Andrei Martin

Output 2:
Centre 4G: Osong Biovalley Masterplan, Korea, 2011

Abstract

Osong BioValley is situated next to Sejong-si Municipal Administrative City in South Korea and is intended to be the country's premier centre for innovation, research and development for the biotechnology industry. The project was designed in response to a competition brief to integrate development in the Osong Valley through a creative and future oriented master plan. Its design methodologies were was conceptually driven, but relied at the same time on extensive site analysis, precedent study, studies of natural growth patterns and biomimicry and programmatic development through story-scaping. Its objectives were to be globally competitive through connectivity and livability and to integrate a number of activities - research and development, education, biotechnology industries and cultural tourism - into a sustainable urban complex. The masterplan was required to be robust enough to regulate development while responding to different possibilities over time. In response to this, it proposes a cellular layout branching outwards from a social hub, at the intersection of a number of transportation networks and natural systems. Four axes and quadrants are organised in pinwheel fashion around this centre, accommodating research clusters that include education, medicine, industry and agriculture in different ways. At the centre, a strong social and leisure nexus acknowledges that biotechnology is driven by lifestyle as much as by research.

Key Words

Master plan, biotechnology hub, connectivity, liveability

Context

Centre 4G was designed by Andrei Martin in his capacity as a Senior Associate Partner at PLP Architecture, a London based group of architects, designers and thinkers founded in 2009 by Lee Polisano, David Leventhal, Fred Pilbrow, Karen Cook and Ron Bakker, in collaboration with South Korean Tomoon Architects. Although the practice draws from a rich history and experience of working together on projects around the world, it has the culture of a young start-up. It is producing intelligent, exciting and ground-breaking designs through a continual commitment to social, economic and environmental ideals. It shuns preconceptions, fixed architectural styles or methods, allowing each project to become a unique opportunity to research, analyse and creatively respond to its brief, site and context. The foundation of the work lies in a commitment to the quality of life in the city, a delight in the handling of material, space and light and optimism about architecture's potential to enrich society.

Osong BioValley is situated next to Sejong-si Municipal Administrative City (Quadrant 1 in the master plan) and will be Korea's premier centre for innovation, research and development for the biotechnology industry. PLP Architecture and Tomoon Architects' scheme was placed second in an open competition organised by the Chungcheonbuk-do Provincial Government and the Urban Design Institute of Korea that attracted 83 entries. The proposal reflects PLP Architecture's passion for the transformative role of ideas and commitment to designing rich and multivalent cities to enrich the lives of their inhabitants. It adds to their work at Ningbo in China for the fashion industry, adapting and transforming it to meet South Korea's strategic objectives for its biotechnology industry.

General Description

The Centre 4G master plan proposed a cellular layout branching outwards from a central social hub in four directions (fig. 02). It was designed around four concepts: Gather (a concentration of people), Give (the extension of ideas into the surrounding communities), Grow (urban development) and Gradate (the interaction between biotechnology and nature) (fig. 04a). Its central nucleus brought people together to create a concentration of knowledge, exchange and collaboration (fig. 04b,c). From here, four axes spread the creative ideas generated to benefit surrounding communities (fig. 04d). These structured the growth of urban form and between them, formed four districts (fig. 04f). Each of these quadrants accommodated aspects of bio-medical research and industry in a gradated relationship with natural surroundings (fig. 04e).

Research Questions

The master plan addressed the follow research questions:

1) How can development in the Osong Valley be integrated through a creative and future oriented masterplan?
2) How can the Osong BioValley be developed into a globally competitive bio-industry hub?
3) How can an environment for academic-industrial cooperation be created?
4) How can opportunities for cultural tourism be integrated into into a bio-industry complex?
5) How can design for long term environmental sustainability be achieved?

Aims and Objectives

1) To integrate development in the Osong Valley through a creative and future oriented master plan.

A key objective of the competition for the Osong Biovally Master plan was to integrate a number of existing developments (the Osong Biotechnopolis, Osong Biotechnopolis II, Osong Station Area and Osong Medical Cluster) into a globally competitive bio-technology hub (fig. 05). Centre 4G proposed to do this by firstly creating a central nucleus adjacent the existing Osong Station to serve as a strong social, cultural and leisure nexus (fig. 05b). From it, four transportation axes, determined by adapting existing railroad patterns and natural topographic features extended outwards in a pin-wheel formation, defining the spines of the future urban growth pattern and dividing the plan into four quadrants (fig. 05c). Sub axes roads branched outwards from the pinwheel spines, connecting to one another to form a developed circulation system and dividing the quadrants into a system of mixed-use blocks (fig. 05e). This primary organisational strategy connected the proposed new town to the existing system of interregional and inter-local roads and railways, allowing convenient access to surrounding cities (fig. 08a). Intermodal transportation interchanges were carefully planned to minimize congestion (fig. 08c). In addition, the master plan integrated development into an existing regional green network (fig. 11). The city's water system was orientated to follow the natural catchment flow between two existing lakes (fig. 11). The proposed nucleus surrounded a central green area and each quadrant contained a green sector, forming an interwoven green space network with surrounding green reserves (fig. 16a). These natural boundaries were intended to regulate urban expansion over time. The phasing of the development proceeded out from the central nucleus, which, along with the axes set up the framework for the city's growth (fig. 05e). While phased growth was projected up to 2031 and beyond, the robust framework could accommodate different possibilities over time, depending on social and economic conditions and advancements in technology (fig. 17).

2) To develop Osong BioValley into a globally competitive bio-industrial hub.

Global competitiveness required that the master plan deliver two primary goals - connectivity and livability. This acknowledged that biotechnology is a globalised industry and driven by lifestyle as much as by research. Centre 4G was designed to provide broad industrial connectivity and a rich and multivalent city to enrich the lives of its inhabitants. Extensive site analysis at multiple scales, from the national to the local ensured connectivity and ease of access to and from multiple transportation networks (fig.07, 08a). Korea's High Speed Train (KTX) crosses the site and intersects with two railroad networks at Osong Station at the centre of the scheme (fig. 08b). Here intermodal exchange can be made to local trams, buses and cars (fig.08c). Korea's Bus Rapid Transit System (BRT) flanks the east of the city, with two connections to its tram network (fig.08d), and Cheongiu airport lies immediately to its north (fig. 08b). A number of inter-local roads intersect with the master plan's main axes and connect them to regional centres (fig.08b). Within the four quadrants, public transport, in the form of buses and trams as well as cycling lanes ensure ease of movement (fig.08d).

A number of strategies were proposed to address conditions of livability. The first of these was a broad approach to land use (fig.05g). 'Play' lay at the heart of the city, in the form of the commercial, entertainment, cultural, international and recreational activities making up the central nucleus; 'Living', in the form of residential and educations activities lined the primary axes and 'Work' (research and industry) lay behind these, in the urban quadrants they created (fig. 05h). This arrangement meant that residential and educational activities faced outwards towards natural settings, while mixed use research and industry, parks and agriculture were accommodated in urban blocks (fig.10a). As these blocks got closer to the axes, became more densely occupied and building height increased towards the central nucleus, creating a concentration of activities and a legible urban environment (fig.10c.d). This approach drew on ideas developed for the city of Curitiba in Brazil, which is structured by high density, public transport axes extending from a central core. Each quadrant of Centre 4G incorporated a thematically programmed green sector corresponding to its natural characteristics and function, creating different interactions between human activities, cultural events and nature (fig.12a,b). The characteristics of the green sectors were related to their adjacent quadrant. Quadrant 1, housing an existing administrative complex and crossed by the high speed train line contained a linear park along the train line for community activities (fig.12c); Quadrant 2, focused on education facilities, incorporated a hilly eco-park (fig.21); Quadrant 3, the industrial and research quadrant incorporated an urban farm (fig.22, 23) and Quadrant 4, the business sector and closest to one of the rivers flanking the site, focused on aqua-culture (fig. 24). The overall land use pattern of the resulting proposal was 66% green space, 17% work space, 10% living space and 7% play space, a dramatically different profile from other techno parks or biomedical research complexes in Korea and elsewhere (fig.13a,b,c).

3) To create an environment for academic-industrial cooperation and to integrate opportunities for cultural tourism into the bio-industry complex.

As an extension to Objective 2, Centre 4G was designed to incorporate bio-related activities such as medical and biotechnology research and development with industry, education, cultural tourism, service industries and others (fig.09a). It did this firstly by assigning different functions to different areas of the plan: commerce, entertainment, leisure and international hotels were locate at the Centre (fig.16b); Quadrant 1 incorporated an existing administrative centre and added high tech medical-industrial functions; Quadrant 2 was structured as a research and development hub around an existing university (fig.16c); Quadrant 3 linked farm lands and bio-technology functions to form a green biotechnology hub (fig.16e) and Quadrant 4 served as the business centre for investment, finance and marketing as well as accommodating an international convention centre (fig.16g). To strengthen the connectivity between the urban functions and to maximize the efficiency of the land use, these functions were mixed based on the unit of a block (fig.15). This diversified the physical space and function of the scheme at the scale of the block, with heights and densities calibrated with the main structuring elements of the plan as previously described. In this way diversity, overlap and integration was built into the urban morphology, zoning and density of the proposal (fig.10b). A number of facilities were proposed to promote medical and cultural tourism. These included a bio-museum, an art gallery, a theme park and medical tours of health care institutions.

4) To design for long term environmental sustainability

Within the overall planning strategies describe above, a number of further aspects were proposed to enhance environmental sustainability. The master plan promoted smart growth from the centre out regulated by natural systems and allowing for their co-existence (fig.12a). It incorporated substantial green open space as an integral part of the urban system and proposed the use of green transportation and renewable energy (fig.08d, 22).. Its streets and distances were designed to be cycle-able or walk-able (fig.20). and its green areas to promote bio-diversity (fig.16d, fig.21,23). Passive energy principles, green roofs and vertical farms were all part of the kit of parts proposed as development principles and urban guidelines (fig.14).

Research Methods

This master plan was conceptually driven, around the idea that by concentrating people and knowledge around a centre, creative ideas would be generated that would spread out to benefit surrounding areas (fig.18). The centre was conceptualized as a device to draw together existing axes of energy, from which ideas would be re-radiated out along four axes, regulating the growth of the urban form in relation to natural boundaries (fig.11). The four axes were determined by adapting existing railroad patterns and natural topography, thereby defining four quadrants of development (fig.05). This concept was encapsulated in the name of the masterplan, Center 4G, an acronym standing for Gather (a concentration of people), Give (extension of ideas out from the centre), Gradate (interaction with nature) and Grow (manage urban growth) (fig.04). These ideas were developed via studies of natural growth patterns and principles of biomimicry (fig.06a) as well precedent studies of historic urban centres, including Boston, Berlin, Lucca, Madrid, Manhattan NY, New Delhi, Paris, Philadelphia, Washington DC (fig.06b). Given the importance of connectivity and integration with nature for the success of the development, extensive site analysis at many scales was undertaken. This investigated the site's broad industrial context and connectivity, (fig.07) existing transportation infrastructure (fig.08), watersheds, developmental thrusts, green space networks and current developments in Osong Valley (fig.11). From this, an initial diagram defined four arcs around a central point, a centre and four radiating axes. The directional flows towards this centre were understood and developed into four axes radiating out from the centre in a pinwheel fashion, defining the limits of four quadrants and driving growth outward from the centre (fig.16a). Within each quadrant, the urban morphology was developed through a combination of natural or pre-existent landform (hills in Quadrant 2, farmland in Quadrant 3 and village in Quadrant 4) and what the architects called 'story-scapes' or programme narratives (fig.09b,c,d).

Dissemination / Impact

The project was awarded second place in an international open competition organised by the Chungcheonbuk-do Provincial Government and the Urban Design Institute of Korea that received 83 international entries. It was published in Architecture and Design Competition 92, pp 34-37.

