

# Planning and Implementing TOD with the 3V approach

## MODULE 2

# ASIAN CASE STUDIES IN TOKYO, SEOUL, SINGAPORE, HONG KONG

Serge Salat

Urban Morphology &

Complex Systems Institute



2<sup>nd</sup> Transit-oriented Development (TOD) Technical Deep Dive  
(TDD)  
Planning and Implementing TOD at City, Corridor and Station  
Scale



# Planning with the 3V Approach

## Asian Case Studies

- Objectives
  - Understanding the link between the 3V Approach and Integrated land use and transportation planning in the Asian context
  - Understanding how to plan TOD and polycentric urban growth at city scale with the 3V Approach
  - Learning by observation
  - Case Studies in Tokyo (including Shibuya Redevelopment), Seoul, Singapore, Hong Kong

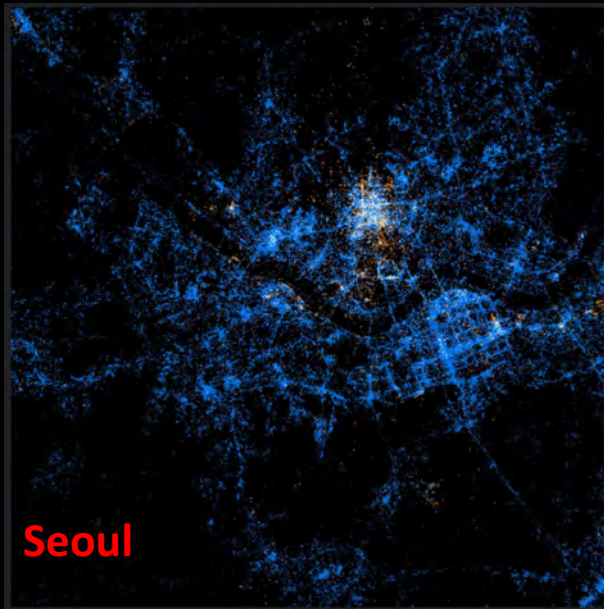
# Learning by observation: 3V Approach In Asian Cities



**Tokyo**



**Singapore**



**Seoul**



**Hong Kong**

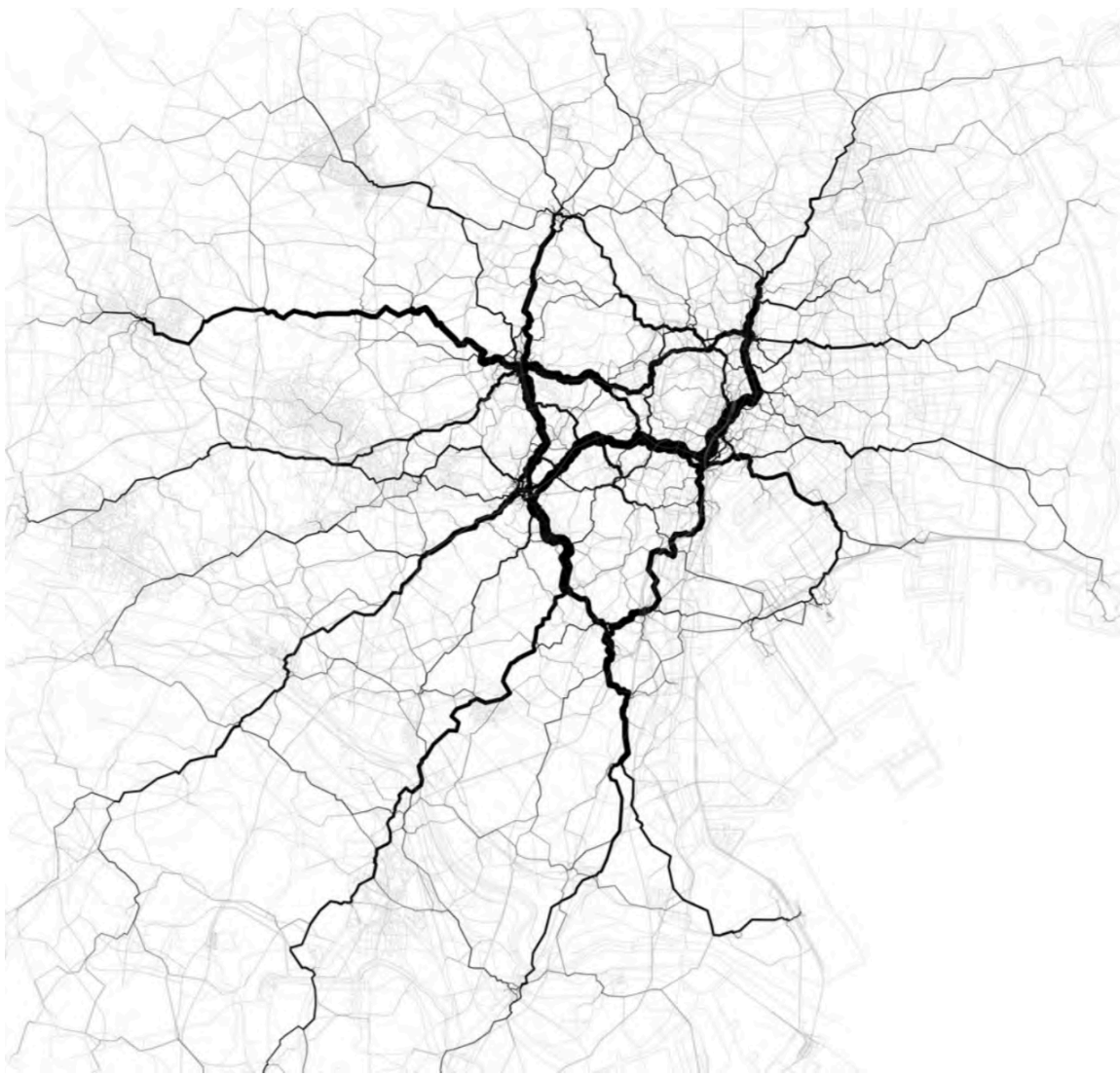


# Tokyo



Source: Eric Fischer



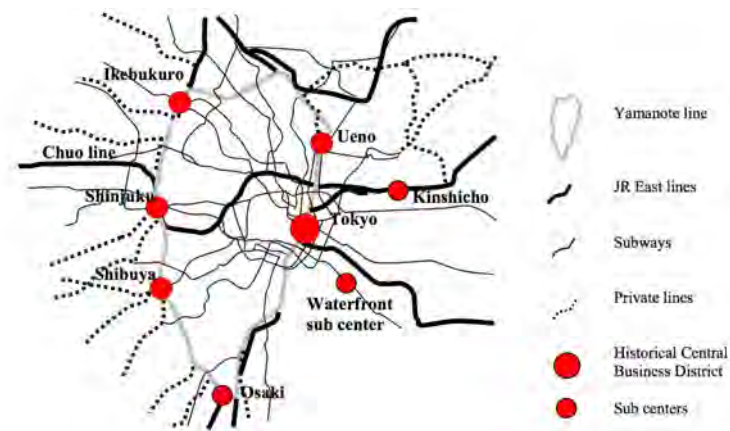


### Flows of people: Paths through Tokyo – Source: Eric Fischer

Routing 30,000 randomly-chosen trips through the paths suggested by 10,000 randomly-chosen geotags.

Data from the Twitter streaming API, August, 2011. Base map from OpenStreetMap, CC-BY-SA

Source: Eric Fischer



Source: Chorus and Bertolini 2011.

### Node and place value in a polycentric city

Red pictures by tourists; blue pictures by locals

Source: Eric Fischer

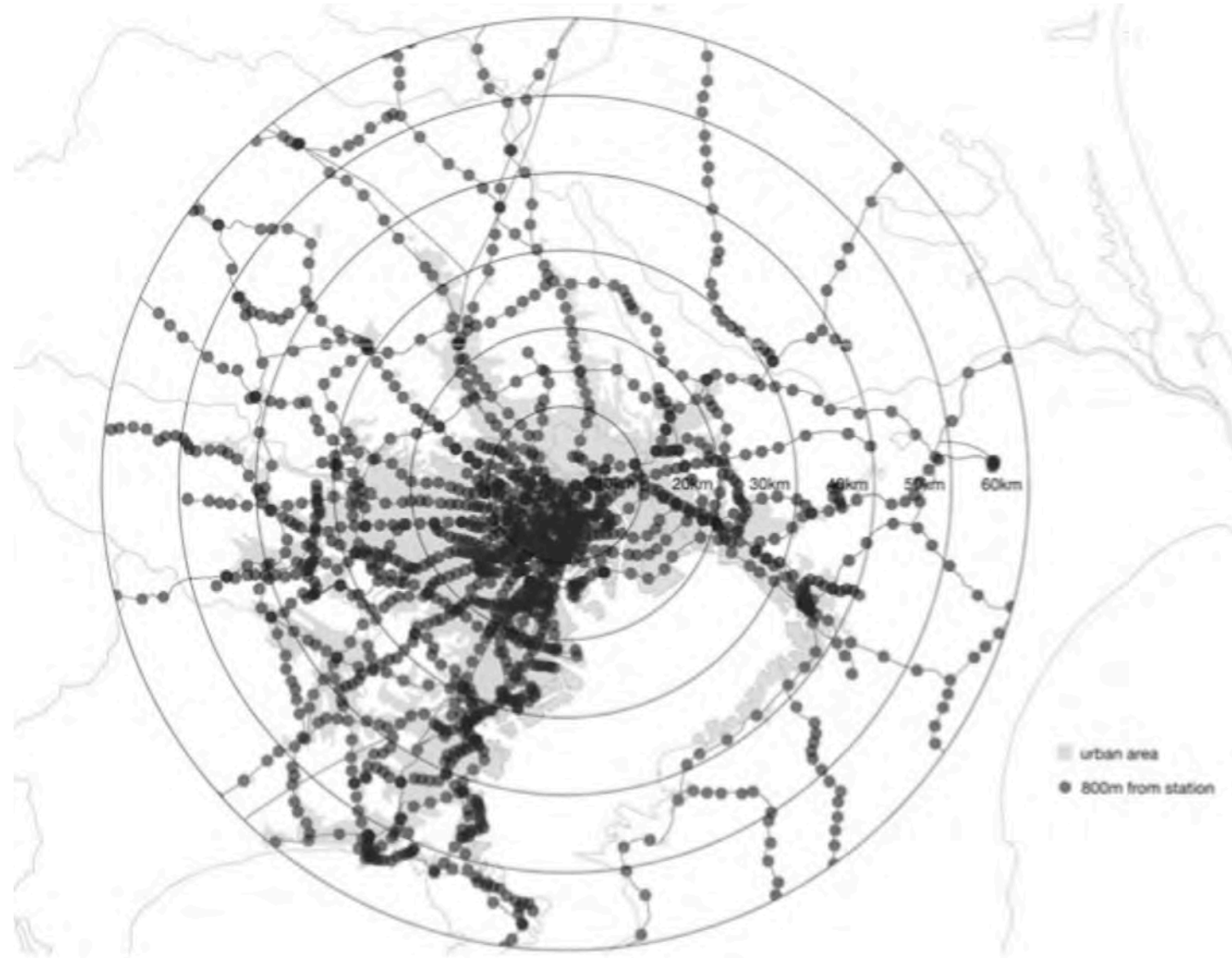




# Node Value

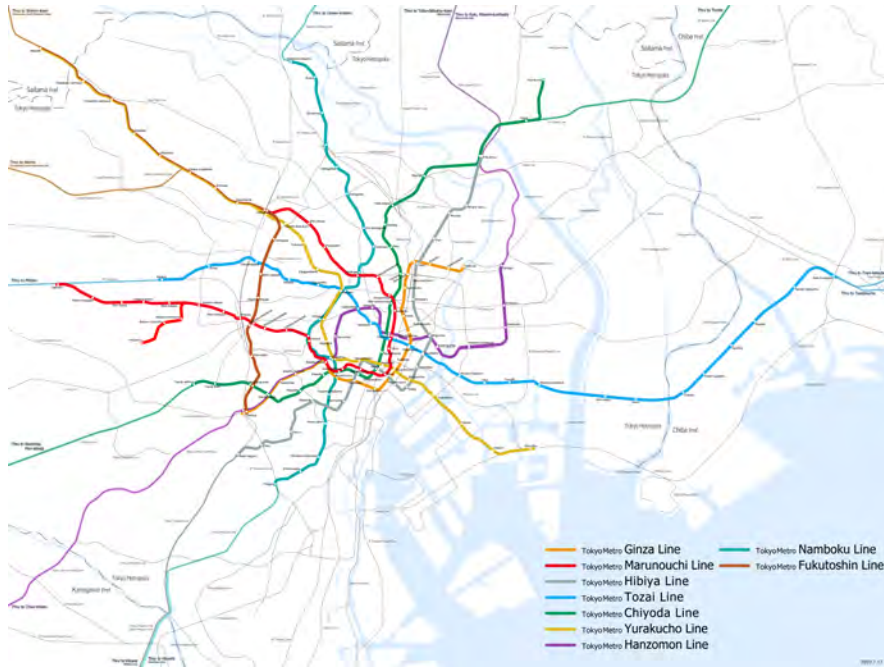
## Tokyo is clearly one of the world's most public transportation oriented megacity

Railway construction was one of the national modernization policies in Japan, and the national railway network connecting central Tokyo and other cities in Japan was established by the end of the nineteenth century. Beginning in the 1920s, private railway companies purchased huge areas of land in the suburbs of Tokyo and developed housing estates or garden suburbs. Private railway companies were able to pay for the railway constructions by the profits they made from selling or leasing the developed housing estates and commercial areas around the stations. Public corporations also developed large-scale housing estates along railway lines in the suburbs starting in the 1960s such as Tama New Town and Chiba New Town. On the other hand in central Tokyo, the subway network has been developed continuously since 1927. As a result, nearly **73%** of morning commuters to Tokyo 23 Wards used railway lines while only 9% of them used private automobiles in 1998 (Nakamura et al. 2004). Others used bus, bicycle or foot.



Tokyo urban area, railway network and 800-m catchment areas around stations. Source: Otaka et al. 2005.





Top: Tokyo Metro lines

Right: Railway operators in the Greater Tokyo area

Today the Tokyo Metropolitan Area has an extensive railway network, totaling more than 2,500 km in length of which over half is privately owned and operated. As in other major world cities the period in which the railway network expanded the most was between 1915 and 1935, when almost 600 km of tracks was built. But after the Second World War Tokyo's railway network kept growing steadily due to the rapid industrialization in combination with the prevailing land scarcity in Japan. A strong urbanizing movement led to the development of new towns along railway corridors, where railway was the only means of reaching Tokyo's Central Business District







Company/Agency	Type	Length km	# of Stations	Passenger km million	Year Opened
Tobu	Private	463.3	202	12,667	1897
Seibu	Private	176.6	92	8,669	1912
Keisei	Private	102.4	64	3,508	1909
Keio	Private	84.7	69	7,186	1910
Odakyu	Private	120.5	70	10,528	1923
Tokyu	Private	100.1	98	9,469	1922
Keikyu	Private	87.0	72	6,220	1898
Sotetsu	Private	35.9	25	2,604	1917
JR East	Former Public	1,698.3	516	76,694	1987 (1870) <sup>a</sup>
Tokyo Metro	Former Public	183.2	168	16,356	2004 (1927) <sup>a</sup>
Toei Subway	Public	106.2	105	5,291	1927
TX	Quasi-Private	58.3	20	NA	2005 (1991) <sup>a</sup>
Total		3,216.5	1,501	159,192	

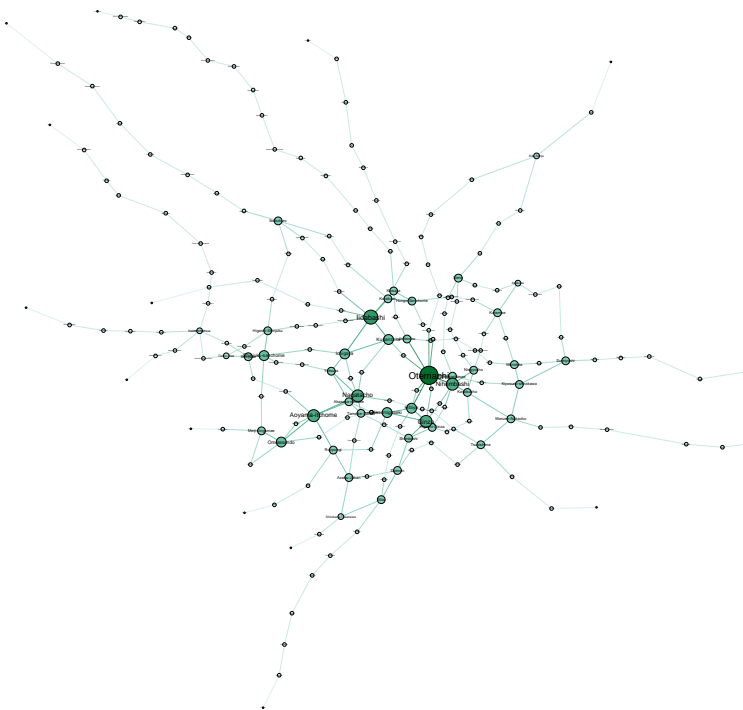
Major Railway Operators in the Tokyo Greater Metropolitan Area, 2005

Encircling Tokyo's core area is the Yamanote line, with major terminals and high rise office developments at or near the Tokyo Marunouchi, Shibuya, Shinjuku, Shinagawa, Ikebukuro, and Ueno stations. Within the Yamanote loop is a dense network of both the now privatized Tokyo Metro and publicly owned Eidan Subway services. Also crisscrossing central Tokyo are several lines of the privatized Japan Railway (JR) East (formerly the publicly owned Japan National Railway). Radiating outward from JR East's Yamanote loop is a thicket of privately built rail lines, plus JR East's heavy rail lines. Tokyo's private rail lines serve suburban areas and connect to major terminuses on the Yamanote loop, allowing passengers to Tokyo's radial railway system supports and reinforces the region's monocentric structure.

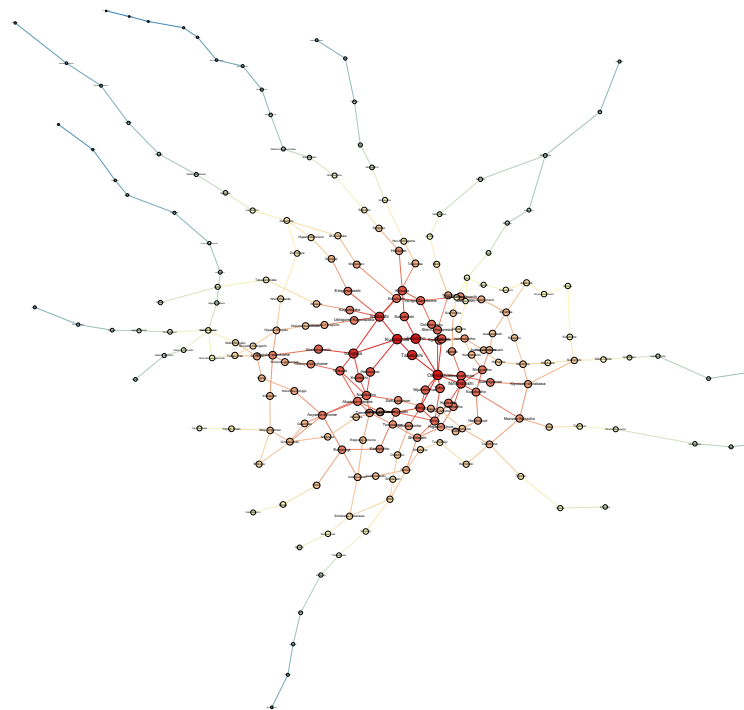


# Tokyo subway

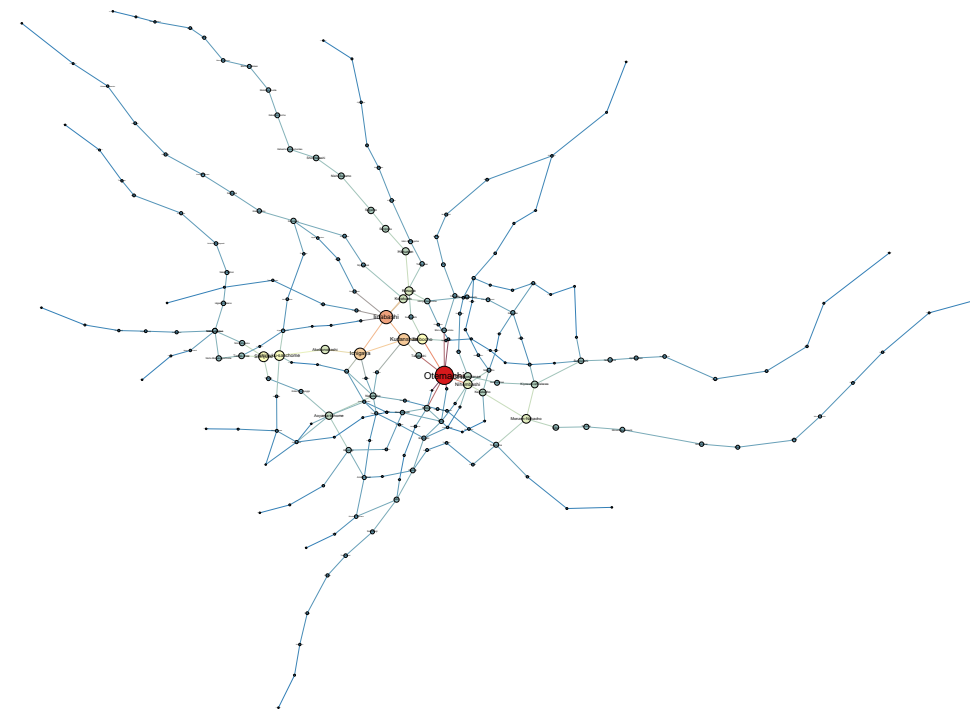
217 stations out of an urban rail network of about 2000



Degree centrality

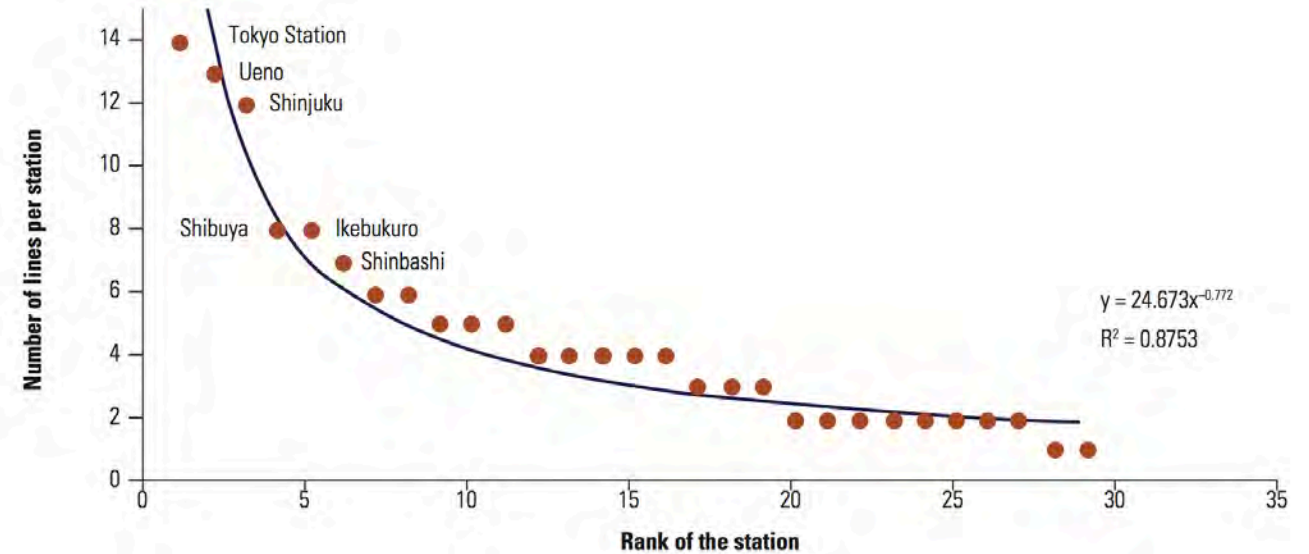
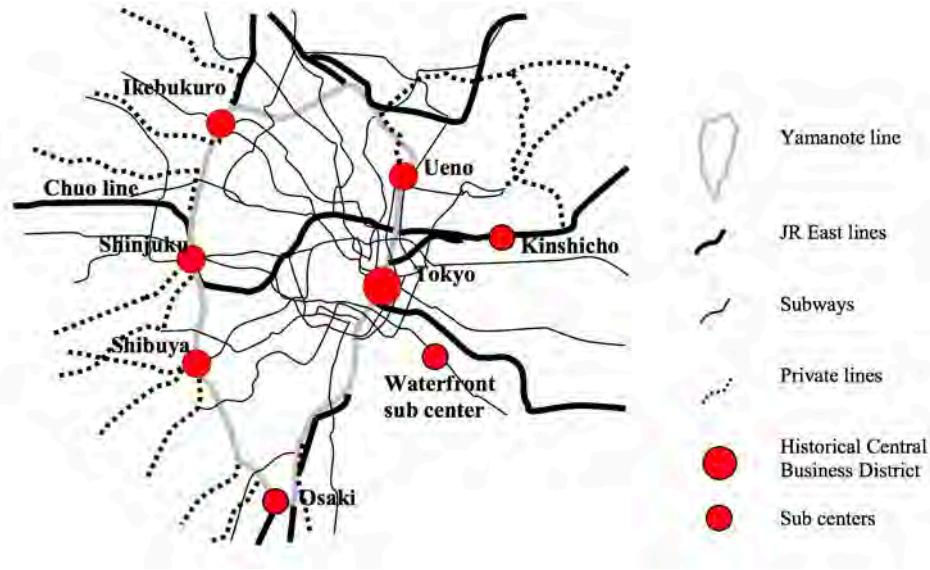


Closeness centrality

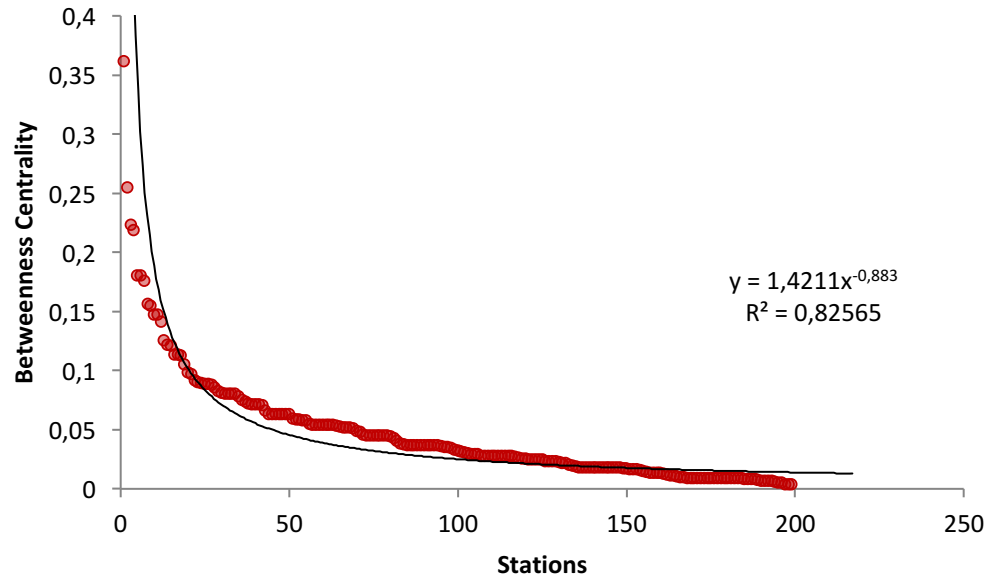


Betweenness centrality

# Tokyo subway network is a hierarchical system containing hierarchical subsystems



Structure of Tokyo's Railway Network. Source: Chorus, Bertolini 2011.



*Betweenness centrality in Tokyo subway network*

## *Degree centrality along the Yamanote line*

Source: Urban Morphology and Complex Systems Institute

The structure of the private railway network in Tokyo has supported the formation of sub-centers. The network consists of several radial lines running from the suburbs to the center of Tokyo. With the exception of the Chuo line, all these lines terminate on the Yamanote loop, a circular line that connects most of Tokyo's urban centers.



# Place Value

**High diversity** in Tokyo can be attributed to the flexible planning style used by government planning agencies. The “loose” character of government planning efforts is perhaps best illustrated by the way the land use zoning system is used in combination with volume controls. The land use zoning system in Japan specifies 12 basic zone types, which can be roughly divided into three categories: residential, commercial, and industrial. Neither zone type is limited to only residential or industrial usages. For example, even in the most strictly zoned residential area it is possible for residents to dedicate a part of the house to small-scale commercial activities such as a store. Commercial zones have the fewest use restrictions. Virtually every kind of land use is allowed here, and controls on building activities are the weakest. In Tokyo, a commercial zoning designation is traditional in the areas around stations, along major roads, and in the central business district.

