013; New York, 2014; and Miami, 2015. This paper also introduces 9 different prototypes developed by the research studios as examples of how tall buildings can take a strong role in shaping dense vertical urbanism.

## Keywords: Adaptability, Connectivity, Low carbon, Sustainability, Urban Design, Verticality

在通过城市公共空间复兴、密集型基础设施网络建设以形成更集约可持续的城市发展背景下，高层建筑正面临着转型的大好机会——它们应是集工作生活娱乐甚至交通于一体的城市中心，其中饱含创新的形式、技术和环境来面对人口爆炸、城市更新和气候变化的挑战。基于上述思考，本文通过对城市环境要素和当地文化传统的挖掘，探寻高层建筑的新范式。本文还对同济大学和世界高层建筑与都市人居学会在2013年的芝加哥，2014年的纽约和2015年的迈阿密开展的联合设计课程的成果进行分享和反思，并介绍了在课程中发展的9个代表性高层建筑范式，以作为高层建筑作为高密度垂直城市塑造重要角色的示例。

**关键词：**适应性、连通性、低碳、可持续性、城市设计、垂直性

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## Preface: Tall Buildings in the Dense Urban Habitat

Along with the acceleration of world population growth and urbanization processes, by 2014, the 2% surface of the earth that is covered by cities already contained 53.4% of the world's population (World Bank, 2016). In recent years, consciousness has been raised about restricting urban sprawl and minimizing the impact of urban development on nature. The idea of sustainable development emerged in a period of economic recession and the global energy crisis of the 1970s. It became a mainstream theory and gained the general consent of developed countries in the 1980s. In the context of sustainability, urban areas are regarded as both the source of sustainability's challenges, as well as the key to the success of sustainable development in the future (Yang DF., 2010).

## 引言：高层建筑与高密度都市人居

随着世界人口持续增长以及城市化进程加速，在2014年，仅占地球2%表面积的城市土地已承载了53.4%的人口（世界银行，2016）。与此同时，限制城市发展对自然环境影响的可持续发展理念已深入人心。1970年代在西方经济衰退和全球能源危机的背景下，可持续发展作为全新的理念应运而生，并在1980年代逐渐成为一种主流的声音，并得到社会的普遍认同。在可持续发展理念的影响下，城市地区即被视为造成不可持续问题的现实根源，也被看作实现可持续发展的未来希望（杨东峰等，2010）。在这样的背景下，高密度已成为城市发展的必然趋势，城市必将在未来更为紧凑，呈现出更高更立体的面貌。而通过混合使用开发将更多城市功能引向空中也已经成为高层建筑未来发展的重要方向。

然而在现阶段，城市中的高层建筑往往是实现土地价值最大化的媒介，抑或建造者

Under these circumstances, dense habitat is already becoming the inevitable trend of urban development. Our cities will definitely become more compact and volumetric in the future. And through mixed-use development, bringing more urban functions into the sky has already become an important trend for future tall buildings.

However, most tall buildings that have actually been constructed in contemporary cities are merely tools for maximizing the value of a real estate plots or symbols of power and ambition. The relationship between the building and its location is predominantly either a commercial one or a visual one. Thus these buildings are largely divorced from the specifics of the place they inhabit – physically, culturally, environmentally and, often, socially (Wood, 2014).

Even if the technologies, efficiencies and performance of high-rises, especially supertall buildings, nowadays have improved, we can hardly claim they are less expensive, energy-wasting and closed off than low-rise buildings of prior generations. The main factors that determine the structural cost of “supertall” buildings of 300 meters and higher include: architectural modeling and floor plan layout, the need to fortify the building against seismic and wind loads, structural system selection and materials, etc. The cost of constructing supertall buildings in China is 9–30 times higher than that of traditional small scale low-rise buildings (Ding JM., 2014). The material per unit area of supertall buildings is much higher than normal buildings, and the need to produce more building materials requires greater energy consumption (Fan Z., 2015). A rational direction for thinking about the future development of tall buildings might be: how to realize high input and higher returns via the synergies promoted by mixed-uses, to create more possibilities and realize the sustainability goals in the economical, environmental and social dimensions.

The main challenge for the typology of the future is that of creating tall buildings that are relevant to the specifics of place – physically, environmentally and culturally. To realize this, we need tall buildings that maximize their connection to the city, climate and people.

### Opportunity: CTBUH Student Design Research Studio

From 2013 to 2015, three serial collaborative research design studios were undertaken by the College of Architecture and Urban Planning (CAUP) at Tongji University, with

assistance from the Council on Tall Buildings and Urban Habitat (CTBUH) and funding from international architectural design companies as part of the CTBUH Student Design Research Studio Funding. Using the framework suggested above, these studios are based on three real sites and projects in Chicago, New York, and Miami, and are mainly focused on typological research of mixed-use supertall buildings of the future.

As a joint course between CAUP and CTBUH, this research-oriented high-rise studio for graduate students is mainly based on international collaboration. Through multiparty cooperation, the aim of the course is to encourage the professors and students from Tongji University to think, to study, and to research the positive significance of tall buildings for future urban habitats as assessed on the platform of Western advanced theories and experiences. By means of learning from developed countries, the students establish standpoints as architects and scholars, then posit the future development trends of tall buildings.

Students are divided into five groups to complete their proposals through the research, investigation and development stages. The studio proceeds through lectures, presentations, seminars and reviews. The 16-week studio includes four weeks of preliminary study, two weeks of site visits with an overseas workshop, nine weeks of design development and a final review. It's worth mentioning that the funding creates a great opportunity for students to absorb the frontier theories and ideas from first-class architectural design companies, as well as the firsthand materials collected from their investigation. The on-site work obtains great results.

