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JTTRI International Seminar on Railway and Area
Development in Manila

一般財団法人運輸総合研究所

マニラにおける鉄道整備と沿線開発に関する国際セミナー

Railway and Area Development

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2.5 Creating a sustainable urban railway system

Chapter 3: Toward Responding to Urban Transport Issues

JTTRI Future Prospect

Introduction

(1) Objectives

- In order to solve problems such as serious traffic congestion caused by rapid population growth ASEAN cities, integration of railway and area development will be proposed based on the local conditions in each cities.

This presentation is one of the research outcomes from:

**“Research Group on Railway and Area Development”
sponsored by JTTRI**

- Dr. Shigeru Morichi, Professor Emeritus, GRIPS, as a director of this research group
- Collaboration with 18 experts from academic, public and private sectors

(2) Directions

- Utilizing Japanese expertize and JTTRI long-accumulated know-how
- Case study in Hanoi, Bangkok, Jakarta, and Manila.

Chapter 1: Challenges in Urban Railway Development

Four case studies

■ Hanoi Metro Line 2 (Phase3)



<https://vietnamfinance.vn/tap-doan-sumitomo-muon-thuc-nhanh-du-an-do-thi-thong-minh-nhat-tan-noi-bai-20180303205654052.htm>

■ Bangkok MRT Orange Line



<https://www.mrta-orangelineeast.com/en/train>

■ Jakarta MRT North-South Line (Phase2)



<https://news.detik.com/berita/d-4491696/pagi-ini-mrt-jakarta-mulai-berbayar>

■ Metro Manila Subway Line 9 (Mega Manila Subway)