## ● Control of Building Use by Land Use Zones

Examples of buildings													Area with no land-use zone designation (Utilization Control Areas are excluded)
	Category I exclusively low-rise resi- dential zone	Category II exclusively low-rise resi- dential zone	Category I mid-high-rise oriented resi- dential zone	Category II mid-high-rise oriented resi- dential zone	Category I residential zone	Category II residential zone	Quasi- residential zone	Neighbor- hood com- mercial zone	Commer- cial zone	Quasi- industrial zone	Industrial zone	Exclu- sively industrial zone	
Houses, Houses with other small scale function (store, office, etc.)													
Kindergartens, Schools (Elementary, Junior High, Senior High)													
Shrines, Temples, Churches, Clinics													
Hospitals, Universities													
Stores (mainly selling dairy commodities)/Restaurants with floor space of 150m <sup>2</sup> max. on the first or second floor (excluding ☼)												D	
Stores/Restaurants with floor space of 500m <sup>2</sup> max. on the first or second floor (excluding ☼)												D	
Stores/Restaurants not specified above (excluding ☼)				A	B								
Offices, etc. not specified above				A	B								
Hotels, Inns					B								
Karaoke boxes (excluding ☼)													
Theaters, Movie theaters (excluding ☼)							C						
☼Theaters, Movie theaters, Stores, Restaurants, Amusement facilities and so on, with more than 10,000m <sup>2</sup> of floor area													
Bathhouses with private rooms													
Independent garage with floor space of 300m <sup>2</sup> max. on the first or second floor													
Warehouse of warehousing company, independent garage of other types than specified above													
Auto repair shop					E	E	F	G	G				
Factory with some possibility of danger or environmental degradation													
Factory with strong possibility of danger or environmental degradation													

Note A : Must not be built on the third floor or higher. Must not exceed a floor area of 1,500m<sup>2</sup>.

B : Must not exceed a floor area of 3,000m<sup>2</sup>.

C : Audience seating floor area must not exceed 200m<sup>2</sup>.

D : Stores and restaurants must not be built

E : Floor area must not exceed 50m<sup>2</sup>.

F : Floor area must not exceed 150m<sup>2</sup>.

G : Floor area must not exceed 300m<sup>2</sup>.



## Dense and connected street patterns

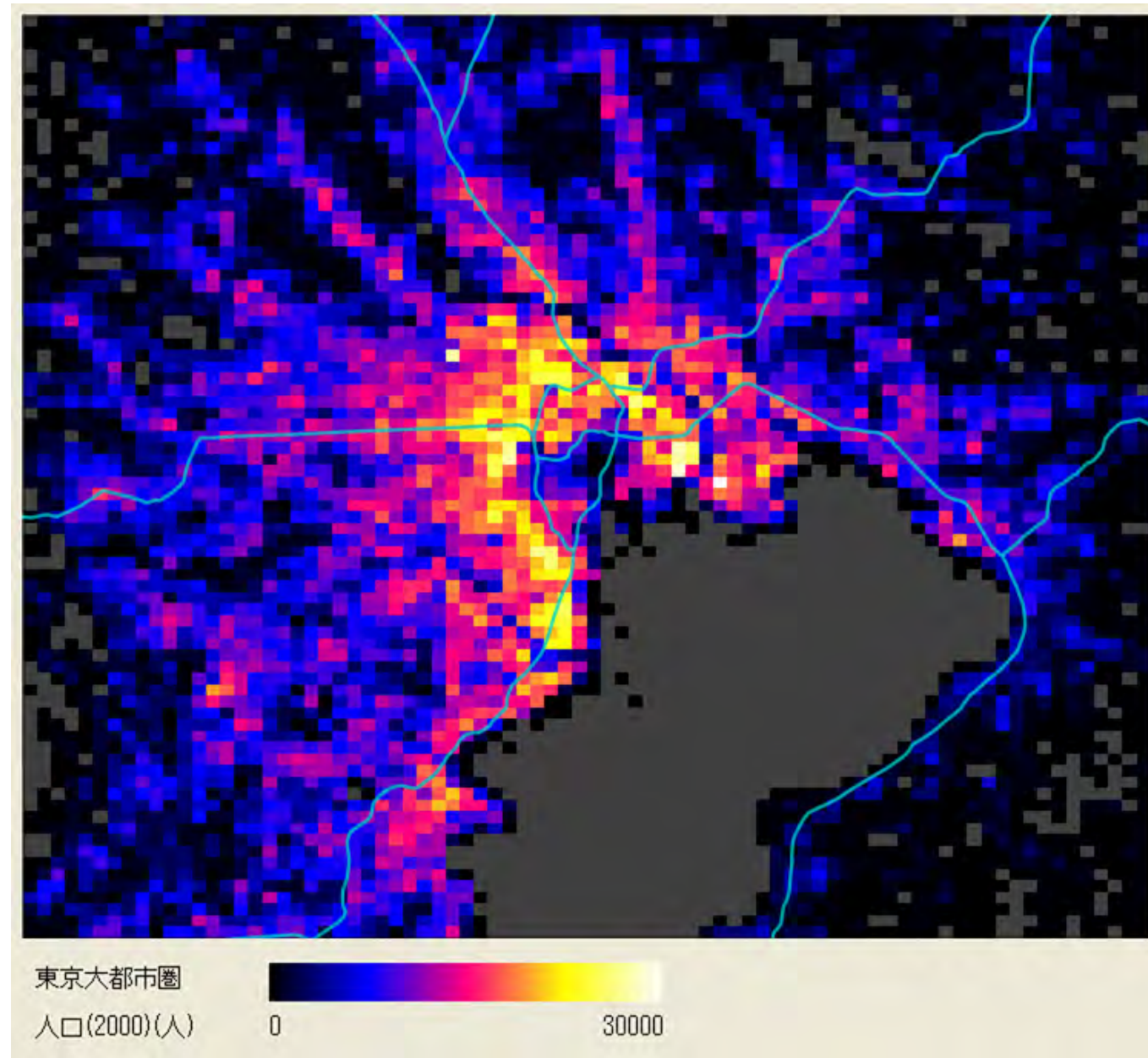
Biking heating map, Tokyo





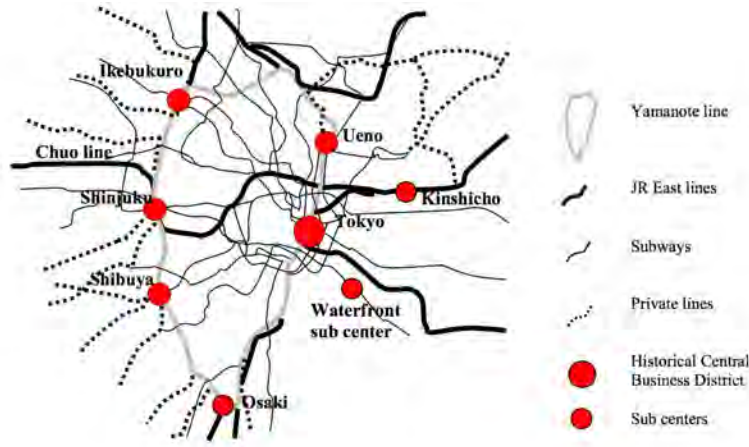
# Market Potential Value

**High intensity and hierarchy of sub-centers can be attributed to the use by the government of the instrument of Floor Area Ratio (FAR) to further encourage the growth of the sub-centers and regional centers in Tokyo by assigning these areas higher FAR values than their surroundings. The central business district has been assigned the highest FAR values, followed by the sub-centers around the Yamanote loop. In Japan, FAR values are designated by law but not fixed. Several instruments exist that allow for a relaxation of existing FAR values. Exemptions to existing FAR values, referred to as the “FAR bonus”, are granted when a private developer meets certain conditions such as investing in public infrastructure and/or open space. This practice benefits both the government and the private sector; the government receives public infrastructure for which it does not have to pay, while the private sector receives an additional building volume, which enables them to make a greater profit. Such planning incentives have greatly influenced development around rail stations**





1. High values of betweenness centrality in Tokyo
2. Zoning map shows the Setagaya-ku which mainly is filled with dense and low buildings (coloured blue). The red/pink shows commercial developments, around railway stations or along roads.
3. Tokyo zoning map with high FARs along the Yamanote line
4. The commercial districts, above Shibuya, big red blob to the left, and Ebisu, the outgrowth to the right, in Shibuya-ku.

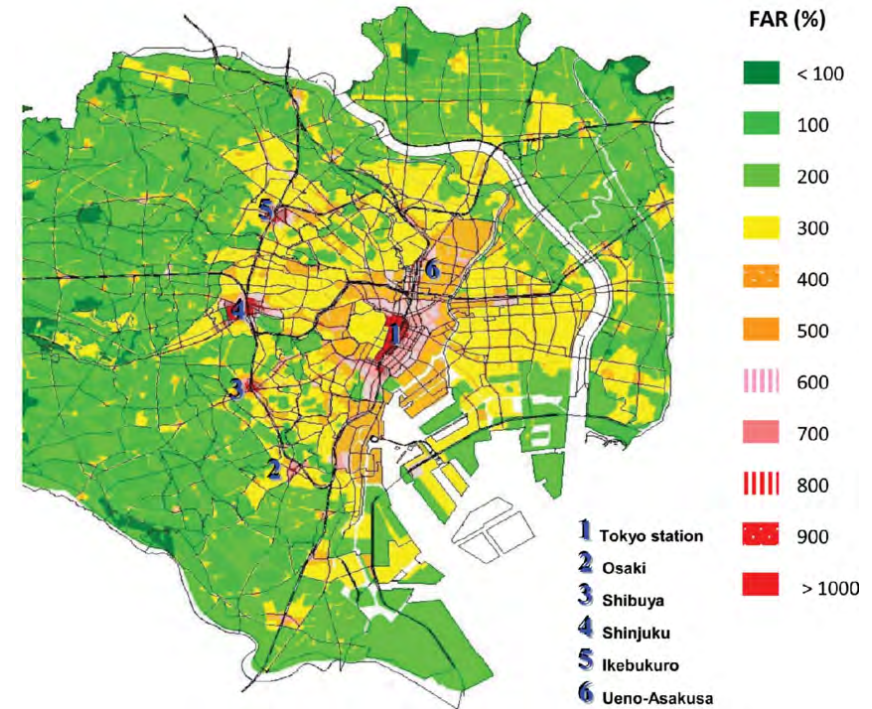


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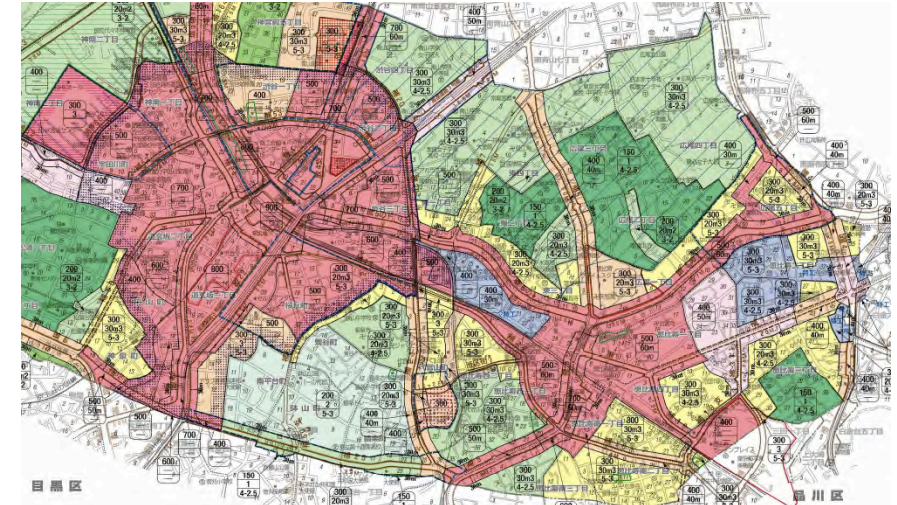


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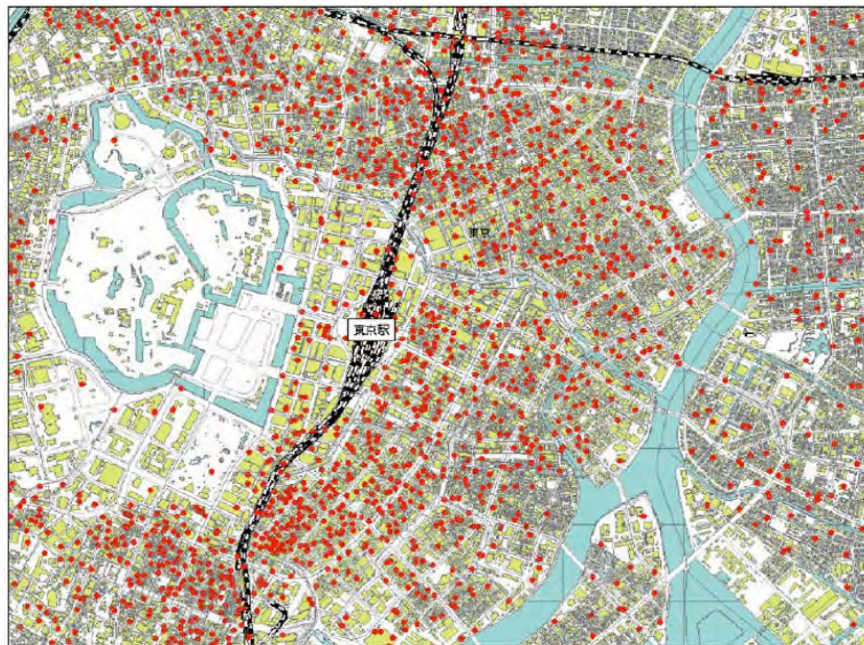
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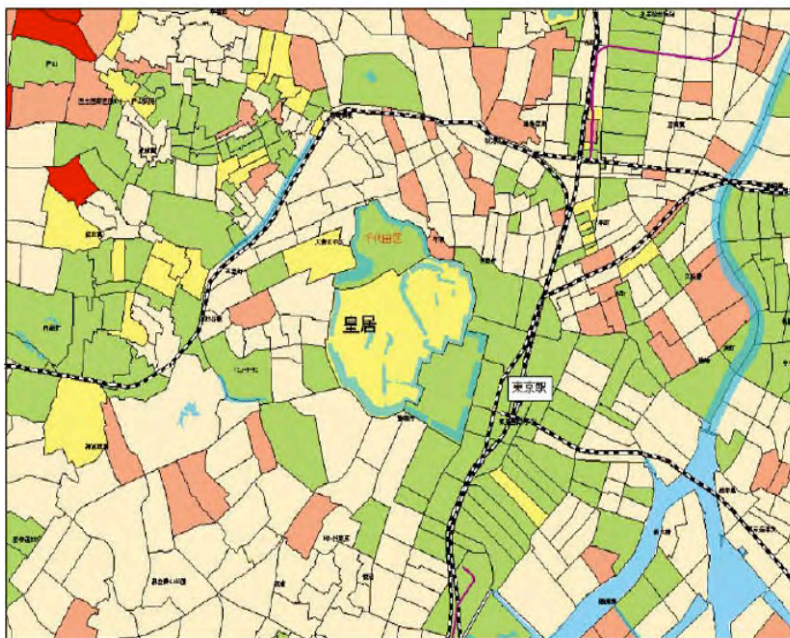
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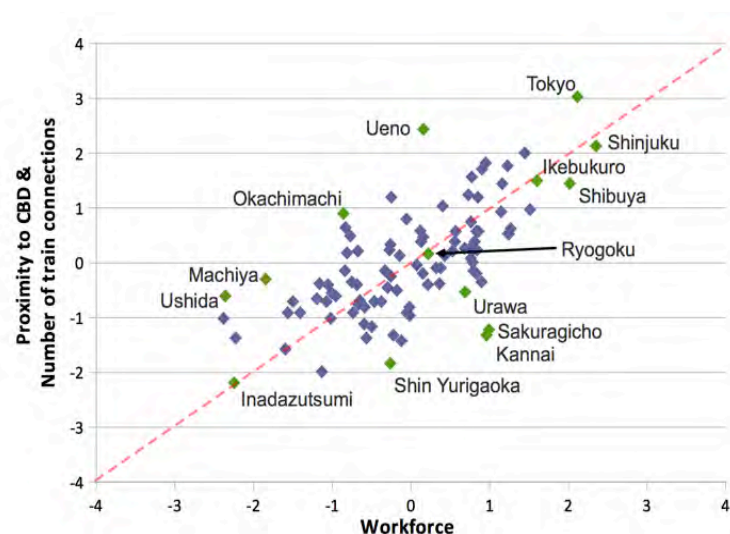
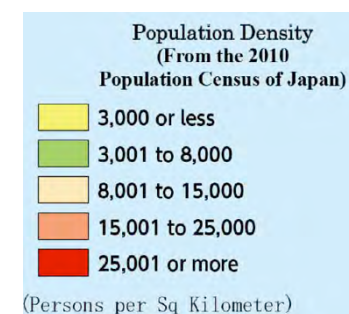




Left: Dot map showing spatial distribution of businesses around Tokyo Station (1 dot equals 50 businesses). Source: 2009 Economic Census for Business Frame of Japan.



Right: Map showing population density by address block around Tokyo station

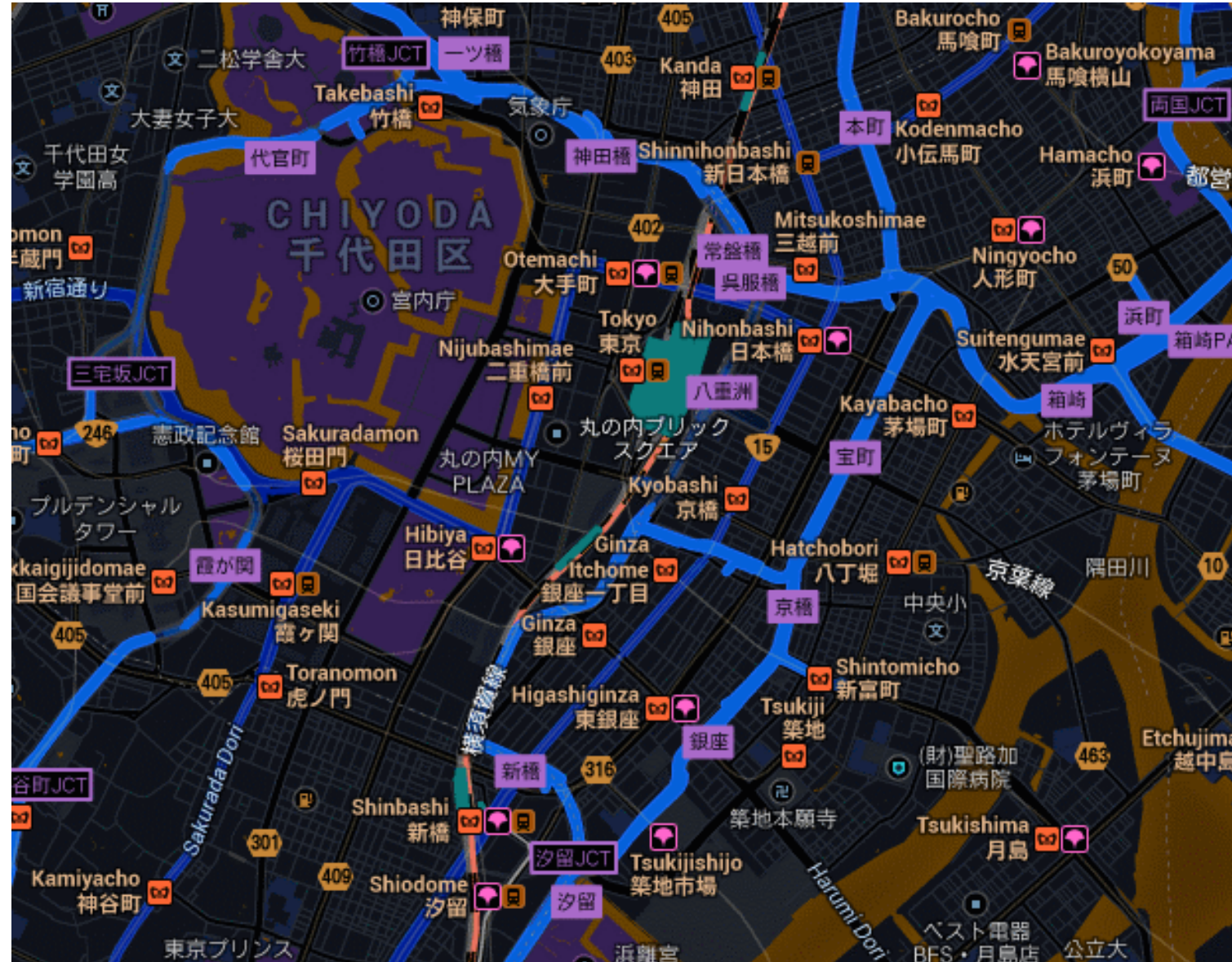


Chorus and Bertolini (2011) have found in Tokyo a positive relationship between the network position of a station and workforce concentration, but a negative relationship when population concentration is considered. Densification occurs at the main nodes of transit systems but it is not a residential concentration; it is an economic concentration fostered by the agglomeration forces of higher connectivity and accessibility that also push up land values making these highly accessible areas more profitable to be used for businesses than for residential developments. Conversely population concentrations occur at less connected and less accessible areas in the network.

Node-place model 'Proximity to CBD and Number of Train Connections versus Workforce' ( $p < 0.001$ ). Distances in standard deviation units. Source: Chorus, Bertolini 2011.



The synchronization of high accessibility and connectivity (node-value) and of high place-value, creates high level of economic concentration and peaks of market value. Tokyo station, the major hub in the transit network, is situated in the heart of the historic central business district. More than 4000 companies, including the head offices of many national and international firms, are located in the surrounding area, contributing to approximately 20 percent of Japan's gross domestic product. Approximately 240,000 people work in the area (Okada 2006). The CBD is the site of the highest concentration of jobs and workers within the Tokyo metropolitan area (Kawabata 2003). This concentration of economic activity is reflected in the high density of energy consumption: 25 km<sup>2</sup> (4 % out of 600 km<sup>2</sup> in Tokyo 23 wards totaling 9 million inhabitants) use 18 % of the total urban energy (GEA 2011).





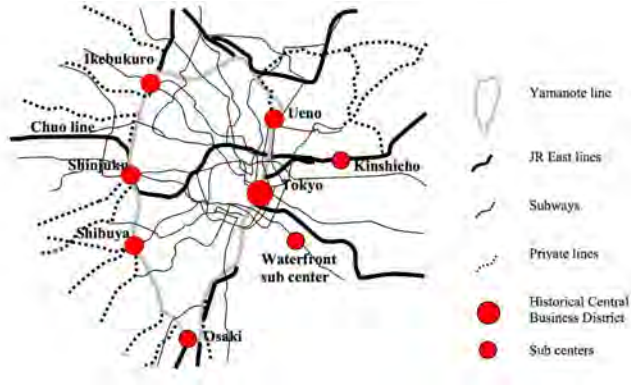
# Shibuya Redevelopment in Tokyo



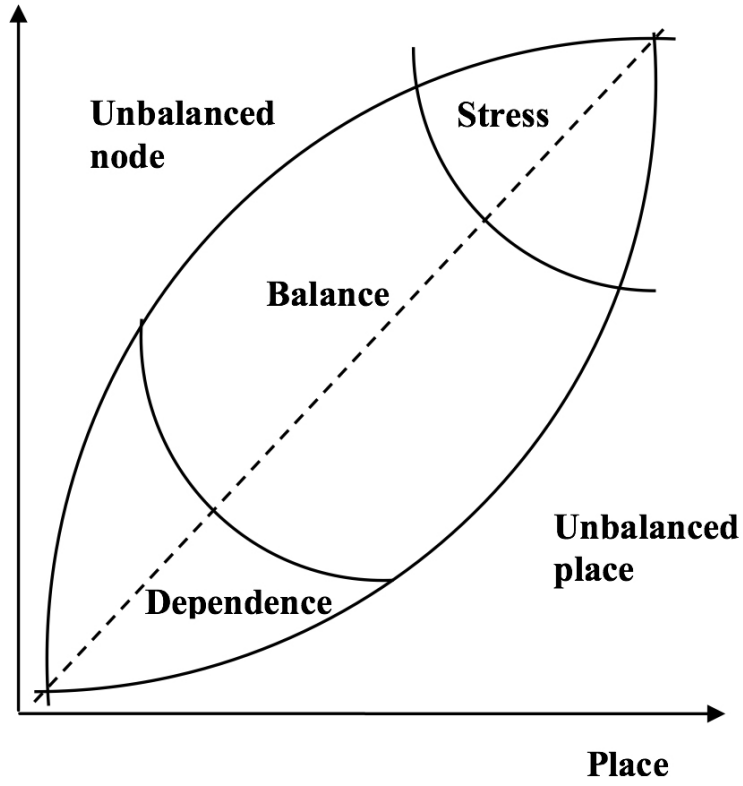
*"It may sound presumptuous, but I want people to think of Shibuya in the same way they do London, Paris and New York."*  
*Shibuya Ward Mayor Ken Hasebe*



## Tokyo Shibuya



Node



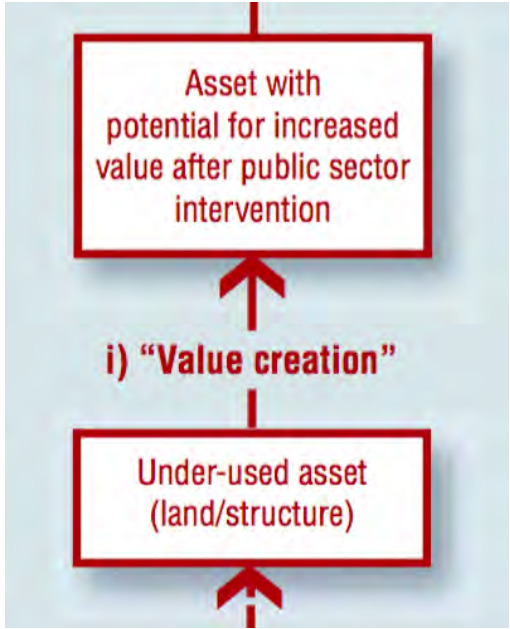
**An unbalanced node with a high potential for increasing market potential value**

Shibuya is a special ward in Tokyo. As of May 1, 2016, it has an estimated population of 221,801 and a population density of 14,679.09 people per km<sup>2</sup> (that is the average density of Tokyo 23 wards 618 km<sup>2</sup>). The total area is 15.11 km<sup>2</sup>. Shibuya ward is thus an unbalanced node with a very high node value and an unrealized market potential value, while having a strong place value due to its image as one of the fashion centers of Japan, particularly for young people, and as a major nightlife area. According to the 3V Framework, the high connectivity of Shibuya would call for an increase in people and jobs density accompanied by an enhancement of public realm to make higher density livable and to enhance connectivity at local level and interchange between lines. This is the strategy that has been followed by Tokyo.



