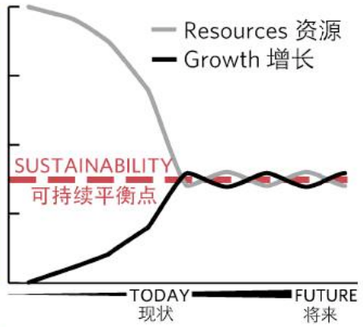
CORNELL UNIVERSITY +
URBAN MORPHOLOGY TEAM

BEYOND SUSTAINABILITY: TOWARD REGENERATIVE DESIGN
超越可持续走向可再生

SUSTAINABLE DESIGN

Sustainable design maintains a level of environmental, economic and social capital that does not further deplete the resources and systems of a site or project



可持续设计

可持续设计的模式是避免环境、经济以及社会资源在发展中不会遭到进一步的破坏

REGENERATIVE DESIGN

Regenerative design uses the resources and processes of the site to promote continuous environmental, economic, and social capital growth

可再生设计

可再生设计的模式是利用场地的现有资源去刺激环境、经济和社会的发展

FACTORS THAT INFLUENCE BUILDING ENERGY PERFORMANCE 影响建筑耗能效率的因素

URBAN MORPHOLOGY 城市形态

Urban Morphology, or the form of a city's fabric,has been shown to have the potential to improve a city's energy performance by a factor of 2. Four sets of morphological parameters influence the energy efficiency of Green Buildings. They are as follows:[1]

I. Building mass organization

Built-up area: Amount of land on a site that has been built upon

Floor Area Ratio (FAR): Number of floors per surface area of footprint

Contiguity: Connectedness between the surfaces of neighboring buildings.

Building Height: Height of structures on a site

Compacity: A measure of the contiguity defined by the following equation:

$$C = \sum_{buildings} \frac{A_{ext}}{V^{2/3}} [/]$$

where C is compacity, A_{ext} is the area of external walls and V is the volume of the building

II. Openness to the sky

Occlusivity: Sunlight blocked by the built or natual environment

Solar Admittance: Amount of solar energy entering a space.

III. Passive volume - volume of a building less than 6m from the building envelope

IV. Street networks - *Number of Intersections:* a measure of walkability

城市形态，也常被称为城市肌理，已被证明有可能加倍或者减半城市能源使用的效率。以下是四套城市形态学参数对绿色建筑的能耗使用的影响：

I. 建筑群体的组织关系

建成区：场地中建筑物的用地面积

建筑容积率：指一个小区的总建筑面积（每层面积乘以层数）与用地面积的比率

接触性：建筑表面之间的接触

建筑高度：场地上建筑物的高度

容纳性： 一种衡量接触性的参数，用以下公式计算 C是容纳性，A是外墙的面积，V是建筑的体积

II. 空间的开放性

遮阳性：被自然环境或者建筑环境所遮挡的太阳能

太阳能吸纳性：进入建筑内部的太阳能

III. 被动量：建筑体积少于6米的建筑围护结构

IV. 街道网络结构

Case Studies of REGENERATIVE DESIGN
可再生性设计的案例分析

ENVIRONMENTAL *Wind Energy in Denmark*

Denmark found itself with relatively high CO_2 emissions per capita, largely to coal-fired electrical power plants. To remedy this problem while promoting growth and improving quality of life, Denmark started to develop alternative energy in the form of commercial wind power during the 1970s. Today wind energy is one of Denmark's main energy sources. The country is less dependent on imported energy, and is able to produce enough energy for both domestic use and export, providing a new source of revenue.

环境再生：丹麦的风能

在70年代，由于燃煤发电厂，丹麦的二氧化碳人均排放量相对较高,丹麦必需发展替代性能源　当前风能是一个主要的能源来源。丹麦较少依赖进口的能源供应。丹麦生产的能源可以供国内使用甚至可供出口。

ECONOMIC *Ruhr Valley in Germany*

The Ruhr Valley is famous for its industrial history. Collieries, steel works and tall chimneys characterized the Ruhr region. Now the old industrial ruins have been converted into cultural venues. The valley is able to benefit from its mix of industry, energy production, environmental technologies and modern service industries.

社会再生: 德国的鲁尔山谷

鲁尔山谷是著名的工业区. 现在老工业遗址已被转换成文化场馆。 这也得益于其产业结构的能源生产，环境技术和现代服务业。

SOCIAL *Beijing 798*

Beijing 798 Art District, arranged in a square 800m x 800m block, was previously an electronics factory, and has since been rebuilt by the former East Germany. It is a typical example of Bauhaus-style buildings. Now it is one of the most fashionable districts in Beijing, with over 100 art galleries, bars, retail and more than 60 artist studios.

经济再生：北京798

北京798创意区总占地23万平方米，是一个800乘800米的方阵。原为798电子工业厂区，由原东德援建，建筑多为包豪斯建筑风格，目前有 超过100个艺术画廊、酒吧等单位和超过60个艺术家工作室。

BENEFITS of a FINE GRAINED GRID

Extrapolations from the work of Serge Salat

A city's morphology has implications on more than just energy consumption. The fabric of a city also impacts its walkability, potential for economic and social diversity, livability, identity, imageability, and occupant behavior.

城市的形态影响的不仅仅是能源消耗，也会影响到城市的步行性，经济的发展潜力和社会的多样性，可居住性，城市身份， 城市意象以及居民的行为。

ENERGY CONSUMPTION

- Fine grained grid morphology can halve a city's energy consumption
- Contiguous building surfaces reduce compacity, the proportion of exterior walls, and lower heating and air-conditioning costs.
- Low-rise buildings do not require elevators, use less construction materials, and do not shade streets or neighboring buildings.
- The grid can be oriented to impede wind and distribute sunlight.