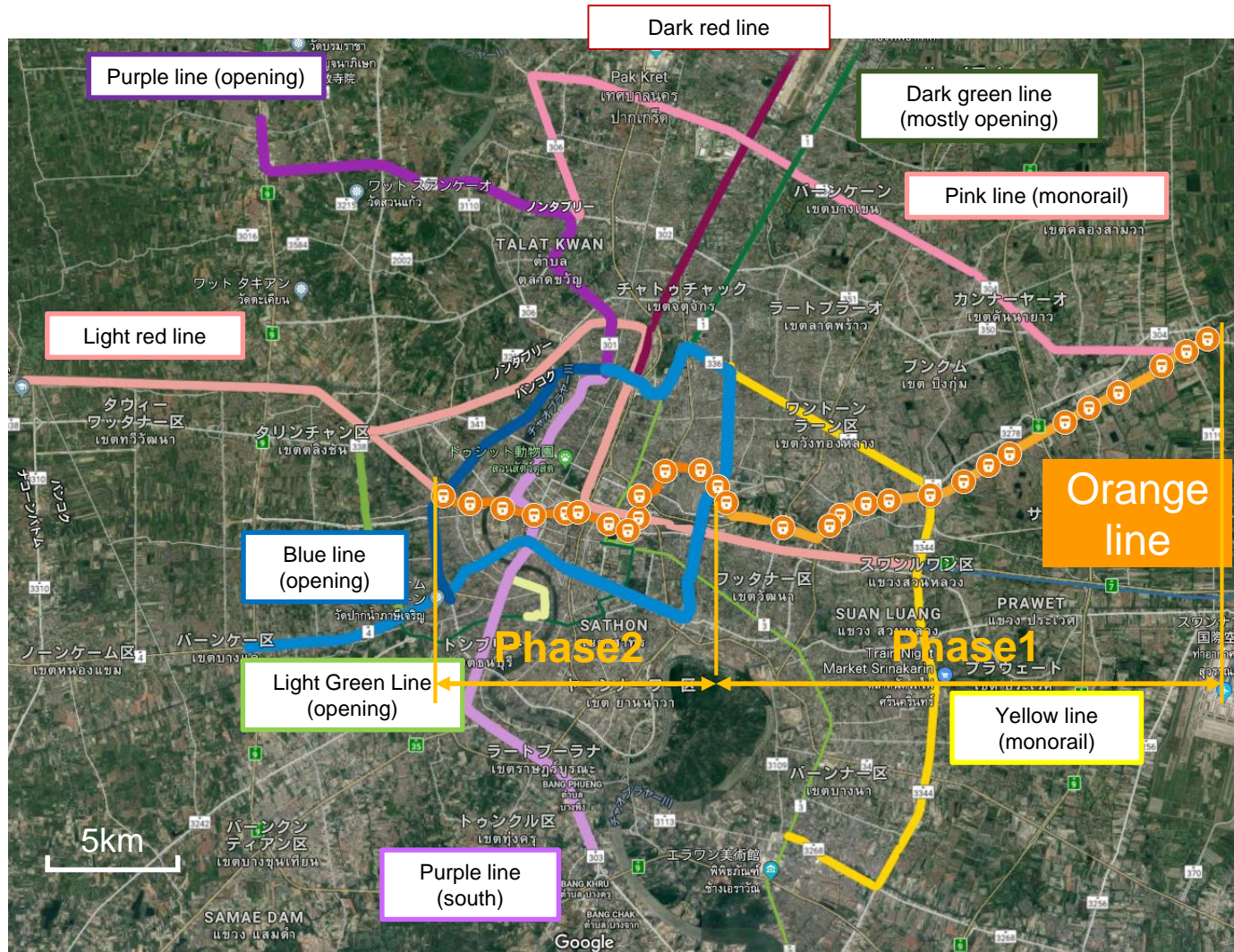


You Tube : FILIPINO PROUD CHANNEL

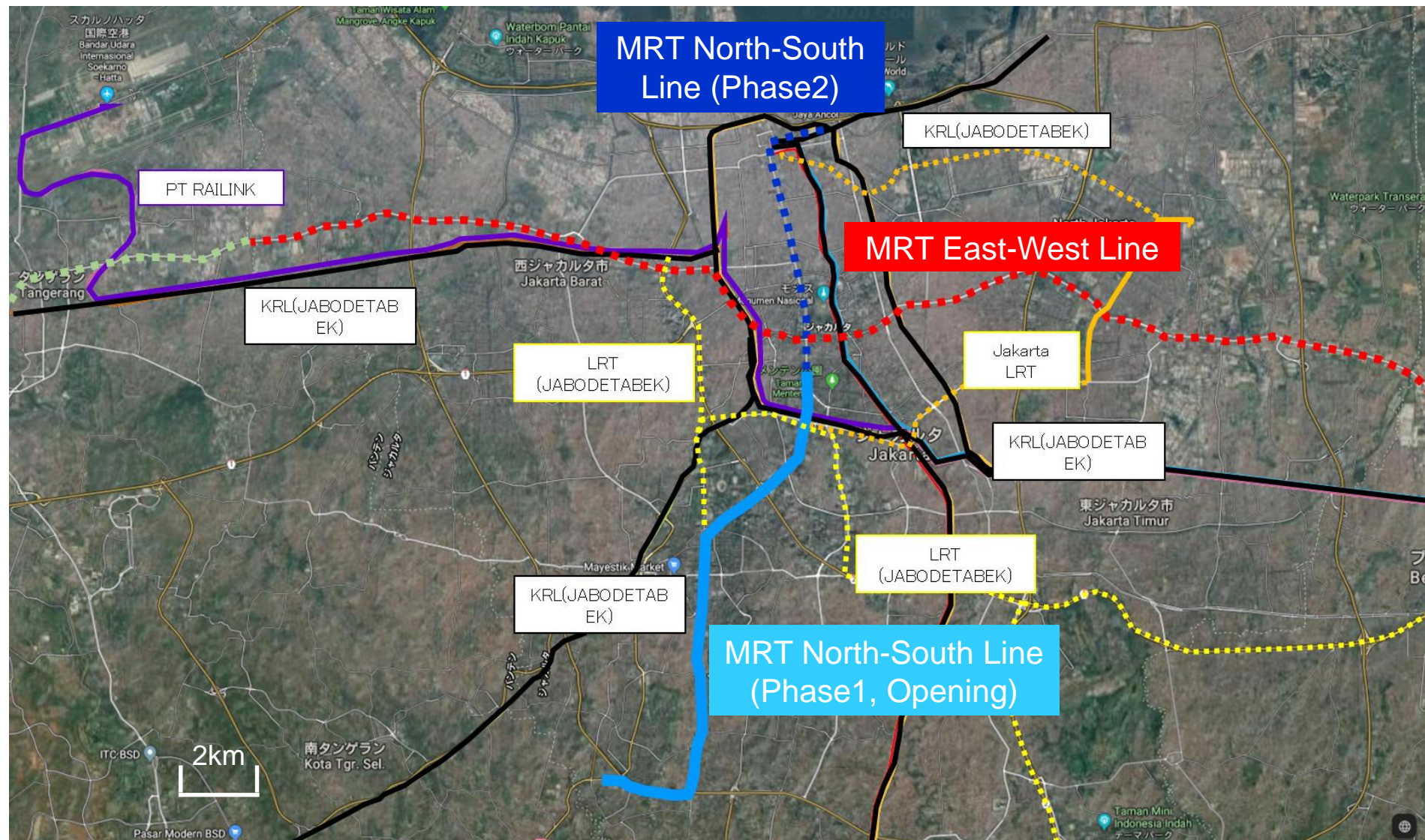
Hanoi Metro Line 2 (Phase3)