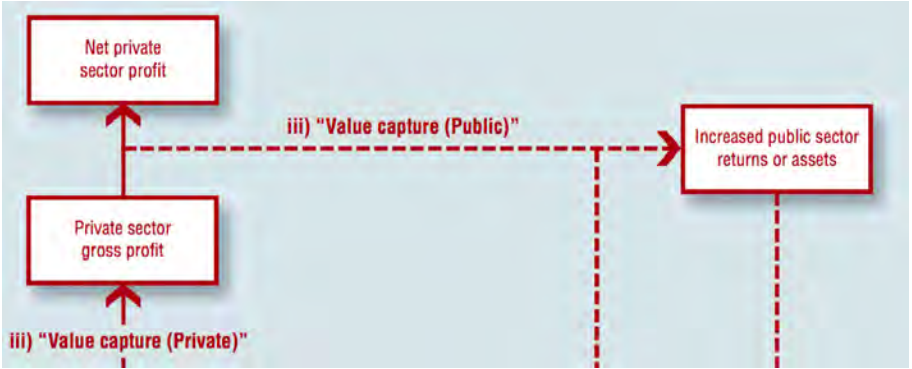
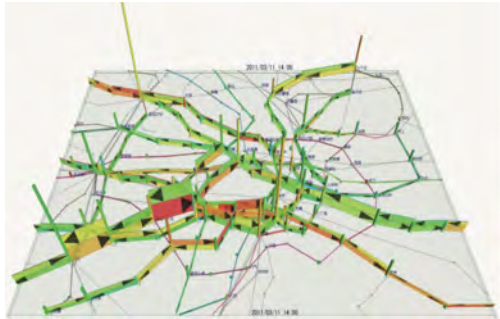
Place Value

Increasing the urban quality and attractiveness of a location



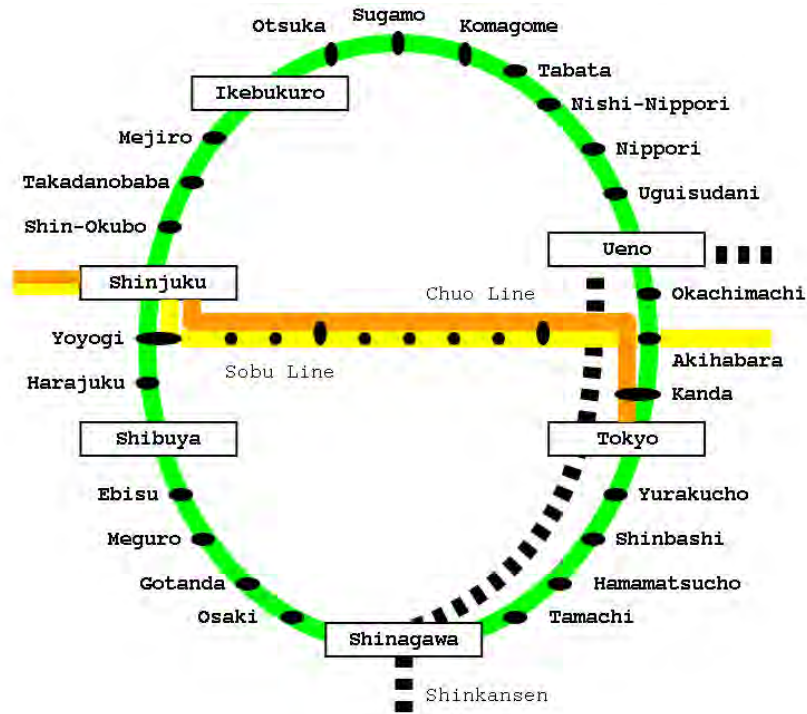
Node Value

Increasing the connectivity and accessibility of a location by investing in transit



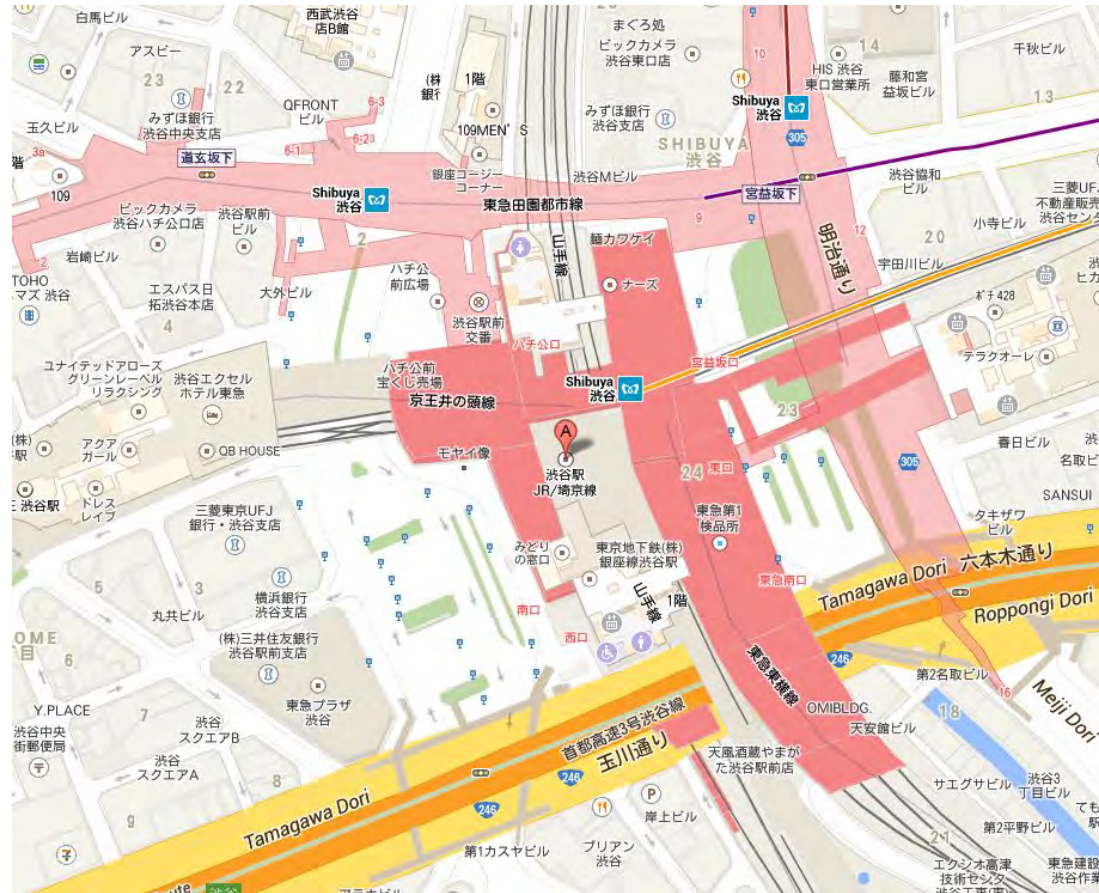


# Node Value: Improving connectivity between lines



High values of degree, closeness, and betweenness centrality along the Yamanote line in Tokyo

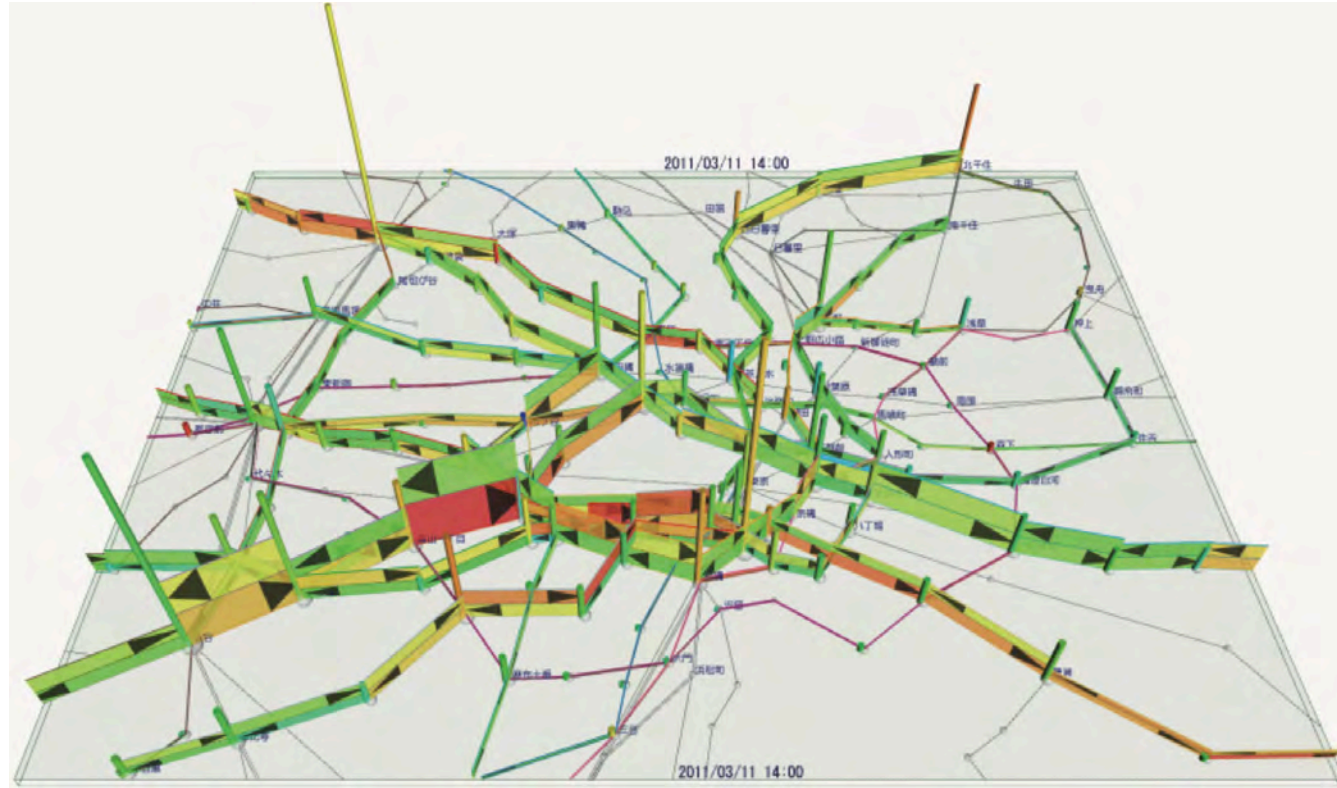
Private railway lines are prohibited by law from passing through central Tokyo, therefore all terminate at Yamanote loop that circles central Tokyo. Only the publicly owned subways and the, until the 1980's publicly owned JR East lines operate within the Yamanote loop.



Nine rail lines and three underground lines converge at Shibuya, one of the most important stations in Central Tokyo. It is a case of urban centrality linked to transit that have given Tokyo its present shape.

Originally built in 1885, Shibuya Station has continued to change with the times, adding or moving platforms at various points in history in order to accommodate the eight lines it now services. As a result, the connections between many of the lines are poor, making it difficult to navigate the station efficiently. Once complete, the two Yamanote Line platforms will be consolidated into a solitary "island" platform, the Saikyo Line will be moved and positioned alongside the Yamanote Line, and the Ginza Line platform will be moved about 130 meters toward the Hikarie building.

**High ridership:** On average, nearly 3 million passengers use the station on weekdays. Shibuya Station is the fourth-busiest commuter rail station in Japan and the world (after Shinjuku, Ikebukuro, and Ōsaka / Umeda) handling a large amount of commuter traffic between the center city and suburbs to the south and west.



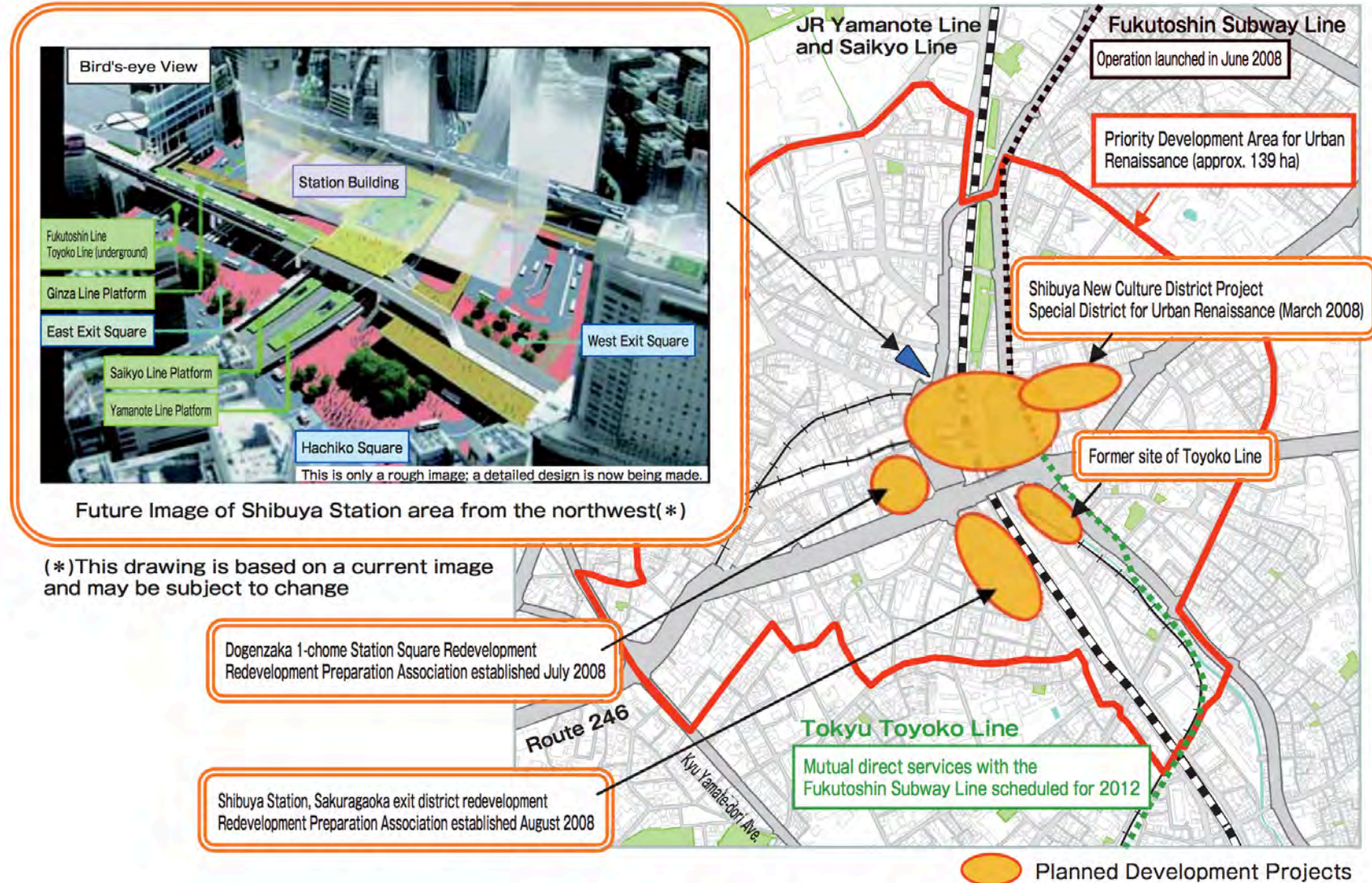


# Place Value

## Development of Shibuya Station district

Redevelopment in the area around Shibuya Station is gaining momentum due to the designation of the area as a Priority Development Area for Urban Renaissance, the launching of the Fukutoshin Subway Line, and the line's mutual direct services with the Tokyu Toyoko Line. Urban infrastructure in the area, including the station, however, still face problems such as aging facilities, complicated passenger flow in transferring train lines, and the jumbled confusion of pedestrians and vehicular traffic in front of the station.

In June 2009, the TMG decided on urban planning for the area that included the station square, roads and railroads; and in cooperation with the central government, Shibuya ward, and railway companies, is proceeding with initiatives aiming to reorganize and develop features such as railroad facilities, station squares, and station buildings in an integrated manner. Furthermore, this area will also be turned into one that befits its position as a hub for new culture – bustling but pleasant to stroll around in – by properly guiding developments by the private sector.



Major Development Projects in Shibuya Station Area. Source: Tokyo Metropolitan Government, 2011.



## ***Shibuya Hikarie: a mixed-use program enhancing local connectivity and creating place value***

Tokyu Corporation has positioned the Shibuya Hikarie (hikari means light in Japanese) building near the site of the former Tokyu Bunka Kaikan building as a leading development project in Shibuya, and is promoting the plan as a core stakeholder. The building name is meant to express the idea of a light shining from Shibuya that changes the world. Shibuya Hikarie is a 182.5-m skyscraper with a feeling of transparency expressed mainly by glass. It aims to be a platform for creating new value and projecting that value as a symbol of the ever-changing town of Shibuya.

***Mixed use.*** The lower levels will house a new Tokyu Department Store, the higher levels will house offices, and the middle levels will house three cultural facilities: the Tokyu Theater Orb, a 2000-seat theatre for performances centring on musicals; an exhibition hall that will be a new information hub for the town; and an academy for fostering creative human resources.

***A connective building which forms a pedestrian network.*** The structure will make use of the surrounding sloped terrain, forming a pedestrian network that connects characteristic zones of Shibuya such as Shibuya Station, Meiji Dori, Miyamasu-zaka, and Aoyama, via five floors of the building. Furthermore, the aim is to enhance the convenience of Shibuya as a mobility hub and to revitalize the area by creating movement and bustle in the surrounding streets. This will be achieved by a vaulted structure from the third floor underground to the fourth floor above ground to enable easy movement between floors, and by providing direct access to the Tokyu Toyoko and Tokyo Metro Fukutoshin lines from the third floor underground. Advanced environmental functions will also be provided, such as exploiting the natural ventilation function of neighboring Shibuya Station and planting about 30% of the floor area with vegetation (Tokyu Corporation).

***Urban cores: 3D connecting public space.*** Various spots around Shibuya Station and buildings that are currently under construction will have vertical structures called “urban cores,” which will help funnel pedestrians from the subway station to their desired destination. An example of such a core is the cylinder-shaped heart of the Hikarie building, where long escalators inside an atrium-like space guide pedestrians from the basement to the street and other rail connections. The design does not only want to attract people to the station, but help them effortlessly explore the outer neighborhoods of Shibuya. The urban core will connect people from the buildings to the street.



*Completed in 2012, Hikarie is a shopping, office and entertainment tower on the east side of Shibuya Station*



## Enhancing place value: Shibuya River



*Now little more than a concrete chute, the Shibuya River will be redirected and opened up*



Developer Tokyu also aims to revitalize the little-known Shibuya River, currently a narrow chute behind buildings that's lined with concrete and devoid of any greenery. The river has been diverted and a large catchment tank has been constructed for heavy rain. In an unusual move for Tokyo, the space along one part of the river will be opened up into a plaza with trees and a walkway for pedestrians. The skyscraper and surrounding area are slated to be complete in fiscal 2017, which ends in March 2018.



## Enhancing place value: Observation deck



*At 3,000 square meters, the rooftop observation deck will be one of Japan's biggest*

Another change will bring people far above the complex terminal. On a multipurpose skyscraper that will be built over the station by 2019 – just in time for the Olympics – Tokyu will open an observation deck at a height of 230 meters.

Visitors will be able to see the bustling intersection below as well as Tokyo Tower, Tokyo Sky Tree, Roppongi Hills and other city landmarks, as well as Mt. Fuji on clear days. At 3,000 square meters, the rooftop observation deck will be one of the largest in the country and will also feature a helipad and interior lounge for enjoying the lights of the city at night.

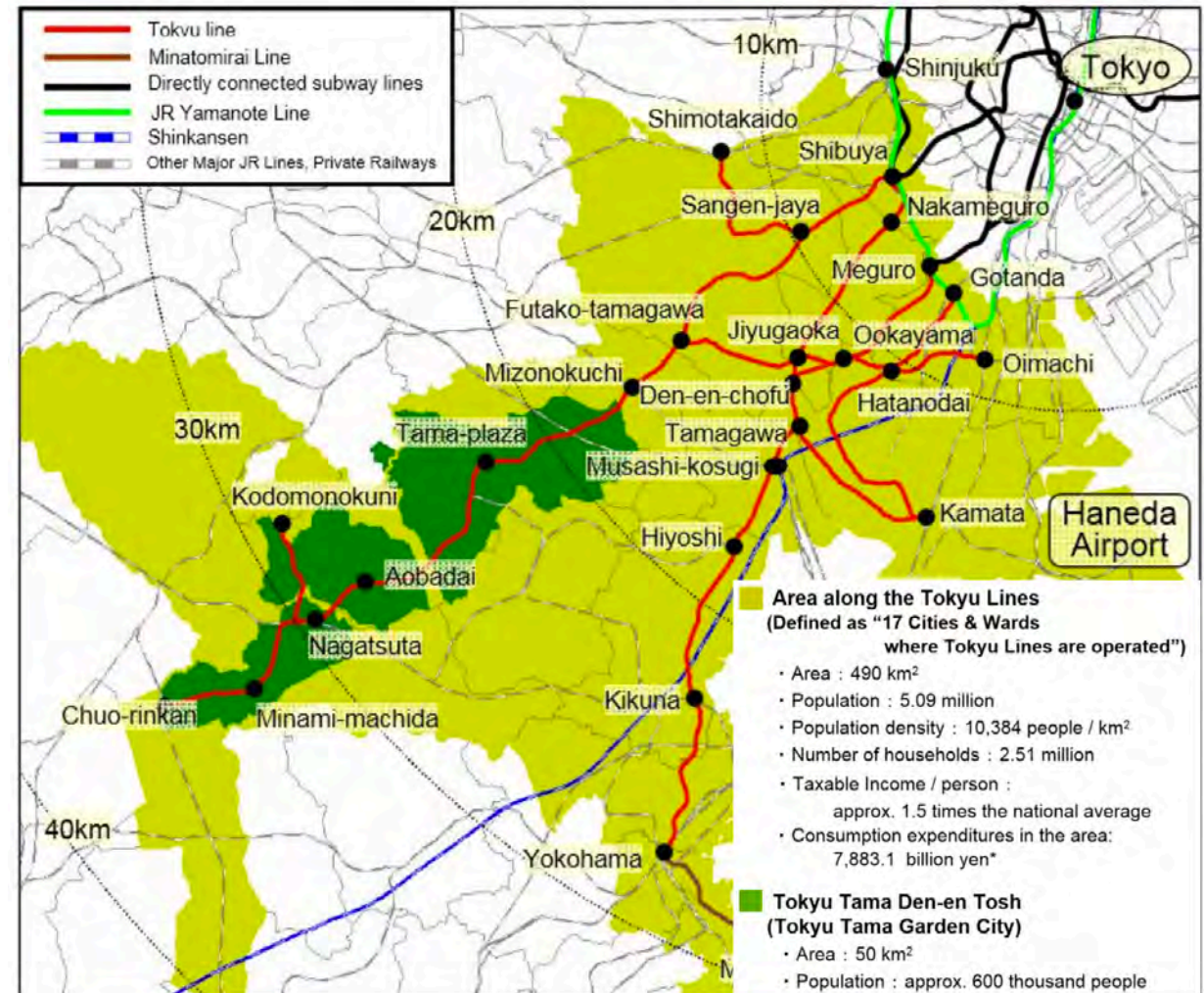




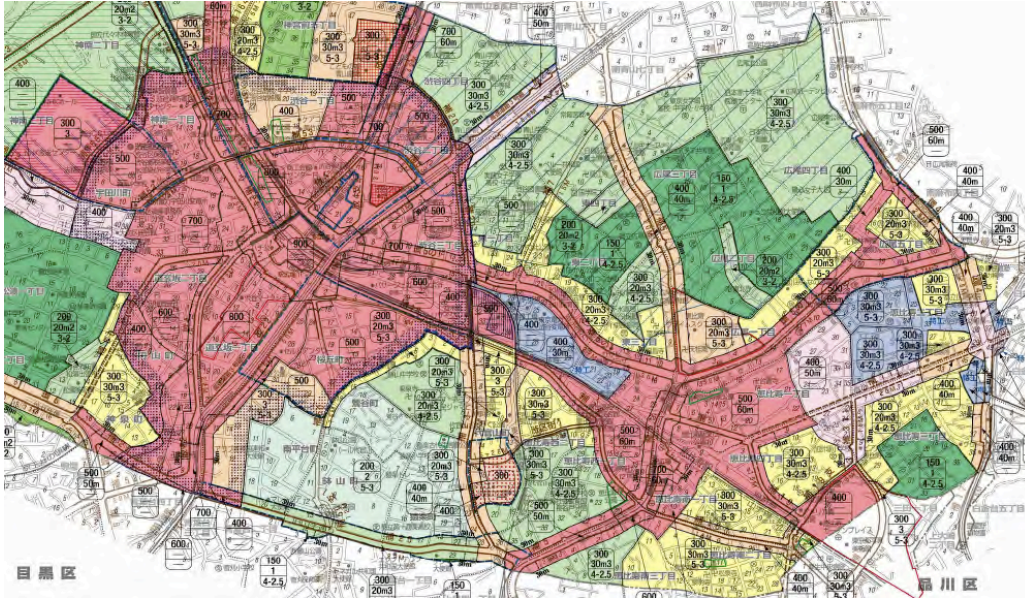
# Market Potential Value

Though railway was originally the main business of the private railway companies it is not the most profitable. A financial rate of return averaging between 1.1 and 1.2 is not spectacular, but in comparison, other railway companies worldwide very seldom achieved profitability. The most profitable side business for private railway companies is real estate development, making up for over half of the profits of the Tokyu Corporation. Among Tokyo's private railway companies the ones who ventured into real estate businesses successfully also are the ones with the highest network usage. This gives the impression that the integration of railway- and real estate development is vital in establishing a profitable traffic flow. For the Tokyu Corporation, the railway business is not only about "connecting points" but rather about the real estate opportunities that develop along a railway corridor. Along with railways, the company also operates 400 businesses, including real estate development, hotel management, and retail. **The Tokyu Corporation not only paired land development and transit investments, but also applied this to an entire corridor along the Tokyu Den-En-Toshi line originating in Shibuya.**

Other profitable businesses of private railway companies are for example warehouse chains, such as Tokyu's own department stores. It is also common for most private railway companies to venture into bus services, but these have always incurred minor losses. The busses provide feeder services for the stations and land developments owned by the railway corporations, making these more profitable. Bus services are then subsidized with profits from other company ventures. Together all these ventures allow the railway companies to increase profit margins drastically, making them among the most successful businesses in Japan.







FAR around Shibuya station  
The commercial districts,  
above Shibuya, big red blob  
to the left, and Ebisu, the  
outgrowth to the right, in  
Shibuya-ku.

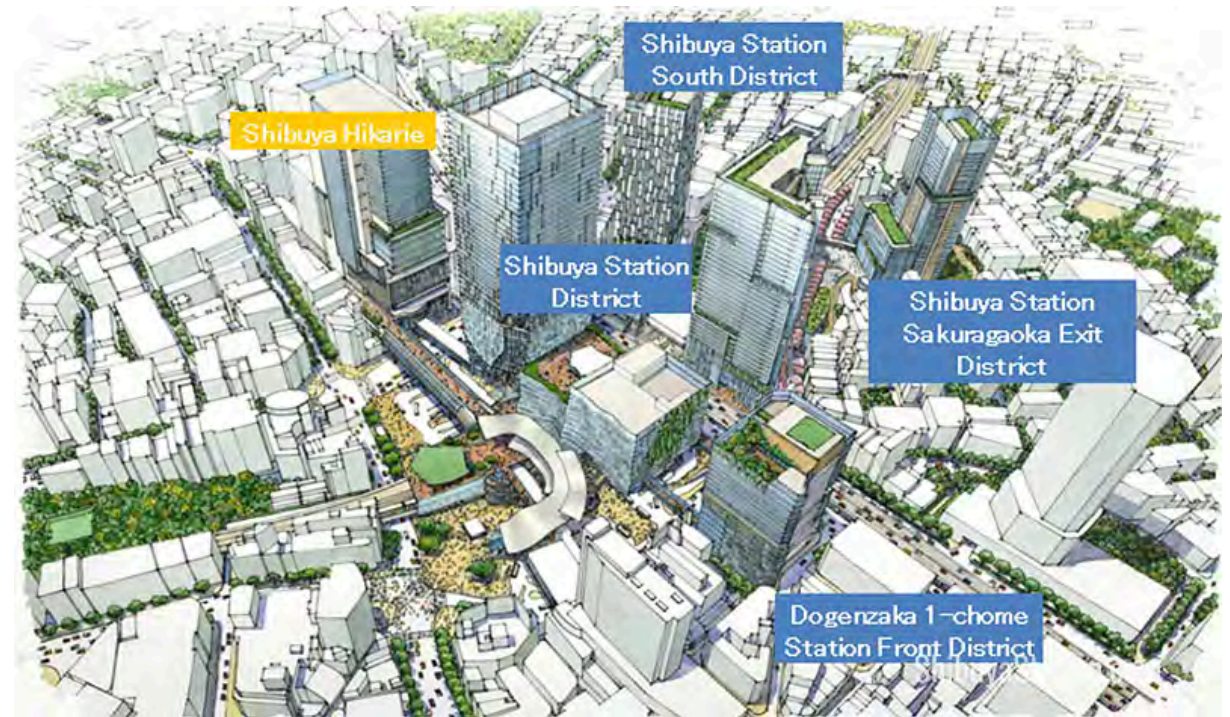


Department stores, and many other uses, stack over the site, deemed  
the fourth busiest commuter station in Japan. It is an aggregative  
architecture.



## Rebranding Shibuya as an international hub

The area around Shibuya Station was designated for urgent urban renewal in December 2005. Since then, considerations of urban infrastructure have been made in earnest by government agencies, railway operators, local parties, and others. On 22 June 2009, a decision was made on urban planning including renovation of the station plaza and a location change for the Tokyo Metro Ginza Line station, gradually bringing the overall vision of development for the area around the station into focus. After the current Toyoko Line station is relocated underground and through service starts, development is scheduled to start on the station block and block previously occupied by the Toyoko Line. Financed by railway operators such as Tokyu Corp., East Japan Railway Co. and Tokyo Metro Co., developers are now working on four large construction sites around Shibuya Station. Work on a fifth site, the Hikarie building, which is owned by the Tokyu Group, was completed in 2012.