WALKABILITY

- Neighborhoods require about 100 intersections per km^2 to be walkable, which is usually not achieved in car-centric cities.
- The dense road network allows for man-powered transportation, reducing the amount of energy consumed by motorized traffic.

SOCIAL INTERACTION

- When people walk, streets become public spaces integrating diverse groups of people.
- Interaction creates a vibrant cultural experience for all users.

LEGIBILITY AND HUMAN SCALE LEAD TO PLACE IDENTITY AND IMAGEABILITY

- A fine grid is designed with the size of humans in mind. Properly scaled streets create a more legibile and easily understood city.
- With smaller, more legible and intimate streets, place identity and imageability can develop more readily.

ECONOMIC DIVERSITY

- A mixed economy brings a variety of services in close proximity to residents, while it maintains stability in an uncertain global economy.

HISTORICAL CONTINUITY

- The fine grid is an ancient urban form that survives in the most beautiful modern cities, such as New York, Paris, Amsterdam, and Beijing.

LIVABILITY

- Noise and air pollution, long commutes in traffic, and limited access to nature make many modern, car-dependent cities difficult to live in.
- The fine grid promotes regenerative modes of transportation with positive externalities, and lower noise and air pollution and travel times.

Coarse Grid 粗网格

Fine Grid 细网格

网格系统的优势

能源消费

- 网格形态可以减半城市的能源消耗。
- 联排建筑可以减少拥挤感， 外墙的比例，降低暖气和空调的耗费。
- 低层建筑物不需要电梯，施工耗材少，并且不遮挡街道和周边建筑的阳光。
- 网格可以通过调整方向来阻止寒风和分散阳光。

步行性

- 社区每平方千米需要约100个交叉路口才能达到步行畅通，这在汽车城市中是经常都达不到的。
- 密集的路网可以降低交通的能源消耗。

社会互动

- 人们步行时，街道则变为各类人群互动的公共场所。
- 这样的互动为旅客以及当地居民都创造了一个充满活力的文化体验

特性，人的尺度和私密性 与意象和庄严性 （小尺度与大尺度）

- 好的城市设计会比较这两个尺度，并提供一个适宜的比例供市民享用。
- 网格系统考虑到人的尺度而创造了相对私密的街道和社区空间，与周边的露天广场和公园形成对比。

经济的多样性

- 混合商业为临近居民提供各种各样的服务，同时也可以在波动的全球经济体系中抱起相对的稳定。

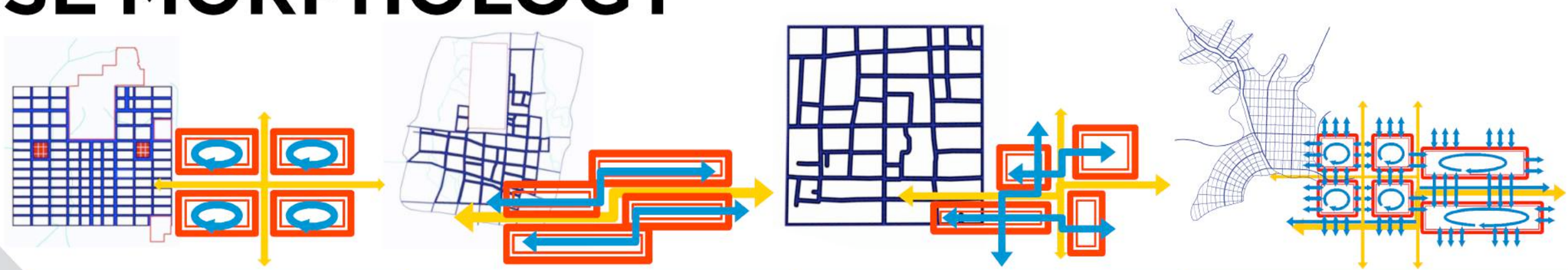
历史延续性

- 虽然网格系统是一种古代城市的形态，却在许多著名的城市中保留至今，如罗马，巴黎，阿姆斯特丹和北京。

可居住性

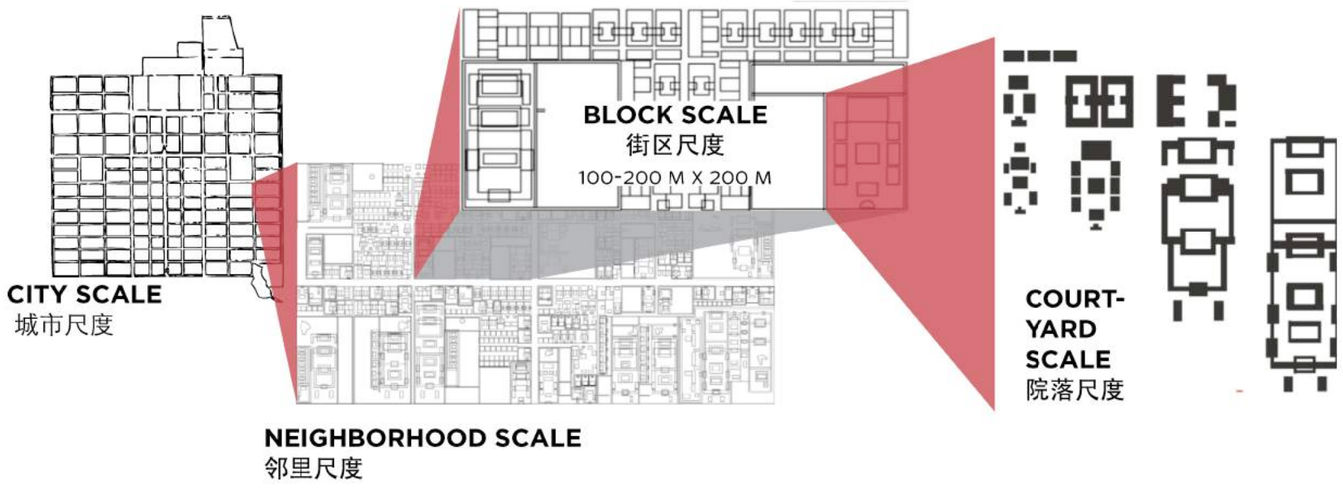
- 噪音和空气污染，堵塞的远距交通，有限的亲近自然通道使许多现代汽车城市生活困难，同时也进一步推动郊区化。
- 网格系统则通过积极的外部设计促进再生型运输方式，降低噪音、空气污染和旅行时间。