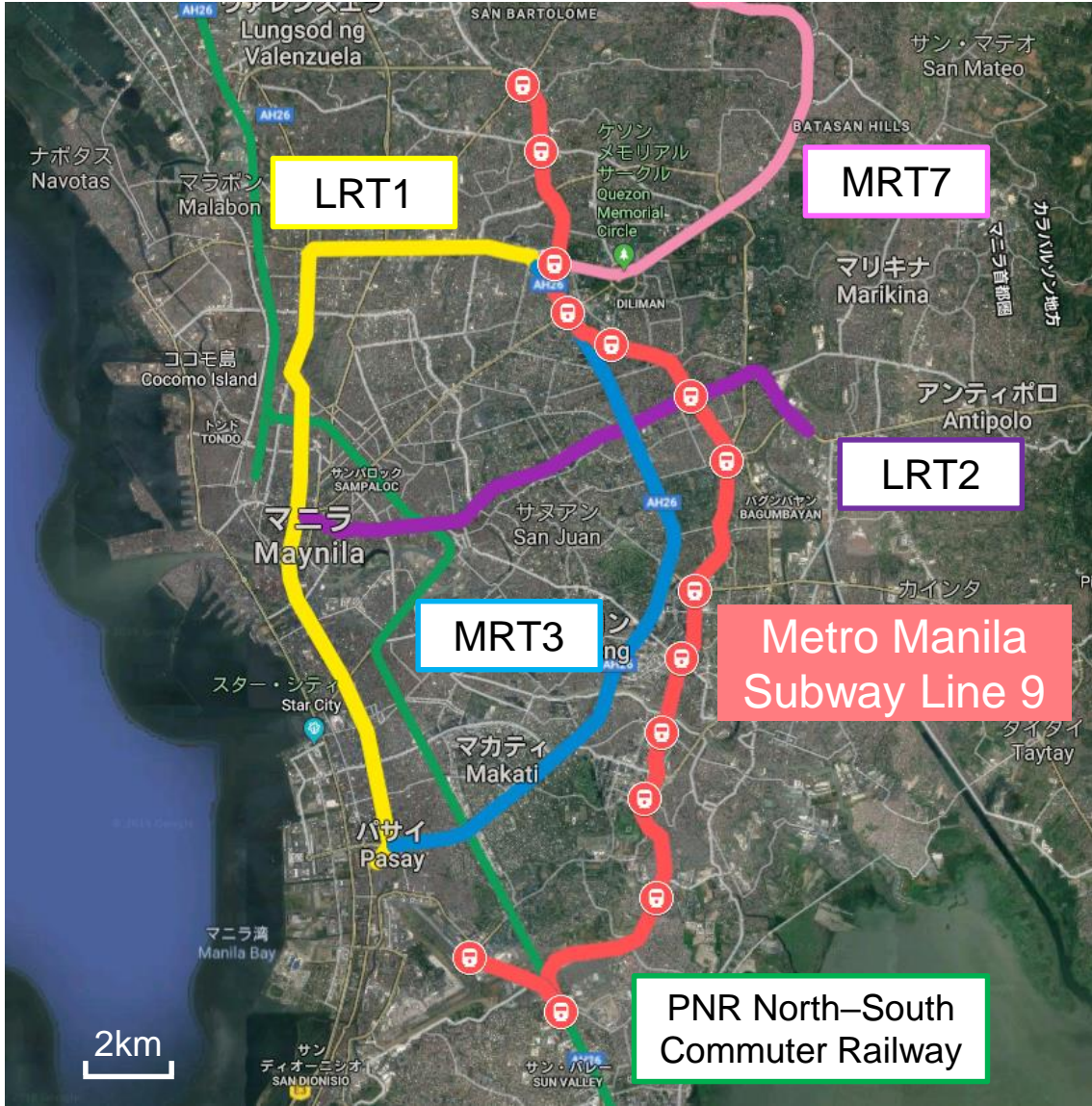
Bangkok MRT Orange Line



Jakarta MRT North-South Line (Phase2)



Metro Manila Subway Line 9



Challenge 1: Collaboration Between Railways and Area Development

In order to cope with the rapid population increase and rapid urbanization, many housing required. To provide accessibility to those housing, railway development to the new town becomes one of the social issues.

- Prevention of urban sprawl development by private-sector-led PPP (Hanoi)
- Local community development plan have not been well-established (Hanoi, Manila)
- No coordination between Railway PPP and TOD (Jakarta, Manila)
- Concrete policy and procedure for land readjustment for development are not established. (Hanoi, Bangkok)

Further discussion in 2.1

Challenge 2: Securing Financial Resources for Railway Development

Due to government financial constraint, recent urban railway investments are usually relying too much on PPP.