Evidence

Images and Drawings

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Fig. 24 Quadrant 4
Fig. 25 Aerial perspective, night view

Fig.01 Competition Board

Fig.02 Centre 4G Overall Plan

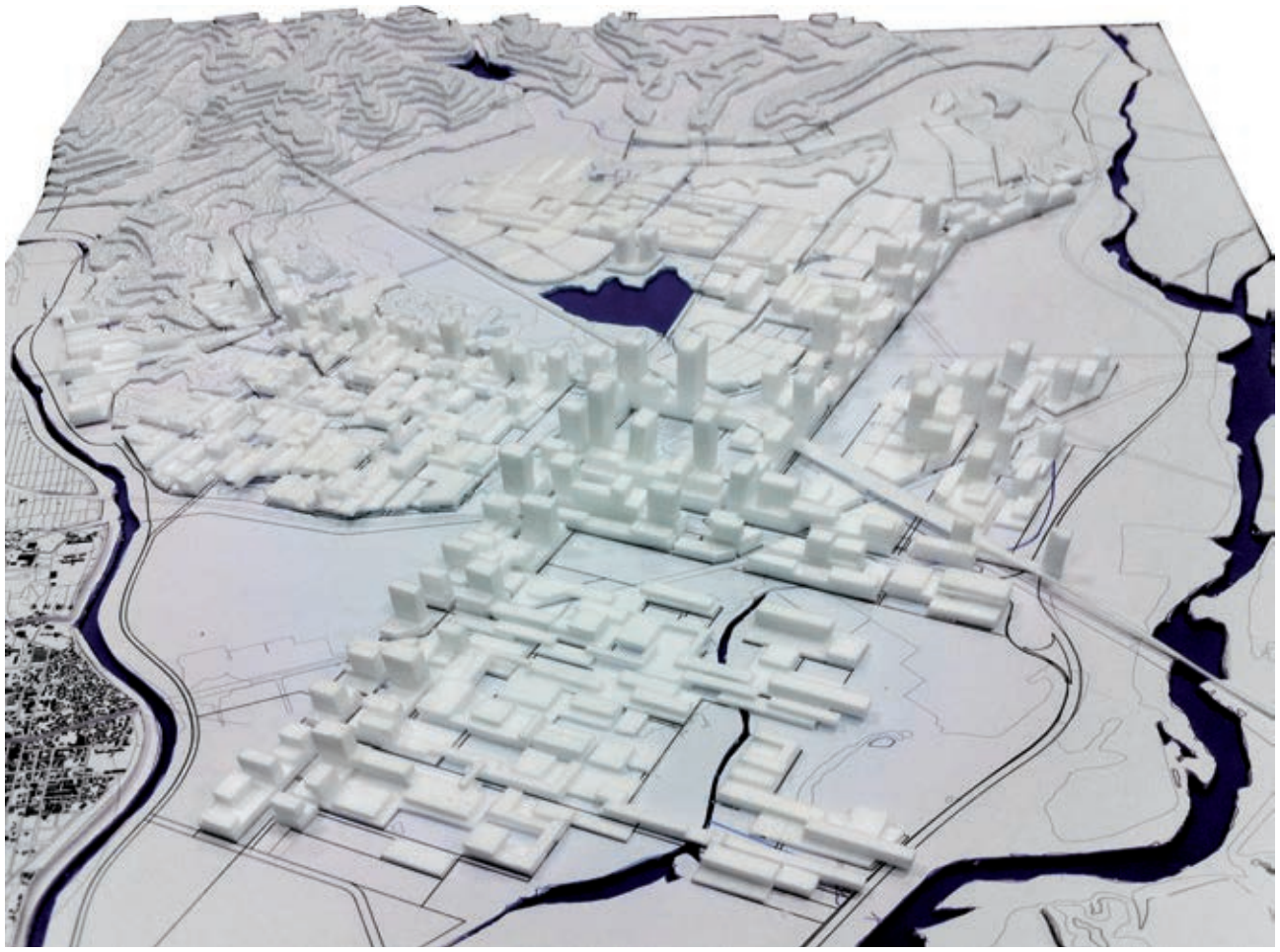


Fig.03 Working Model

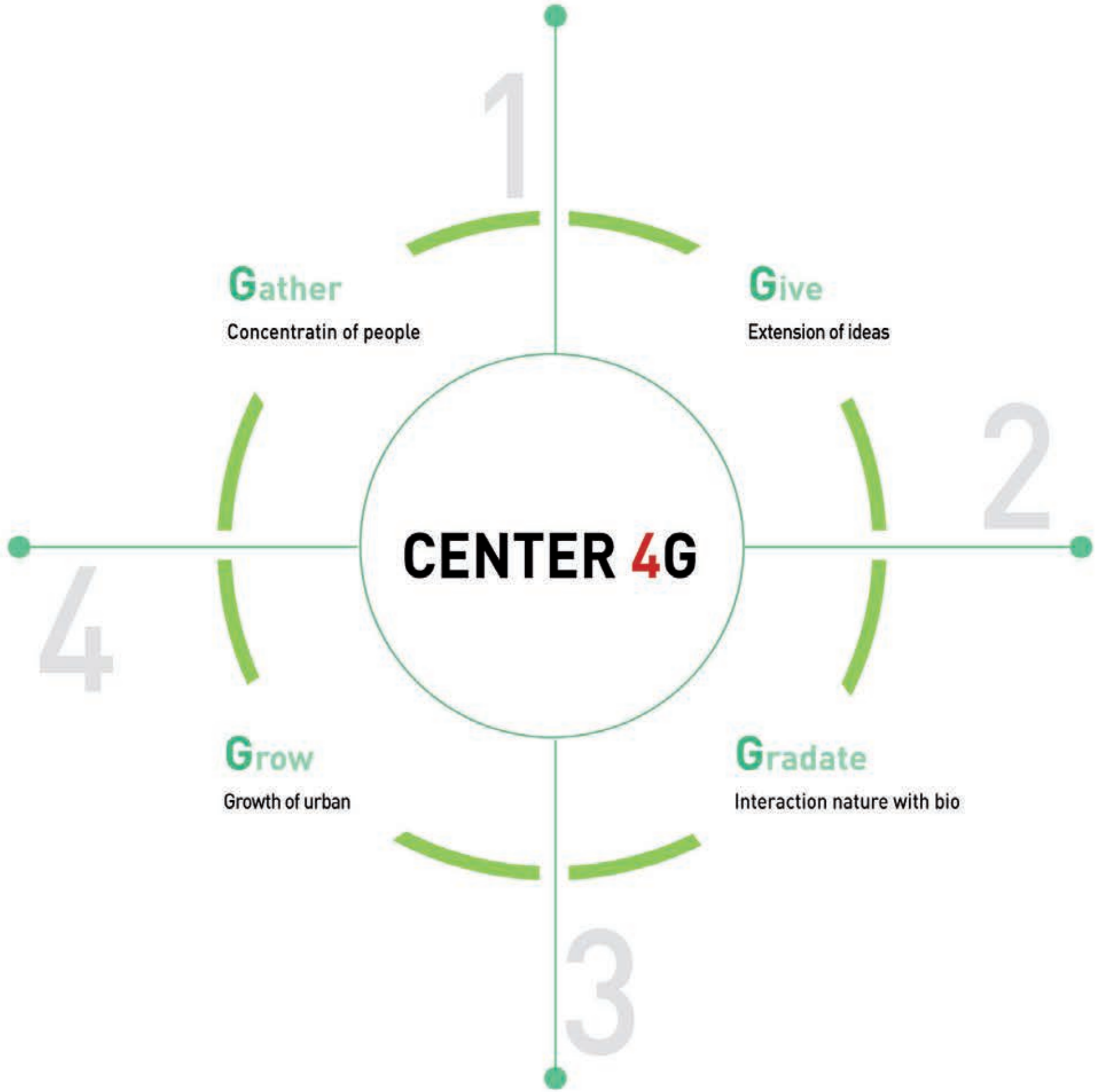


Fig.04a Conceptual Diagrams

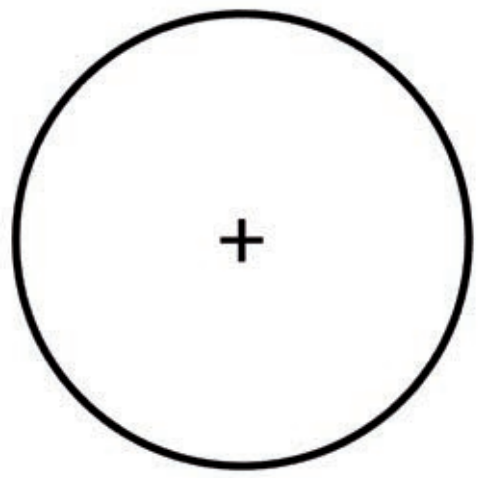


Fig.04b. Centre

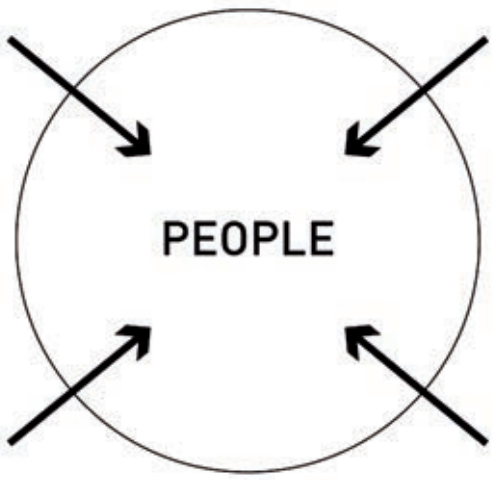


Fig.04c. Gather

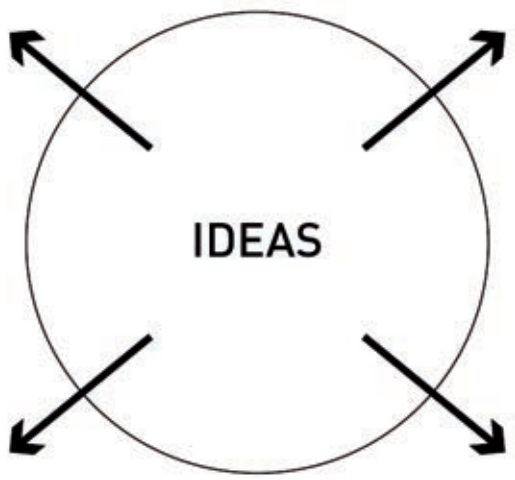


Fig.04d. Give

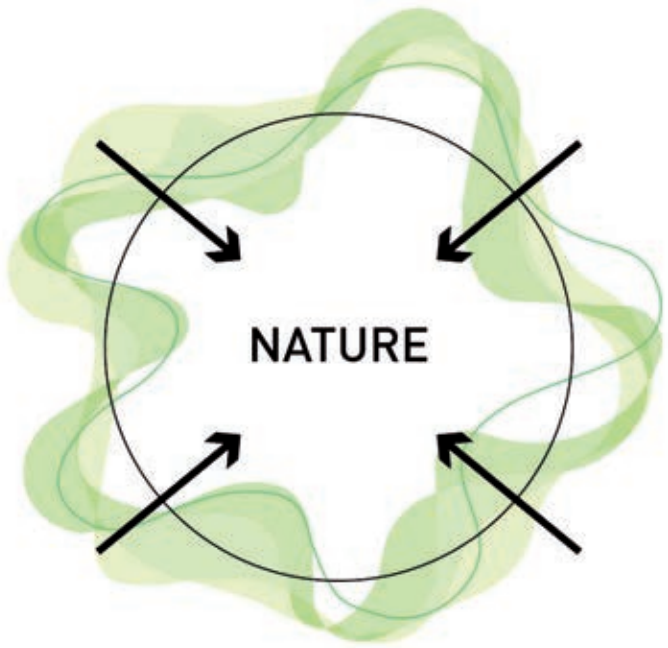


Fig.04e. Gradate

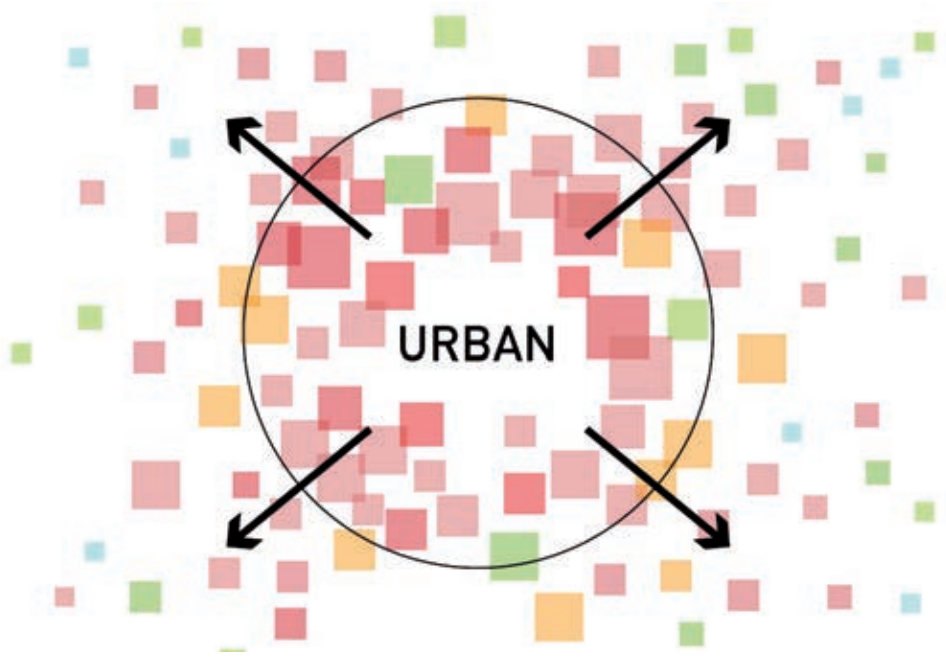
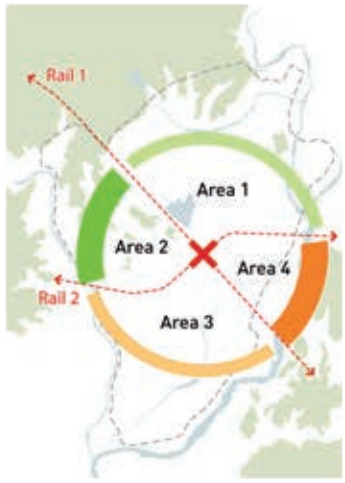


Fig.04f. Grow

Design Concept

Four Urban Areas



Four areas are formed by adapting railroad pattern and natural topography and have different characteristics.