VERNACULAR *of* CHINESE MORPHOLOGY



	Tang Chang'an 唐长安	Song Bianjing 宋汴京	Ming Xing Cheng 明兴城	Future Cities 未来城市
① System of Division 分布系统	Districts 里坊制	Street Block 街坊制	Grid 网格制	Mixed Grid 混合型网格制
② Shape of Divisions 分布形态	Square 方形	"Organic" plane 自然形态	Square & Organic 方形&有机形态	Square & Organic 方形&有机形态
③ Organization of Commercial Activity 活动组织形式	Commercial Activity only in two markets 商业集中在东西两角	Commericial activity along the streets 商业活动沿街发生	Commercial activity along primary streets 商业活动沿街发生	Mixed use along primary streets 城市街道融休闲娱乐商业为一体

SCALES *of* ANALYSIS



PRINCIPLES DERIVED *from* CHINESE SPATIAL ORGANIZATION:

中国城市空间组织的几个特点

Fine-grained systems can promote:
- Social cohesion through denser spaces.
- Economic and social growth result from spaces that are more easily adapted to changing needs.
- Increased energy efficiency is acheived through more flexible options of movement due to higher connectivity.

Courtyard houses provide:
- Social spaces for private and semi-private use, connecting neighbors and providing a sense of identity and safety

Street life should be:
- Vibrant, creating stronger social cohesion
- planned to the human scale, with the single resident in mind and not the car, industry, or the greater network

Transportation planning should promote:
- Walking as a preferred transportation mode over all
- Mechanical, electric, or zero-emissions vehicles over car use

网格系统：
- 通过较高密度的空间增强社会凝聚力
- 因更适应不断变化的外部环境而促进经济与社会发展
- 道路系统之间紧密的连接提供了更灵活的流动方式以及更高的能耗效率

街道生活应该：
- 提供热闹多样化的街道活动以增强社会凝聚力
- 按照人的尺度设计，以人为本的思想，而非以车或工业为中心

交通规划应该：
- 提倡步行系统
- 鼓励机械化的，电子的或者零排放的交通工具

SITE
场地压力
PRESSURES

NATIONAL国家

Huludao's new CBD will serve as the gateway to a revived northeastern region of China.

Huludao will host events for the 2013 national games

The CBD will absorb up to 350,000 rural immigrants, including a transient 'floating' population.
新开发的CBD将会使葫芦岛市发展成为中国北部地区的门户城市
葫芦岛市被定为2013年全运会的分会场
CBD开发区需要容纳350000来自农村的新城市人口，这其中还包括拆迁住户

SOCIOECONOMIC 社会经济

The CBD will help China achieve 8% growth in GDP with a 20% reduction in energy intensity.

Developments opportunities will be auctioned to private firms and thus must be marketable.

The CBD will be a domestic and international tourist destination.

The city should withstand economic restructuring within 15-20 years.
CBD开发区将帮助中国在减少20%能源损耗的情况下增长8%的GDP
开发项目的机会将会拍卖给私企因此会很有市场价值
CBD地区还会称为一个面向国内和国际的旅游胜地
城市经济结构也会在15到20年之内有较大改变

ENVIRONMENTAL 环境

The prospering middle class will increasingly demand private automobiles.

The soil, water and air are already heavily polluted with heavy metals and sulphur from existing heavy industries, posing a threat to human health.
日益壮大的中产阶级会对私人汽车有更大的使用需求
土壤，水以及空气也会因现存的重工业而进一步遭到污染从而威胁人们的健康

ECO-Tourism

"responsible travel to natural areas that conserves the environment and improves the well-being of local people"

ECONOMIC INCENTIVE

The daily expenditure of cultural tourists 50% higher
70% would pay $150 more for a two-week stay in an environmentally-friendly hotel

ECOTOURIST PROFILE

Higher education
Higher income bracket
Opinion leaders that define world image

NURTURING MORPHOLOGY

Vibrant streets and diverse marketplaces to provide cultural experiences
Small footprint to preserve the surrounding hills, Moon River and beach.

Source: The International Ecotourism Society Fact Sheet

NATIONAL国家

The CBD must develop a unique character and identity to represent the region's prosperity.

The CBD must include a sports complex, including a soccer stadium.

Morphology must be dense and adaptable, while providing a variety of housing options.
的开发必须走出一条拥有自己地区特色的发展道路
CBD地区还需要包含一个综合体育馆和一个足球场
城市形态必须具有密集性和可变性，同时应该提供多样化的住房类型

SOCIOECONOMIC 社会经济

The growing new economy must be based on education, technological innovation, alternative energy production and other less energy-intensive industries.

A dense, low-rise morphology will provide high property values and low building costs for developers.

The city should encourage "ecotourism", which preserves natural assets, such as the beach, surrounding hills and the Moon River basin, while creating opportunities for cultural experience.

The fine-grained grid can be efficiently adapted to a variety of economic uses.
经济发展应该建立在教育、技术创新、新型能源的开发以及其他能源高效利用的产业之上
一个密集且低层的形态将会为开发商提供高回报低成本的开发形式
城市也应该大力提倡生态旅游业，它是一种在包揽当地人文景观的同时也保护自然地区，比如海滩，周围的群山以及月亮河盆地的旅游形式
细网格系统可以有效地根据不同经济用途而改变和调整其形式

ENVIRONMENTAL 环境

High density and pedestrian-friendly streets with efficient transit along with disincentives with diffuse demand for private cars.