Next, an introduction of the representative results from the three studios, respectively.

### Study: Introduction to Research Results

#### Chicago 2013: Toward Zero Carbon Project Introduction

The project site is located at Wolf Point, Chicago, at the confluence of the North, South and Main Branches of the Chicago River and the convergence of the Near North Side, Loop, and Near West Side community areas of Chicago. At the time of the research studio, the site was a parking lot, and incorporated into the City's River Edge Enhancement Plan. In 2007, the owner, the Kennedy family, planned to develop the property

权力和野心的象征。建筑物与场地的关系要么是实现单一商业功能，要么是单一视觉功能。这些建筑大多与其所在的环境特征毫无关联——不论是物质形态方面，文化方面，环境方面还是社会方面（伍德，2014）。

即便当今高层建筑的技术、效率和性能已今非昔比，我们也无法回避高层建筑（尤其是超高层建筑）相较多层建筑造价昂贵、耗能巨大、系统封闭的事实。超高层建筑工程造价的影响因素主要包括：建筑造型与平面布置、建筑物所在地区的抗震设防烈度和风荷载、结构体系选型和材料等方面；中国超高层建筑的建造造价约是传统普通多层建筑的9–30倍左右（丁洁民等，2014）。高层（超高层）建筑能耗较之一般建筑，主要是多在单位用材；生产更多的建筑材料意味着更多的耗能（范重等，2015）。那么，如何通过混合使用产生的协同效应，实现高投入高回报，创造更多可能性，并实现经济、环境和社会维度相平衡的可持续目标，是高层建筑未来发展更为理性的思考方向。

创造未来高层建筑类型的主要挑战来自建筑与其场所特性的相关性——包括场所的物质特性、环境特性和文化特性。为实现这一点，我们需要最大化地建立高层建筑与城市、气候和人的联系。

### 契机：CTBUH学生研究型设计课程

同济大学建筑与城市规划学院有幸在2013–15年三年间，获得CTBUH学生研究型设计课程基金资助，在CTBUH及国际知名建筑设计机构的协助下，分别在芝加哥、纽约和迈阿密三座美国城市，结合实际项目和基地，开展围绕上述背景的超高层建筑综合体研究型设计课程。

这一课程的目标，即是通过多方配合的国际合作，让同济师生借助西方先进理念和经验的平台思考、学习和研究高层建筑对未来城市人居环境的积极意义。在学习西方先进经验的同时，建立作为建筑师和学者的立场，进而思考高层建筑未来发展方向。

综合授课时间因素将学生分为5组，通过讲座、汇报、点评结合讨论的授课形式，让学生按照“研究—调研—深化”的三个步骤完成课题。16周的课程包括4周的前期研究，2周的实地调研及海外工作营，9周的设计深化，以及最终的联合评图。值得一提的是，CTBUH基金的资助使得学生能有机会在直接接触顶尖设计机构的前沿思想和理论的同时，也对基地及所在城市展开实地调研，这一阶段往往成果颇丰。

接下来将分别对课题组在三个城市的研究成果进行介绍：



Figure 1. 2013 Studio Site in Chicago (Source: CTBUH)  
2013芝加哥课程基地 (来源: 世界高层建筑与都市人居学会)

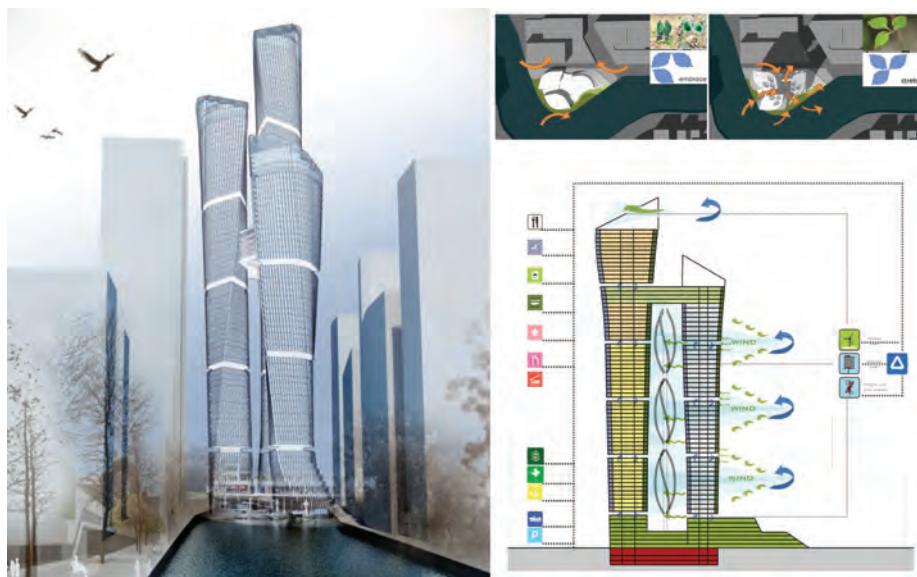


Figure 2. Ventus Tower (Source: Xu Mengya, Jia Tingting, Xu Zhonghua)  
风之塔 (来源: 徐梦雅, 贾婷婷, 许钟桦)

with three high-rises and skyscrapers. In 2012, updated plans were proposed, with several target completion dates over the next decade (Figure 1).