- Due to limitation in tax-based budget, measures to utilize private funds are under consideration in the case of Jakarta
- Property tax system is not well-functioning (Bangkok, Jakarta, Manila)
- The suitable role for the private and the government in PPP is not clearly determined (Hanoi, Bangkok)

Further discussion in 2.2

Challenge 3: Providing a High-Quality Railway System

The system of the railway which has been introduced does not meet the user demand

- Formulation of integrated railway and area development master plan (Hanoi)
- Overlapping route plans (Jakarta)
- Heavy Congestion in Low-capacity MRT3 (Manila)
- No organization to supervise multiple projects, including LRTs and subway (Manila)

Further discussion in 2.3

Challenge 4: Integration of Railway Development with Social Infrastructure

The required railway-related infrastructures, such as station plaza, are not in consideration

- Infrastructure investment plans from the government and the private investors are independently developed without coordination (Manila)
- The construction of rail (LRT1, MRT3, MRT7) and bus transfer terminals at North Avenue is delayed due to legal conflict (Manila)

Further discussion in 2.4

Challenge 5: Creating a Sustainable Urban Railway System

Loss and bankruptcy of railway companies are one of the most common issues in Asian Countries

- There are many cases of PPP failure in Asian urban railway projects.
- Lack of expertise in railway operations

Further discussion in 2.5

Chapter 2 Examination Items for Railway Development

2.1 Collaboration Between Railways and Area Development

2.2 Securing Financial Resources for Railway Development

2.3 Providing a High-Quality Railway System

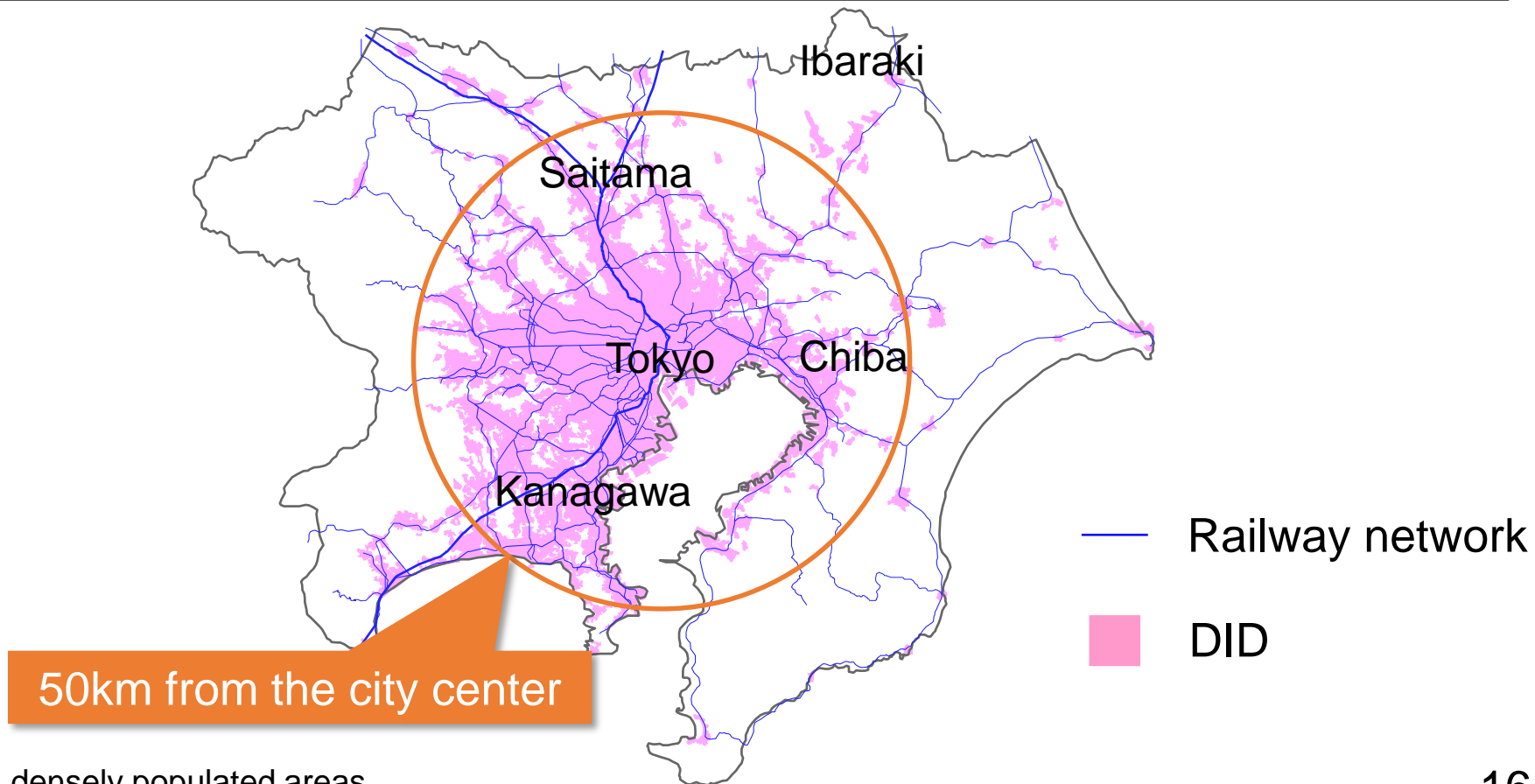
2.4 Integration of Railway Development with Social Infrastructure