An integrated biological wastewater treatment system can remediate existing pollution while providing recreational space and biomass for electricity generation.
高密度和方便行人的街区上应加设大众交通站点以此来减少对私家车的需求
一个综合的污水生物处理系统可以修复现有的污染，同时提供休闲空间和生物质能发电

CORNELL UNIVERSITY +
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METHODOLOGY

for developing a Northern Chinese

REGENERATIVE URBAN FABRIC

7 INTRODUCE MUNICIPAL SYSTEMS

The design of transportation and environmental systems will depend on the urban structure. Public transportation should be available from within 400M of every point in the city. Natural water treatment systems should be coordinated with connected green spaces where water is available. Our primary green space runs along the Moon River, where gray water is naturally treated for reuse.

6 DEFINE NEIGHBORHOODS BY ACTIVITY

Various activities should be distributed throughout the city to reduce transportation needs and maintain economic and social growth. The commercial district and public services should be centered and accessible via primary roadways. Offices should buffer high traffic areas. Schools and sports facilities should be accessible but where open space is available. Recreation areas should be designated where interesting topography and wildlife exist. On our site we proposed a site for the commercial district along a primary road acting as the central axis of the city and a primary road along the beachfront for tourism and recreation. We placed schools and a sports complex at the edge of the city where land is cheaper but near primary roads for ease of access. We designated the beach front, surrounding hills and moon river for recreational activity.

5 SUBDIVIDE BLOCKS WITH PEDESTRIAN WAYS

Permeability and seclusion must be appropriately balanced within blocks according to use. Residential blocks should have fewer tertiary roads to reduce traffic and help create semi-private, secluded spaces. Commercial blocks should have a dense tertiary network to maximize storefront area and permeability.

4 IDENTIFY STREET HIERARCHY

A hierarchy of roadways should be defined and strategically positioned. Primary roads provide external access to highways, train stations and nearby towns. Secondary streets connect the primary roads and favor pedestrians and transit over private automobiles. Tertiary streets divide blocks created by secondary streets and provide mainly pedestrian access. On our site we identified four primary roads, two of which connect the site to the existing city and two of which connect the site to the highway and train station. The secondary streets make up the remainder of the grid and the tertiary streets are defined in the individual block models.

3 ADJUST ORIENTATION OF BLOCKS

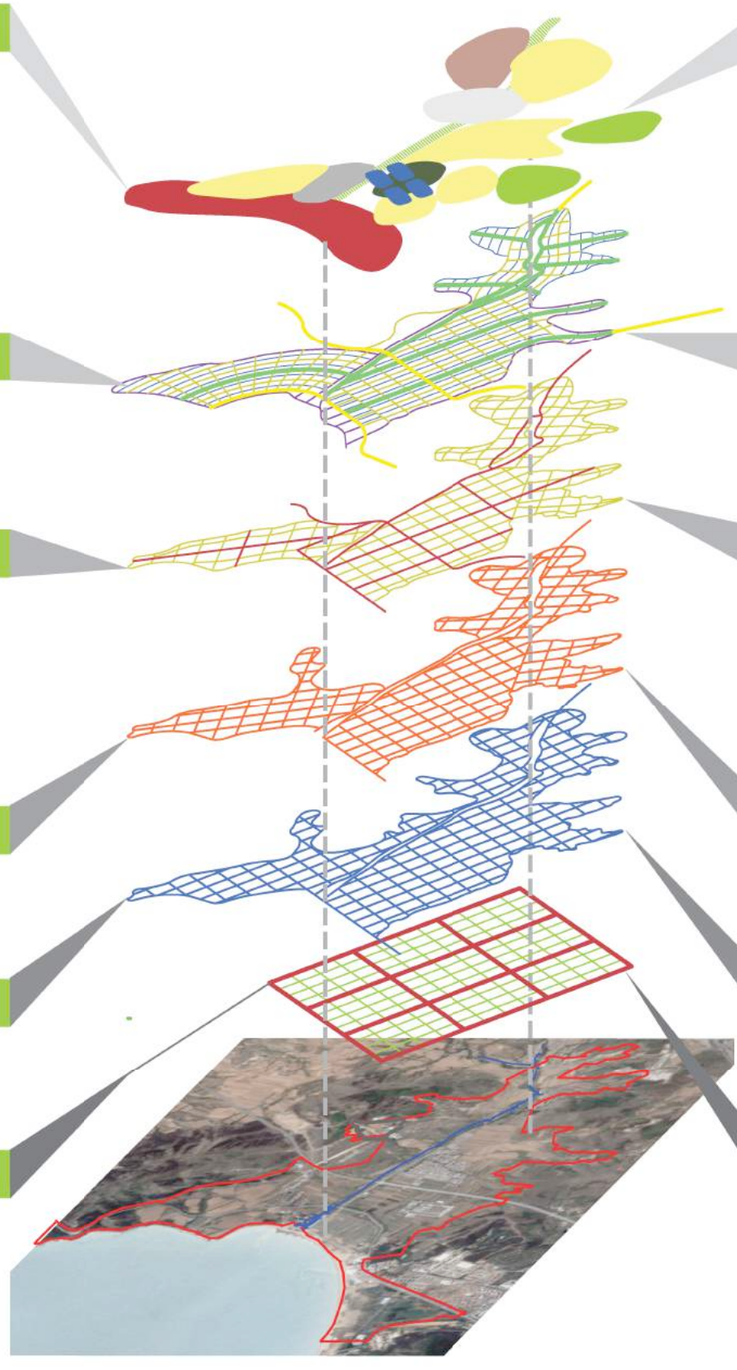
The blocks in areas of irregular topography are then rotated or morphed to maintain an appropriate street density and accessibility. On our site in Huludao, we rotated the grid below the Moon River and in mountain valleys and relaxed the grid to organically form to natural disruptions.