Urbanized Territory

The urban developments are extended in the same directions as the axis.

Urban expansion are regulated based on the natural boundaries (mountains, streams) and physical boundaries (roads, railways).

Reconnecting Urban Areas

Separated areas are divided by railroads. Integrating the areas through the four axis will allow to establish a strong center point.

Urban Growth Patterns

Four main axis and branched sub-axis form urban pattern.

Sub-axis connected to other sub-axis forming a developed circulation system.

Transforming Main Axis

The directions of axis will be modified based on natural terrains and existing urban conditions. The length of the axis will be adjusted by the infrastructure. This will define the spine of the Urban growth pattern.

Urban Functions

The function of center is Play The programs are shared for leisure and lifestyle.

Within the Axis, the urban function of living is faced toward the natural setting. On the other side of the axis, the works are research and industry.

Fig.05a Design Concept

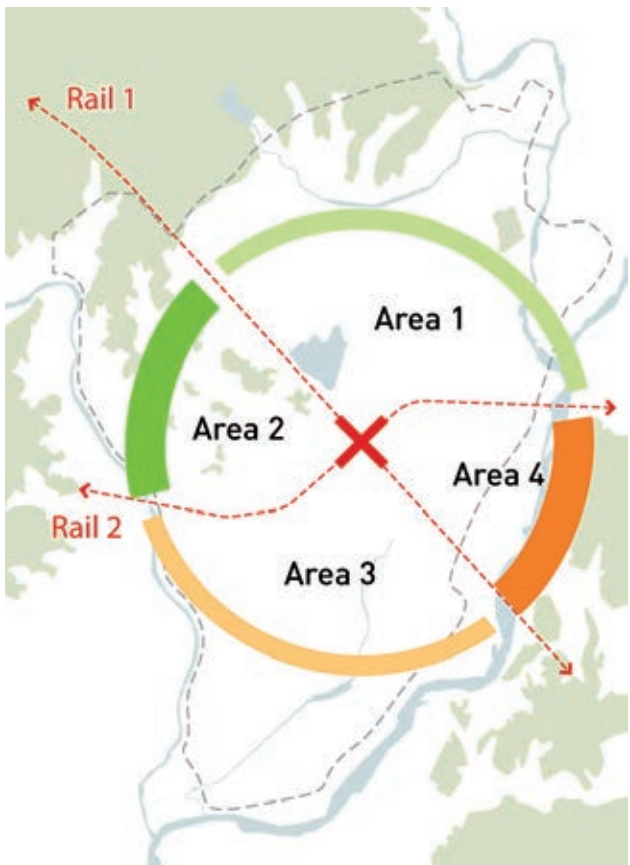


Fig.05b Four Urban Areas

Fig.05c Urbanised Territory

Fig.05d Reconnecting Urban Areas

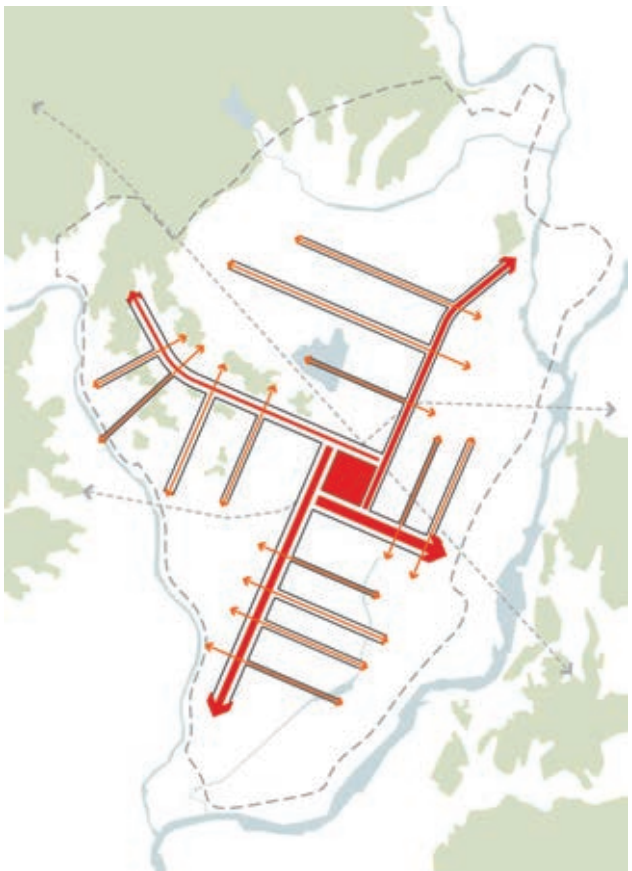


Fig.05e Urban Growth Pattern

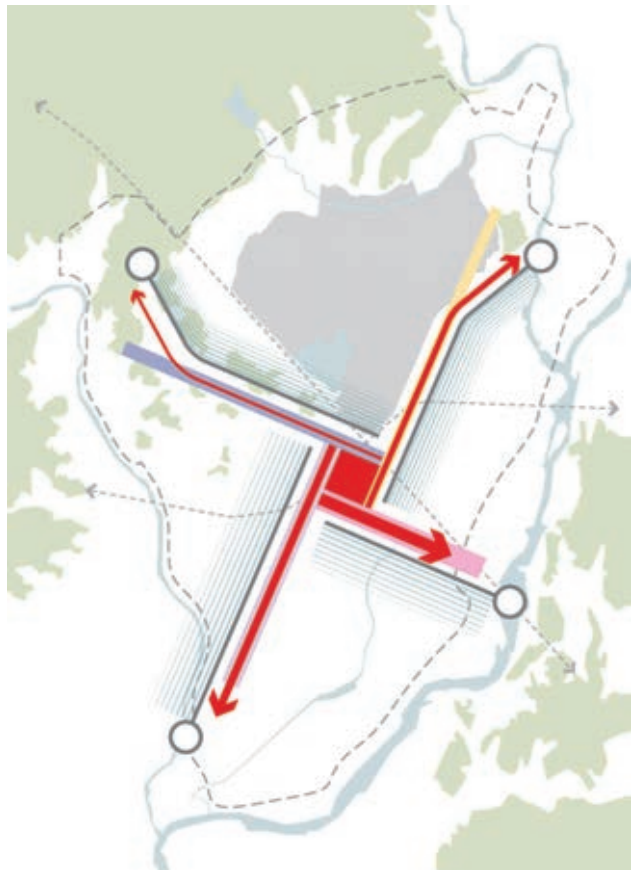


Fig.05f Transforming Main Axis

Fig.05g Urban Functions 1

Fig.05h Urban Functions 2

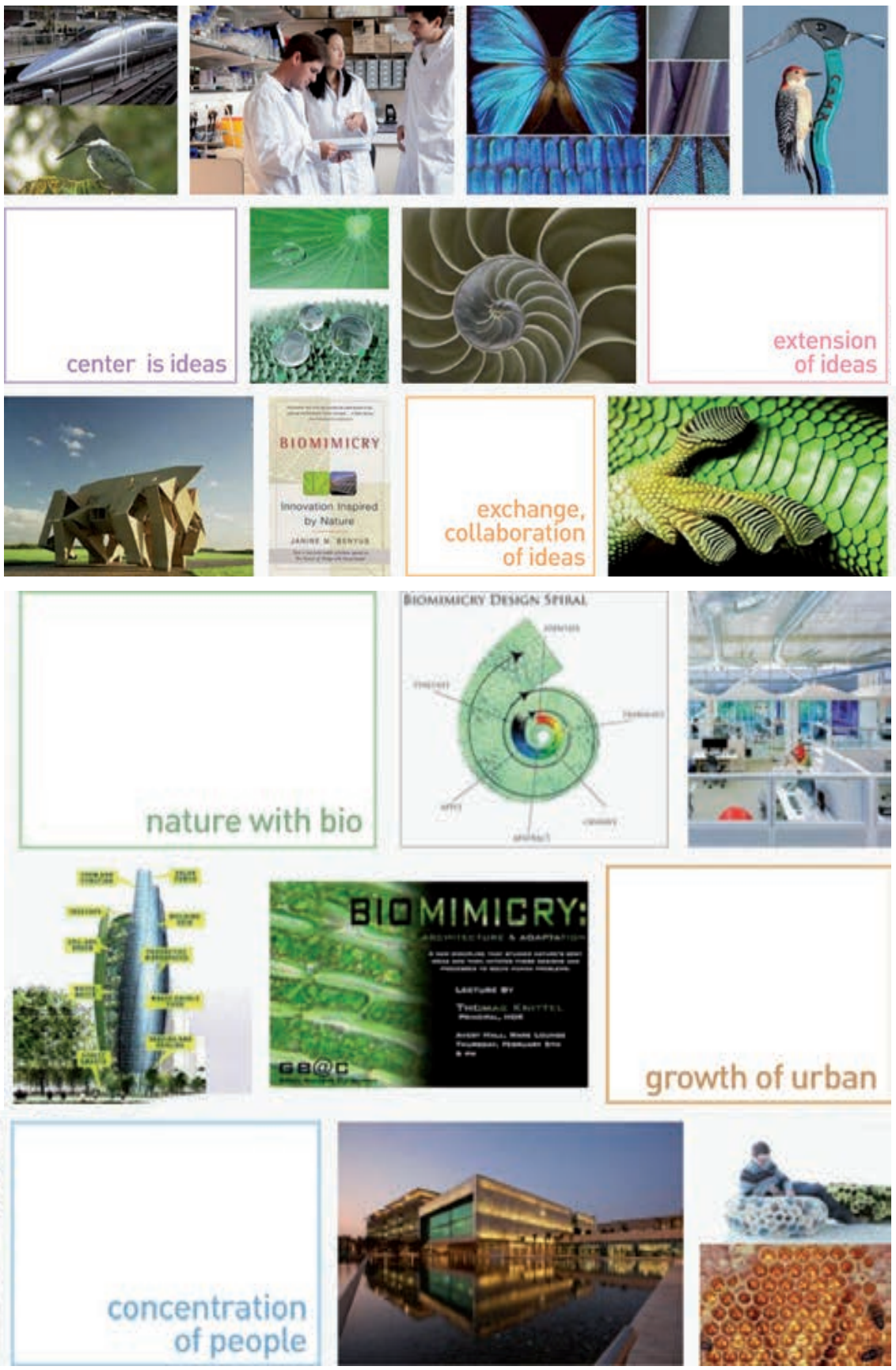
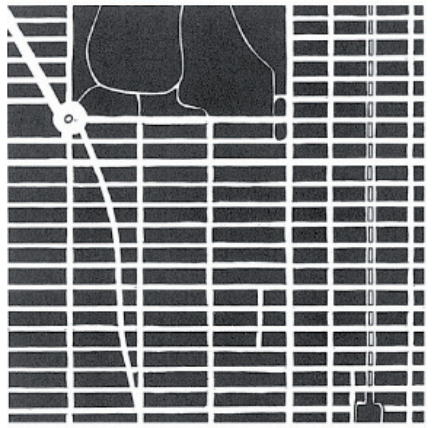