Under the aegis of Shibuya Ward, the Tokyu Corp. railway conglomerate, JR East, Tokyo Metro and other entities, four major developments – Hikarie, Shibuya Station South Area, Dogenzaka and Sakuragaoka – are planned for the area surrounding Shibuya Station as well as a rebuild of the terminal itself. The overall development of Shibuya is being managed by the ward office, while each individual construction site has been delegated to private companies. Locals have also been involved in the development process to ensure that Shibuya is not just torn down and turned into something that loses its vibrancy.

## Shibuya Station Area



*The Shibuya Station skyscraper will be the centerpiece of the new town*

The pulsing heart of the neighborhood, Shibuya Station has been under construction for years already. In 2013, the Tokyu Toyoko Line connecting Shibuya with Yokohama was buried underneath Shibuya Station and connected to the Fukutoshin subway line. This allows trains to travel all the way from Yokohama to Ikebukuro, another Tokyo rail hub, and far beyond.

## Shibuya Station South Area: Connecting the neighborhood



*This skyscraper in the Shibuya Station South Area will serve as a bridge between the Shibuya 3-chome district and the terminal*

Also on the east side of the JR Yamanote Line railway is the Shibuya Station South Area. This zone will make use of land that was occupied by the Tokyu Toyoko Line railway – which now goes underground between Shibuya and Daikanyama stations. The centerpiece of this zone is another skyscraper – 33 floors above ground and 180 meters tall. While it will mostly be office space, the building will also have a hotel, shops and space for incubating creative content startups. The structure will also serve as a bridge between Shibuya Station and the Shibuya 3-chome area, which is cut off from it by Route 246 and Meiji Dori street.



## Dogenzaka Area



*A new building in the Dogenzaka area near the Shibuya Mark City complex will have commercial and office space*

On the southwestern side of Shibuya Station lies hilly Dogenzaka, a large shopping and entertainment district. Tokyu is also planning to breathe new life into the neighborhood with a large-scale development at Dogenzaka 1-chome, located by the existing Shibuya Mark City complex, which houses shops, offices, a hotel and the terminus of the Keio Inokashira Line. A new building facing the Shibuya terminal will be erected in fiscal 2018, which ends in March 2019. It will be a mixture of commercial and office space, with the project being led by Tokyu Fudosan Holdings, Tokyu Group's real-estate arm.

## Sakuragaoka Area

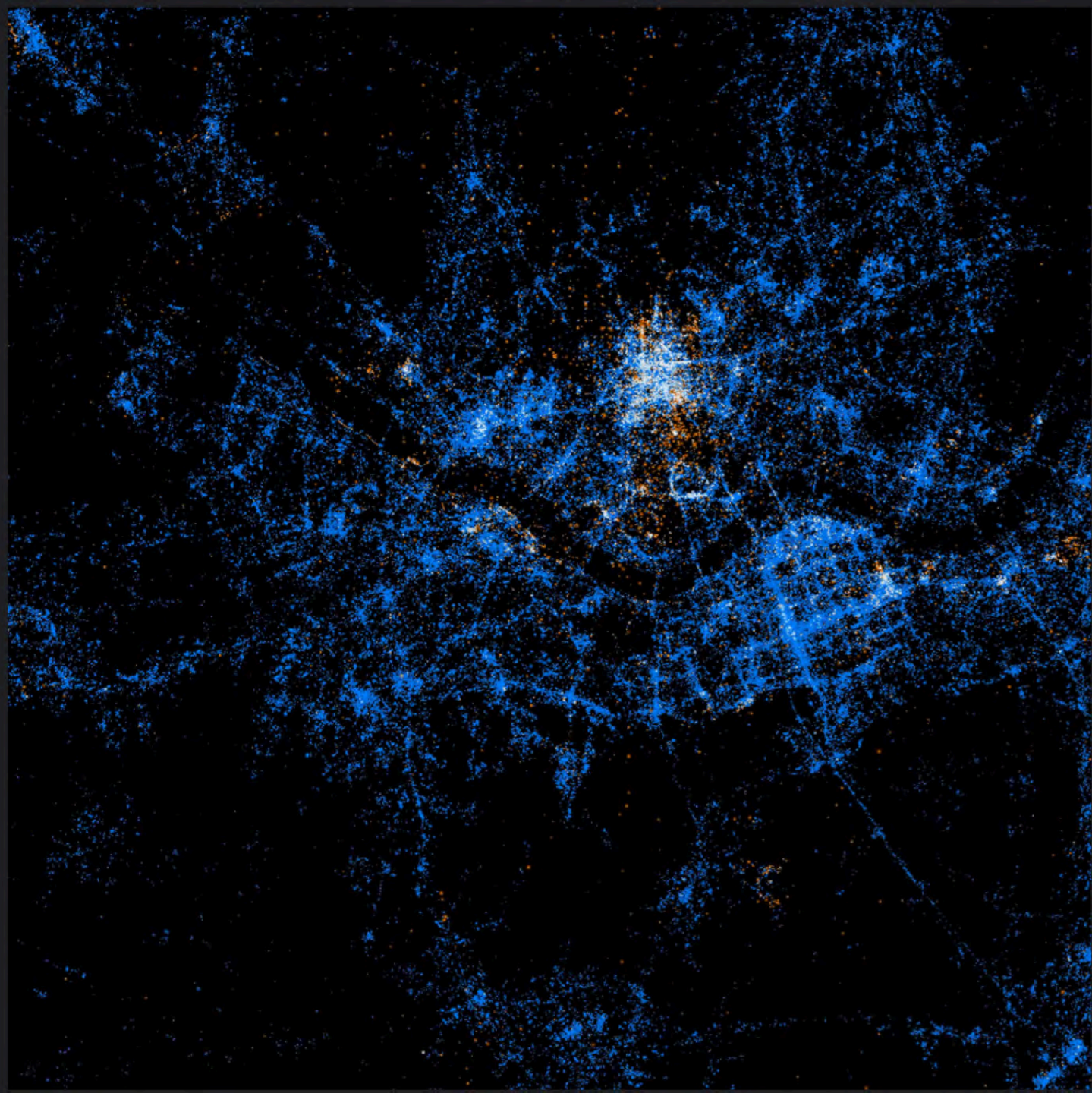


*The Sakuragaoka condos and offices are targeted at foreign businesses*

Located south of the station and on the west side of the Yamanote Line, the Sakuragaoka zone redevelopment will add yet more high-rise buildings to Shibuya. One will be a 180-meter tall, 36-story office tower and the other will be a 150-meter tall, 32-story condominium. Featuring multilingual medical and childcare facilities, as well as serviced apartments and a startup incubator, they will be designed to appeal to foreign companies as part of the move to rebrand Shibuya as an international hub. Construction begins in 2016 and is scheduled to wrap up in fiscal 2020, which ends in March 2021.

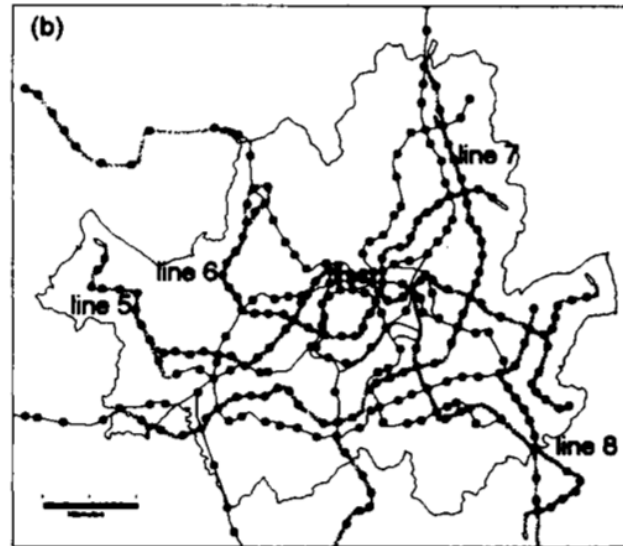
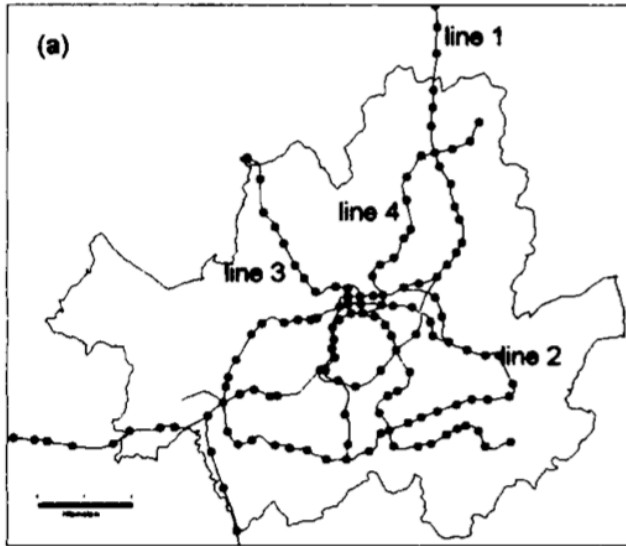
# Seoul

Source: Eric Fischer



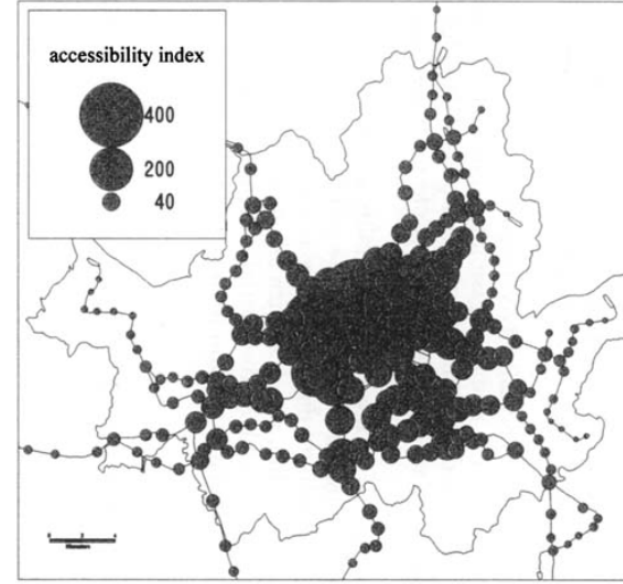
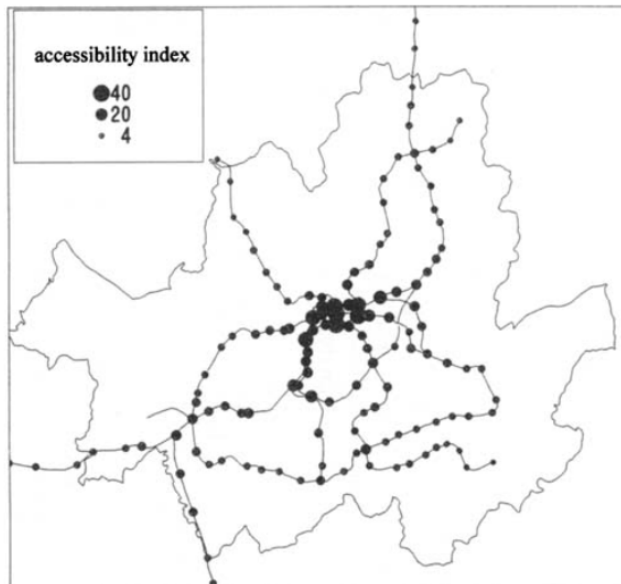


# Node Value



Seoul subway network: (a) in the first phase; (b) in the second phase.

The subway network in Seoul has undergone two expansion phases since the construction of Line One in 1974. The first phase is from the operation of Line One to the complete construction and full operation of Lines Two, Three, and Four. The second phase has begun with the construction of Lines Five, Six, Seven, and Eight, which have been completed in 1998.

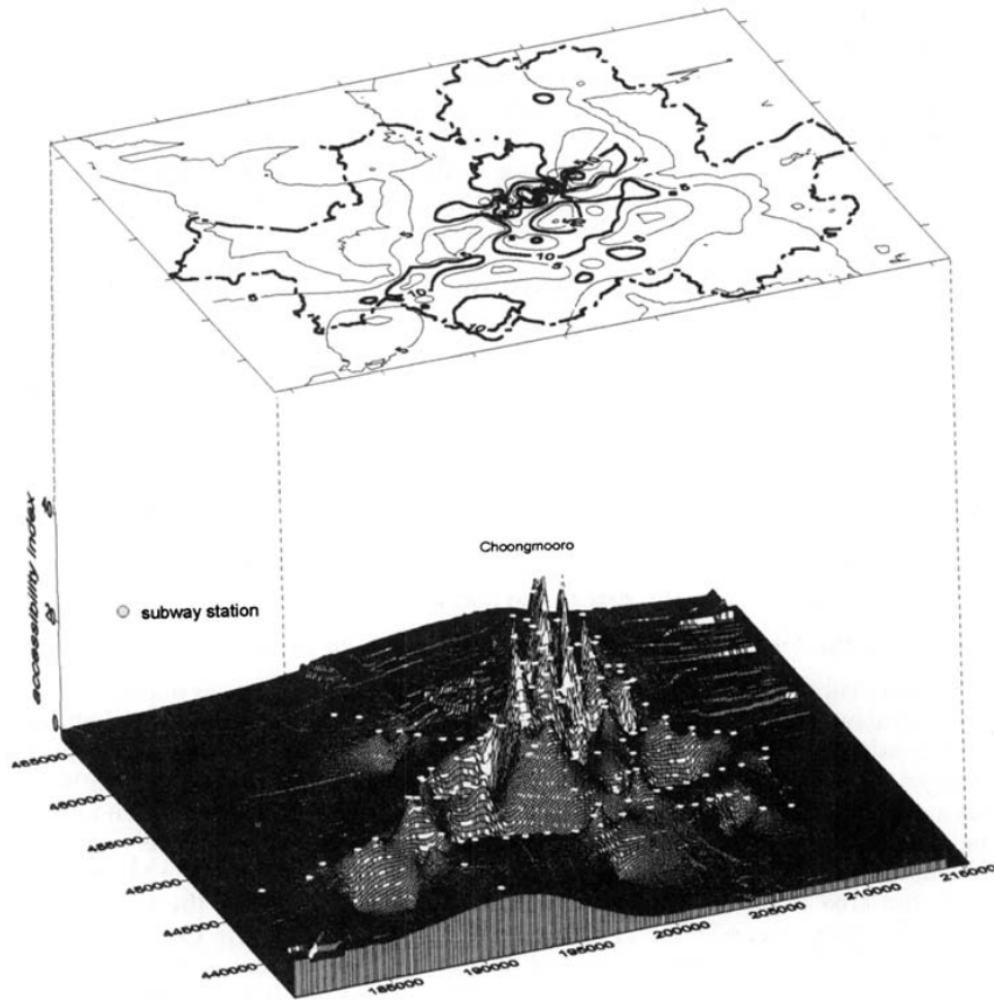


Spatial patterns of nodal accessibility: (a) in the first phase; (b) in the second phase.

Between the 2 phases, intra-urban accessibility has changed in response to the addition of new linkages. Whereas some centers have been advantaged by the expansion of the subway networks, others have been relatively disadvantaged. Changes in the relative node values due to the expansion of the subway network have induced changes of the market potential value, which in turn have affected considerably the land use types and intensity of development.

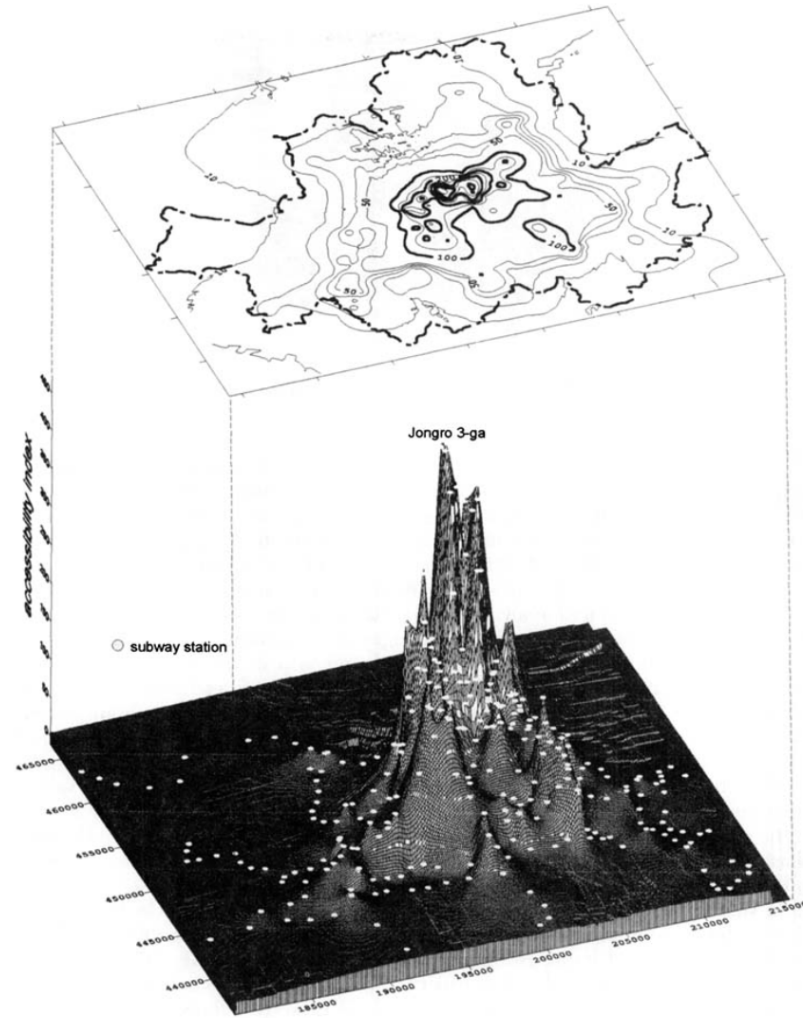
*Source: Keumsook Lee and Lee-Yeon Lee 1998.*





Spatial patterns of nodal accessibility in the first phase.

Source: Keumsook Lee and Lee-Yeon Lee 1998.

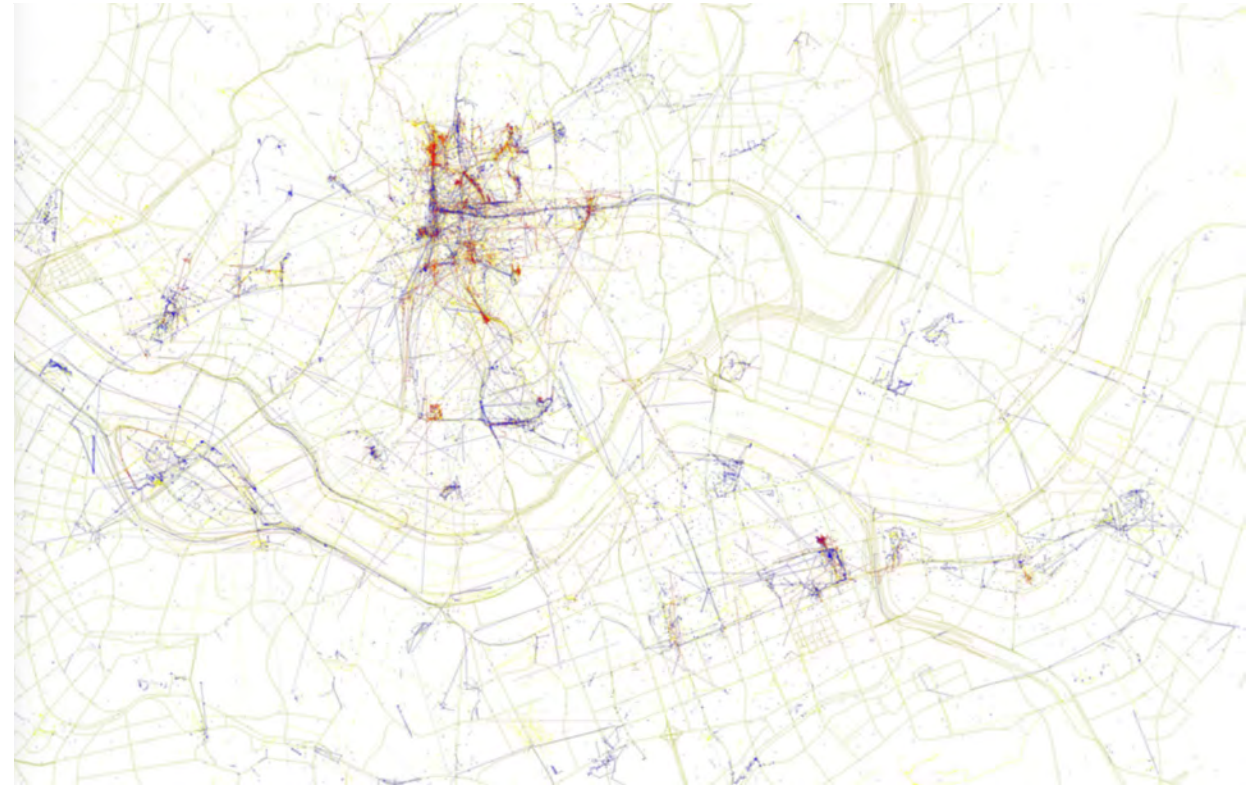


Spatial patterns of nodal accessibility in the second phase.

Node values in general tend to decrease as one moves outward from the central business district both in the first phase and in the second phase. In the two phases, high node values are concentrated near the CBD with a significant increase around the CBD in the second phase. The nodal accessibility values increase dramatically in the second phase: the largest accessibility value of a node in the second phase turns out to be about eleven times larger than that in the first phase. However, the spatial distribution patterns look rather different as shown in the 2 figures. The spatial pattern of the accessibility surfaces in the first phase shows an atypical shape with several peaks spreading from the CBD toward the north, southwest, and southeast. Such an atypical pattern is transformed into a nearly concentric pattern in the second phase. Although dominant peaks appear at the CBD in both phases, there exists striking difference in their heights. In the second phase, the scope of the highly accessible area is expanded with several peaks at the transfer nodes connecting different subway lines. High level in the hierarchy of hubs (high degree centrality of a node) increases strongly accessibility value.



# Place Value



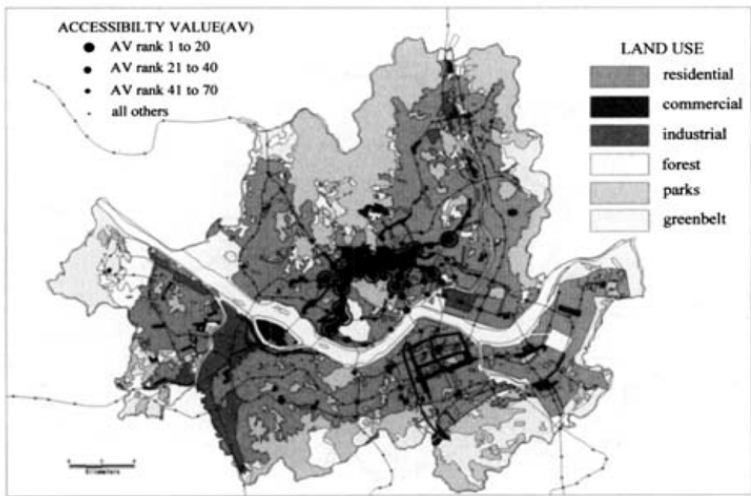
**Place value:**  
Red pictures  
by tourists;  
blue pictures  
by locals  
Source: Eric  
Fischer

## Town Planning Scheme of Seoul on "Feng-Shui" Principles

Proper balance among the four mountains and well-shaped forms associated with imaginary animals that ensure harmony mirroring the cosmos and that guarantee prosperity for those who occupy the place. The guardian animals are black tortoise to the north, vermilion bird to the south, blue dragon to the east, and white tiger to the west. Seoul is endowed with all auspicious geometric elements.

Source : 「Seoul」 17th Milano Triennale Report, Seoul Metropolitan Government, 1989



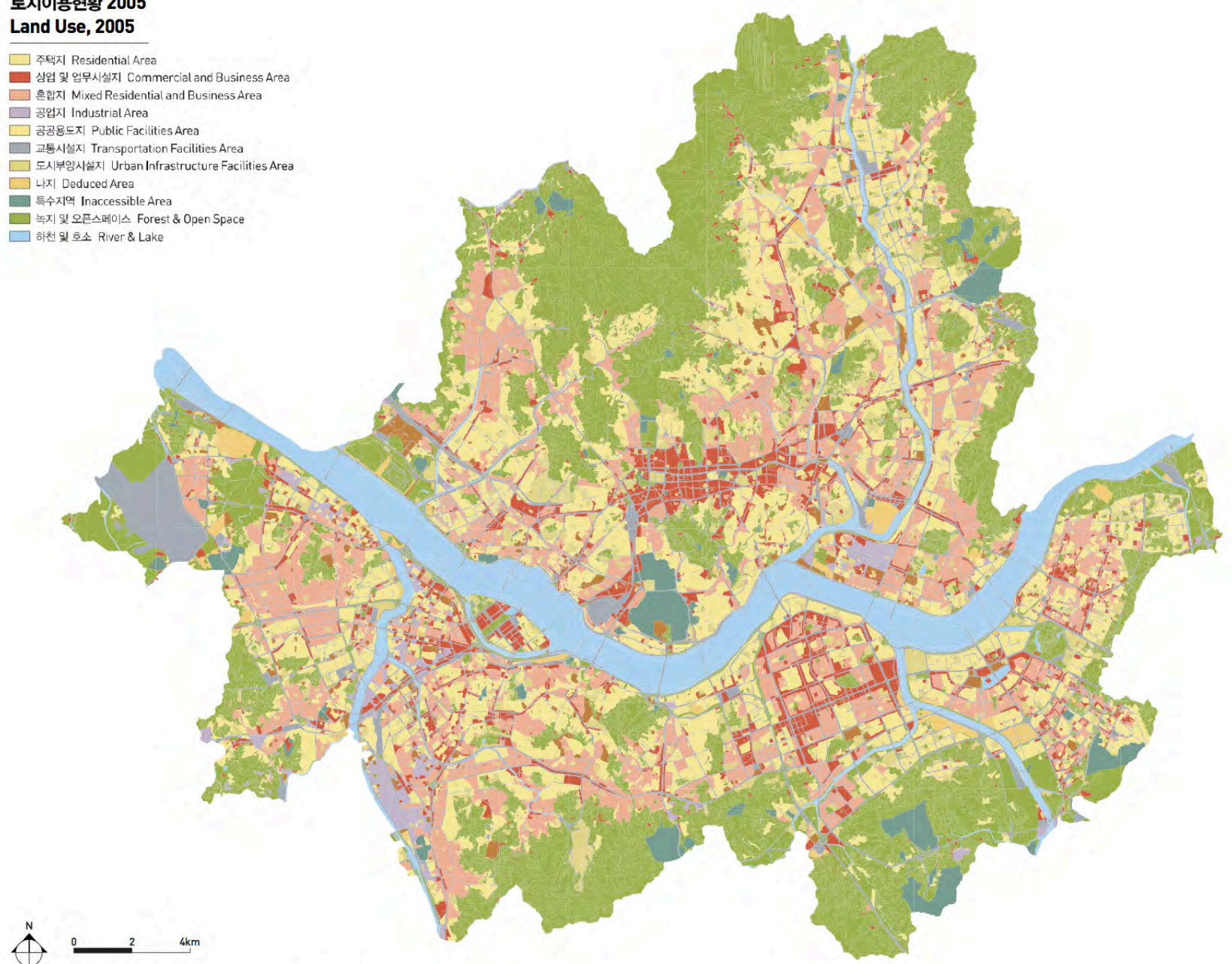


Source: Keumsook Lee and Lee-Yeon Lee 1998.

The map above shows the correlation between high levels of accessibility and changes in land use. It overlays the accessibility rank map with the land use map. The current land use of the central area in the northern part of the Han River, where nodes of high accessibility concentrate, is mainly commercial.