2 EXPAND THE GRID TO DEFINED LIMITS

Limits of the city must be defined by slope of topographical features and a maximum of an hour walk from the city limit to the city center (a 4.5 km distance). The grid is then extended to these limits and 200m x 200m secondary grid is layed over the city within its defined limits.

1 APPLY A BASE GRID TO THE SITE

Studies of urban morphology have shown a 3 x 3 grid of 800M x 800M neighborhoods to be an efficient, adaptable, and culturally referential model. From this we derive a base grid for eco-cities in Northern China. The grid is first aligned appropriately on the site to minimize wind in the city, and maximize solar access and alignment with natural site features. In Hu Lu Dao, the sun, wind, consideration of the oceanfront and surrounding mountains informed grid placement.



市政系统简介 7

交通和环境系统的设计取决于城市结构。公共交通应满足可从城市中的任何一点出发400米的范围内都可达。天然水处理系统应与绿化空间相联系，因为这些空间内水源相对丰富。我们的主要绿化空间沿月亮河布置，在这个空间内中水通过自然手段净化回用。

通过活动定义邻里单元 6

在整个规划区的范围内对各种活动进行分布，以减少交通需求，保持经济和社会的良性发展。商业中心区及公共服务区应该位于中心位置，且通过主要道路使其具有良好的可达性。休闲区应该位于地形丰富和野生生物聚集的区域。在我们的设计基地内，我们选取作为商业区的用地是在主要道路沿线，作为城市的中轴线。滨海的一带也将成为旅游目的地和娱乐用地。我们把学校和一个综合体育场馆选址于城市边缘。这里的土地便宜，且附近的主要道路，可达性良好。我们将海滩、周边的山以及月亮河流域作为娱乐活动的场所。

用步行道路细分地块 5

渗透和隔离必须根据地块的使用进行适当的平衡。居住街区周边应该有较少的支路，以减少交通，并帮助创造半私密，幽静的空间。商业街区应该有一个密集的支路路网，以最大限度地提高店面临街的面积和渗透性。

确定道路的分级 4

道路系统的分级需要被定义和被战略定位.主要道路联通城市和高速公路、火车站以及临近的城镇。次级道路连接主要道路和主要的步行区，供私人自驾车流通。支路再次划分由次级道路划分的街区，连接主要的步行区。在本设计基地中，有四条主要道路：连接葫芦岛市中心以及高速公路和火车站。次级道路对网格进行了细分。支路则划分了每一个街区。

调整街区的方向 3

处于的不规则地形中的街区通过旋转或变形，以保持适当的街密度和无障碍环境。在葫芦岛基地内，我们旋转月亮河南部和山谷中的网格,放宽部分网格形成了自然环境中的有机形式

扩展网格定义边界 2

城市的边界必须通过地形的坡度和从城市中心步行一小时的最大距离（通常取4.5公里）来界定。然后网格就在这个边界的范围内展开，在此基础上划分了200x200米的二级网格网格.

在基地中运用基本网格 1

通过研究,我们发现,3x3的网格,800x800米的邻里单元是高效的，具有很好的普适性。目前作为参照的模型。从该基本网格，我们发展出了适合于中国北方城市的生态城市基本网格。然后，将该网格适应于城市最小风向、最大光照和基地的自然特征。在葫芦岛市，设计考虑了光照、风和城市背山面海的地理环境，对网格进行了相应的调整。

WEAVING *the* URBAN FABRIC

Street dimensions determine the border of the block.

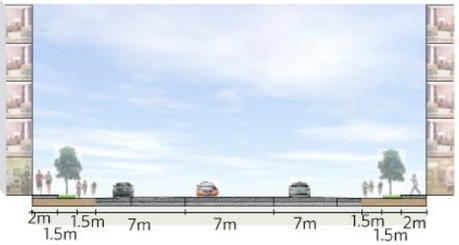
编织城市结构 街道的宽阔决定街段的边沿

The grid is defined with the 200 x 200 m divisions as the centerline of streets. Thus the street widths determine the size of blocks. These sections show the dimensions for the different types of streets. The dimensions reflect an agenda of maintaining human scale in the streetscape while promoting walkability through constricting vehicular access, maintaining solar access and exposure to green space.

网格系统是由200米乘以200米的单元格组成，主干道是中心轴。 因此道路宽幅就决定了街区的尺度。以下是不同街道断面尺寸。这些街道尺度都建立在“以人为本”的基础上，鼓励人们步行而非车行，同时保证足够的日照和绿色空间。

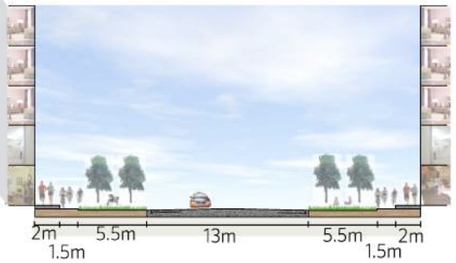
PRIMARY STREET - THRUWAY 主干道- 一般通道

- High density mixed-use retail and residential buildings along primary streets
- 2% slope on each side and porous road surface allow rainwater to penetrate and replenish natural water system
- 道路两旁是高密度混合性商业区和居住区
- 道路两边2%的斜坡以及多孔的铺面材料可以吸纳雨水并补充自然水循环系统



PRIMARY STREET - GREENWAY 主干道-绿色通道

- Expected building heights: 5+ stories
- 2% slope on each side and porous road surface allows rainwater to enter natural water system
- Wide greenways act as linear parks and facilitate social gathering and outdoor activities
- 道路两旁建筑层高：五层以上
- 道路两边2%的斜坡以及多孔的铺面材料可以吸纳雨水并补充自然水循环系统
- 宽阔的绿色通道可以作为线性公园为市民提供室外活动空间