2.5 Creating a Sustainable Urban Railway System

2.1 Collaboration Between Railways and Area Development

Railway-Oriented High-Density Urban Development

The Tokyo metropolitan is developed by extend DID area to suburban along the railway lines



DIDs: densely populated areas,
Defined by an area of density of 4,000 people/km² or more, or a basic unit blocks with population of 5,000 or more

TOD

TOD (Transit Oriented Development) = Public Transportation-Oriented Developments

Urban development which aims to promote public transit, not to increase automobile dependency

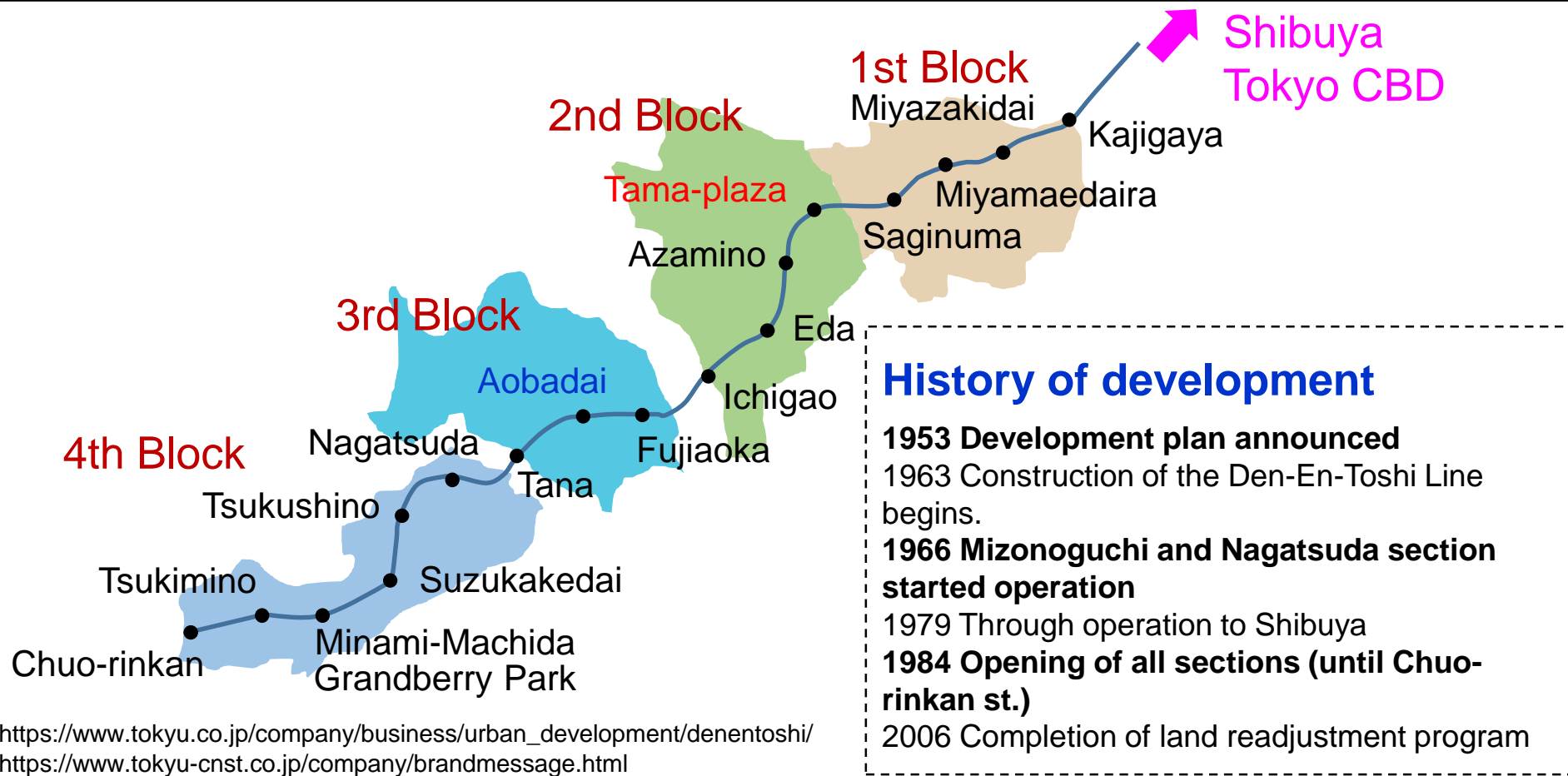


Example of TOD in Japan

TOD along Den-En-Toshi (Garden City) Line:

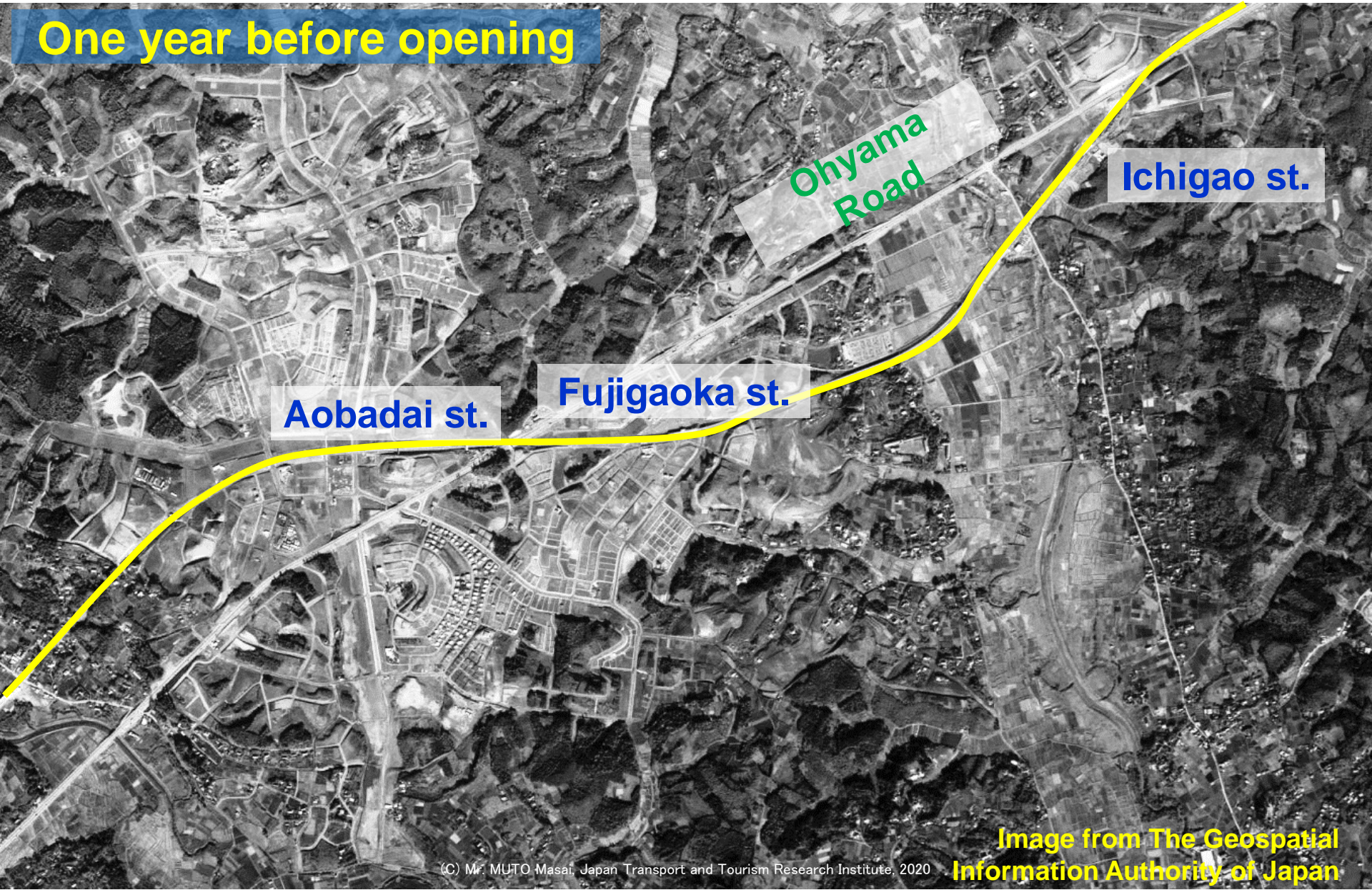
Integrated railway (Den-En-Toshi Line) and land development (with land readjustment program), taken by only one developer, Tokyu Railway.

- Total area \approx 5,000ha, Population \approx 620,000 (March 2017)
- The largest private land development project in Japan