Using the framework of the Chicago Central Area DeCarbonization Plan, which was produced by Adrian Smith and Gordon Gill Architecture in 2009 in response to the challenges faced by the city, this comprehensive design studio is aimed at designing tall buildings that are positive additions to the city's skyline – visually, urbanistically, and environmentally. Students work in groups, and each group works with tutors to establish a unique set of environmental Key Performance Indicators (KPIs) – a set of quantifiable goals that drive the design. These KPIs allow students to work toward the goals set in the DeCarbonization Plan.

#### Wind Capture

Chicago is known as the "the Windy City." The design of Group 5 is based on utilization of the city's wind resources. The group conducted wind environmental analysis and found three dominant wind directions throughout the year. The group chose

to design a project consisting of a set of three towers, so as to flexibly adapt to the local wind environment. The towers were rotated and streamlined, which efficiently makes wind flow smoothly across surfaces, facilitates the maximum lead angle of the wind, and reduces wind loading by creating conditions to take advantage of wind energy in the upper levels. The public space is enclosed on the ground floor to create a comfortable environment for activities. The design of triple skin shapes the public space in the air, and achieves maximum balance between the wind energy utilization and interior comfort (Figure 2).

#### Waste Recycling

Waste treatment is an unavoidable problem of high-density cities. In the Chicago Loop, according to the study, dealing with waste on the site nearby can have significant impact on decarbonization. The design of Group 2 is inspired by the synergism of low-carbon architecture and urban surroundings with the theme of waste recycling. For the underground portion of the project, the proposal is for a composting factory. Here, waste will be degraded or recycled after being transported to the

### 思考：研究成果介绍

#### 芝加哥2013：迈向零碳

##### 课题综述

课程基地位于芝加哥的沃尔夫角。沃尔夫角是芝加哥河北段、南段和主要支流的交汇点，位于近北区、市中心卢普区和近西区这三个社区交界处。基地现在是一块停车场，已被纳入了城市河岸美化计划。2007年，基地的拥有者肯尼迪家族计划将其开发为三栋高层和超高层建筑，但这一计划最终搁置（图1）。

遵循Adrian Smith + Gordon Gill 建筑事务所在2009年为回应今天城市所面临的挑战而制定的“芝加哥减碳规划”框架，本次综合性设计课程的目标是从视觉、城市、和环境方面设计对城市天际线发展有积极贡献的高层建筑。学生通过分组合作，与指导教师一起制定独一无二的环境关键绩效指标，即一组指导设计的量化目标，这些目标将引导学生朝着脱碳规划中设定的目标努力。

#### 风能获取

芝加哥以“风城”著称，组5即以风资源利用为设计核心。通过风环境分析发现三个全年主导风向，从而选取三幢塔楼组合的模式灵活应对当地风环境。利用旋转流线型（可有效引导风顺畅地流过表面）标准层，使得高层塔楼在空中获得最大导风角度，创造利用风能的条件并减少风荷载，而在底部则形成围合的公共空间，创造适合人群活动的舒适环境。借助三层表皮的设计，能在塑造空中公共空间的同时，最大化地达到风能利用和建筑内部舒适性的平衡（图2）。

#### 垃圾循环

垃圾处理是高密度城市无法回避的问题，我们经过研究发现，卢普区垃圾就近处理对于脱碳规划意义重大。组2由建筑与周边城市环境的协同低碳入手，以垃圾循环利用为主题。建筑的地下部分为垃圾降解厂，垃圾从现存的废弃地下运煤通道（原用于冬季采暖）运输至工厂降解或回收，再生的物资和能源将供给综合体和城市。源源不断的有机质带来垂直农场建设契机，通过风能及水能驱动旋转实现自动灌溉，为芝加哥河提供独一无二的象征性城市景观（图3）。

factory via the city's existing network of underground freight tunnels, which had been used to deliver coal for winter heating and later abandoned. The regenerated energy supply will feed the complex and the city. Constant organic processes, as well as an automatic rotary irrigation system, driven by wind and water flow, bring opportunities for vertical farming, thus providing a unique and symbolic urban landscape along the Chicago River (Figure 3).

### Low-Carbon Lifestyle

According to the study of lifestyles and site conditions in Chicago, Group 4 raised a proposal to build a vertical park on the site to encourage citizens to adopt a low-carbon lifestyle. The design group added a city complex above the vertical park, which would underwrite the project financially. People from the complex and the city can

do exercises on all kinds of sports platforms via vertical access means, such as slopes and stairs inside the building. Kinetic energy generated through playing sports would be collected and used to provide electricity to the park via diverse means of generation, such as generating floors, generating bicycles and carry-up power collectors. Finally, this educational and recreational landmark would encourage changes in citizens' habits of living, thus promoting a low-carbon lifestyle (Figure 4).

### New York 2014: 3D Network

#### Project Introduction

The selected site is located on the west side of Grand Central Terminal in the largest CBD area in the United States. This site offers a unique opportunity to push vertical urbanism skywards: the allowable FAR on the site is 30, opening up a range of possible functions. These could include

### 低碳生活

组4通过对芝加哥市民生活方式和基地条件的研究，提出在基地上建设一座垂直运动公园，并以此鼓励市民以更为低碳的方式生活。设计小组在垂直公园上方叠加了一座城市综合体以保证项目的经济支撑。来自城市和垂直公园上方综合体内的民众可通过建筑内部的坡道、楼梯等垂直连接方式到达各类运动平台锻炼休闲，而通过运动产生的能量将会通过各种途径收集并为公园供电，这些途径包括：踩踏发电地板，踏板车发电和利用可穿戴型发电装置等。最终，这一寓教于乐的城市地标，将改变市民的生活观念，进而促进低碳城市生活（图4）。