## 토지이용현황 2005 Land Use, 2005

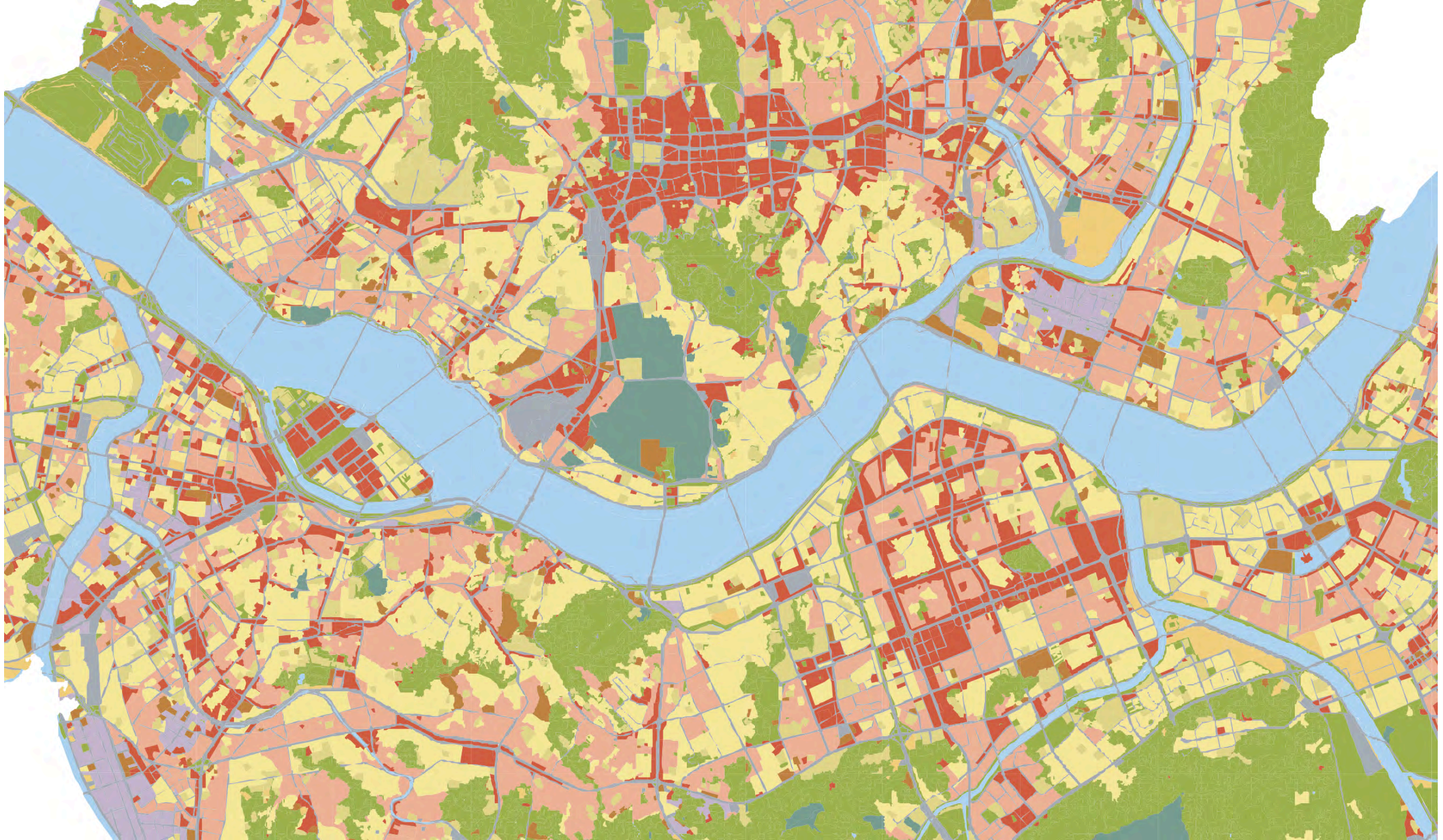
- 주택지 Residential Area
- 상업 및 업무시설지 Commercial and Business Area
- 혼합지 Mixed Residential and Business Area
- 공업지 Industrial Area
- 공공용도지 Public Facilities Area
- 교통시설지 Transportation Facilities Area
- 도시부양시설지 Urban Infrastructure Facilities Area
- 나지 Deduced Area
- 특수지역 Inaccessible Area
- 녹지 및 오픈스페이스 Forest & Open Space
- 하천 및 호소 River & Lake



• 자료 : 서울특별시, 도시생태현황도정비, 2005 | 서울특별시 도시계획국 홈페이지, <http://urban.seoul.go.kr>

• Source : Seoul Metropolitan Government, The maintenance of Metropolitan Biotope Map 2005 | Urban Planning Bureau, Seoul Metropolitan Government, <http://urban.seoul.go.kr>

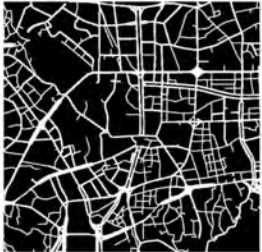






## Dense and connected street patterns

Seoul's Urban Fabric



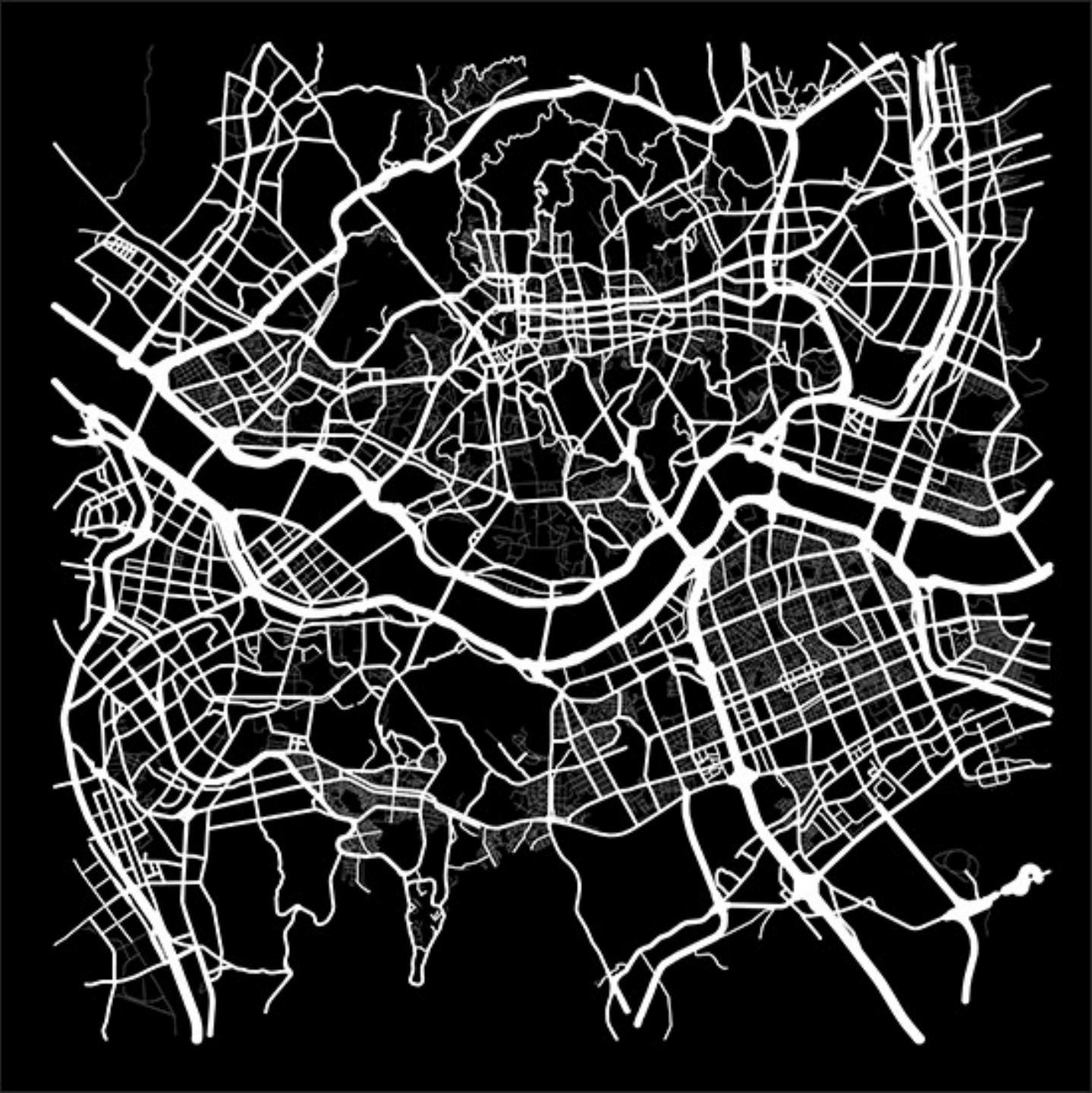
Jongno 종로



Hongdae 홍대



Gangnam 강남

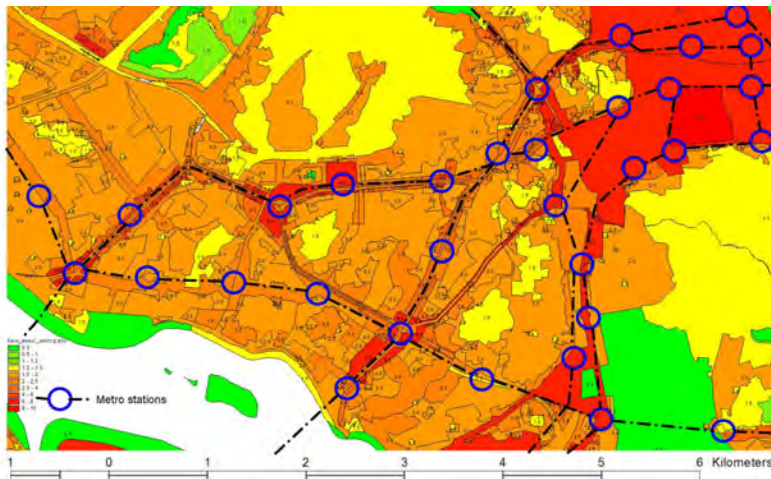




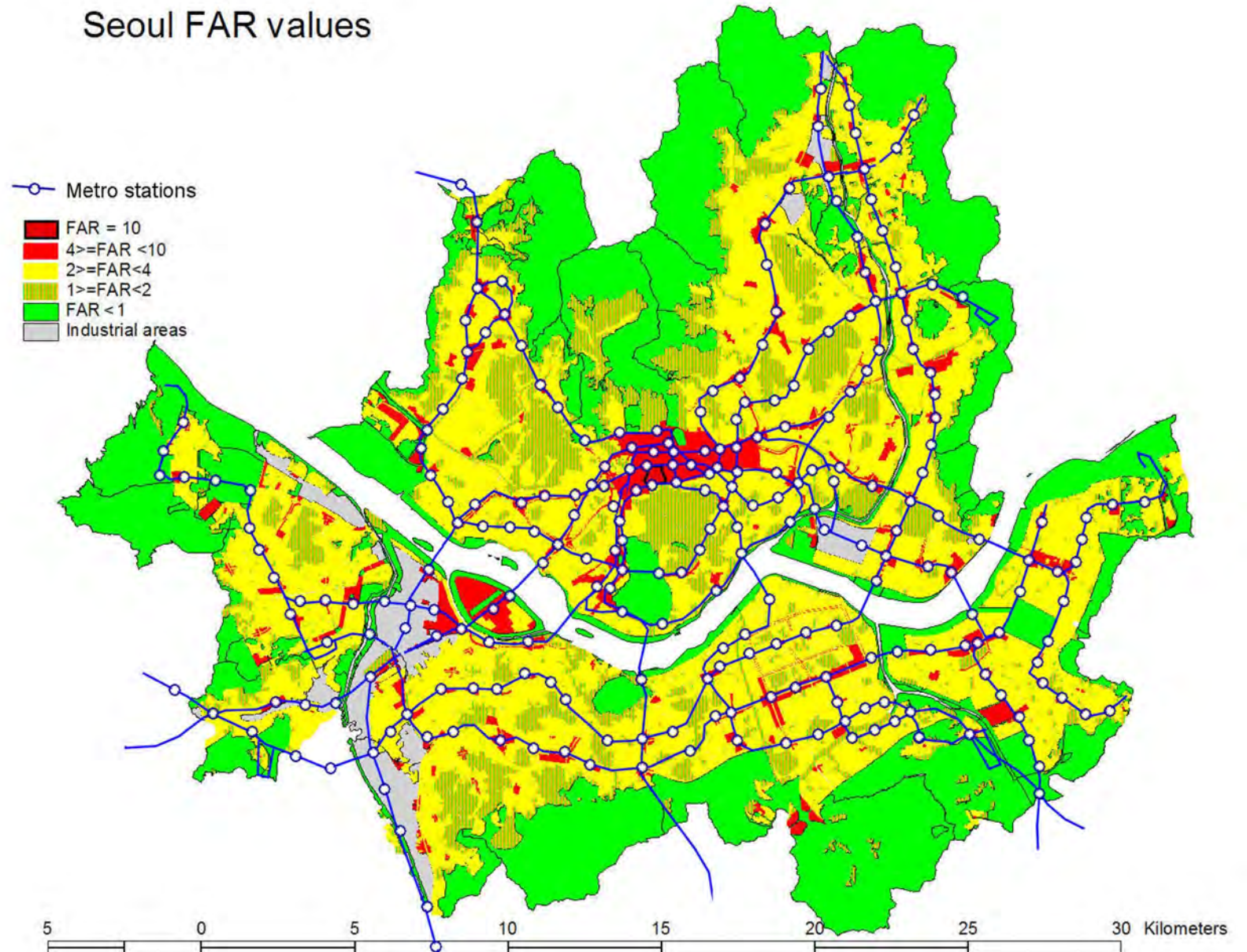
# Market Potential Value

## Using zoning to encourage high-density development around major transit nodes in Seoul

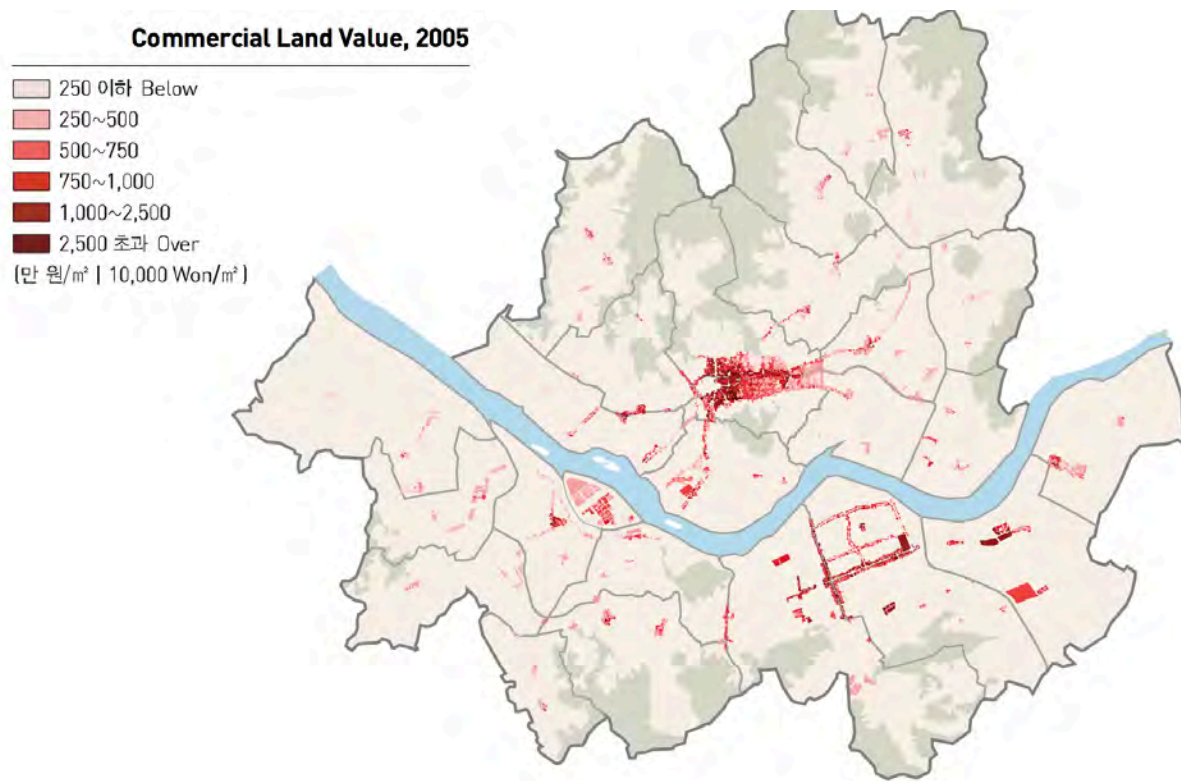
Seoul's zoning regulations set floor area ratios as high as 10 for commercial uses around the most connected and central transit stations, 2–4 for mixed residential and business areas, and 1–2 for residential uses. Uses are defined with fine granularity, depending on proximity to and the importance of transit stations. The result is a varied city in which small residential neighborhoods abut thriving business districts and higher FARs (shown in red in the maps) are allowed near metro stations (indicated by blue circles)



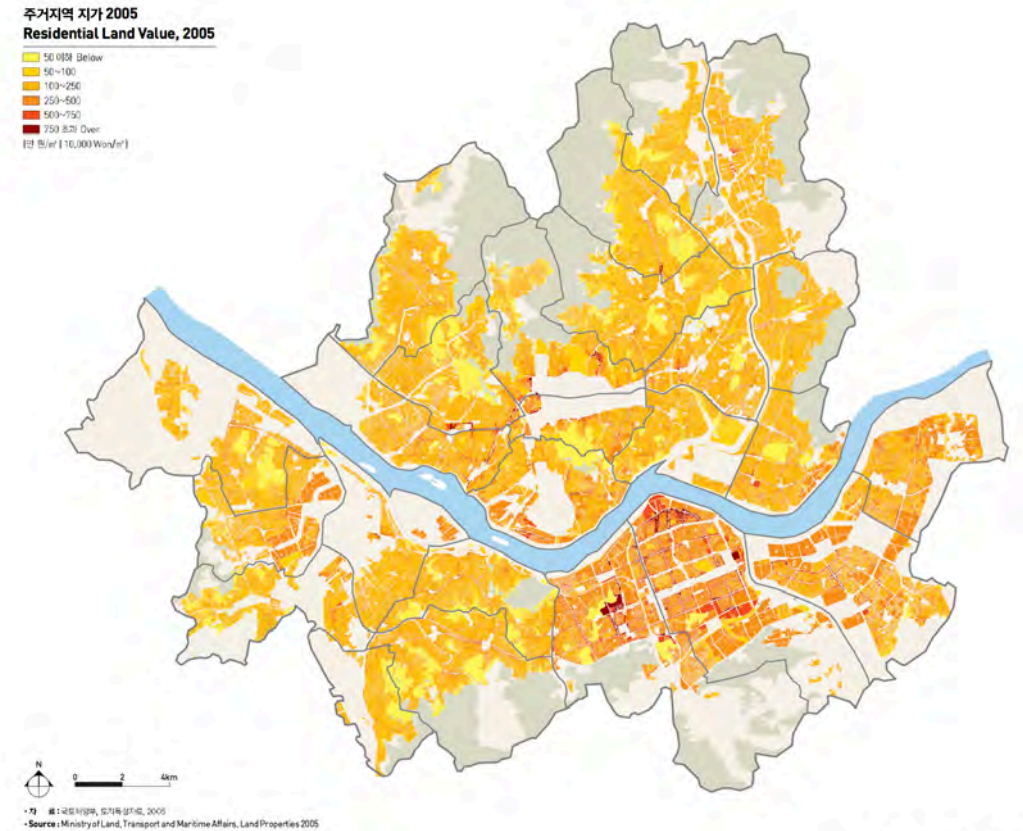
Seoul FAR values







The second phase of Seoul subway construction increases accessibility South of the Han River, in Gangnam district. Until the early 1980s Gangnam and its neighboring areas had remained the least developed in Seoul, but a prodigious development over the last 30 years has earned it a reputation of being one of the most affluent, dynamic, and influential areas in both Seoul and South Korea as a whole. The Gangnam District is one of the 25 gu, which make up the city of Seoul. Gangnam is one of three gu that make up the Greater Gangnam Area along with neighboring Seocho District and Songpa District. Combined, these three gu cover approximately 120 km<sup>2</sup> of land and had a population of 1,567,881 as of 2010, making up 20% of the area and 15% of the population of Seoul.

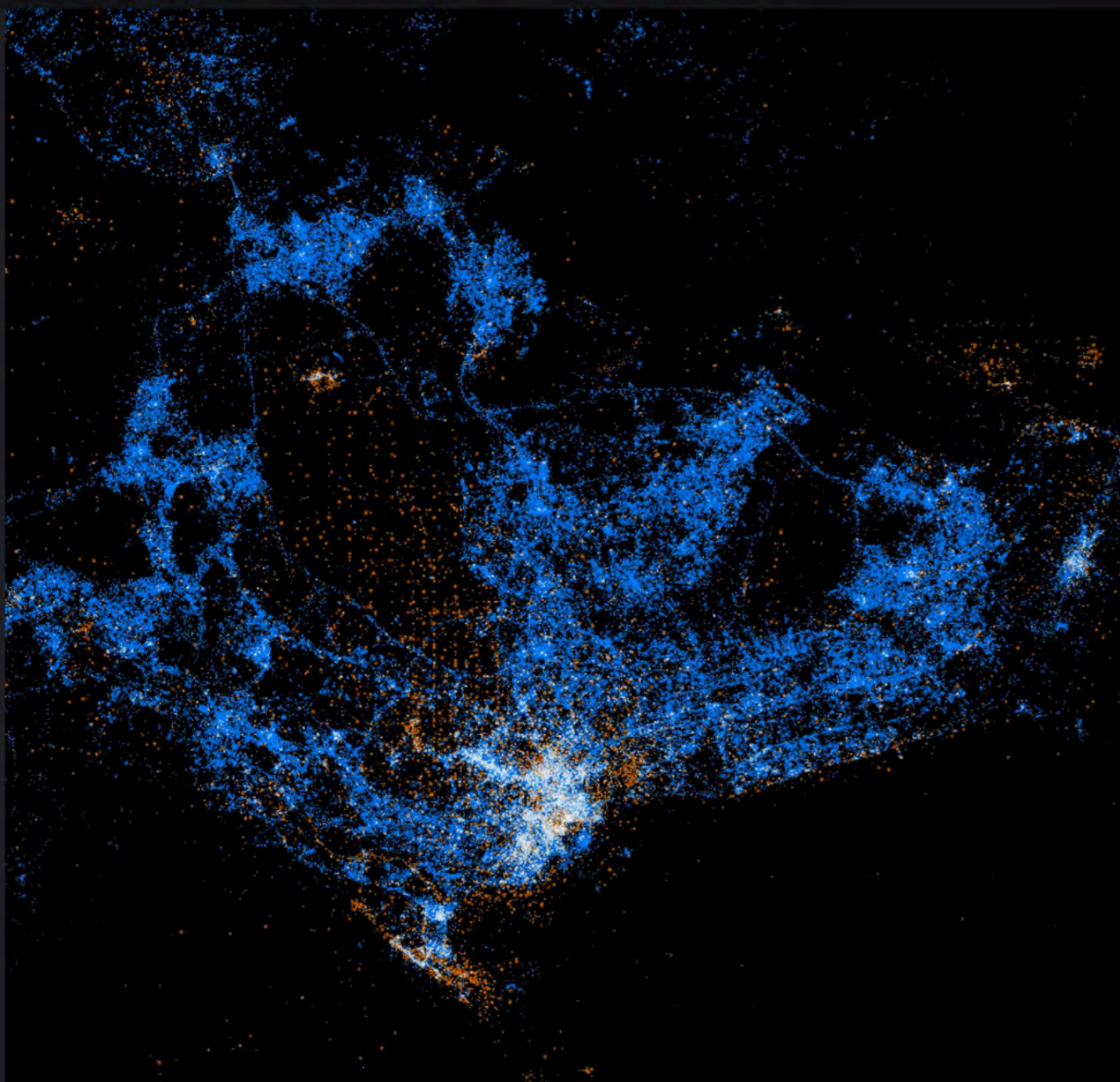


Both the Greater Gangnam Area and Gangnam itself are widely known for their heavily concentrated wealth. The most significant indicator is its extremely expensive real estate. Seoul average apartment costs are approximately US\$5,500 per m<sup>2</sup>, but the average price in Gangnam is almost twice as high, roughly US\$10,000 per m<sup>2</sup>, which is 3.5 times the nationwide average. As for land value, the mere 40 km<sup>2</sup> land of Gangnam district rivals with the entire land value of the city of Busan, the second largest city in South Korea. Combined with the neighboring districts of Seocho and Songpa, Greater Gangnam Area account for almost 10% of land value of the entire country.



# Singapore

Source: Eric Fischer





# Node Value

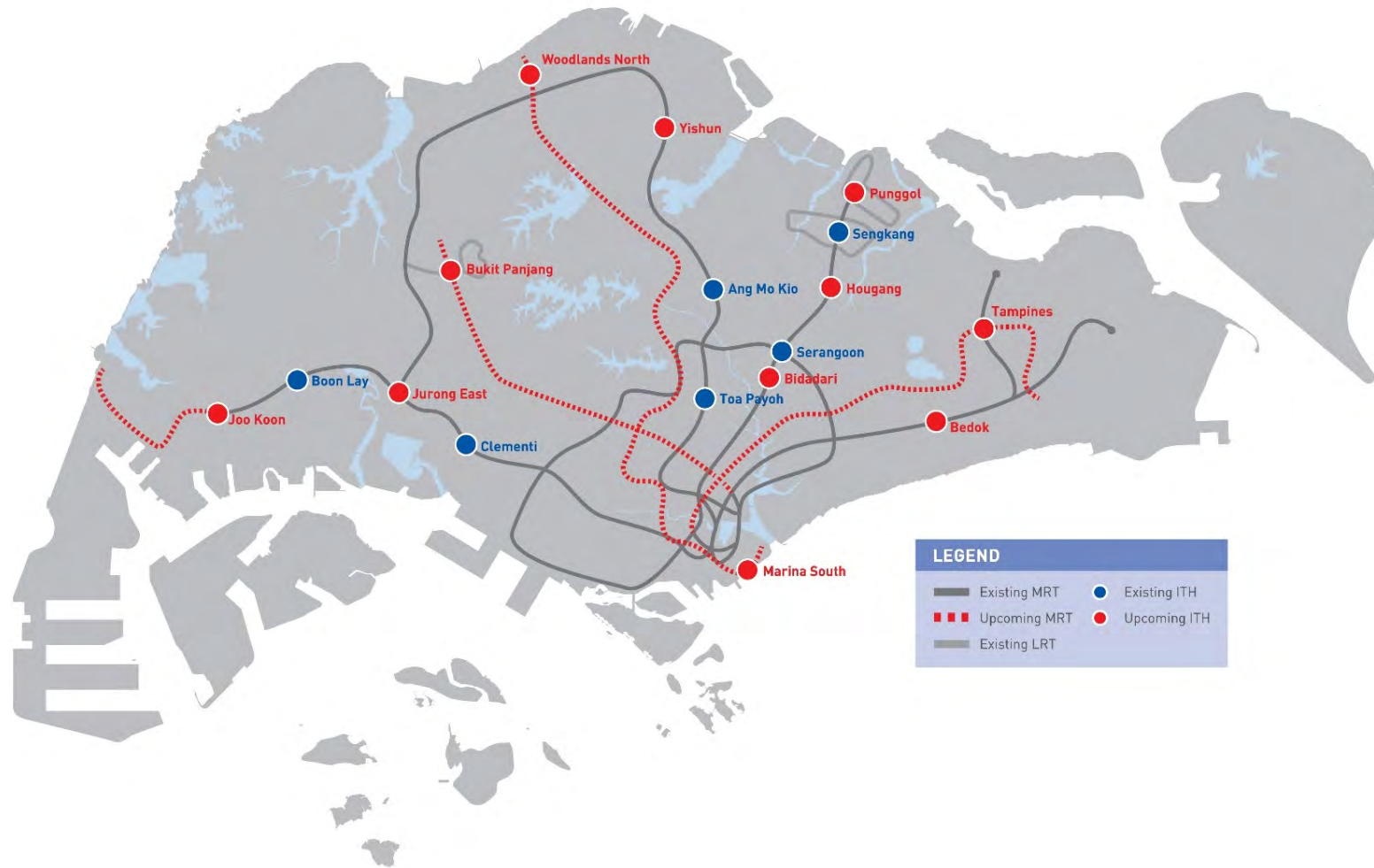
## Achieve 75% Use of Public Transport by 2030

The LTA is going to double the rail network by 2030, by building two completely new MRT lines across the island and lengthening existing lines. By 2030, eight in 10 Singapore households will be within a 10-minute walk of a train station. In wanting to make public transport a choice mode of travel for commuters, the LTA has announced ambitious plans to build new MRT tracks and stations around the island, which will expand the 178km length of Singapore's rail network today to about 360km in 2030.