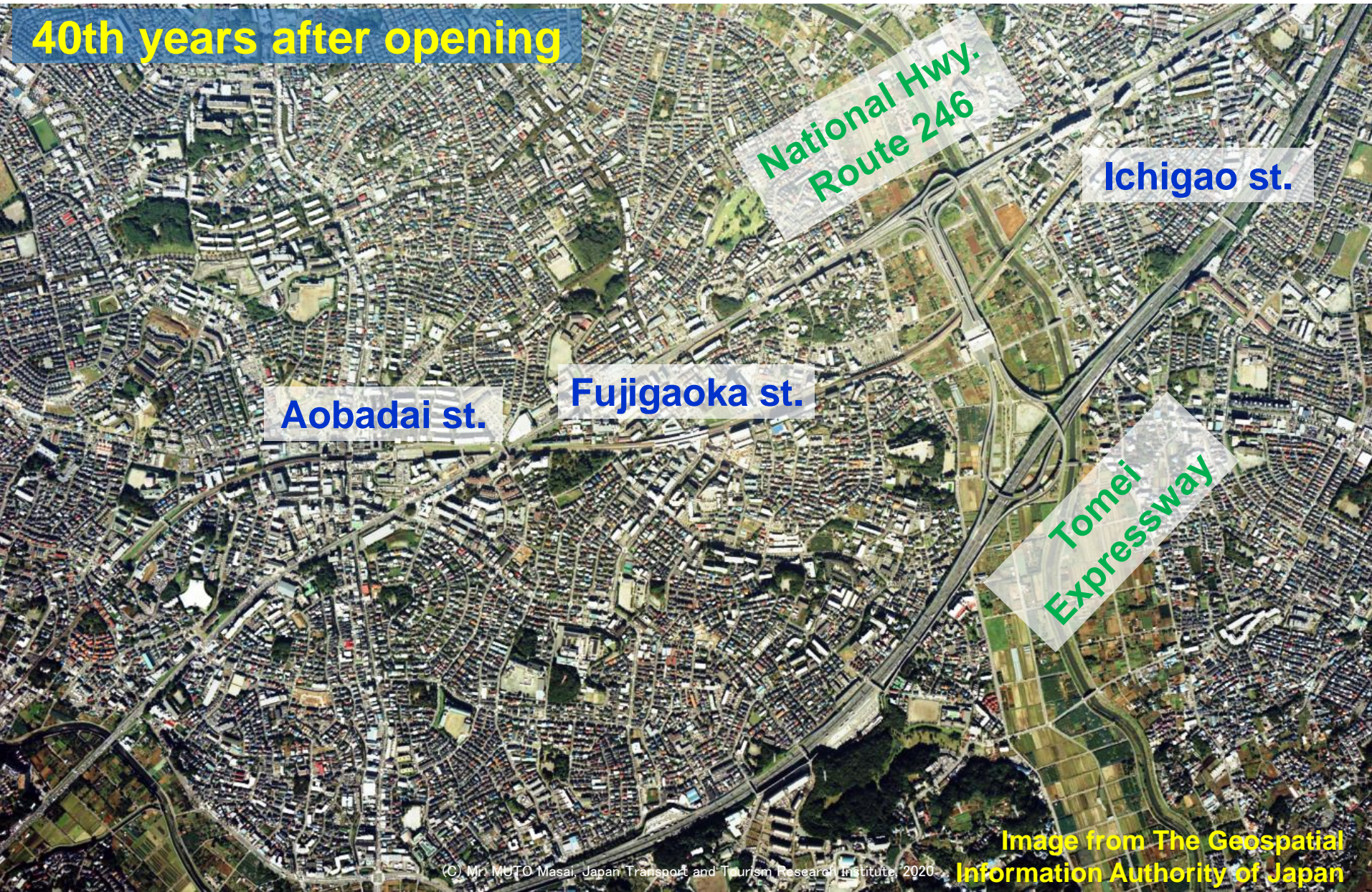
Den-En-Toshi Line, near Aobadai Station, 1965