### 纽约2014：三维网络

#### 课题综述

课题选取的基地位于纽约中央车站西侧地块（美国最大CBD的区域中心），这一地块提供了将垂直都市主义真正推进到垂直维度的极佳契机：根据规划基地容积率可达30，建筑功能包括换乘枢纽、办公、酒店、住宅及可能的公共项目（商业、文化艺术、休闲娱乐等设施）（图5）。

课题意在探索真正的垂直城市对于高层建筑的意义：将超密度的发展置于主要的城市基础设施之上，同时又能提供真正的公共空间，甚至将建筑本身作为城市的垂直基础设施。设计目标定为能挑战“三维城市”的极限：混合功能，鼓励极端密度，同时有策略地在整幢建筑引入有意义的公共空间。

### 价值激发

纽约虽然有三维的城市空间，却没有三维的城市生活，高层建筑的上部空间成为了城市的末端。另一方面，曼哈顿岛周围的河流阻隔了布鲁克林和新泽西的垂直发展。基于上述思考，组4提出了一套缆车通勤系统，并由基地上的一座由三个换乘站垂直叠加并辅以高效垂直交通的混合功能塔楼作为核心。这一系统将有效提升纽约中心区辐射范围内的城市土地上空价值，改变城市空间格局，促进城市整体开发，并为上班族和游客提供对纽约的全新视角（图6）。

### 高效整合

纽约的三个机场之间以及机场与城市轨道交通系统和铁路客运系统的薄弱联系，已经成为纽约高效公交系统的整体缺陷。另外，曼哈顿岛的岩石地质和高密度现状使得向下或横向发展基础设施的设想难以实现。组3利用中央车站的地理位置和交通换乘优势，尝试将规划的机场快线和城市轨道交通从地下延伸到空中，将机场的国际/国内出发层与值机与到达层自上而下安排在高层建筑中，形成“垂直机场”这一新的基础设施，并通过它来实现高效而又便捷的换乘，并将使用者的体验与纽约城市空间特色相得益彰（图7）。

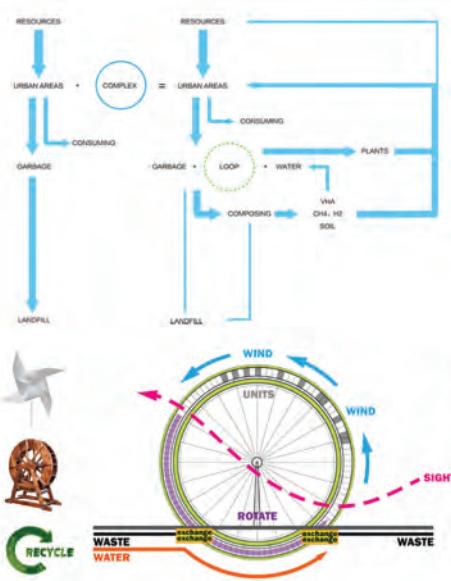


Figure 3. "Loop" of the Loop (Source: Zhang Ziyue, Hou Xufeng, Liu Jinrui)  
卢普区之“环”（来源：张子岳，侯秀峰，刘津瑞）



Figure 4. Low-carbon life (Source: Lei Yu, Hu Qiang, Zhang Xiangchen)  
低碳生活（来源：雷宇，胡强，张祥辰）

a transportation exchange terminal, office space, hotels, apartments and other public facilities (retail, entertainment, cultural and art facilities, etc.) (Figure 5).

This project is intended to explore what “truly three-dimensional” cities mean for tall buildings by locating extremely dense development on top of major urban infrastructure, while simultaneously providing true public space. The students were challenged to develop a tower that pushes the boundaries of what it means to build a “truly 3D city” – by mixing programs, encouraging extreme density, and introducing meaningful public space strategically throughout the buildings.

### Value Stimulation

Although there are plenty of three-dimensional spaces in New York City, there is no three-dimensional urban life. The vitality of the city remains near the ground, and space at height is considered the extremity of the city. On the other hand, the rivers surrounding Manhattan interrupt the march of vertical development to Brooklyn and New Jersey. Based on the above thinking, Group 4 put forward the idea of a new sky-high transportation infrastructure network, based on the city's existing Roosevelt Island Aerial Tramway, which would extend within, through and between tall buildings, in order to bring the dynamism of the street to the very top of the city. This system might be able to raise the value of space at height in New York City, change patterns of urban space use, promote overall development and create new possibilities and perspectives for office workers and visitors (Figure 6).

### Spatial Integration

The connectivity and integration among major airports, the urban railway transport system and subway system is the cornerstone of the high-efficiency transportation system in New York. However, the extreme density of the city makes it almost impossible to build new or expand existing infrastructure horizontally. Additionally, Manhattan island lies on a layer of hard rock, which makes it much easier and more financially efficient to build infrastructure upward than to tunnel downward. Taking advantage of the geographical location and transfer convenience of Grand Central Terminal, Group 3 created a vertical terminal, which provided an elevated terminal for the airport express trains, Long Island Rail Road, and other new transport lines upward. An international departure layer, domestic departure layer and check-in/ arrival layer are arranged from the top to the bottom of the tower. In this vertical terminal, passengers can transfer