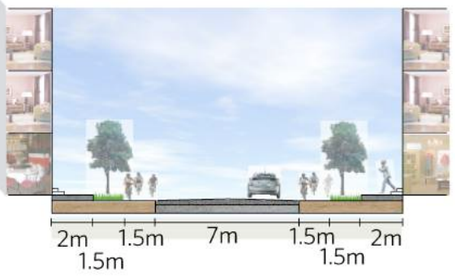


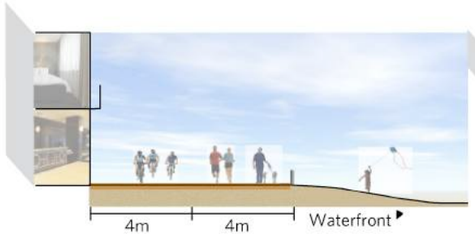
PRIMARY STREET - HIGHWAY 主干道-高速公路

- High density mixed-use office and retail buildings along the highway
- 2% slope on each side and porous road surface allow rainwater to penetrate and replenish natural water system
- Mass transit along the center of the highway
- Private vehnicles on the two sides of the road
- 高速公路两旁是混合性办公用地以及底商建筑
- 道路两边2%的斜坡以及多孔的铺面材料可以吸纳雨水并补充自然水循环系统
- 高速公路的中心是公交专用道
- 私人汽车在道路的两旁

SECONDARY STREET 二级干道

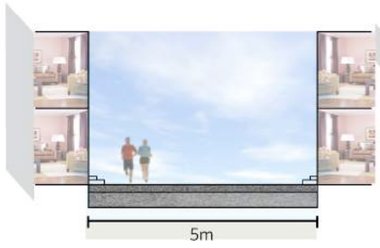
- Expected building heights: 3-4 stories
- 2% slope on each side and porous road surface allows rainwater to penetrate and replenish natural water system
- Greenbelt along sidewalk provides buffer between vehnicular traffic and pedestrians
- 道路两旁建筑层高：三到四层
- 道路两边2%的斜坡以及多孔的铺面材料可以吸纳雨水并补充自然水循环系统
- 人行道旁的绿带将汽车与行人自然分隔





BOARDWALK 滨海景观道

- Luxurious hotels and retail along the boardwalk
- Hotel customers and pedestrians enjoy the waterfront along the boardwalk
- 在木板铺成的滨海景观道两旁是高级酒店和零商
- 酒店住客和旅客可以在亲水平台享受无限海滨乐趣



TERTIARY STREET 三级道路

- Pedestrian, bikes and occasional vehicle access
- Expected building heights: 2-3 stories
- Porous road surface allows rainwater to penetrate and replenish natural water system
- 供行人，自行车和少量汽车通行
- 道路两旁建筑层高：两到三层
- 多孔的铺面材料可以吸纳雨水并补充自然水循环系统`

BLOCK TYPOLOGIES

Guidelines

SOLAR ACCESS 日光照射入口

- A table of building height limits and setback codes was produced respecting Huludao's latitude and our grid orientation.
- Buildings should be constructed contiguously to minimize compacity and 12m thick to allow passive lighting.
- 建筑高度的限制和退界将尊重葫芦岛的维度以及网格的方向.
- 一般地,建筑相邻建设,保证最小拥挤程度.同时相邻建筑的最小间距为12米,以保证被动照明

HUMAN SCALE 人性尺度

- Streets should never be fully shaded and human scale is maintained along the central axis.
- 街道保证不会处于完全被遮蔽的状态.沿中轴线保持人性尺度.

MIXED-USE 混合使用

- All blocks should have accessible street fronts for commercial activity.
- 所有的街区都有可达的用于商业活动的街道界面.

SECLUSION 解决方案

- Blocks in more residential areas should have fewer tertiary streets, creating semi-private courtyards resembling the local vernacular but at a larger scale.
- 居住街区周边尽量少支路,以创造一个半私密的院落,在更大范围内营造了传统的空间

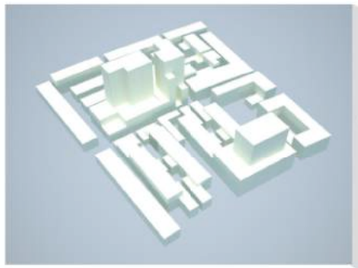
ACCESSIBILITY 可达性

- Blocks in more commercial areas, particularly along primary streets and near the coast, include high-rise buildings and more tertiary streets to maximize accessibility.
- 商业街区,特别是靠近主要道路以及滨海的区域,包括了高层建筑,高密度的支路以保证可达性的最大化.

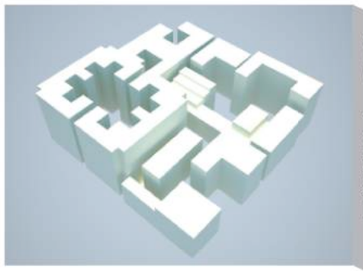
The different blocks show a diversity of form with different FAR's. These forms led to different land uses, from predominately residential to large scale commercial. Using the street hierarchy provided for by the gird methodology, these patches can be mapped onto the city forming a quilted urban fabric. By having different patches in close adjacency the urban fabric acquires resiliency through providing the opportunity for many social and economic niches in close proximity. Clustering the higher density patches around open space creates energy nodes for social contact, be it mass exervcise, festivals or commerce

不同的地段有不同的容积率。这些形态会影响用地的方法，例如住宅用地跟大规模的商业用地。从网格系统中演变出来的道路分级，可以编织出紧密的城市结构，而这个密切邻接的城市结构能提供具有弹性的机会，让社会和经济紧密地发展。此外，把密度较高的发展聚集在空地附近能制造能源节点，让人们可以透过集体早操，节日或商业活动来增加接触。