Source: Bringing New And Extended Rail Lines To You By 2025/2030, Land Transport Authority, 2013  
[https://www.lta.gov.sg/content/dam/ltaweb/corp/PublicationsResearch/files/ReportNewsletter/Connect/Connect-2013-Feb\\_FA.pdf](https://www.lta.gov.sg/content/dam/ltaweb/corp/PublicationsResearch/files/ReportNewsletter/Connect/Connect-2013-Feb_FA.pdf)





## Build new Integrated Transport Hubs (ITH)

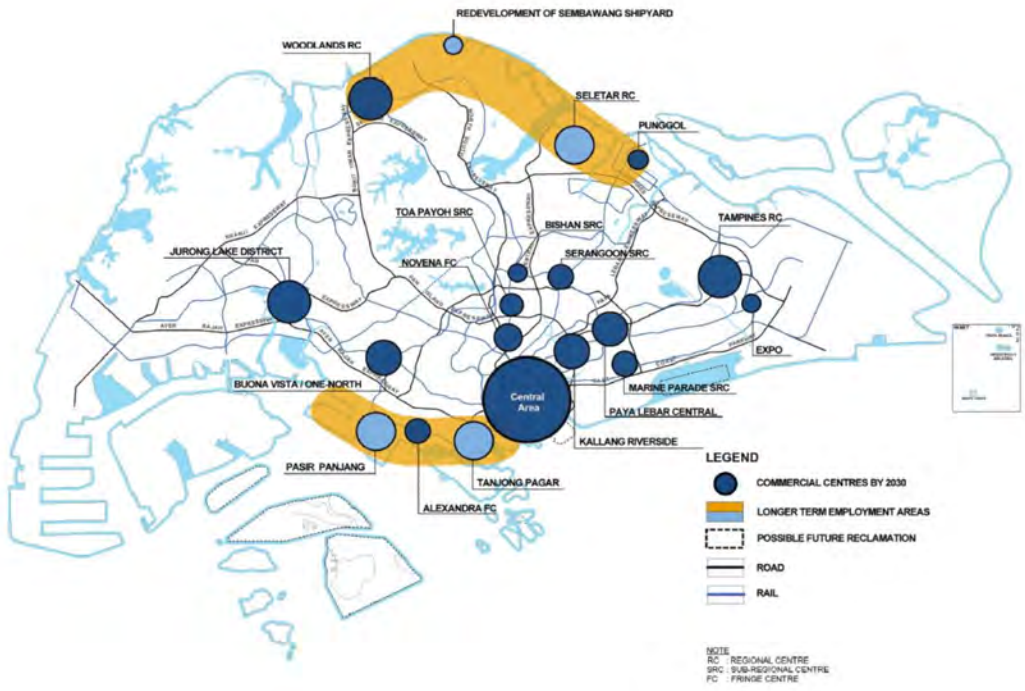
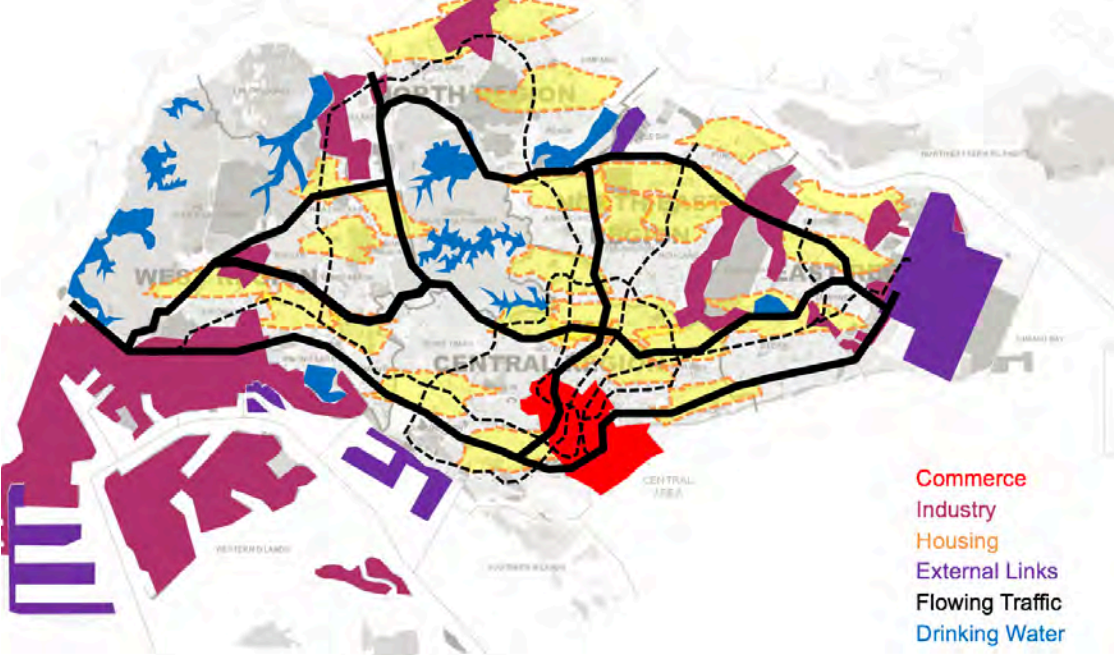
The Light Rail Transit (LRT), also known as the Light Rapid Transit, is a series of localised automated guideway transit systems acting as feeder services to the heavy rail Mass Rapid Transit.

Source:

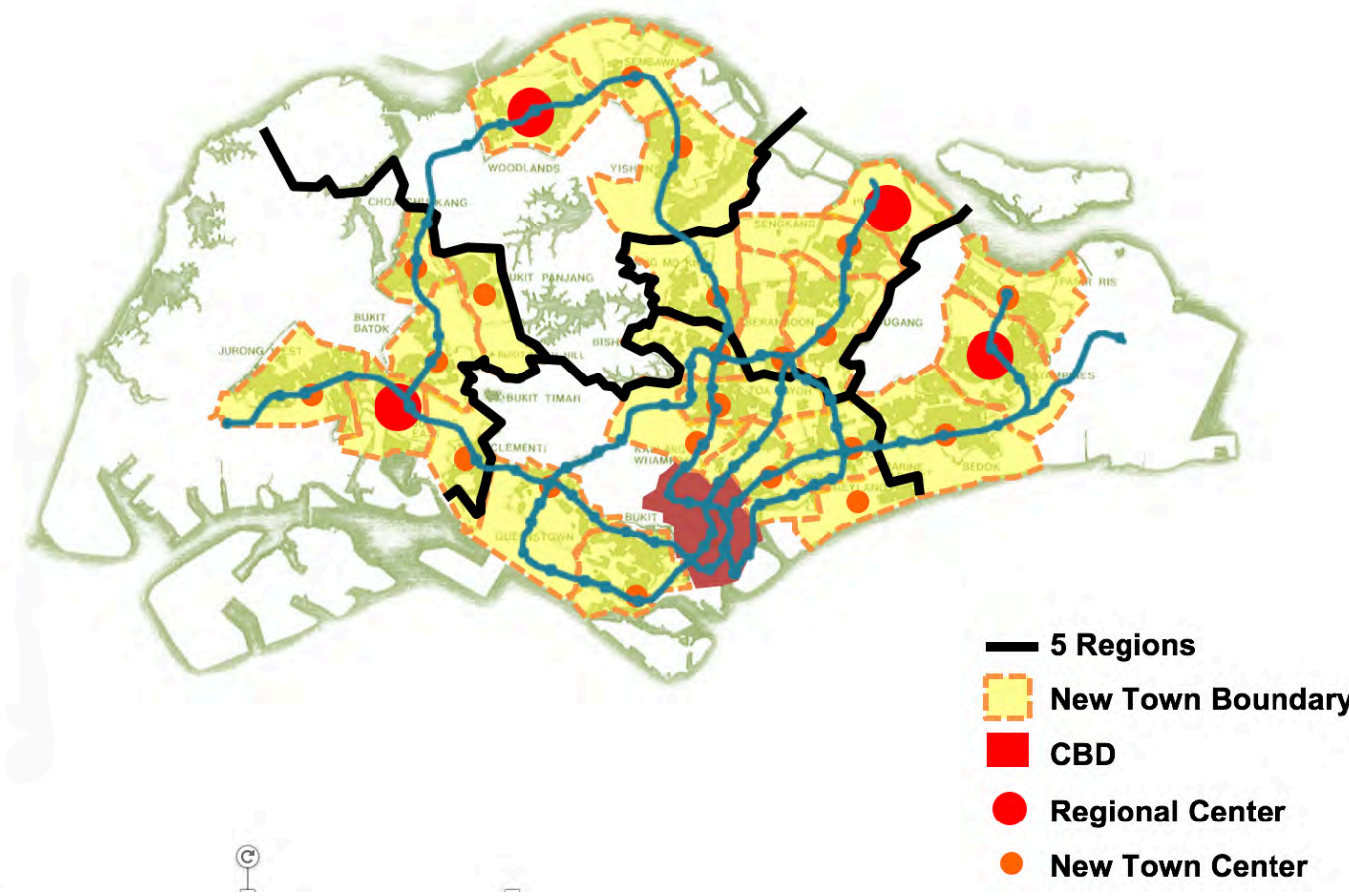
<https://www.ura.gov.sg/uol/master-plan/view-master-plan/master-plan-2014/master-plan/Key-focuses/transport/Tr>

Bus Service Enhancement Programme (2012) will add 1,000 new buses( 25% increase) by 2017.



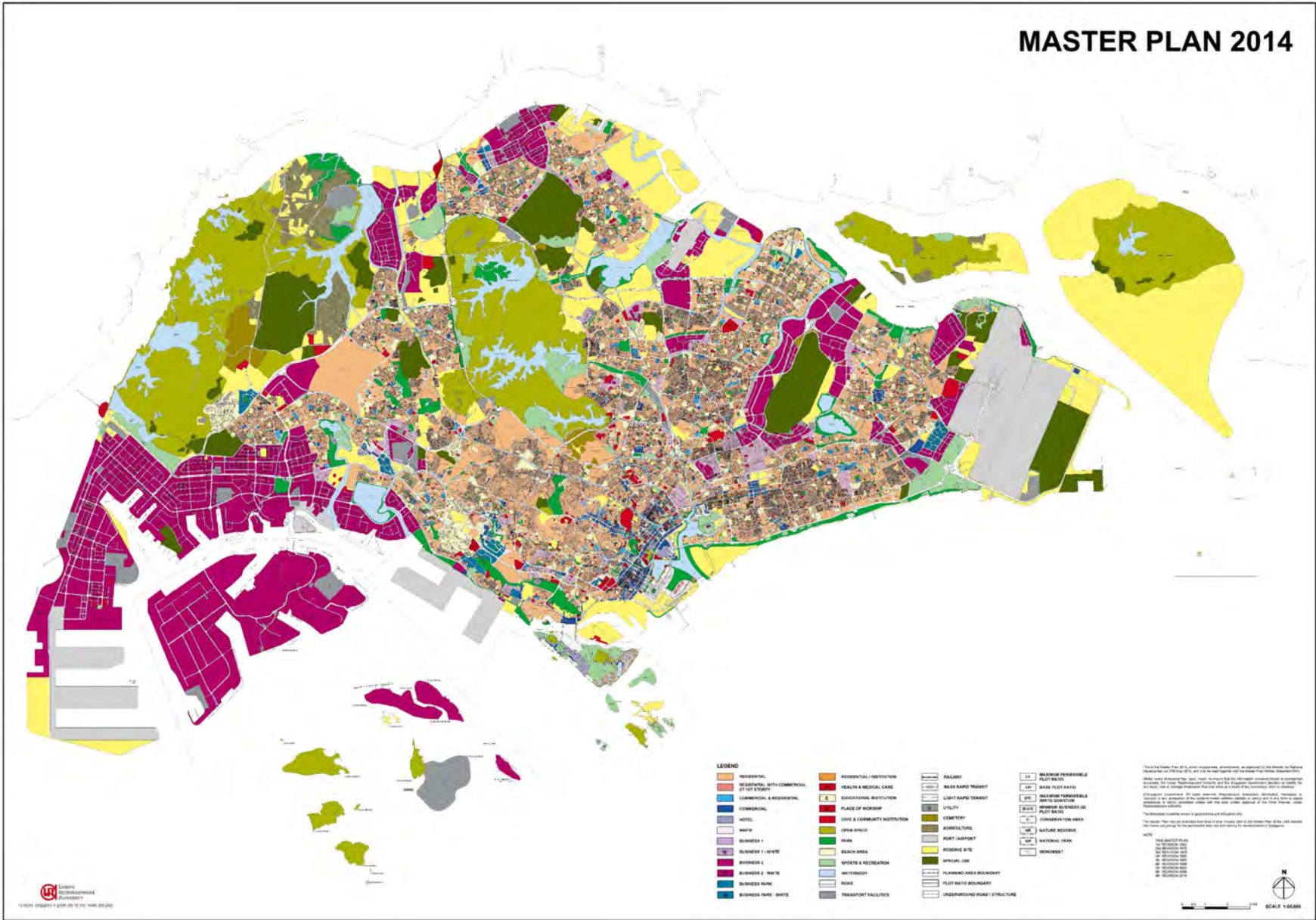


Singapore polycentric structure



Mass rapid transit links commercial centres

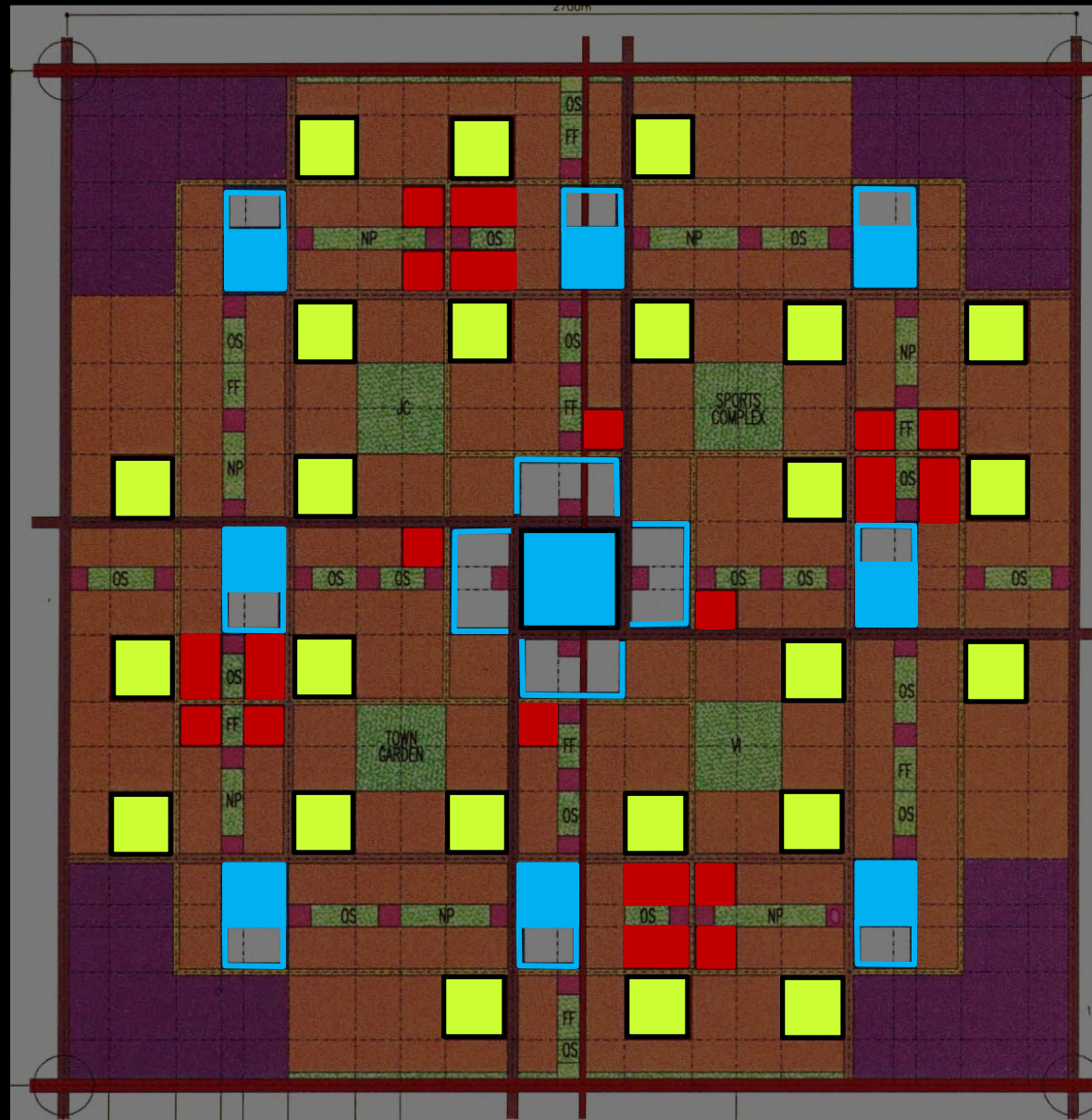






# New Town Prototype

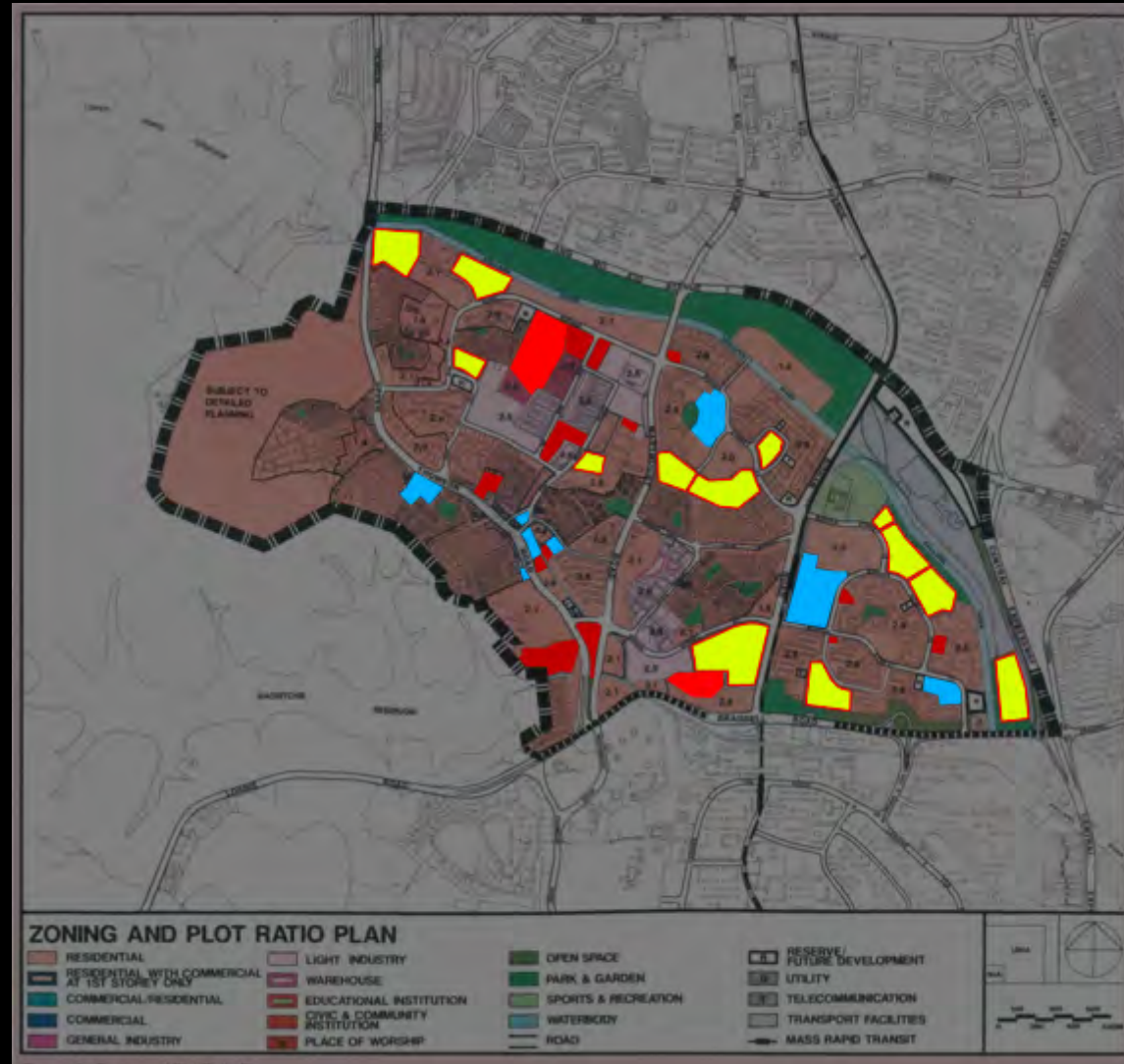
Decentralize and bring  
amenities near homes



- Institutions
- Schools
- Commercial



# Amenities



Bishan  
17% of NT Area

■ Institutions

■ Schools

■ Commercial



## Land use Table – Towards High Self-Sufficiency

Landuse	Area (Ha)	Percentage (%)
Residential	473.5	45
Commercial	83.5	7.9
Educational	72.1	6.9
Institution	21.6	2.1
Parks & Gardens	74.1	7.0
Sports & Recreation	15.8	1.5
Reserve Sites	3.0	0.3
Transportation	140.1	13.3
Industry	84.2	8.0
Utilities & Others	84.2	8.0
<b>Total</b>	<b>1,052.0</b>	<b>100</b>

Source: RSP



# Encourage Cycling and Walking

- Quadruple sheltered walkway network from the existing 56 km to **200 km** by **2018**
- Double the total length of its cycling paths from 355km in 2015 to more than **700km** by **2030**



off-road cycling paths



sheltered walkway

Source: <http://www.todayonline.com/singapore/lta-calls-tenders-sheltered-linkways-59-mrt-stations>  
<http://www.straitstimes.com/singapore/transport/world-cities-summit-study-suggests-ideas-to-promote-walking-and-cycling-in>

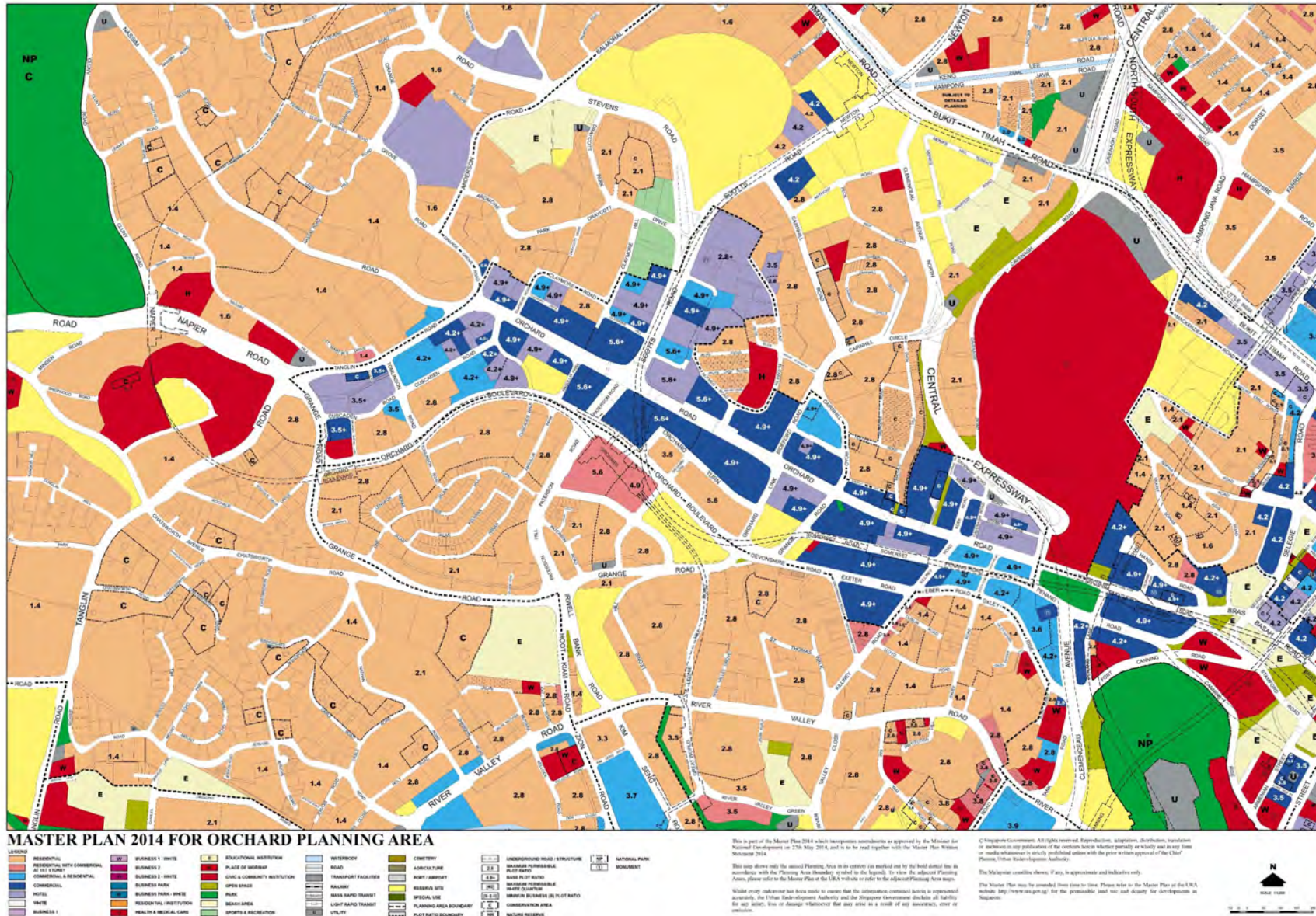


## Ang Mo Kio Model Walking and Cycling Town

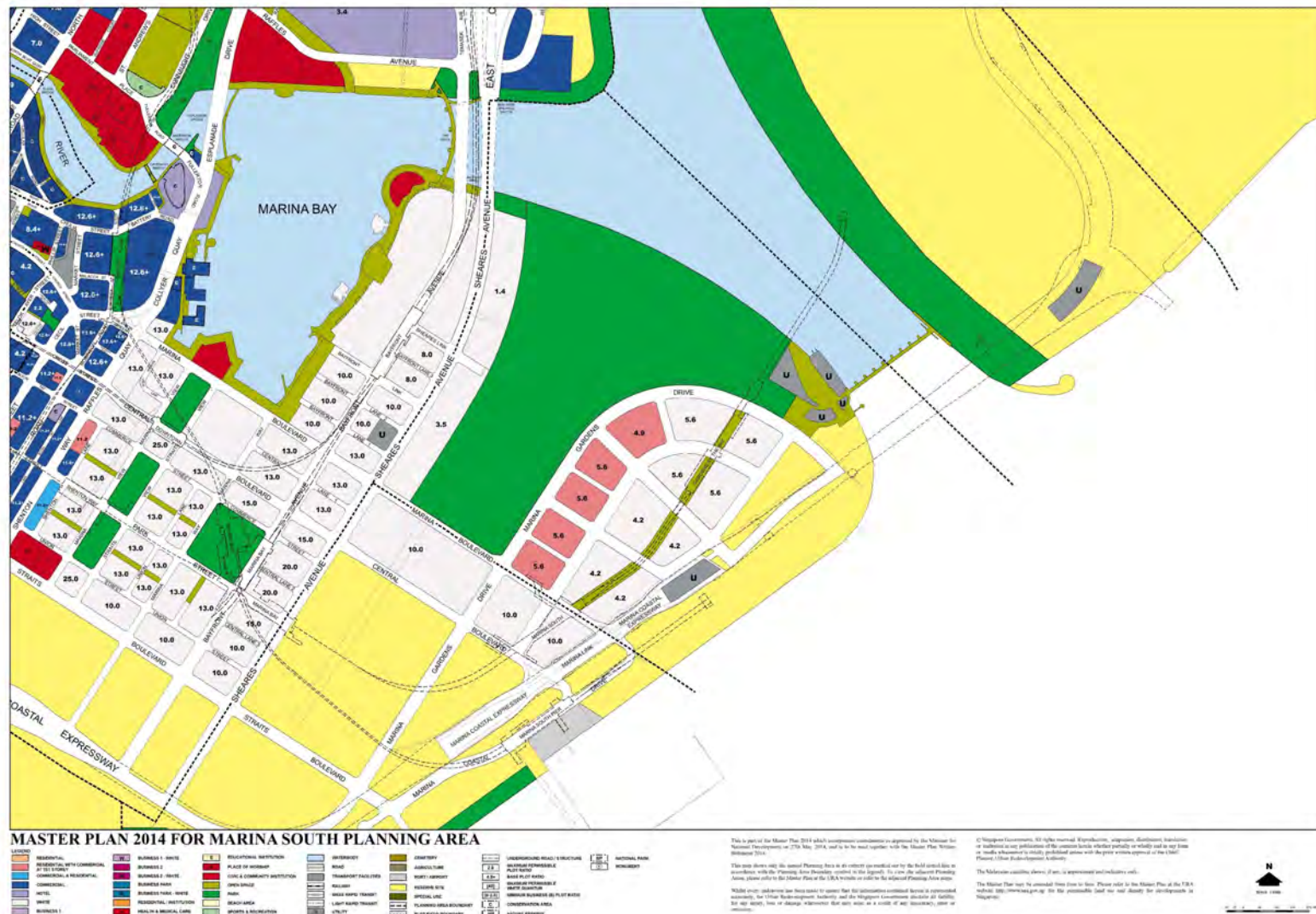
Source: <https://www.lta.gov.sg/content/ltaweb/en/walk-cycle-ride/integrating-cycling-with-public-transport/ang-mo-kio-model-walking-and-cycling-town.html>