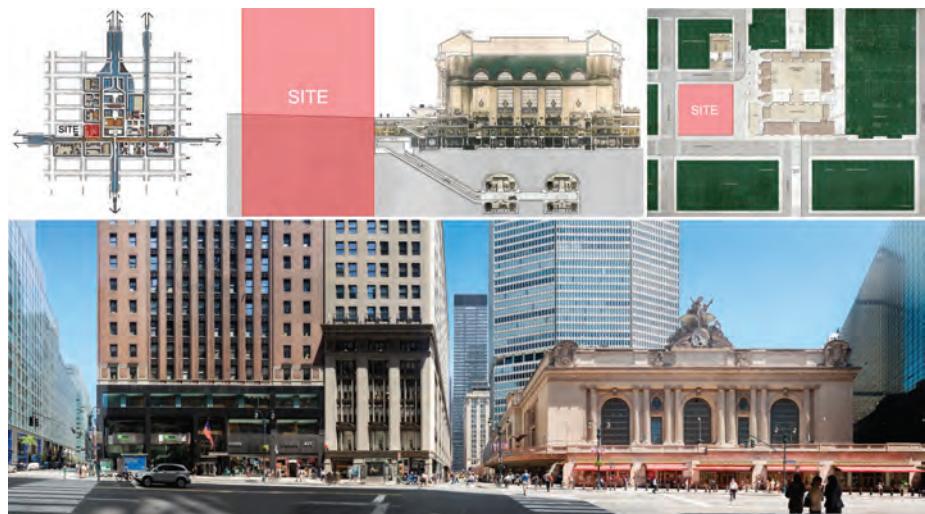


Figure 5. 2014 studio site in New York (Source: KPF)  
2014纽约课程基地 (来源: KPF)

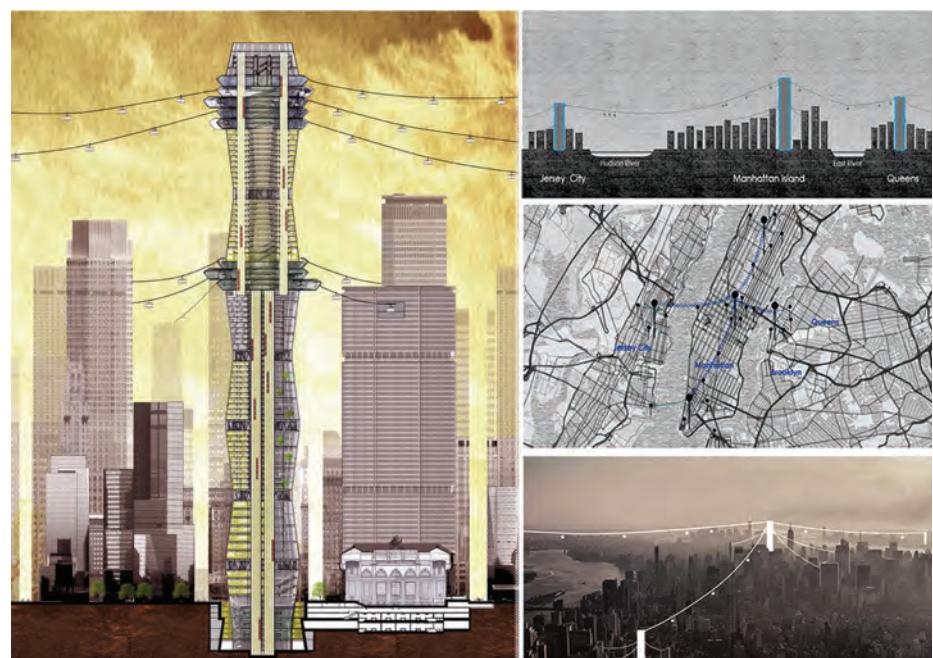


Figure 6. Vertical Value Stimulator (Source: Zheng Pan, Cheng Xiaoyu, Mu Nasha, Wu Menghao)  
垂直价值激发器 (来源: 郑攀, 承晓宇, 牟娜莎, 邬梦昊)

between lines just by walking to the diagonal side of the building, which is a walk within two minutes on the same floor level. This innovative vertical infrastructure makes the transferring and waiting experience consistent with the New York City's vertical urban scenery (Figure 7).

### Cultural Diversity

The New York City's Grand Central Terminal is one of the biggest commuting stations worldwide. It brings a huge amount of people to this dense CBD area, but mainly for working and tourism. There is a lack of life-sustaining facilities that can provide vitality at night and weekends. Group 2 noticed an opportunity to contribute to this situation in the form of a vertical market, which can also stimulate new possibilities for the high-rise typology. This tall building is designed to be as multi-cultural, mixed-use, populist and accessible as traditional streets. This proposal integrates

### 文化融合

纽约中央车站作为世界上最大规模的通勤车站之一，成为纽约特色集中展示的窗口，形形色色的各民族和文化的高流动人群带来了巨大的商机。组2尝试通过与中央车站地下公共空间贯通的“垂直国际市场”来串联空中的小尺度混合功能，并在垂直公共空间结点结合竖向公共交通停靠站点辅以一系列文化艺术和休闲娱乐功能。“巴士电梯”系统保证了整体的可达性和效率。此系统是指：一个电梯井内有多个轿箱单向运行，只停靠特定楼层，形成循环的垂直公共交通系统，与传统后勤电梯与步行系统协同工作，使高层建筑各部分的可达性均质化。小尺度创造的可承受租金，促进了内部功能的自由生长和更新，为各民族和文化在纽约寸土寸金的核心高密度区提供一席之地（图8）。

the underground space of the station with proposed facilities assembled vertically along the height of the building, which are chained together by a spiral pedestrian market running from the bottom to the top. Their accessibility and efficiency are ensured by a "bus elevator" system. The "bus elevator" is a vertical-loop elevator system, in which there are several cabs running in one direction and only stop at appointed floors, thus homogenizing the accessibility of the whole building. People from different cultural backgrounds could find their necessities from these tiny and diverse spaces, which could offer affordable rent as well as self-organization and self-regeneration functions in downtown New York (Figure 8).