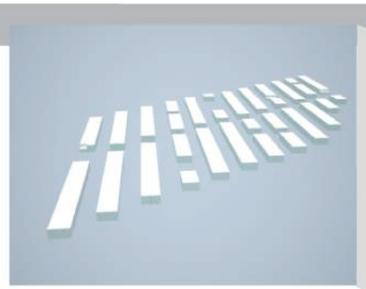
1 MOON RIVER WETLAND PARK
2 ORCHARD HILL 果树园
3 MID RISE 中层区
4 CBD 中央商务区
5 PLAZA 广场
6 GREEN STREET 绿色通道
7 TOWNHOUSES 联排



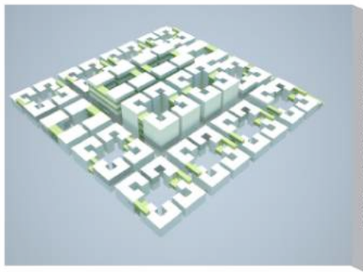
Circle 中心区



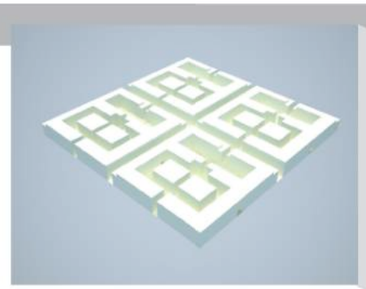
CBD 中央商务区



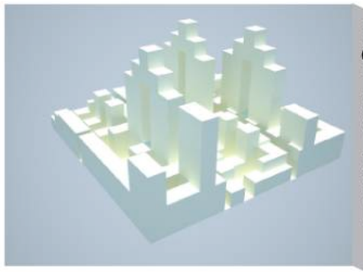
Low Rise 低层区



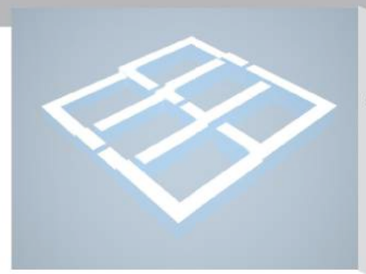
Townhouses 联排



Mid Rise 中层区



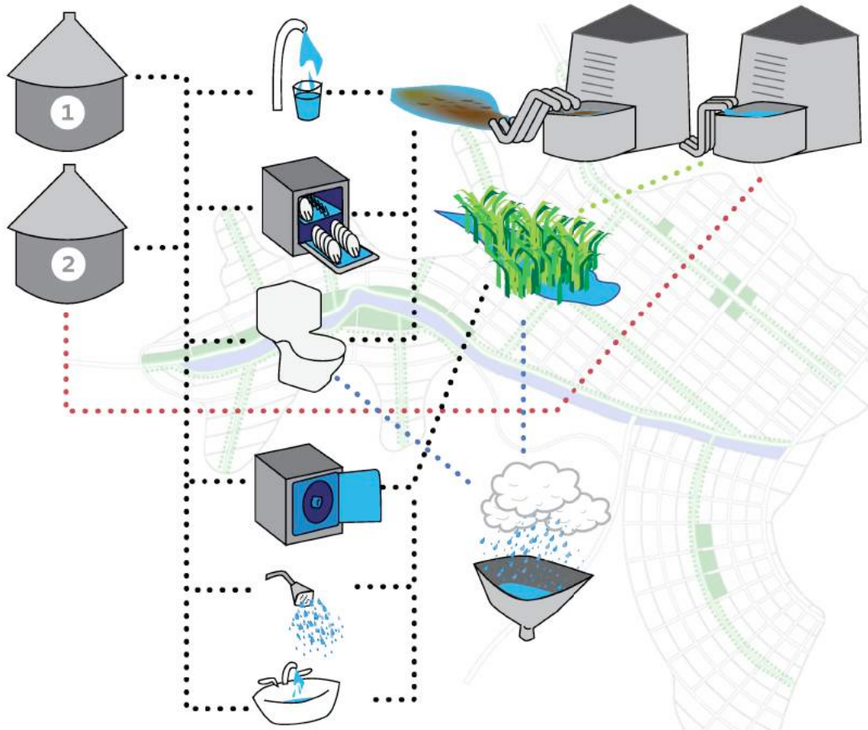
High Rise 高层区



Courtyard 院落

Intended Uses 使用功能	# of 3x3x6m units 方块的数量 3x3x6m	Area (m²) 面积 (平方米)	Block footprint 建筑基地面积	FAR 容积率	Potential Population 规划人口
Residential 居住 Small commercial 小商业 Hotel 旅馆	6684	1200312	24918	4.83	3008
Office 办公 Large Commercial 综合商业 Hotel旅馆 Civic文娱 Residential居住	14461	260298	40000	6.51	6507
Residential居住 Small local commercial 小型地方商业 Agriculture support农业	2503	45054	49994	0.90	1126
Sesidential居住 Small local commercial 小型地方商业	4382	78876	40000	1.97	1972
Residential居住 Small local commercial 小型地方商业	3550	63900	40000	1.60	1598
Hotel旅馆 Commercial商业 Residential居住	4576	82368	40000	2.06	2059
Residential居住 Small local commercial 小型地方商业	684	12312	40000	0.31	308

TECHNOLOGY *within the* GRID 网格中的技术



GREY WATER RECYCLING 中水处理

Wetlands are used for filtration of all household water excluding blackwater (toilet and kitchen sink water) before retention in a reservoir for later reuse (1 & 2). The wetlands serve as the initial phase of water treatment and save 40-50% of water treatment costs per year as a passive system.

湿地系统可以处理除厨房和厕所用水的其他所有生活用水。它可以节省40%到50%的人工水处理费用。

Rainwater would be either captured and used within the buildings or captured and reused for municipal water through the green streets and porous paving. The water that does not infiltrate the urban landscape of street trees and plantings would be channeled into the grey water wetlands and eventually be added to the reservoir.