Fig.06a Conceptual References for Biomimicry

Downtown
Philadelphia,USA

Madrid, Spain

Lucca, Italy



Midtown,
Manhattan, NY, USA

India gate
New Delhi, India

Historic center,
Berlin,Germany

Washinton D.C.,
USA

Etoile-Rond-point
Paris, France

Boston, USA

Fig.06b Precedent for Urban Morphology

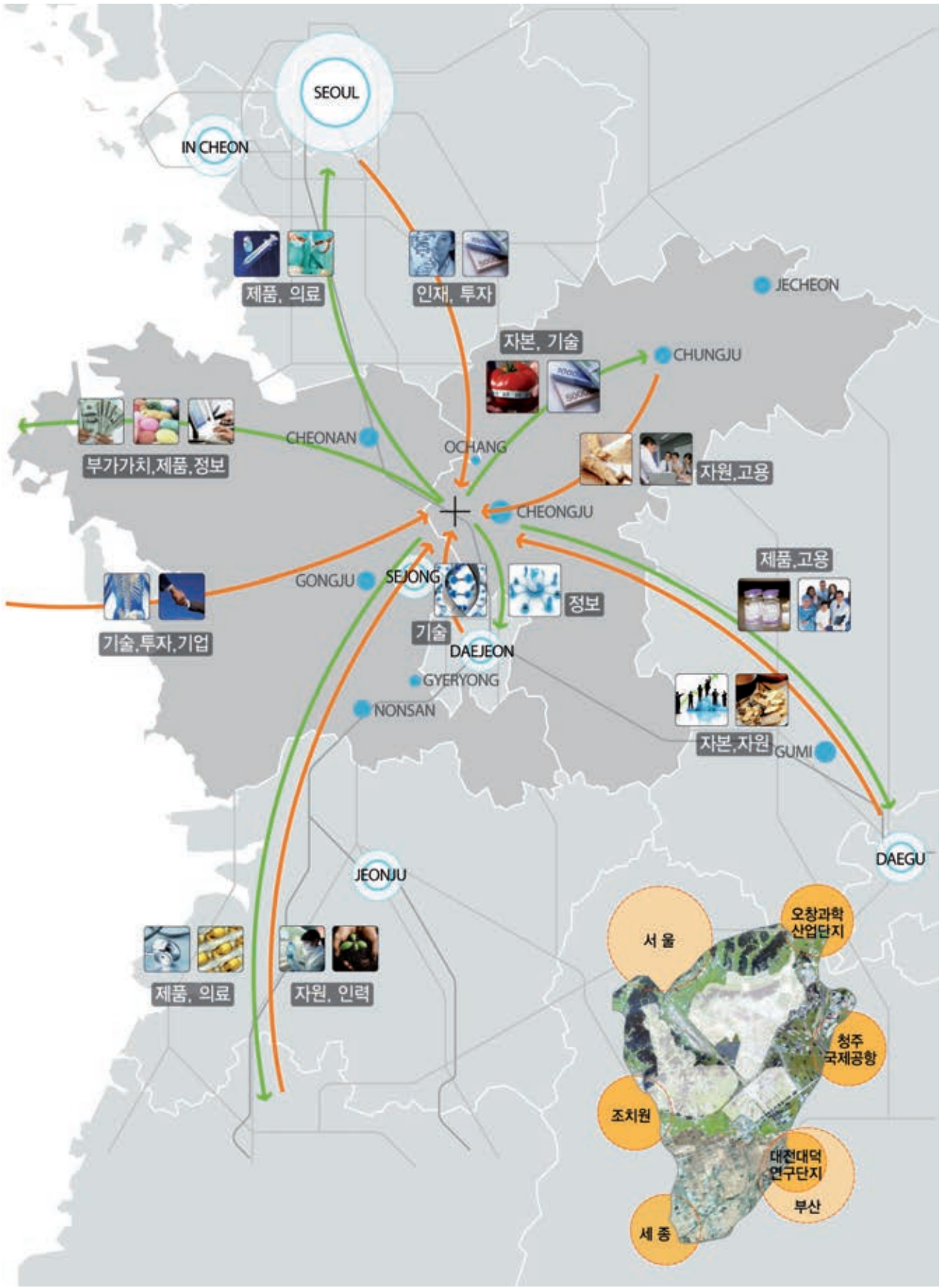
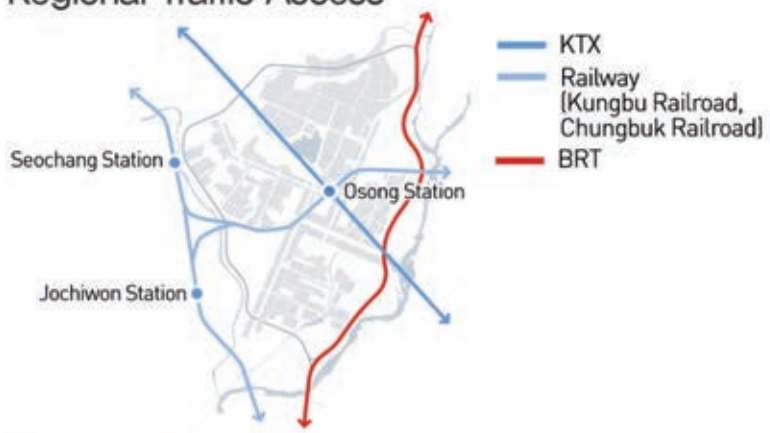


Fig.07 Regional Connectivity

Regional Traffic Access



Osong station Transfer Systems

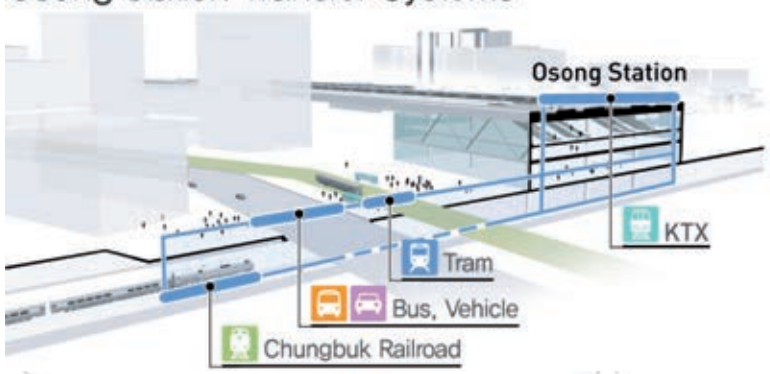


Fig.08a Overall Regional Road and Rail Strategy

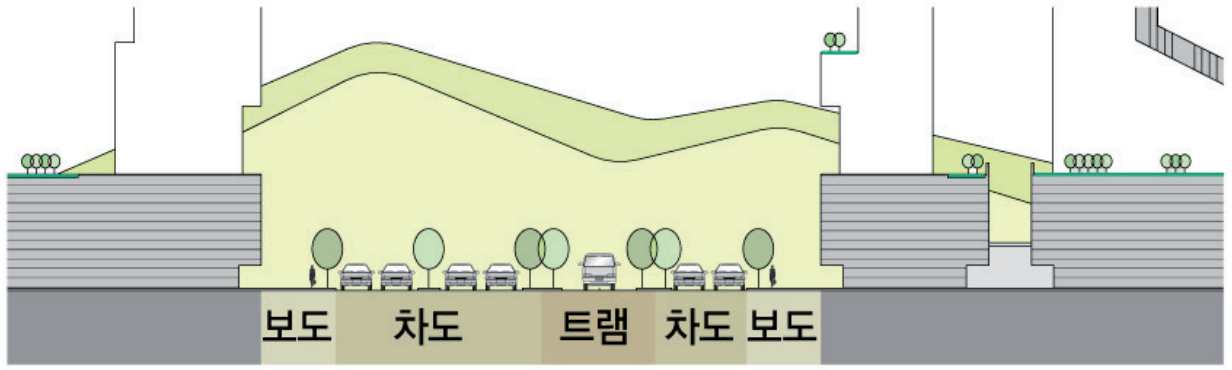
광역 대중교통 체계

Fig.08b Detail: High Speed Rail, Rail and BRT links

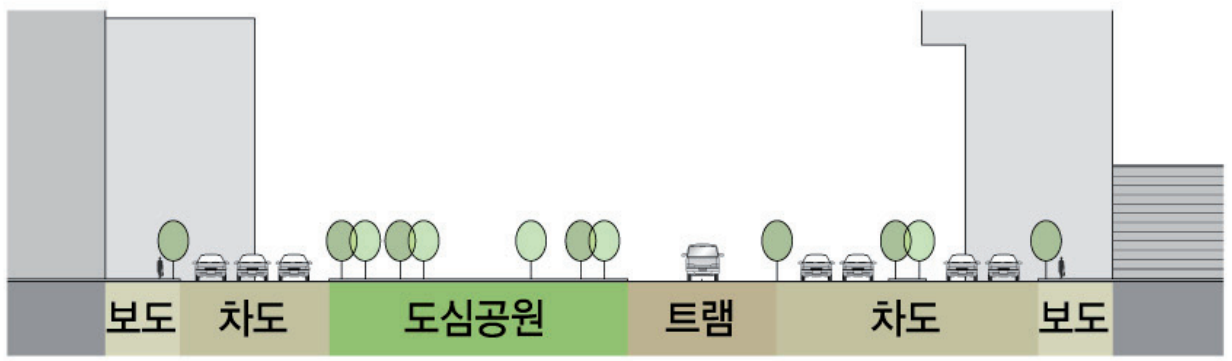
Fig.08c Detail: Osong Station Intermodal Strategy

Fig.08d Cycling, Bus, and BRT Routes

도시 주가로
(Boulevard; Quadrant 2)



도시 주가로
(Boulevard; Quadrant 4)



도시 보조가로
(Community Street)

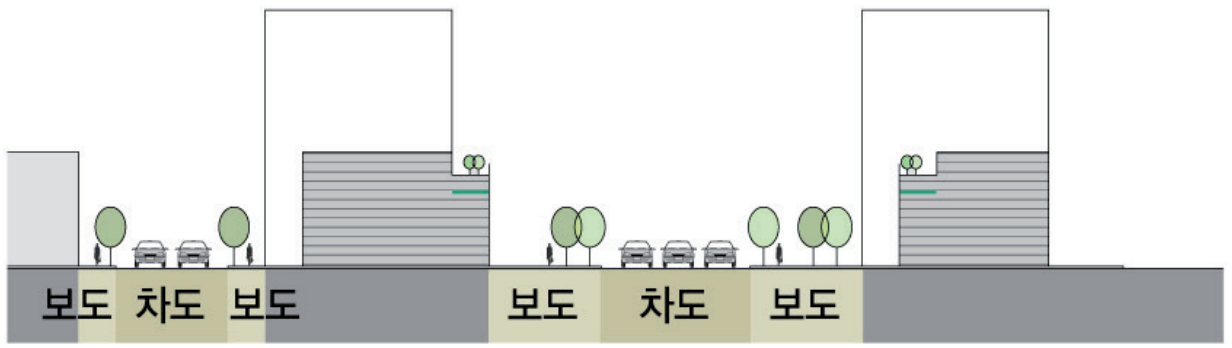


Fig.08e Sections through boulevards and community streets

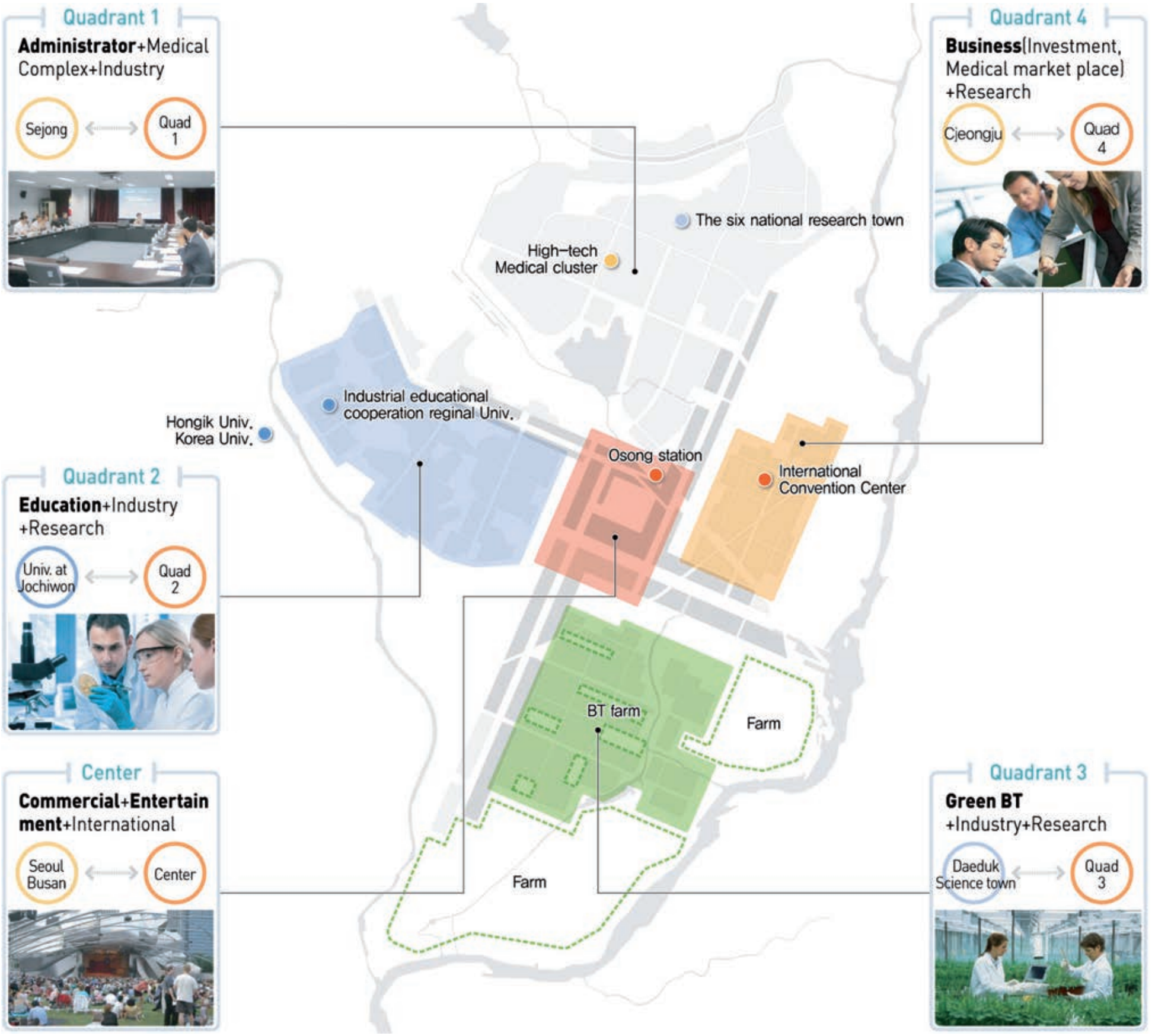
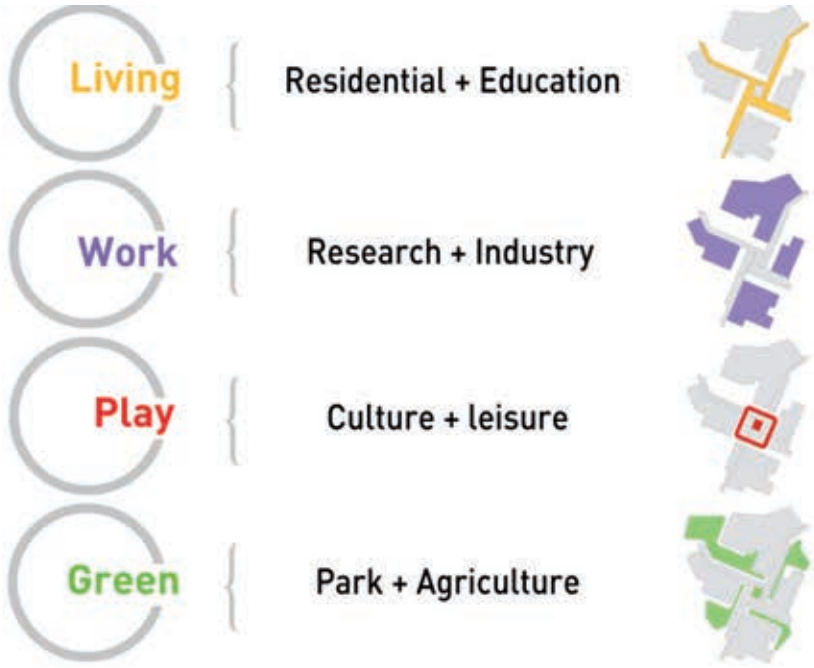