# Market Potential Value





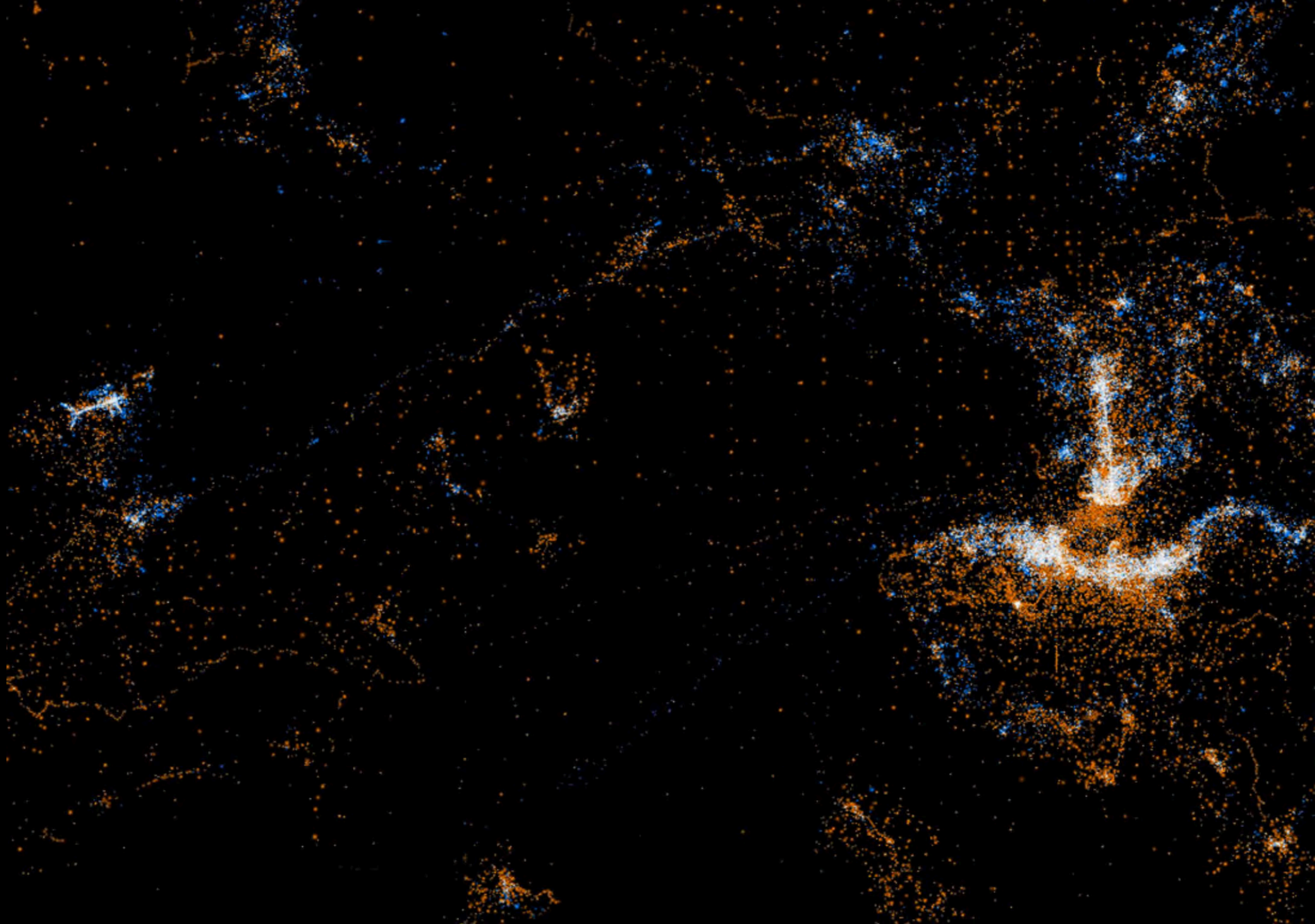


Public sector investment has been key to the development of Marina Bay. This investment has been recouped by returns from the private sector. The Urban Redevelopment Agency has received more than \$4.5 billion from the sale of land parcels (excluding proceeds from One Marina Boulevard and the M+S Marina One development site), according to estimates by CBRE (2012). Public sector investments in infrastructure have attracted local developers as well as developers from Australia; Hong Kong SAR, China; Malaysia; and the United States. U.K. firms reportedly occupy 29 percent of the development's space, with 19 percent occupied by U.S. firms and 18 percent by Singaporean firms. Most occupants are from multinational companies headquartered in Europe (51 percent), Asia (22 percent), and North America (20 percent). Occupants include law, information technology, commodities, energy, and insurance firms as well as financial service firms.

Marina Bay South Master Plan

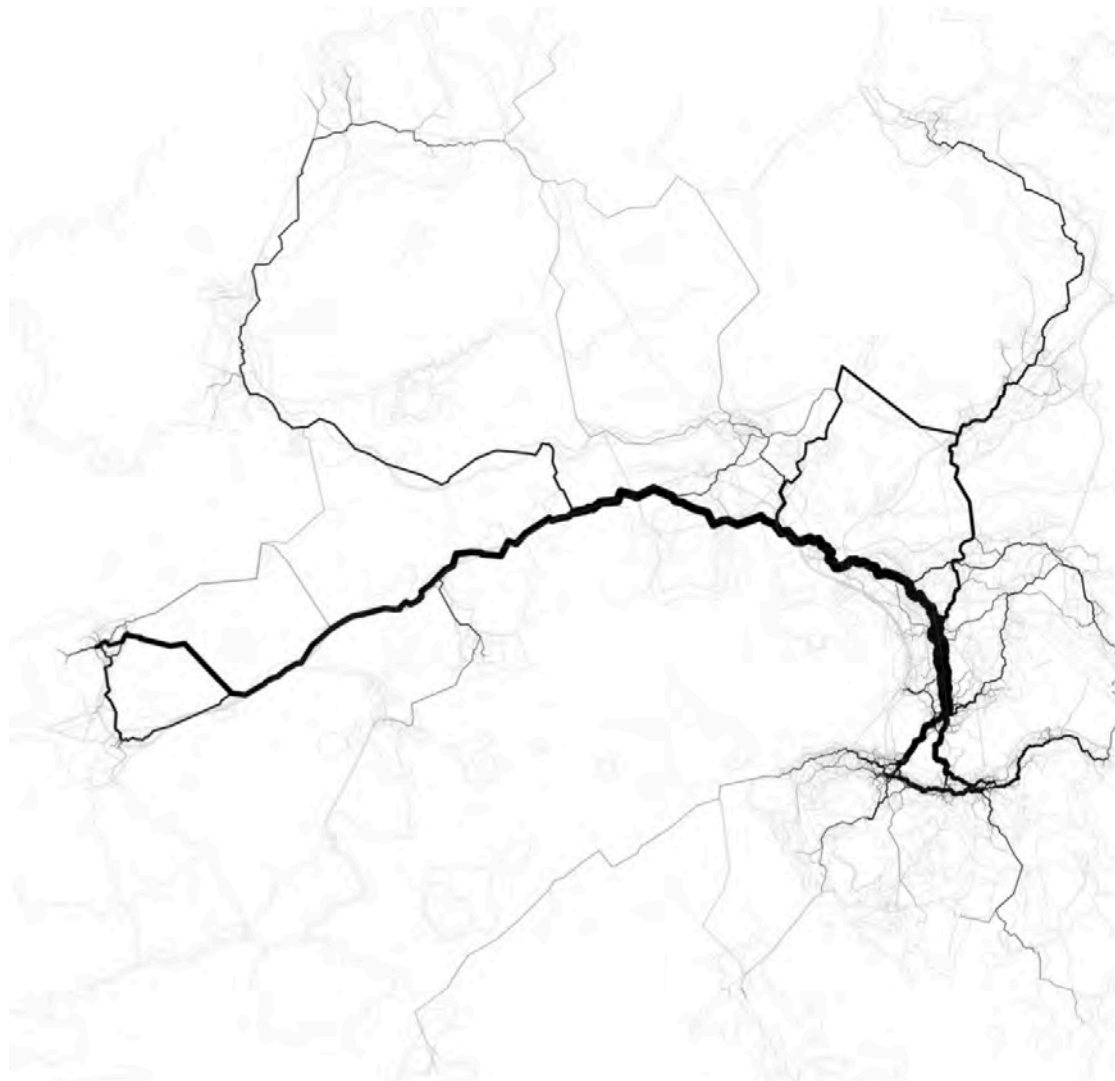


# Hong Kong



Source: Eric Fischer

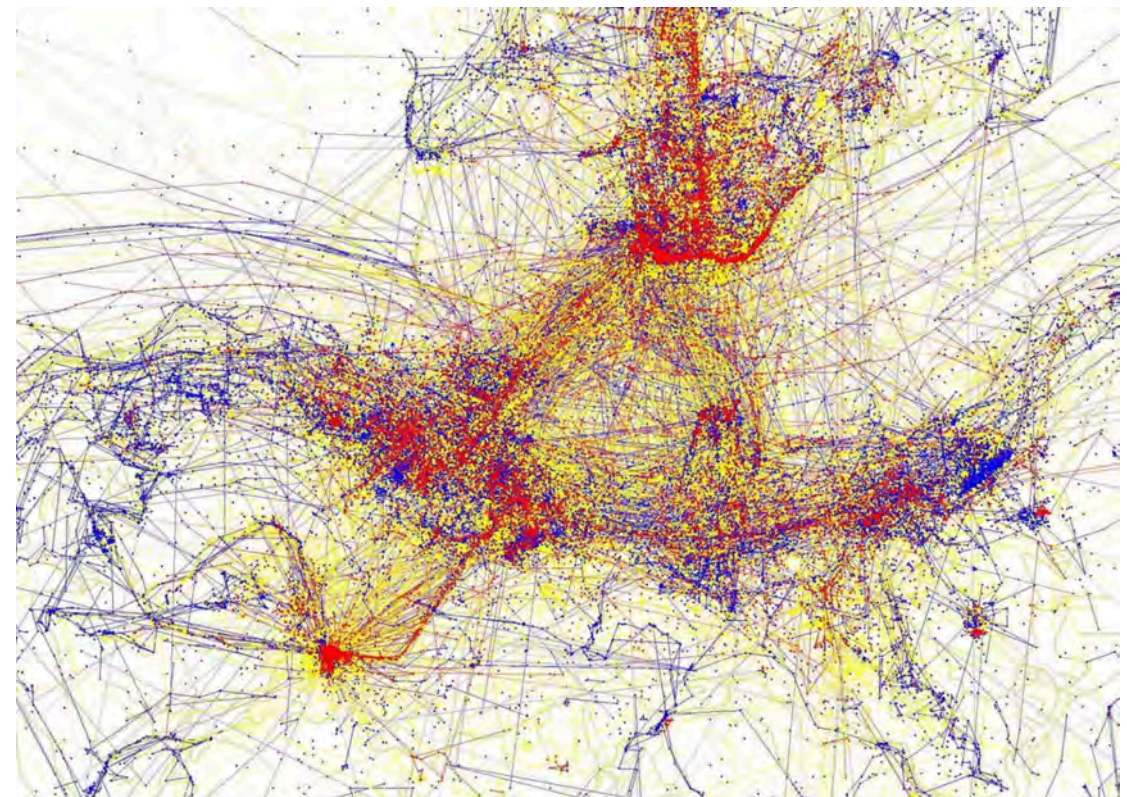




**Node value : Paths through Hong Kong – Source: Eric Fischer**

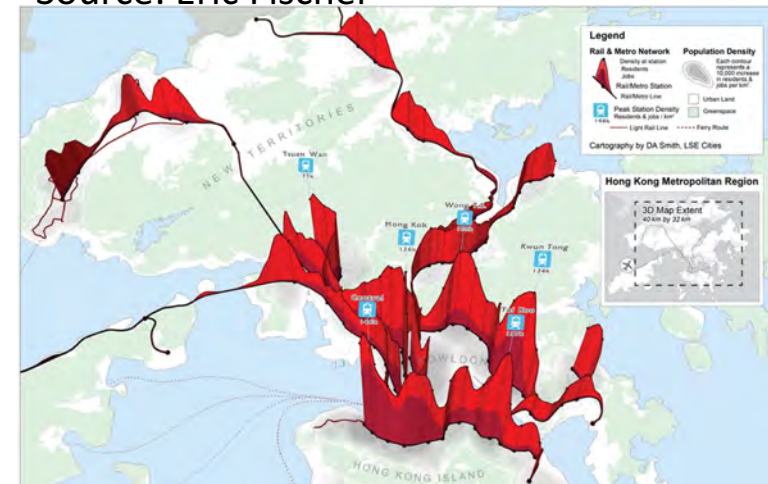
Routing 30,000 randomly-chosen trips through the paths suggested by 10,000 randomly-chosen geotags.

Data from the Twitter streaming API, August, 2011. Base map from OpenStreetMap, CC-BY-SA.



**Place value:** Red pictures by tourists; blue pictures by locals

Source: Eric Fischer

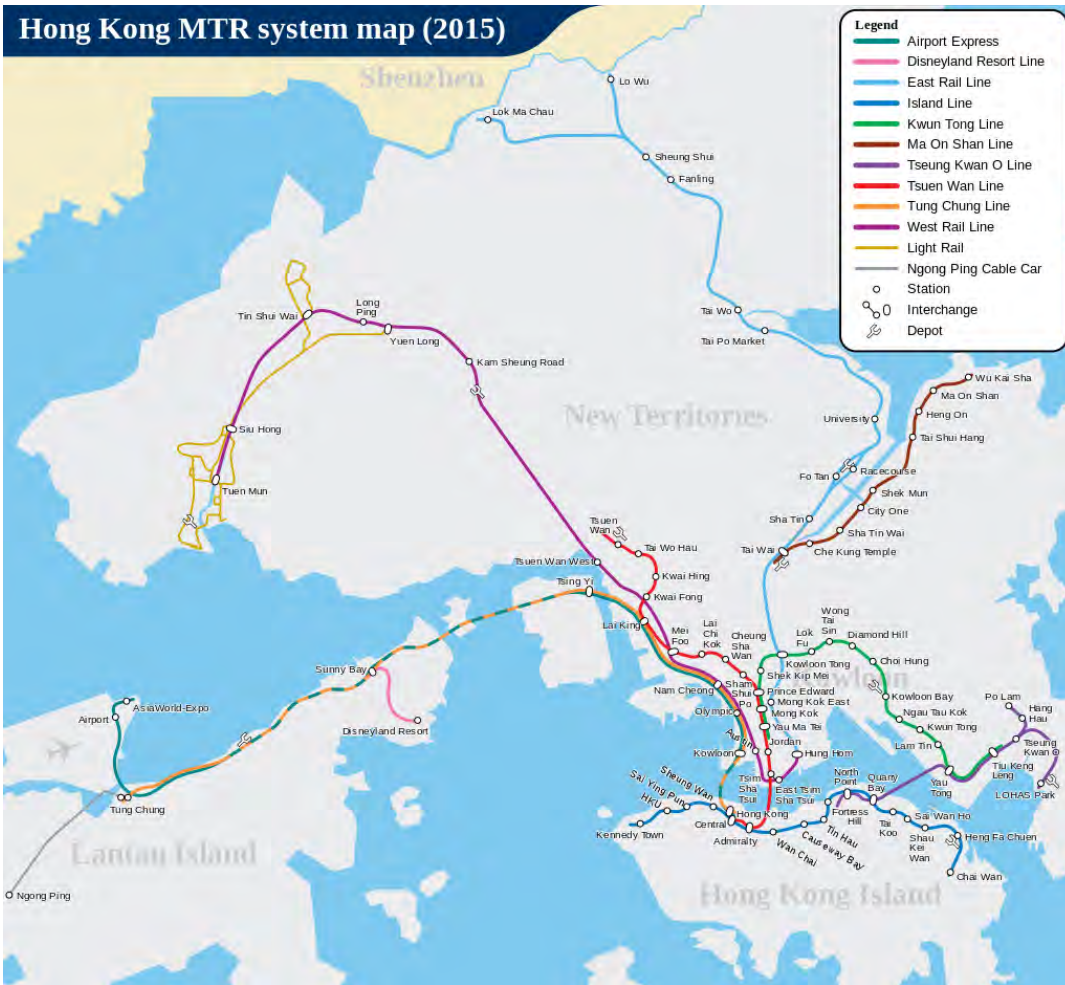


**Market value:**

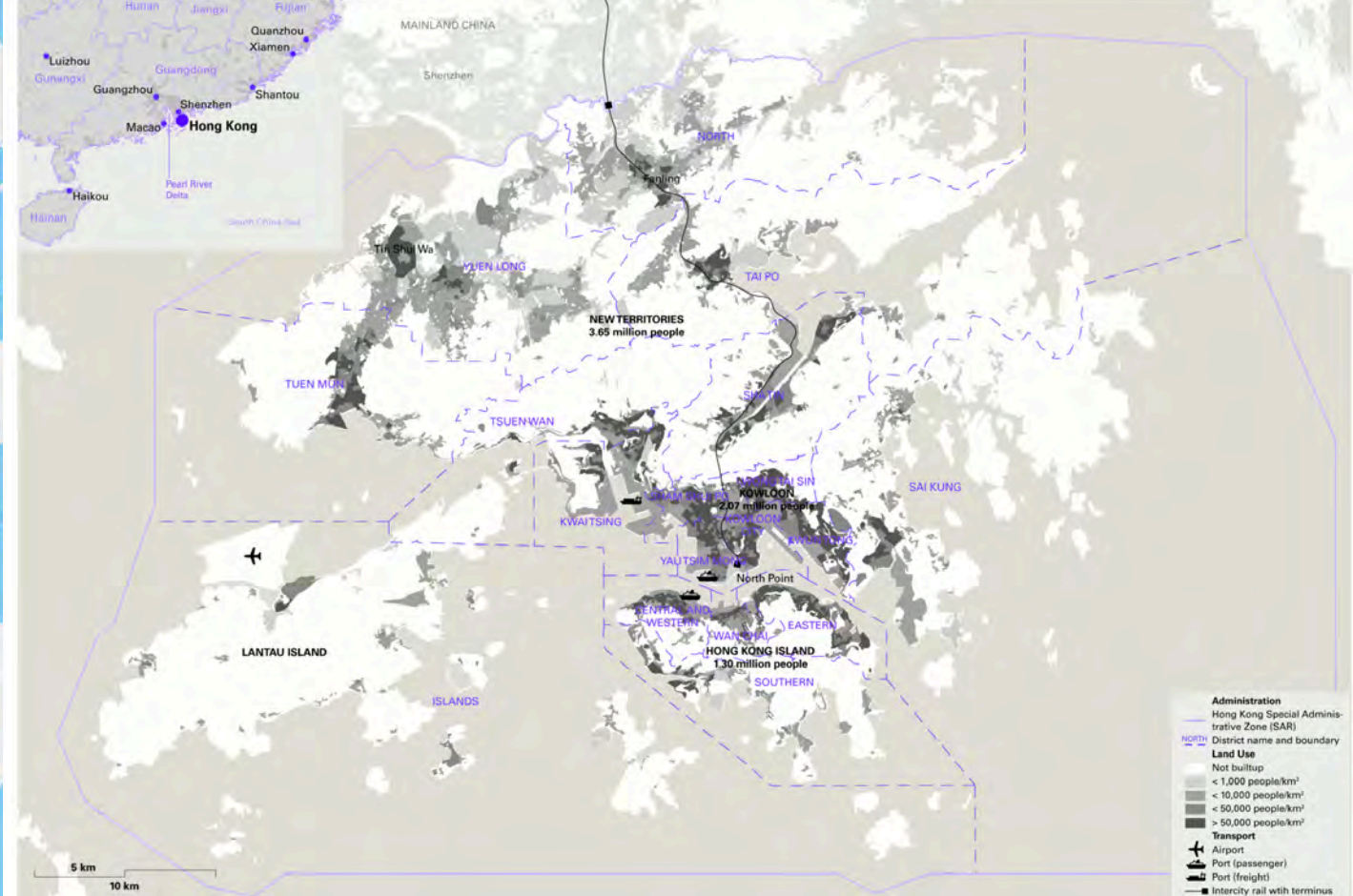
Densities (people and jobs) in Hong Kong are aligned with transit accessibility



# Node Value

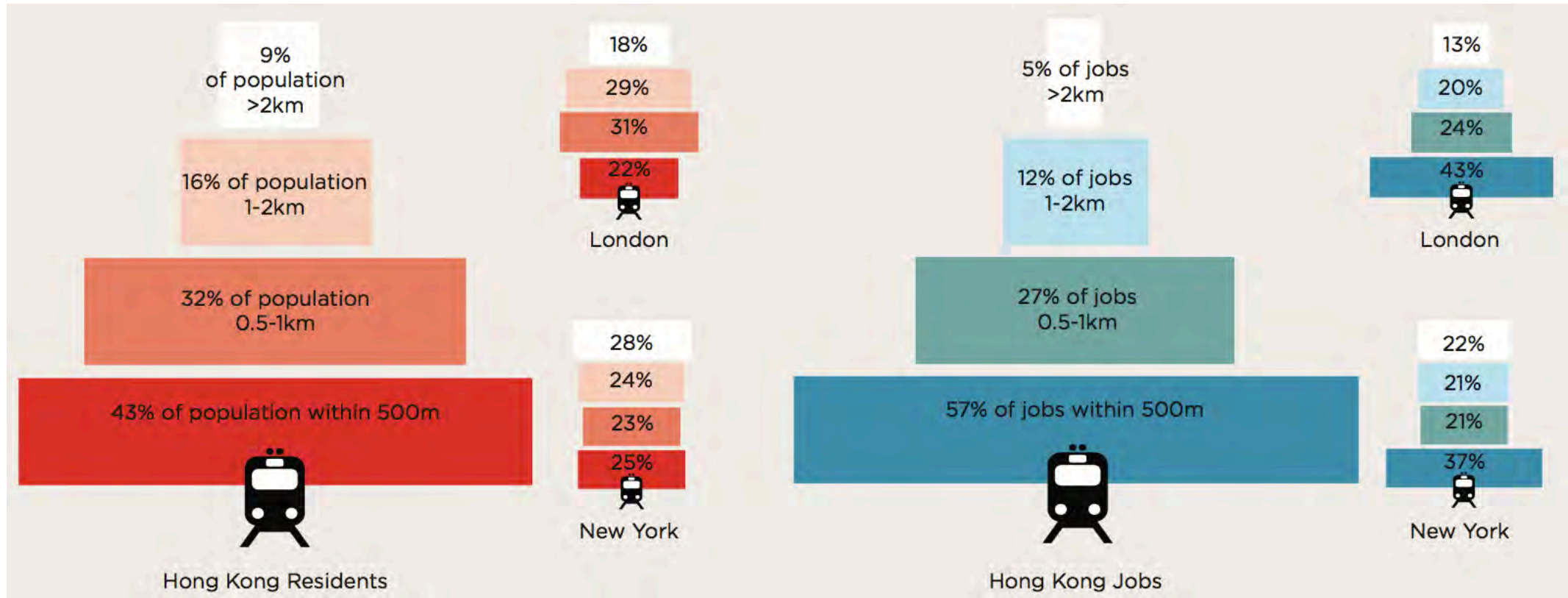


High-density areas in Hong Kong



High density in Hong Kong is aligned with high node values



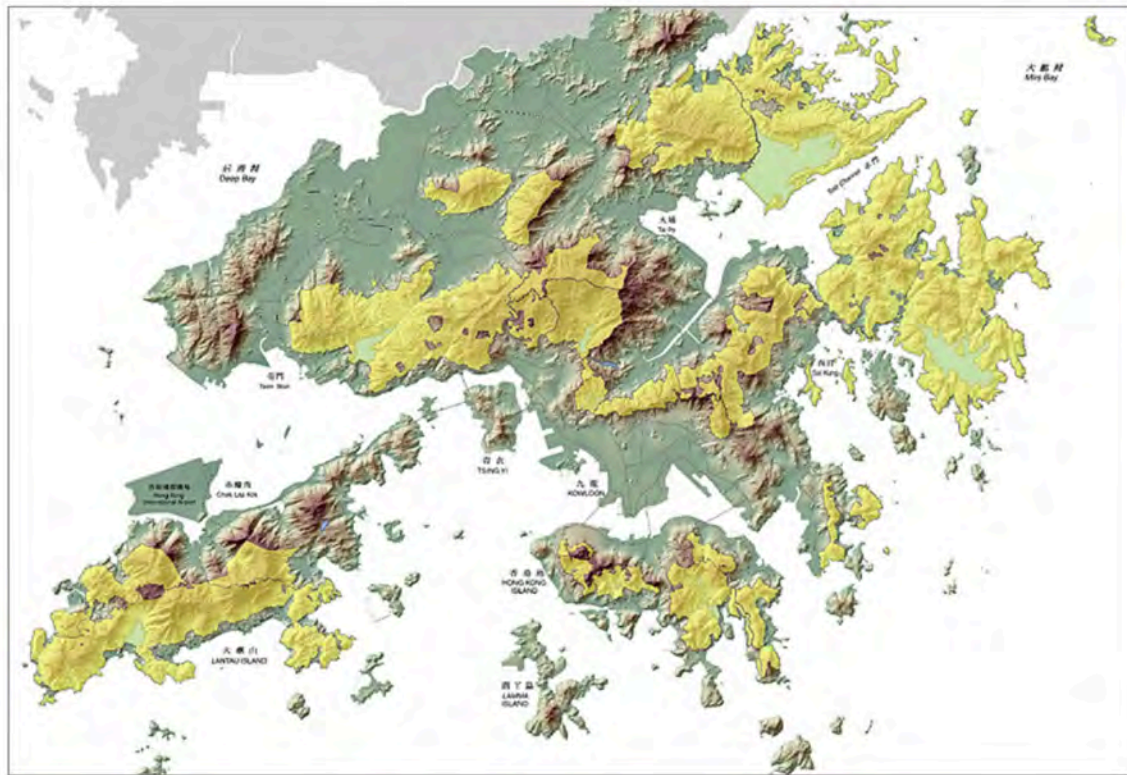


As a result of Hong Kong's approach to integrating transport and land-use planning, 43% of the population (3 million people) live within 500m of an MTR station and 75% live within 1 km of a station. Public transport is used for 90% of all motorised journeys and the car ownership rate (56 per 1000 people) is lower than any other city of similar wealth (as a comparison, the average rate in OECD countries is 404 per 1000 people).

The city's exceptionally high levels of residential density – averaging 21,900 people per km<sup>2</sup> within the built-up area, 6,300 people per km<sup>2</sup> across the entire territory and peaking at 123,300 people per km<sup>2</sup> at North Point – has also created one of the most walkable cities in the world. Not surprisingly, 45% of trips are undertaken by foot.

Source: LSE Cities



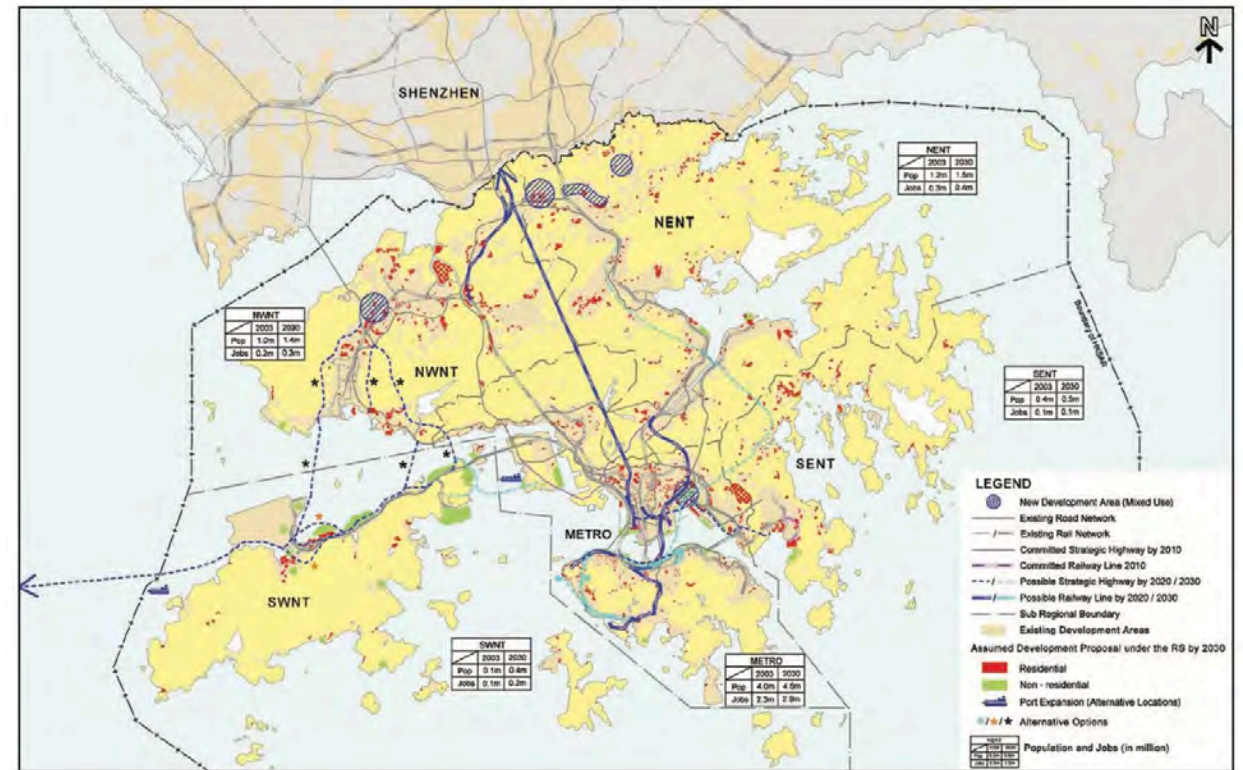


*The Terrain of Hong Kong: Mountains and country parks occupy more than 60% of the land area*

## Hong Kong Planning Concepts

Being a highly compact city, Hong Kong's preferred future spatial development pattern is underpinned by the planning concept of clustering the bulk of development around mass transit railway stations to facilitate fast and mass movement of people in an environmentally friendly mode of transport. Better utilisation of development opportunities in the existing built-up areas where infrastructure capacities permit would also be recommended. However, care should be exercised to take into account urban design considerations (such as building mass and height, provision of breezeways etc.) as well as heritage conservation objectives, in the planning of new developments.