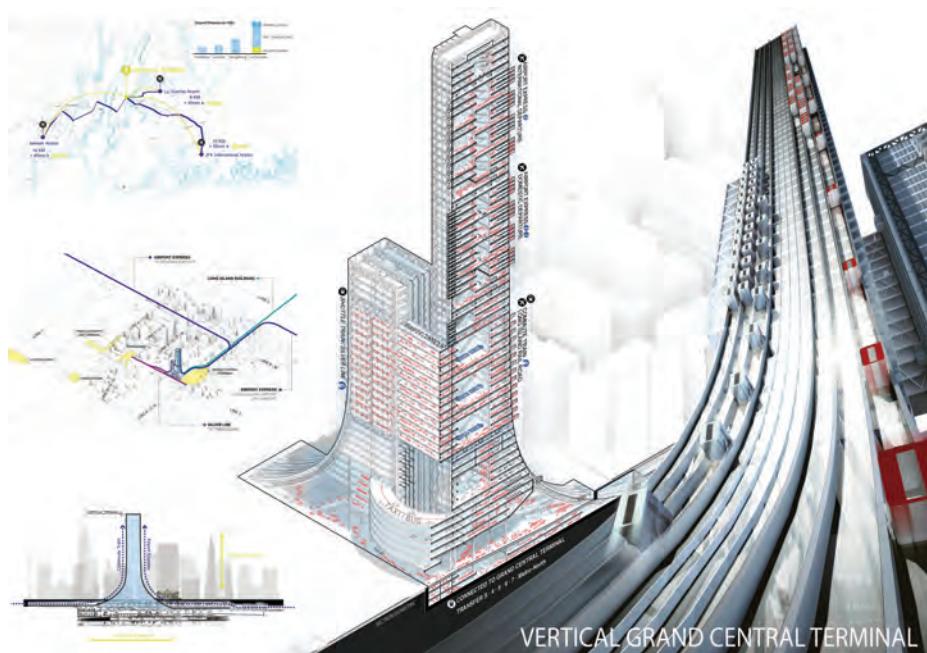


Figure 7. Vertical terminal (Source: Li Ao, Lu Yiyun, Liu Xiaoyu, Yang Zhiyun)  
垂直终点站 (来源: 李骜, 陆伊军, 刘晓宇, 杨之楠)



Figure 8. "My Tiny New York" – Vertical Global Market (Source: Cheng Si, Li Yizhe, Zhang Pu, Zhao Yindian)  
“我的微纽约” – 垂直国际市场 (来源: 程思, 李一哲, 张谱, 赵音甸)

## 迈阿密2015：重塑都心

### 课题综述

位于城市地理中心的布里克尔城市中心，享有南弗罗里达州最好的物流优势。由于地下有两层零售停车场，布里克尔城市中心的街道层的交通得到了空前的解放。一条跨越这一开发项目四个街区的空中人行步道连接起了11英亩（约44515平方米）的区域，同时基地上的轻轨线直接连接了迈阿密最受喜爱的地区。课题选取的基地位于布里克尔城市中心东侧的二期地块，这一建筑将会成为迈阿密最高的大型混合开发项目，以及迈阿密复兴规划的重要组成部分（图9）。

课题意在讨论如何通过混合使用开发，带来超高层建筑更高层次的设计和更多样的

使用，来为城市中心区吸引更多人流并使之停留更多时间。设计目标定为“重塑都心”：基于地形、气候、文化、法规、产业等当地特色，借助公交导向开发优势，向城市旧有的以资本为导向、很少考虑环境和社会价值的开发模式发出挑战，使得城市中心区焕发新的生机。

### 场所活力

沙滩是迈阿密最具代表性的活力激发点。组3在调研中发现，城市中大部分的海岸线都以港口码头为主，真正的海滩离市中心区域很远，人们想要去往沙滩需要驱车行驶十公里以上。由此，组3希望在高密度的布雷克尔地区创造“垂直沙滩”的概念，将沙滩这一活力因素引入城市，结合海水净化、海水源热泵等生态理念，与布雷克尔城市中心的“气候缎带”一体化设计调节微气候，创造未来滨海地区的高层建筑开发模式，使高层建筑在满足自身功能需求的同时，为城市创造更多活力（图10）。

### 知识分享

迈阿密是一个移民比例高达70%的城市。为了使移民在新的城市中产生归属感，并认同当地文化，组5希望在城市中提供一个自由平等的交流场所。选择学校作为平台，以教与学作为交流的手段，以知识为载体，将各种阶级、种族、职业的人群联系在一起。通过面向城市的公共空间，将不同的功能串联起来。通过视线和无线信号实现不同高度的公共空间与不同距离的教育机构的信息传递，通过公共交通系统实现书籍在建筑和社区间的传递，在城市中建立一个虚拟与现实结合的分享网络（图11）。

### 产业驱动

船，作为迈阿密水文脉的承载工具，在过去、现在和未来发挥重要作用。组1发现迈阿密水上交通在连接性、延续性和可达性上不尽如人意。现有的迈阿密水上交通只有固定几个港口可以互相通航。迈阿密河的交通功能现已弱化为运送私人游艇进入海域的通道，而丧失了一般公共通航的功能。他们尝试在设计中通过“船”这一媒介，将迈阿密的水文脉引入建筑，引入高层。建筑功能围绕小型共享船只制造产业展开，通过创造不同高度的船坞，使生活在其中的人们时刻感受水，使用水，享受水。同时，这一设计应对未来，它具有可增长的灵活性。在全球海平面日益上升的背景下，这一建筑将会成为积极应对气候变化的高层建筑新类型。该建筑的垂直船只运输系统将城市的交通水系延续到空中，结构设计考虑了在基础结构上叠加单元和向上生长的可能性。同时，造船产业也将为未来海平面上升水域扩大后的城市提供更具适应性的交通工具（图12）。