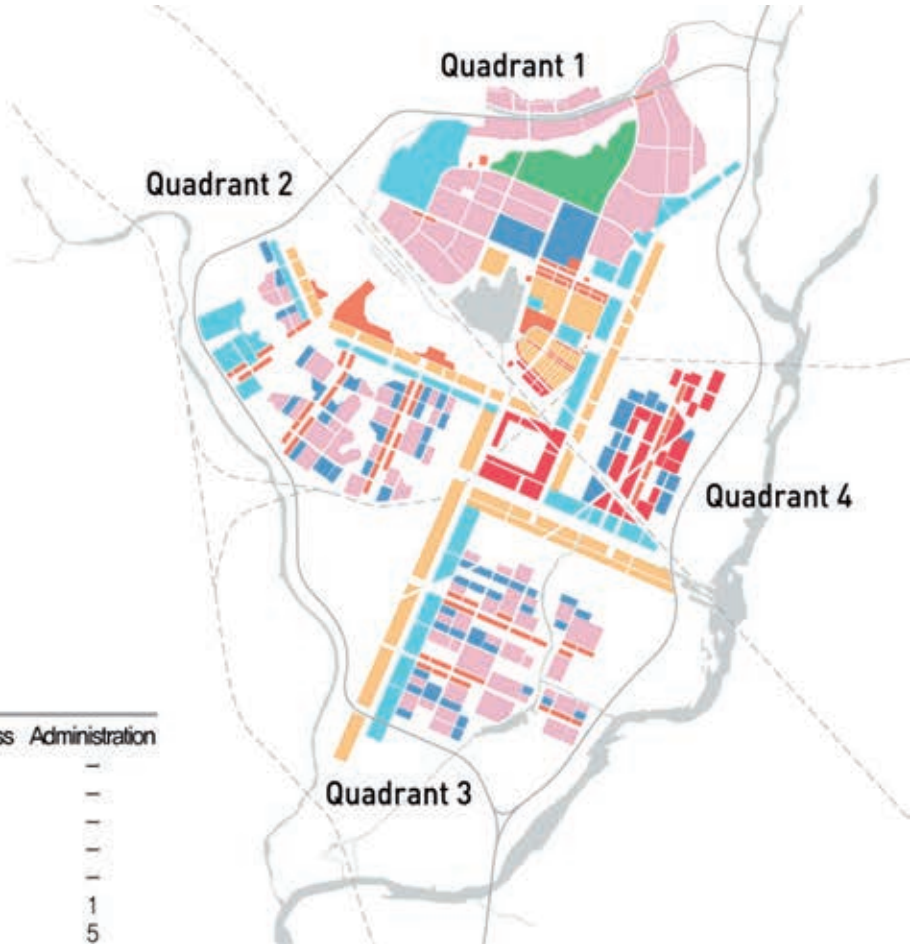
Fig.09a Quadrant Activity Mixes

Fig.09b Landform and Story-scape, Quadrant 2

Fig.09c Landform and Story-scape, Quadrant 3

Fig.09d Landform and Story-scape, Quadrant 4





	Mixed-use							
	Residential	Commercial	Education	Research	Industry	culture	business	Administration
Residential	7	2	–	–	–	1	–	–
Education	–	3	5	–	–	2	–	–
Research	1	1	–	7	–	1	–	–
Industry	1	1	–	1	6	1	–	–
Commercial, Business	1	2	–	–	–	2	5	–
Mixed community	3	3	–	–	–	2	1	1
Administration	–	1	1	2	–	1	–	5

Fig.10a Land Use Diagram

Fig.10b Detail, Land Use Diagram

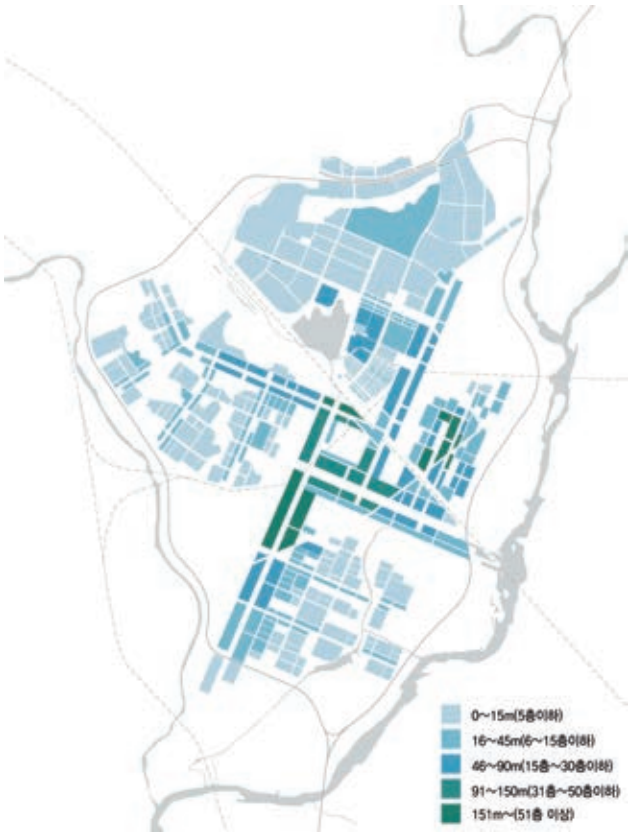


Fig.10c Building Height Diagram

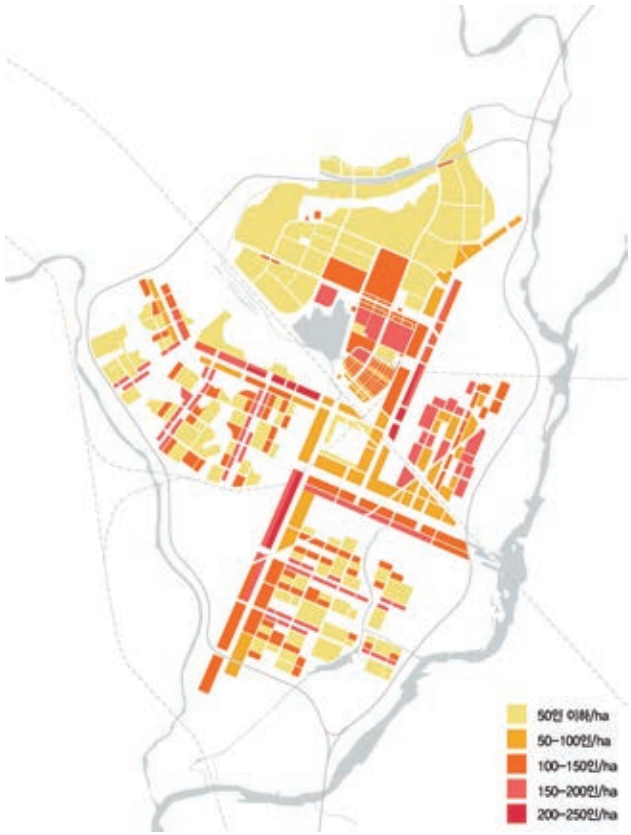
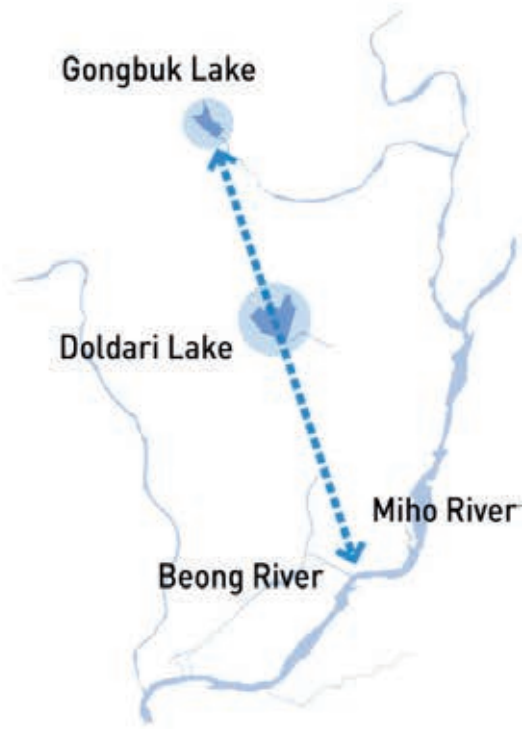