Source: The Hong Kong 2030: Planning Vision and Strategy, Hong Kong SAR Government, October 2007.



Hong Kong Preferred Development Option.  
Long Term- by 2030

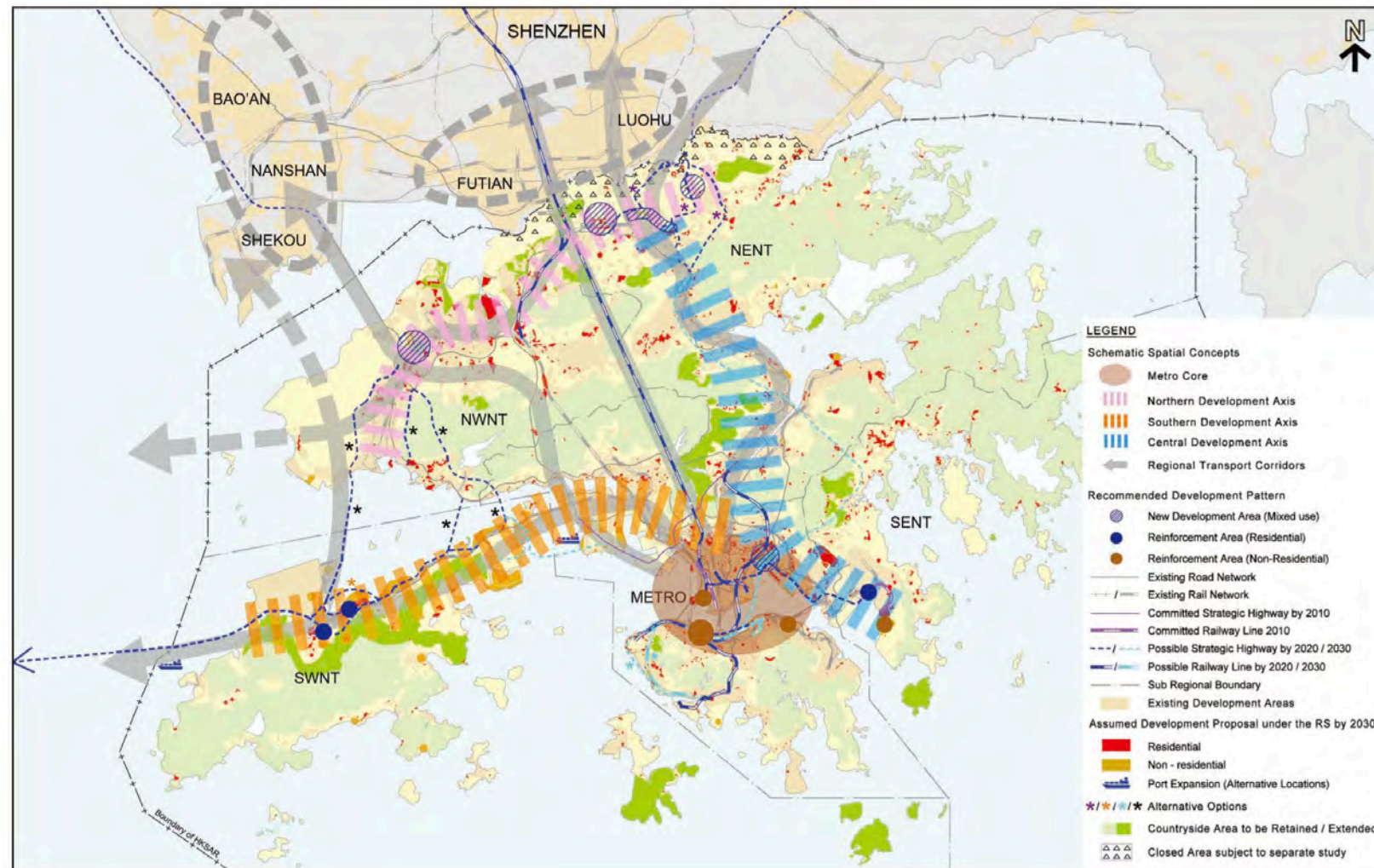


In terms of future development directions, the core urban areas will still remain as the focal point of development and urban activities. Further development opportunities will be found along three axes:

1. the first in a north-south direction roughly aligning with the East Rail
2. the second spreading westwards from the core towards Lantau
3. the third alignment in northern New Territories located close to the boundary with Shenzhen. These development area/axes will serve the following functions:

- **Metro Development Core** – Intensive commercial/business zones and housing for urban-style living;
- **Central Development Axis** – Community-type housing and education/knowledge-building facilities;
- **Southern Development Axis** – Logistics and major tourism facilities; and
- **Northern Development Axis** – Non-intensive technology and business zones and other uses that capitalise on the strategic advantage of the boundary location.

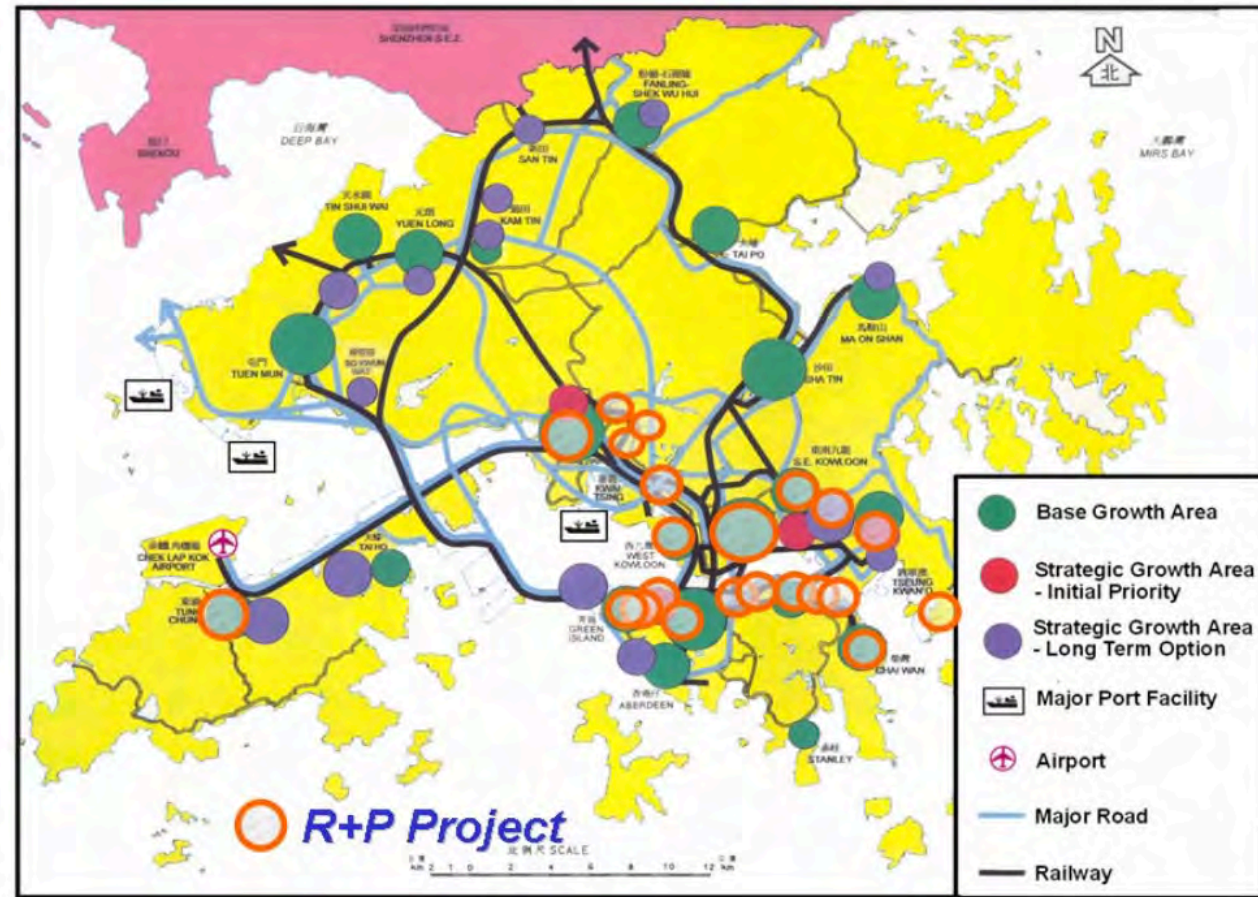
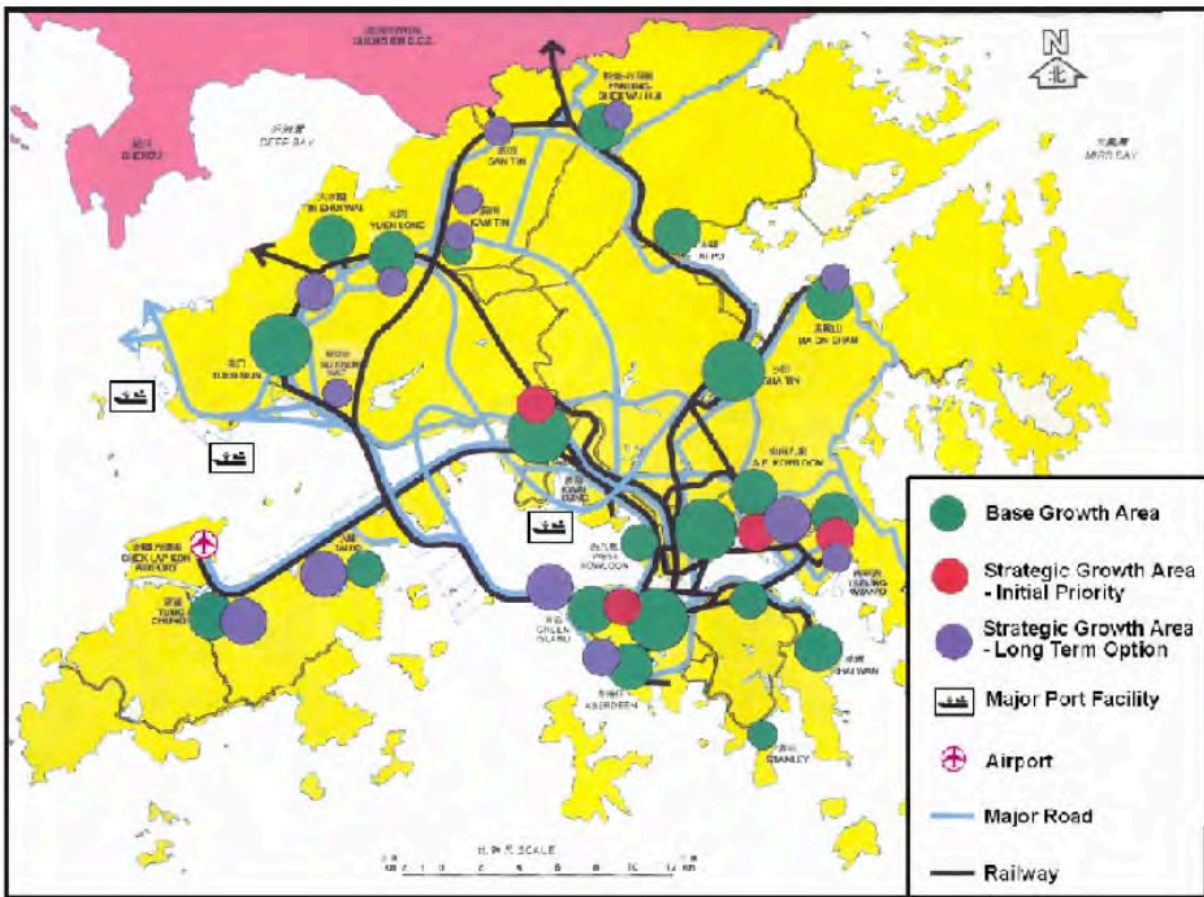
For the rest of Hong Kong in areas falling outside existing developed areas, we would recommend a lower level of development with conservation being a priority consideration.



Hong Kong Preferred Development Option.  
Strategic Concept Plan

Source: The Hong Kong 2030: Planning Vision and Strategy, Hong Kong SAR Government, October 2007.





Territorial Development Strategies: *Left* Metroplan's Proposed Growth Areas forming "Strings of Pearls"; *Right* – R+P Projects Contribute to Strategic Growth Areas. Source (left panel): Planning, Environment and Lands Bureau, *Territorial Development Strategy Review: A Response to Change and Challenges*, 1999.



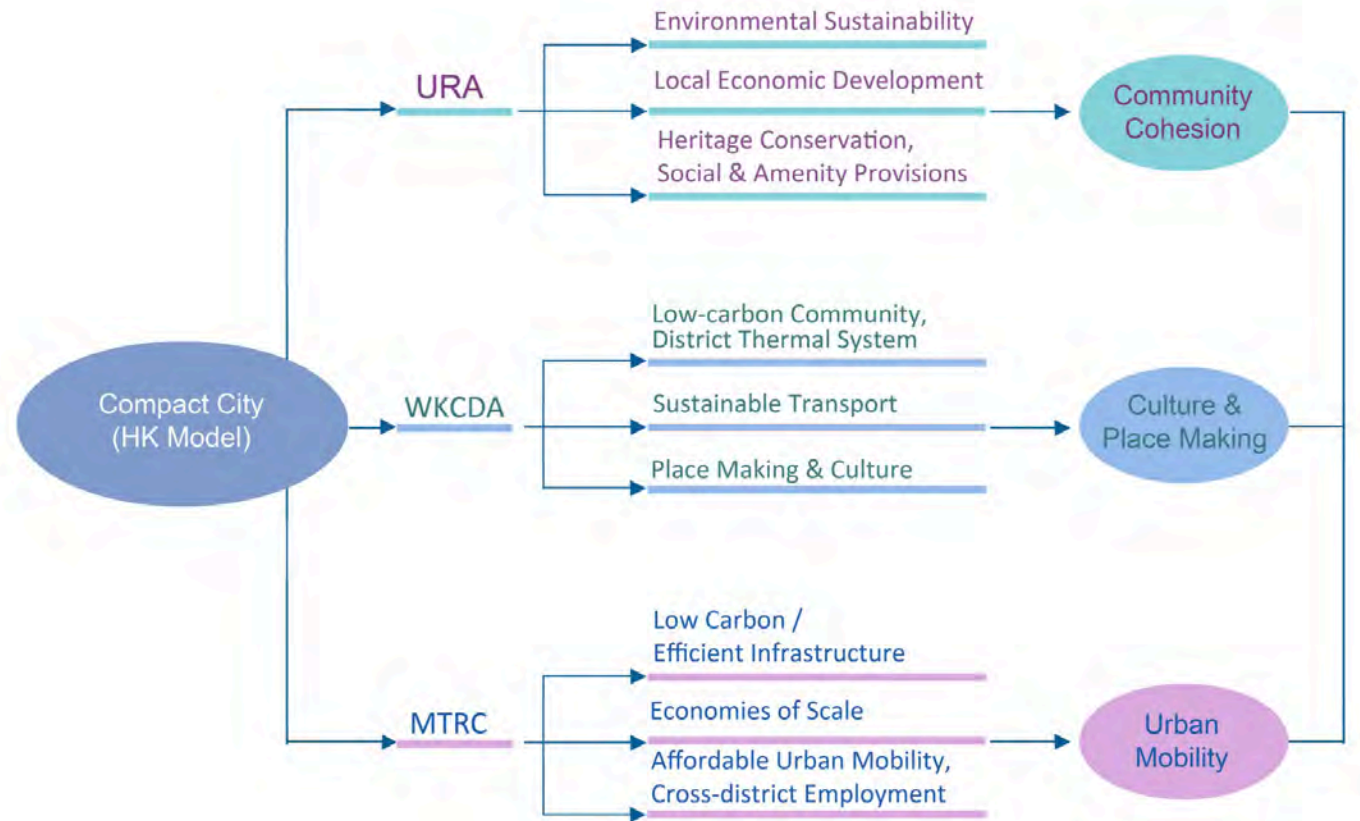
# Place Value

## Hong Kong compact city model

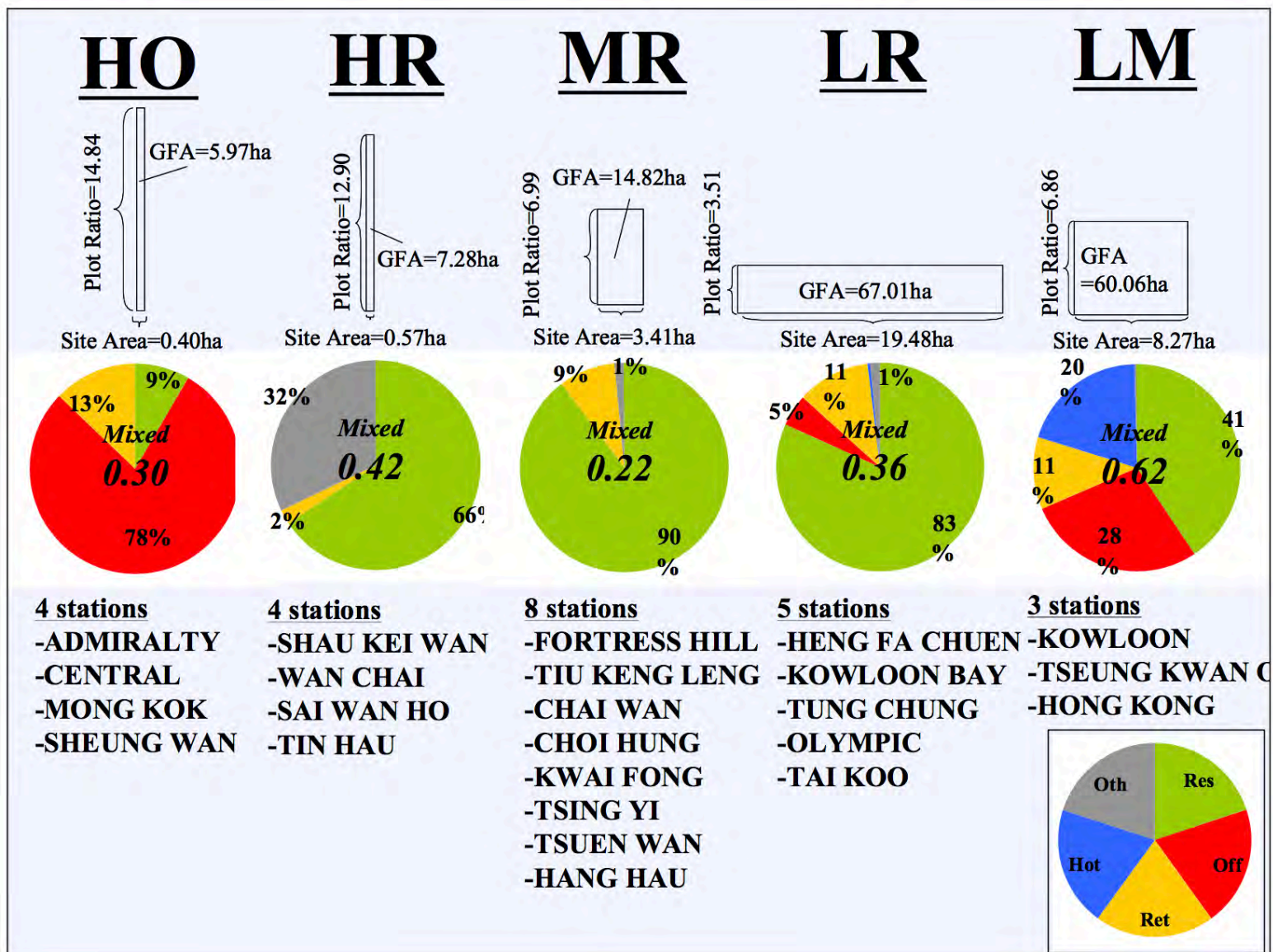


Locations of Hong Kong R+P projects by built environment types

Source: Cervero and Murakami, *Rail + Property Development: A model of sustainable transit finance and urbanism*, May 2008.







Listing of MTR stations in each built environment type and statistical mean statistics for key clustering variables.

Source: Cervero and Murakami, *Rail + Property Development: A model of sustainable transit finance and urbanism*, May 2008.



### Integrated Entrances



### Footbridge Network



### Shopping Mall above Station



### Long Footbridge



Admiralty Station: vertical and horizontal integration

### Corridor to Central



### Well Placed Signage



### Integrated Hotel



### Art Space



### Pedestrian Deck



### Footbridge to Harbor



### Multiple Layers



### Long Foot Bridge



### Public Open Space



Hong Kong Station: connectivity and aesthetics



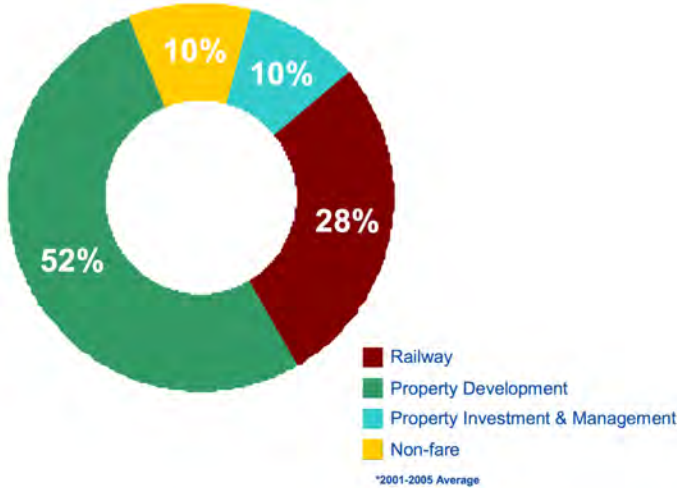
# Market Potential Value



Location of Hong Kong’s R+P Projects, 2007

	Type of Land use					No. of Carports (\$ Spaces)
	Residential	Commercial	Office	Hotel/ Service Apartments	Government & Institutions	
	(# Units)	GFA (m <sup>2</sup> )	GFA (m <sup>2</sup> )	GFA (m <sup>2</sup> )	GFA (m <sup>2</sup> )	
Urban Lines	31,682	314,923	208,866	0	143,034	6,012
Airport Line	28,650	306,640	611,963	291,722	24,770	14,360
Tweung Kwan O Line	29,167	105,814	5,000	58,130	*	6,547
Total	89,499	727,377	825,829	349,852	167,804	26,919

MTRC’s Property Development Overview, 2006



MTRC Revenue Sources, 2001-2005 Average.

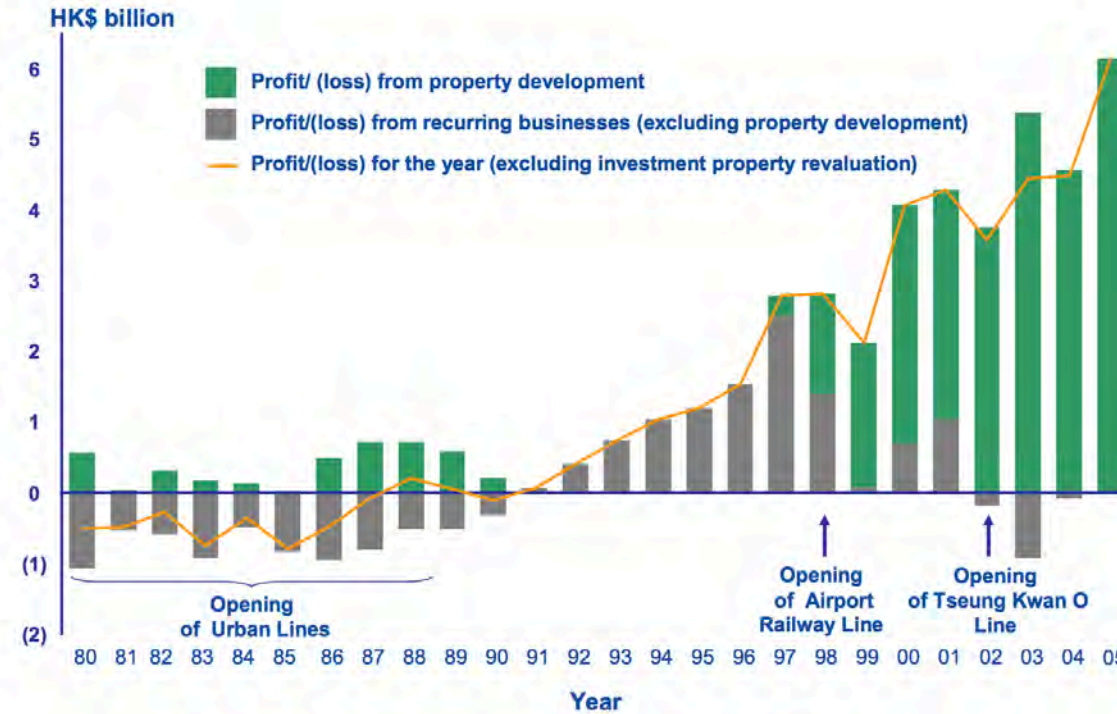
Source: MTRC financial accounts.

For the 1980 to 2005 period, it is estimated that Hong Kong SAR has received nearly \$140 billion (in today’s Hong Kong dollars) in net financial returns. This is based on the difference between earned income (\$171.8 billion from land premiums, market capitalization, shareholder cash dividends, and initial public offer proceeds) and the value of injected equity capital (\$32.2 billion). Thus the government of Hong Kong has enjoyed tremendous finance returns and seeded the construction of a world-class railway network without having to advance any cash to MTRC. The \$140 billion figure, of course, is only the direct financial benefit. The indirect benefits – e.g., higher ridership through increased densities, reduced sprawl, air pollution, and energy consumption, etc. – have increased net societal returns well beyond \$140 billion.

Over the 2001-2005 period, property development produced over half of MTRC’s revenues. By contrast, railway income, made up mainly of fare box receipts, generated 28 percent of total income. Together, MTRC’s involvement in property-related activities – i.e., development, investment, and management – produced 62 percent of total income, more than twice as much as user fares.



Timing and project phasing are critical to the success of R+P given the cyclical nature of Hong Kong's real-estate market. In recent years, MTRC has relied on property development to generate profits to pay off past debt. This is reflected in this figure, which charts annual profits/losses from property development and other recurring businesses over the 1980-2005 period.



During the 1980s, MTRC mostly incurred net losses (based on differences between revenues and combined operating and depreciated capital cost as well as debt service). Even during this period of operating in the red, property development moderated losses. Beginning in the late 1990s when MTRC began aggressively pursuing R+P along the Airport Railway Line, the net yields provided crucial income that went to finance the more recent Tseung Kwan O extension. It took approximately 10 years (1997 to 2007) to fully pay off capital debt for the Airport Line extension. From 2007 onward, earnings from R+P projects on the Airport Line produce funds that no longer need to go toward paying off this debt, allowing these funds to be used to cover costs of Tseung Kwan O and other planned extensions.

Source: Cervero and Murakami, *Rail + Property Development: A model of sustainable transit finance and urbanism*, May 2008.

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Authors' contact

[gollivier@worldbank.org](mailto:gollivier@worldbank.org)

[serge.salat@gmail.com](mailto:serge.salat@gmail.com)