## Miami 2015: Reshaping Downtown

### Project Introduction

Located in the geographical heart of Miami, Brickell City Centre boasts some of South Florida's greatest logistical advantages. Situated above two floors of below-grade retail parking, Brickell City Centre allows an unprecedented ease of street-level traffic flow. Eleven acres are connected by elevated walkways, which span across all corners of the development's four city blocks, while an on-site Metromover light rail station provides direct transit connections to many of Miami's favorite destinations. The site we selected is located on the east side of Brickell City Centre, which is set to become the project's Phase II. This project will become the tallest mixed-use complex, as well as the most important component in the Miami revitalization plan (Figure 9).

This project is intended to explore how to incorporate various uses in supertall buildings via mixed-use development, then attract more visitors to the downtown area and encourage them to stay longer. The design studio is aimed at "reshaping downtown." Based on the local characteristics of topography, climate, culture, zoning law, industry, etc., with the advantage of transit-oriented development, the goal is to challenge the traditional development mode, which is led by capital and rarely takes environmental and social value into consideration, and to bring vitality to downtown.

### Place Vitality

The beach is Miami's most representative activity spot. Through the investigation, group 3 finds most of the downtown coastline consists of ports. Currently, people have to drive 10km to reach the beach from the Brickell area. Therefore, group 3 sought to create a "vertical beach" concept in the high-density Brickell area, introducing this vital factor of a beach, combined with seawater purification, seawater source heat pumps and other ecological architecture ideas, which would be integrated with the "Climate Ribbon" at Brickell City Centre, a continuous outdoor shelter that adjusts the development's microclimate, to form a future development mode for coastal high-rises. This high-rise iteration can potentially create more urban vitality while meeting functional demands (Figure 10).

### Knowledge Sharing

Miami is a city with immigration rates as high as 70%. In order to give immigrants a sense of belonging, and to integrate them into Miami culture, group 5 proposes a communicating place of freedom and



Figure 9. 2015 studio site in Miami (Source: Arquitectonica)  
2014迈阿密课程基地 (来源: Arquitectonica)

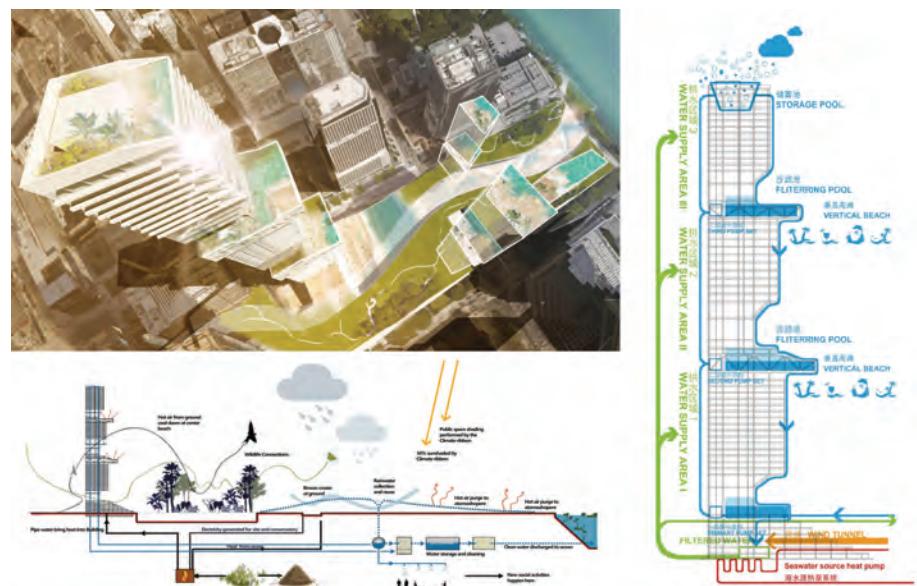


Figure 10. Brickell Beach (Source: Li Le, Li Shuxin, An Yijing, Jiang Lifang)  
布瑞克尔海滩 (来源: 李乐, 李舒欣, 安以静, 姜丽芳)

equality in the city. For their main program, they choose "school as a platform," with teaching and learning as means of communication, and knowledge as the carrier. The vertical school would connect people of all classes, races and occupations. Its public space faces the city, connecting it with the campus. Public spaces at different heights transfer information within the educational institution through sight lines and wireless signals, while the vertical campus transfers visitors and books with communities through the Metromover system, and finally establishes a sharing

### 结语：从紧凑到紧密

当今，在通过城市公共空间复兴、密集型基础设施网络建设以形成更集约可持续的城市发展背景下，高层建筑有机会将自身重新塑造为可持续的城市未来新范式——面对来自人口爆炸、城市更新和气候变化的挑战，应运而生的有着创新的形式、技术和环境的聚集中心，生活、工作和娱乐甚至交通都将在其中展开。这一新范式需要来自地域性环境因素和文化传统的支撑，而这也是维系城市文脉完整性和连续性的核心内容。也就是说，高层建筑的设计必需要从所在地域的文化、物质和环境方面获取灵感。

network for Miami, combining virtual reality and reality together (Figure 11).