Fig.10d Density Diagram

Form of regional green flow

Interwoven system

Circulate Water Flow



Maintain green reserve

Link and Extend

Connect water system through Axis

Fig.11 Environmental Strategy

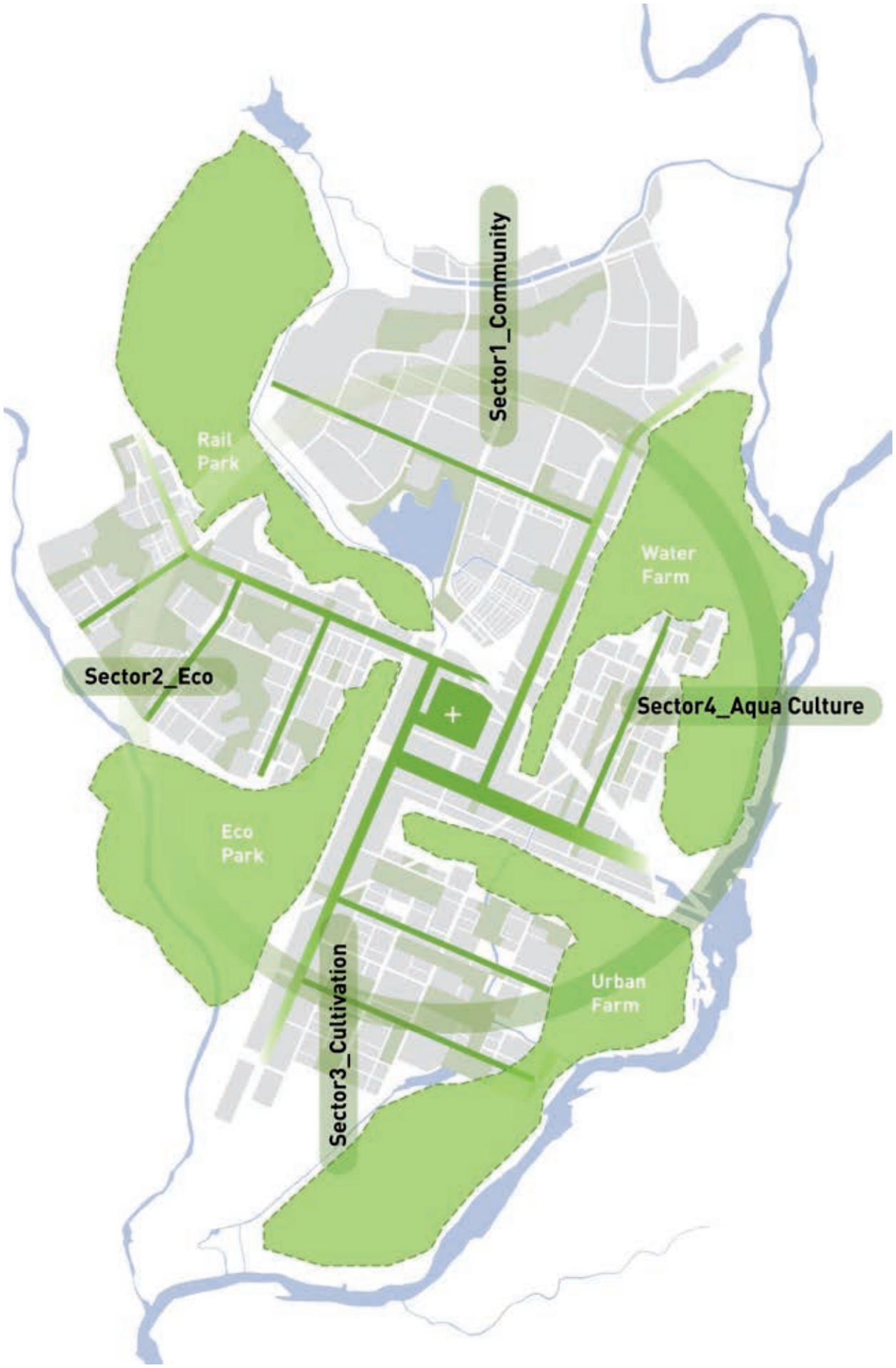


Fig.12a Plan: Green Strategy per Quadrant

Fig.12b Perspective: Green Strategy per Quadrant

Fig.12c Illustrated Green Strategy per Quadrant

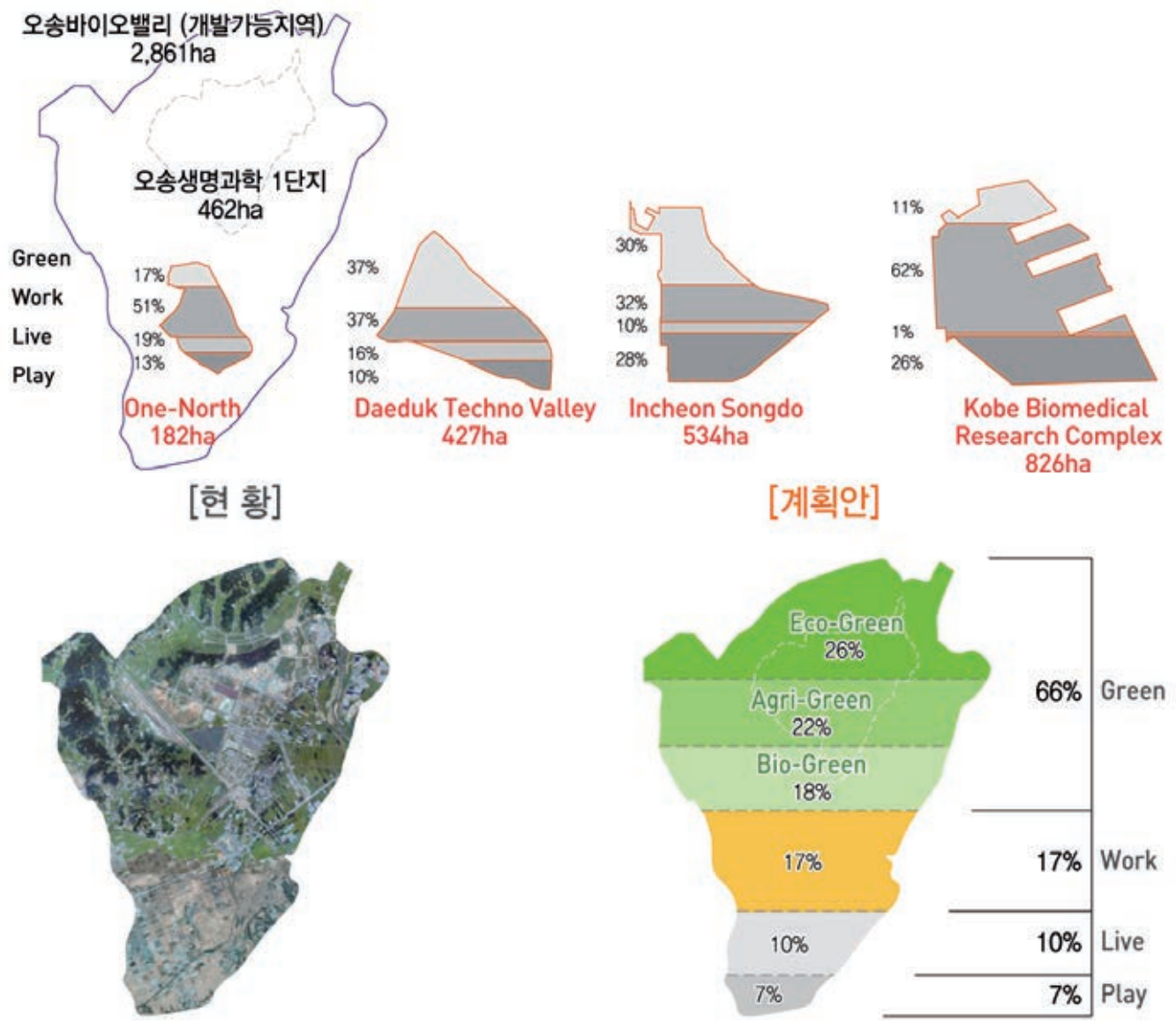


Fig.13a,b Comparisons between green space in Centre 4G and other biotech hubs

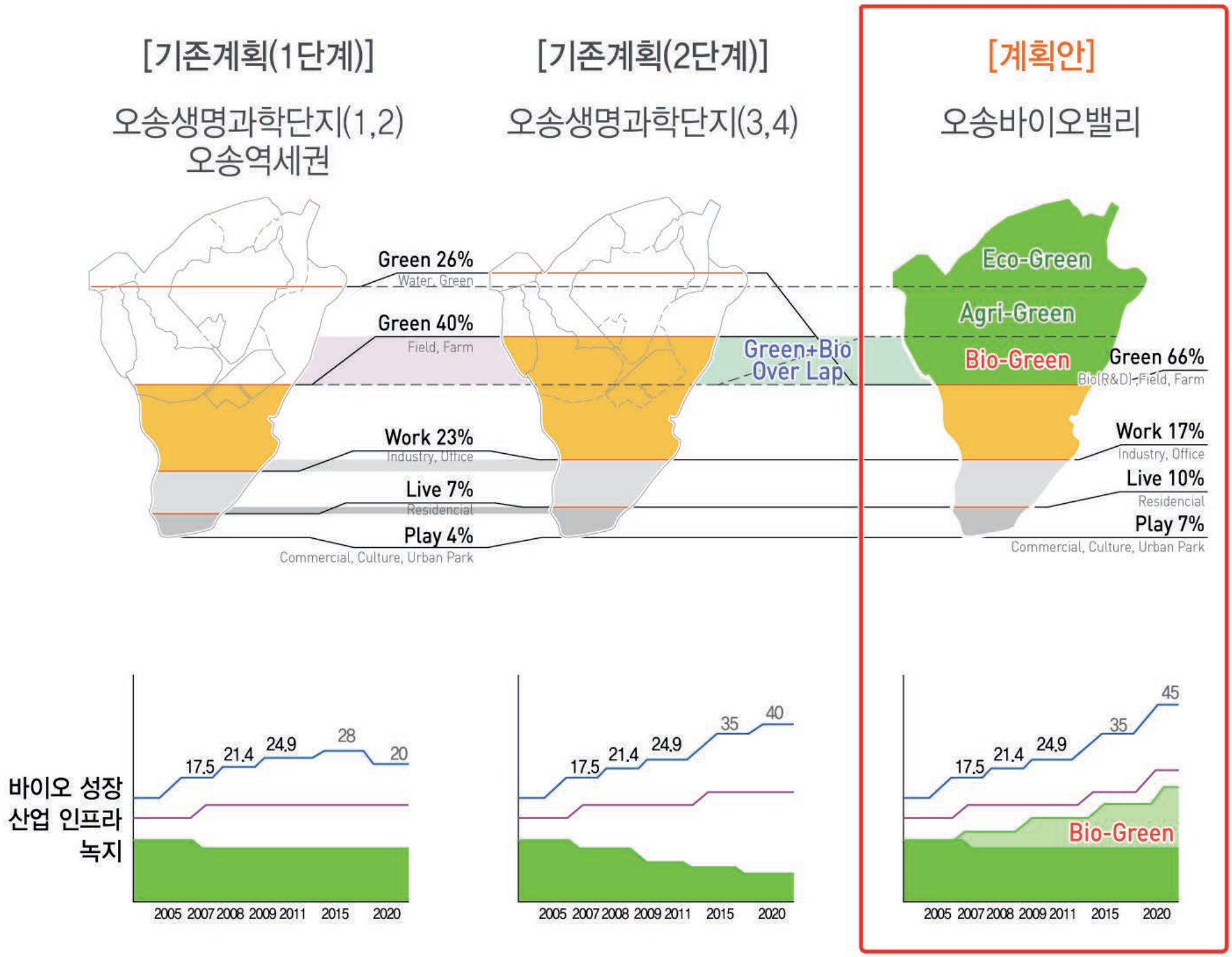


Fig.13c Comparisons between green space in Centre 4G and other biotech hubs

Fig.14 Green Principles

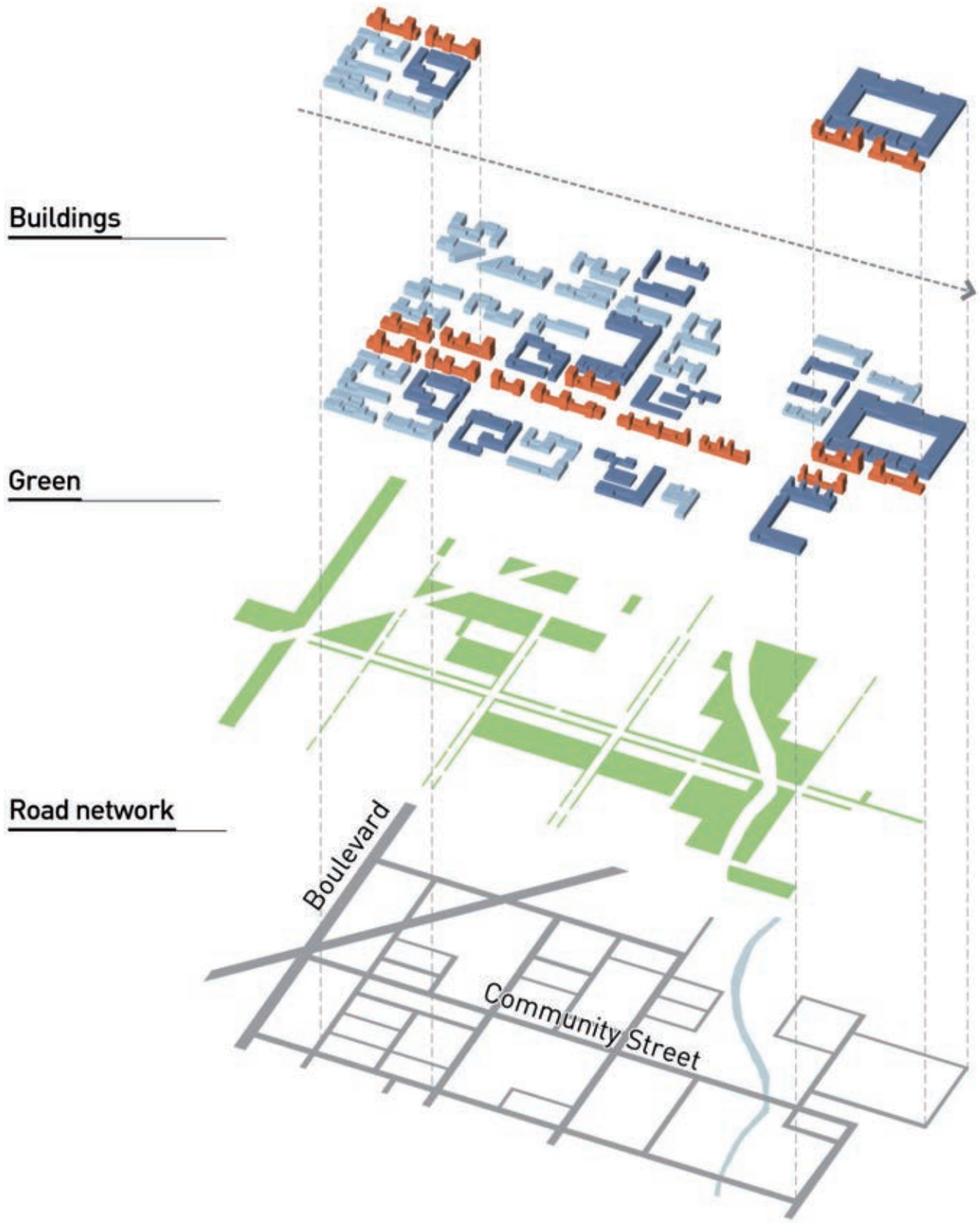
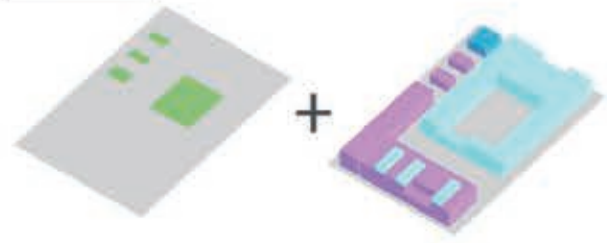