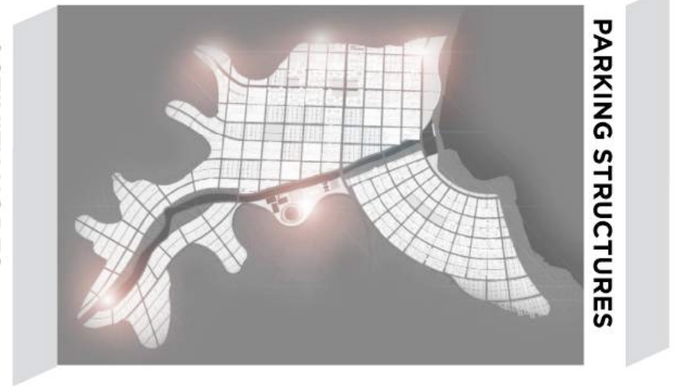
雨水可以被建筑物直接再利用，或者通过绿色廊道和多空性铺面材料被回收，并用于市政用水。没有被街道景观树吸收的雨水也可以回流到湿地系统，经过净化后再次循环利用。

TRANSPORTATION 交通

A REGENERATIVE CITY CANNOT BE CAR-DEPENDENT.
一个良好的城市不能台依赖轿车

MINIMIZE 使减到最少

Noise and congestion to promote livability 噪音和拥挤
Space to encourage density and human-scale streets 空间密度和小街道
Emissions to improve human and environmental health 污染对人类和环境健康
Cost for universal feasibility 推广的成本



APPROACH 方法

- Restrict private cars
- Congestion tax
- Promote biking and walking
- Develop transit in phases
- Utilize Electric taxis
- Evolving bus system
- Light Rail
- Provide parking at city edges so that visitors abandon private vehicles use other forms of available transportation within the city
- 限制私家车
- 拥挤税
- 鼓励骑自行车和步行
- 逐步建立交通运输
- 电动出租车
- 不断发展的公交系统
- 轻轨系统
- 在城市边界处提供集中停车场以限制私家车入城，鼓励人们使用城中提供的其他交通工具。提供停车

An EXPERIENTIAL City
经验为主的城市

To promote maximum resiliency in the urban fabric the entire city needs to be treated as a mixed use development. Within this framework different locations are likely to have different concentrations of respective uses based on landscape and urban features. Blocks along the ocean will have the highest concentration of hotels and tourism-based business while the intersection of the two largest roads will be lined with the highest concentration of office and commercial use.

为了提供一个可塑性强，可变性高的城市空间形态，混合性社区是最值得提倡的。不同地区的 混合性社区在不同的自然和社会背景下可以有相应的功用重点。沿海地区可以将重心放在酒店和旅游业，而市中心的两条主干道交接处则可将重心放在办公和商业用途上。

街道的体验 • STREET EXPERIENCE

Streets are compact and walkable. Ample room for bikers and pedestrians allows for greater sociability. Building heights are lower near the street than on the inside of the block allowing for visibility, solar access, and ease of orientation. Streets feel cozy while maintaining interest through allowing pedestrian access, outside seating, store displays, and street vendors. • 简洁的设计令街道变得容易步行。另外，旁边的单车道及行人道路提供足够的空间作为社交用途。在道路两旁的建筑物高度较低，距离街道较远的建筑物高度较高，这种设计除了让阳光能渗透建筑物，也照顾到视线和建筑物的方向。舒适和有趣的街道设计提供宽敞的行人通道和座位，商店展示，和街头摊贩的空间。

海滩的体验 • BEACH EXPERIENCE

A tourist destination in the summer, the beach at Hu lu dao is full of activity. Hotels and restaurants along its shores create enough room for the influx of tourists in the summer months and the nearby green way and surround windmills remind visitors and residents of the city's eco-mission.
作为夏天的重要旅游地点，葫芦岛的海滩能让你经历很多不同的活动种类。沿岸的酒店和餐厅，环岸的风车和绿色通道提醒夏天的旅客和葫芦岛当地居民葫芦岛环保目标。

湿地的体验•WETLAND EXPERIENCE

The Moon river serves as a wetland remediation area for the city and an ideal space for calm reflection. With small walking paths for visitor access with minimal impact on the ecosystem the moon river wetland can be accessed along nearly the whole length of the city almost all year round.
作为葫芦岛的湿地修正面积，月亮河也是一个让市民休憩的好地方。沿河的小径设计让游客一年四季都能亲近湿地生态区，同时也减低游客对湿地生态的影响。

This project devised a formal process to develop a fine gained grid city that makes use of existing site features, regional processes and historical precedent to create a system that promotes growth independent of resource depletion. The grid creates the opportunity for social and economic growth by providing an organized space for a rapidly urbanizing Chinese population. Wetlands, green streets, and natural areas within the grid encourage a managed program for ecosystem services and environmental regeneration. The scale of the streets encourages walking while providing space for regenerative infrastructure. The various typologies of building envelopes allow for a heterogeneity and density of living conditions. The devised methodologies for city design presented here can be applied to other cities in Northern China and adapted for site specific conditions to maximize the benefits of a fine grained grid.

此项目设计了一个如何应用网格系统来进行有效地城市规划的过程。它利用场地的现有资源，特点和区域历史创造了一个可以刺激城市生长的系统。此网格系统利用有效地空间组织为快速城市化的中国创造了一个 刺激社会和经济发展的城市系统。生态湿地，绿色廊道和自然野生地区为生态系统服务和环境可再生提供了良好的基础。街道的尺度适宜步行和加设可再生的市政基础设施。多样化的建筑和地形为居民提供更多不同的选择和居住密度。 中国北方的其他城市在应用此方法进行城市设计的时候，可根据当地的特色和特殊条件进行适当的调整。