### Industry Drive

As a waterfront city, boats play an important role in the past, present and future of Miami. However, group 1 finds that the current situation of connectivity, continuity and accessibility of Miami water traffic is not satisfactory. In Miami, there are a few ports to berth, while the traffic function of the Miami River is reduced to the role of access for private boats to their berths, rather than as a main waterway. In their proposal, the boat becomes a kind of giant sign to reinforce how the Miami water context is integrated in their design. By bringing a network of communal boat design and repair shops into the high-rise, and placing a series of docks at different heights, they try to create special conditions for the people who live, work or visit this building, reconnecting them with the water. Meanwhile, this high-rise has the spatial and structural flexibility to change in the future. As global sea levels rise, this building might become a new typology of tall building which could actively respond to climate change. Its vertical boat transportation system extends the urban water transportation network into the sky, and the structural design considers the possibility of adding units to the original structure and growing upwards. Meanwhile, the industry of shipbuilding also provides an adaptable urban transportation means for cities facing the future crisis of rising sea levels (Figure 12).

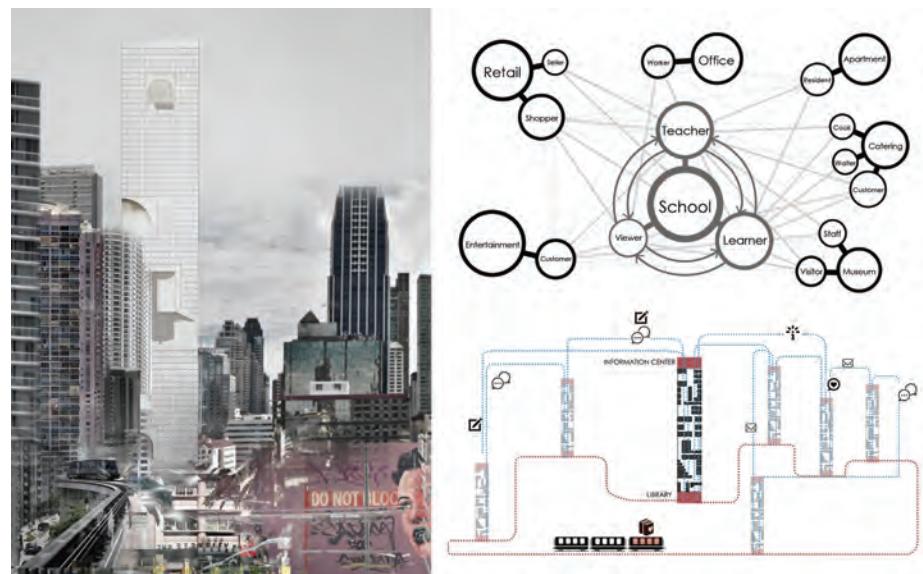


Figure 11. Back to School (Source: Wu Xiaoyu, Yan Kangni, Pan Yihan, Yang Xu)  
回到学校 (来源: 武晓宇, 严康妮, 潘逸瀚, 杨旭)



Figure 12. City on Boat (Source: Cui Jing, Ma Xiaoxiao, Liu Han, Zhang Songyue)  
船之城 (来源: 崔婧, 马潇潇, 刘含, 张松岳)

### Conclusion: From Compact to Close

The need for denser, more concentrated sustainable cities that reduce the loss of open space and the need for energy-intensive transport and infrastructure networks is acute. Tall buildings have an opportunity to reinvent themselves as the typology for a sustainable urban future – becoming focused centers of live, work, play, and even transportation, through innovative forms, technologies and environments that can face the challenges of future population explosion, urban renewal and climate change. This new paradigm of tall building needs to acknowledge and incorporate local environmental factors and cultural/vernacular traditions in order to keep the integrity and continuity of urban context. That is to say, it is becoming more and more important to source inspiration from both the physical and cultural environment during tall building design.

In theory, the impact on social harmony, urban diversity and a whole range of other less-quantifiable aspects of "sustainability" will be an optimal balance point in this equation. This is the possible development direction of tall buildings sought by this serial collaborative research design studios.

It is clear that there is still much to be done to make tall buildings deliver their full potential – in their contribution to dense cities and urban form, their reduced energy consumption (embodied as well as operating), and their social diversity and inclusivity. Time will tell if the tall building will ever reach a completely satisfactory state of evolution in both energy and cultural terms (Wood, 2014).

It is also clear that pursuing spatial efficiency is never the primary goal for the design of a dense habitat. Instead, encouraging

理论上,社会可持续性、城市多样性、以及其它一系列不易量化的“可持续性”方面的影响存在一个最佳平衡点,这也是我们通过联合设计课程想尝试寻找的高层建筑未来发展可能方向。

我们现在清楚的是,让高层建筑充分实现其潜能仍有很多工作要做——包括其对高密度城市和城市形态的贡献、对降低(自含与运营)能耗的贡献,以及对社会多元化和包罗性的贡献。时间会告诉我们高层建筑究竟能否在能源和文化两方面都发展到一个令人满意的状态(伍德,2014)。

我们必须明确:追求空间效率并非高密度城市的首要目标,如何在立体维度创造来自于人群聚集所带来的积极互动,促成对有限空间更为灵活、多样且高效的使用,更为紧密地将人与城市、自然和社会连接,进而迈向可持续的垂直城市主义,才是未来高层建筑发展更为重要的方向。

the positive interactions between people via gatherings on multiple dimensions; promoting the flexible, diverse and compound use of limited space; and connecting people, city, nature and society more closely – thus marching toward sustainable dense vertical urbanism – are the most important development directions of future tall buildings.

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