Fig.15a Mixed Use Block: Roads, Buildings and Green Space

Community mixed -use block A

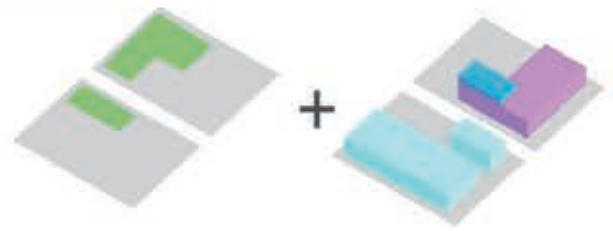
- Lot area : 4,500 ㎡
- The building-land ratio : 35%
- Floor area ratio : 160%
- Open space ratio : 16%

Bio mixed-use block C



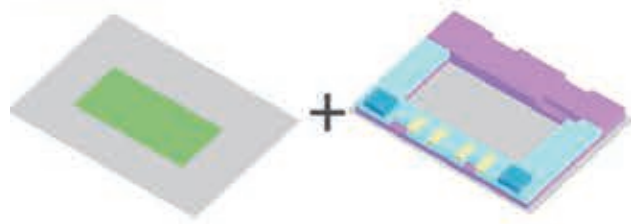
- Lot area : 80,000 ㎡
- The building-land ratio : 48%
- Floor area ratio : 200%
- Open space ratio : 24%

Bio mixed-use block A



- Lot area : 15,000 ㎡
- The building-land ratio : 40%
- Floor area ratio : 172%
- Open space ratio : 19%

Bio mixed-use block D



- Lot area : 80,000 ㎡
- The building-land ratio : 58%
- Floor area ratio : 240%
- Open space ratio : 27%

Fig.15b Mixed Use Block Diagrams

Fig.15c Mixed Use Block: Roads and Land Use Principles

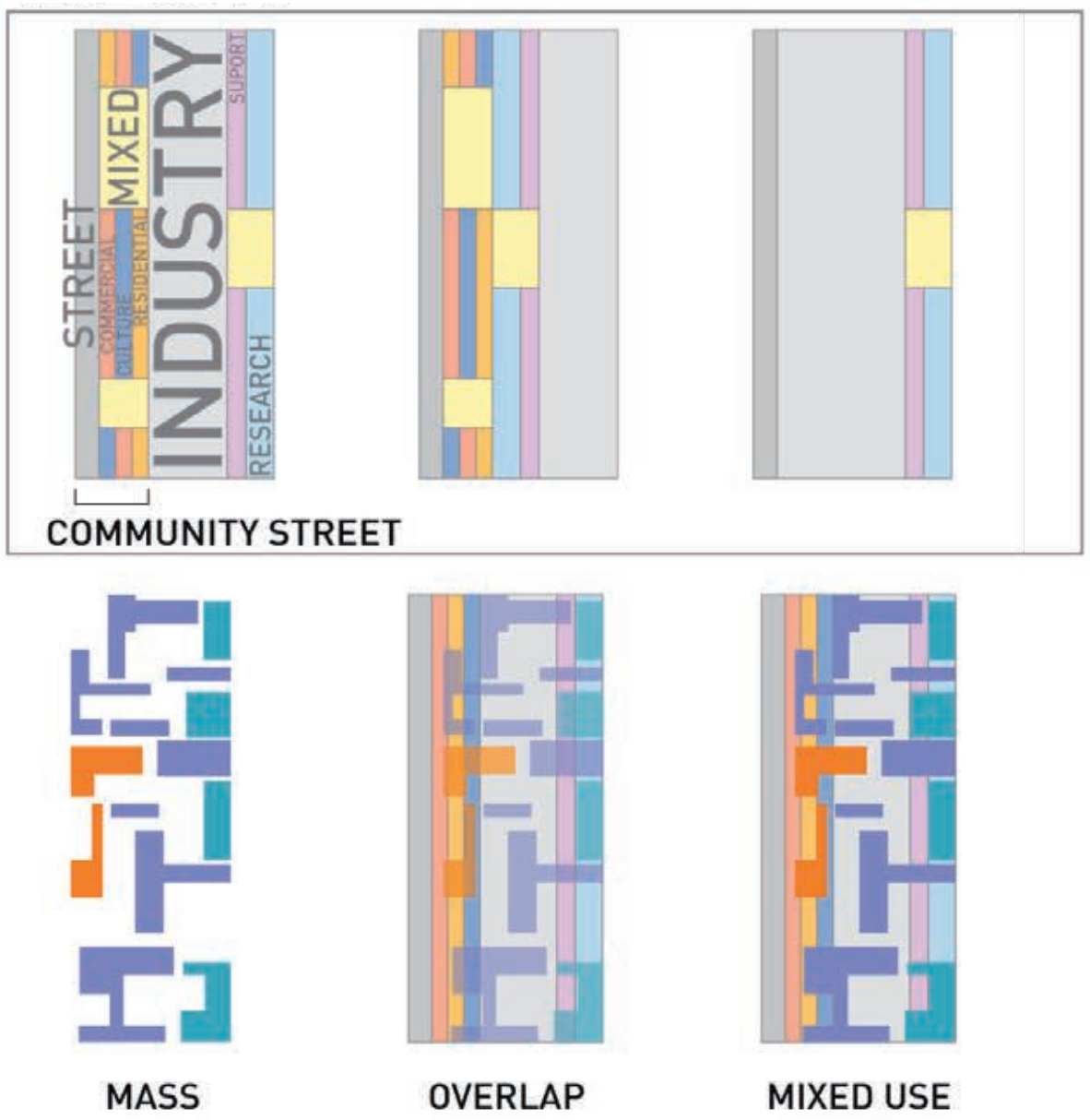


Fig.15d Mixed Use Block: Layering Principles

Fig.16a Overall Master plan

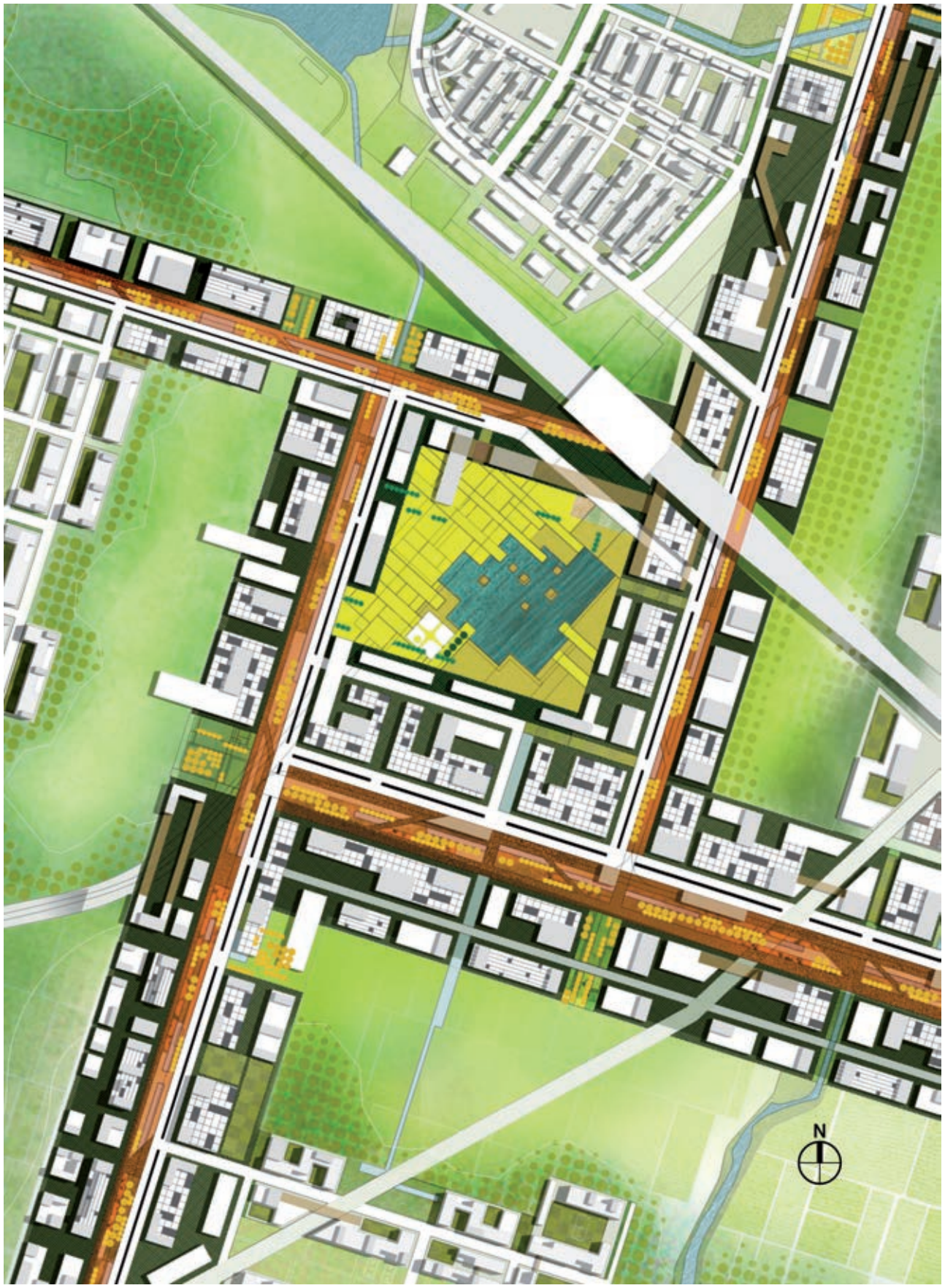


Fig.16b Detail: Central Nucleus

Fig.16c Detail: Quadrant 2

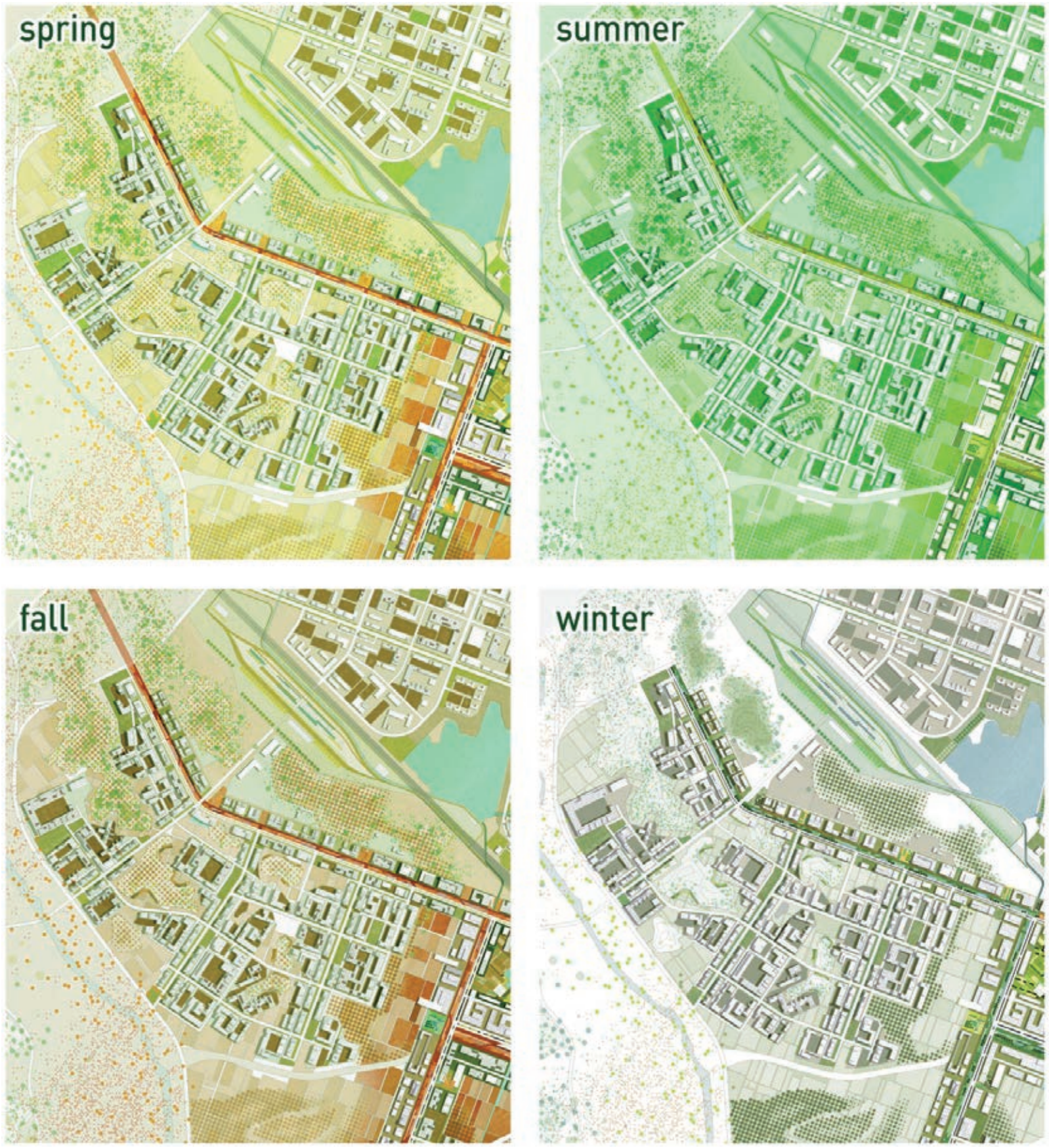


Fig.16d Quadrant 2, seasonal

Fig.16e Detail: Quadrant 3

Fig.16f Detail: Centre and Quadrant 3

Fig.16g Detail: Quadrant 4

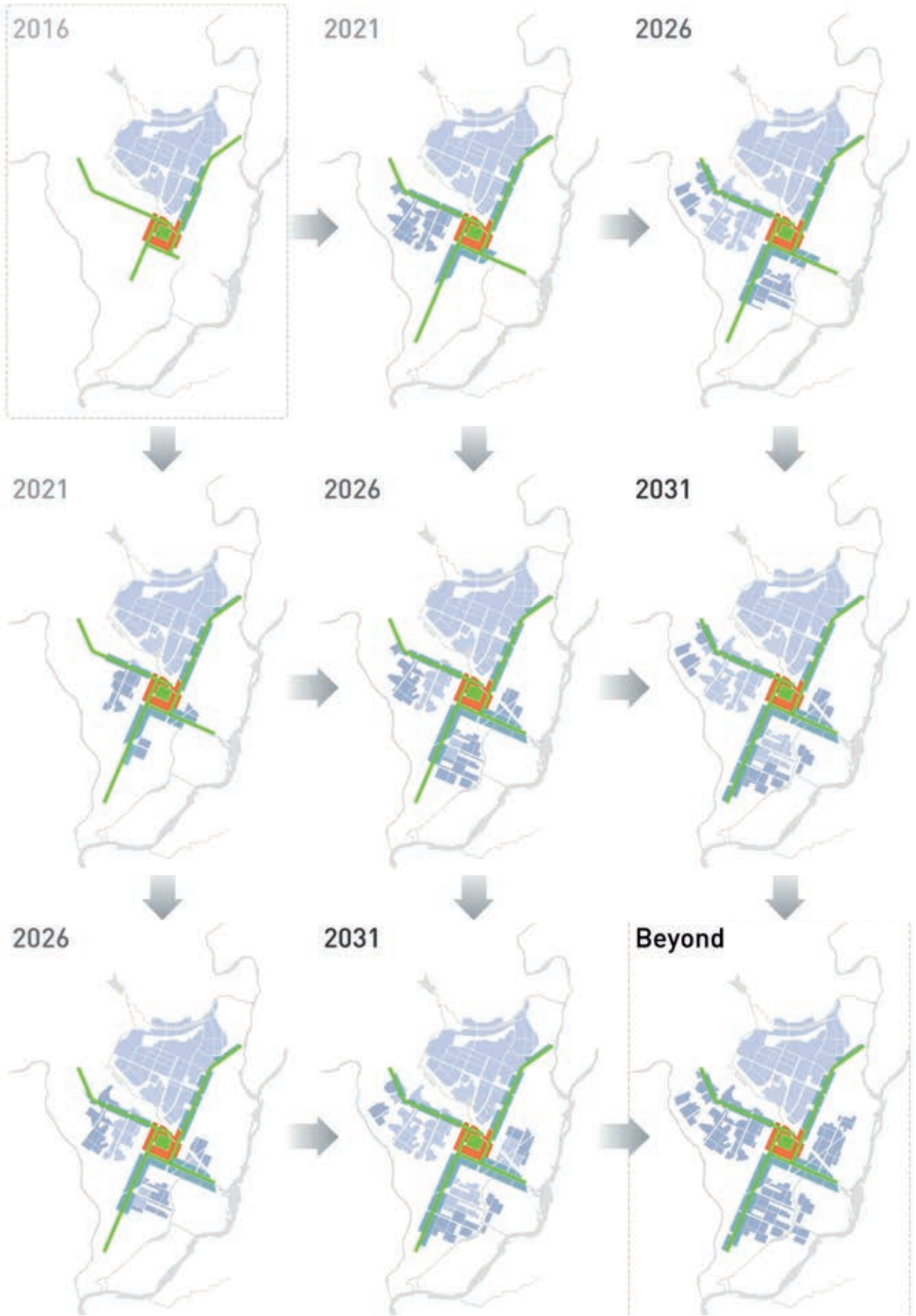


Fig.17 Phasing Diagrams

Renderings

Fig.18 Aerial perspective

Fig.19 Central Nucleus, aerial perspective

Fig.20 Central Nucleus, street view

Fig.21 Quadrant 2

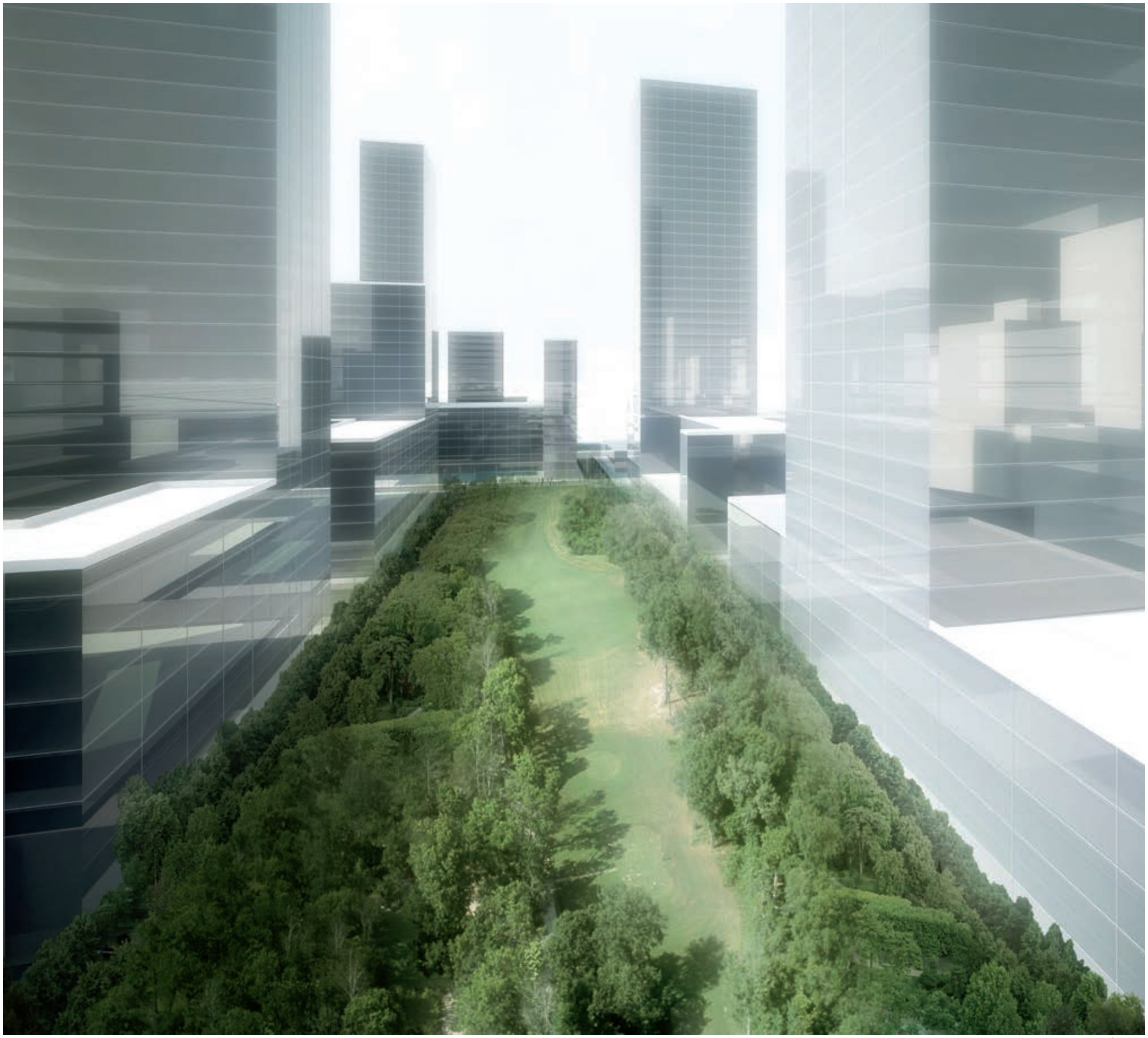


Fig.24 Quadrant 4

Fig.22 Urban farm 1

Fig.23 Urban farm 2

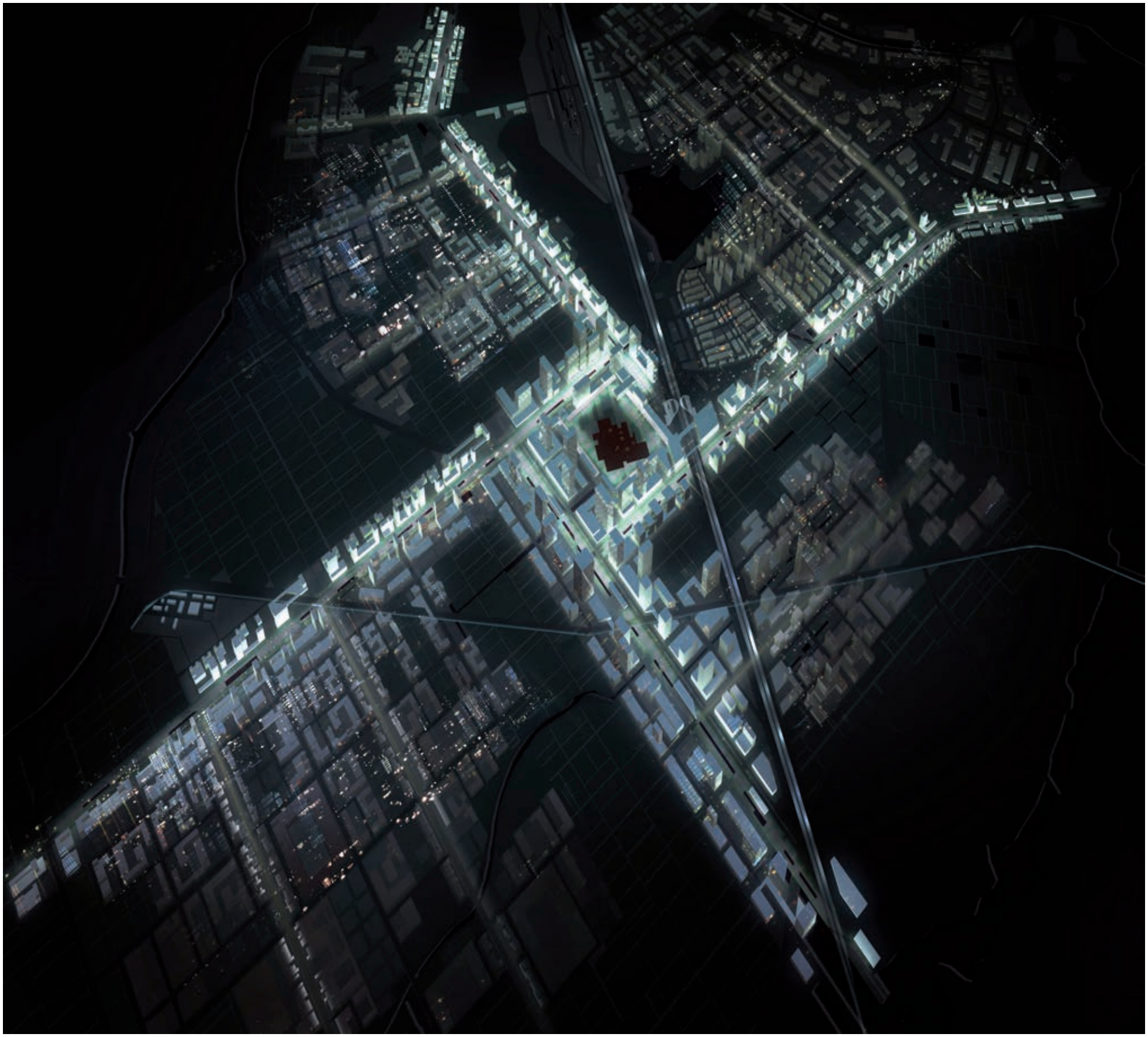


Fig.25 Aerial perspective, night view