One year before opening



Den-En-Toshi Line, near Aobadai Station, 2005

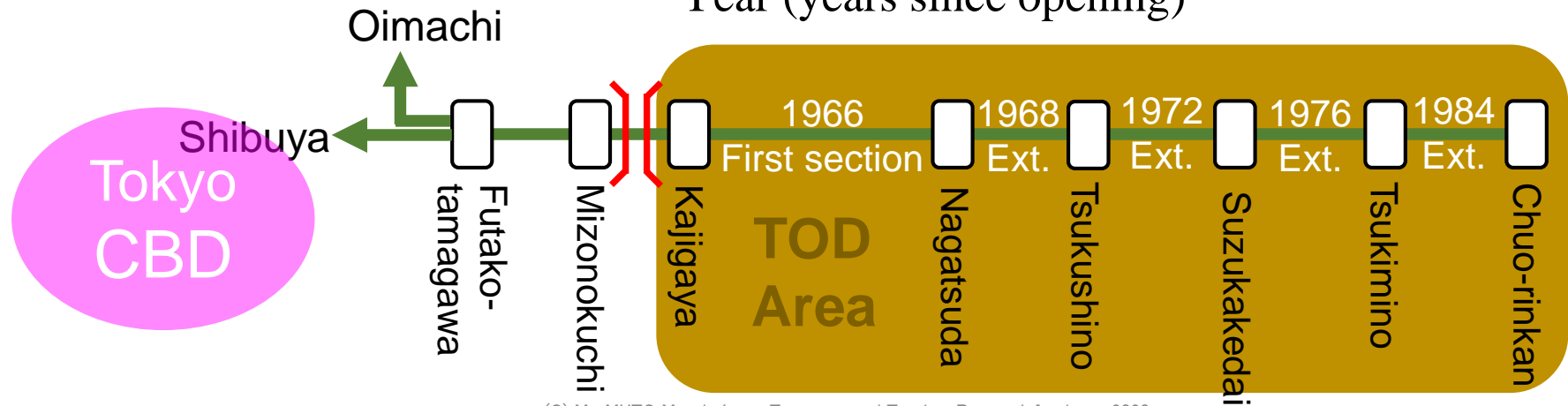
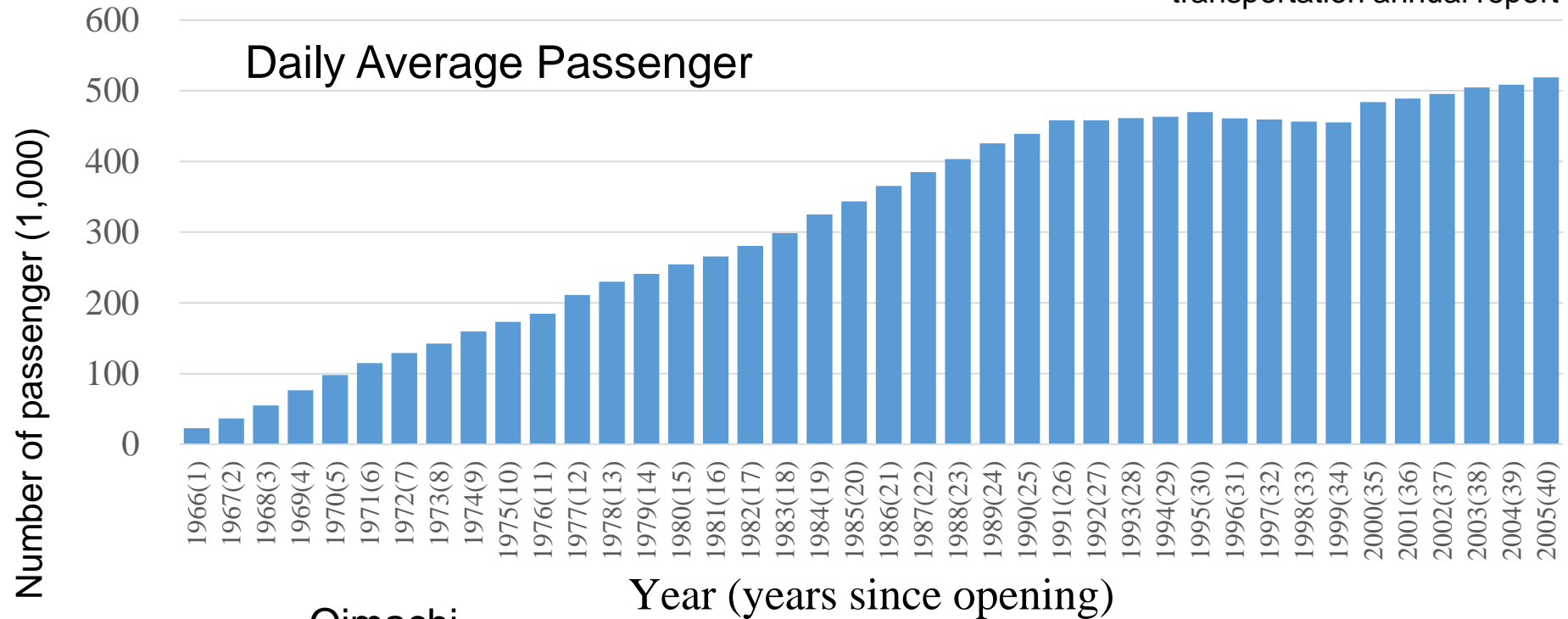
40th years after opening



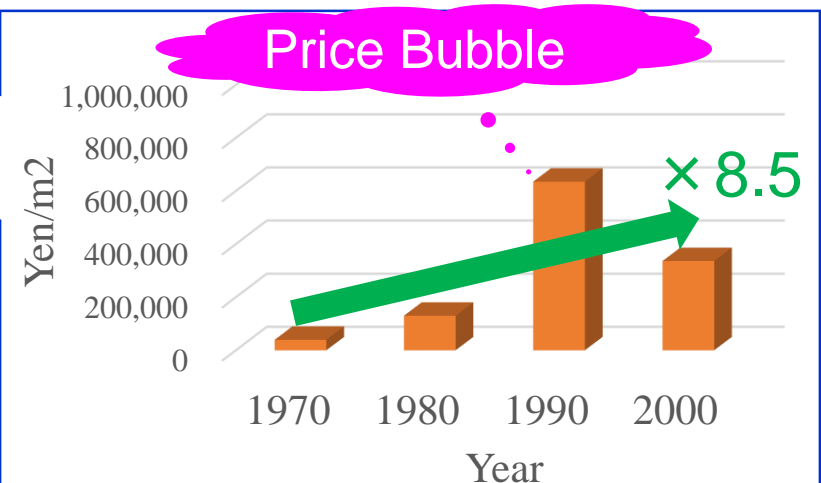
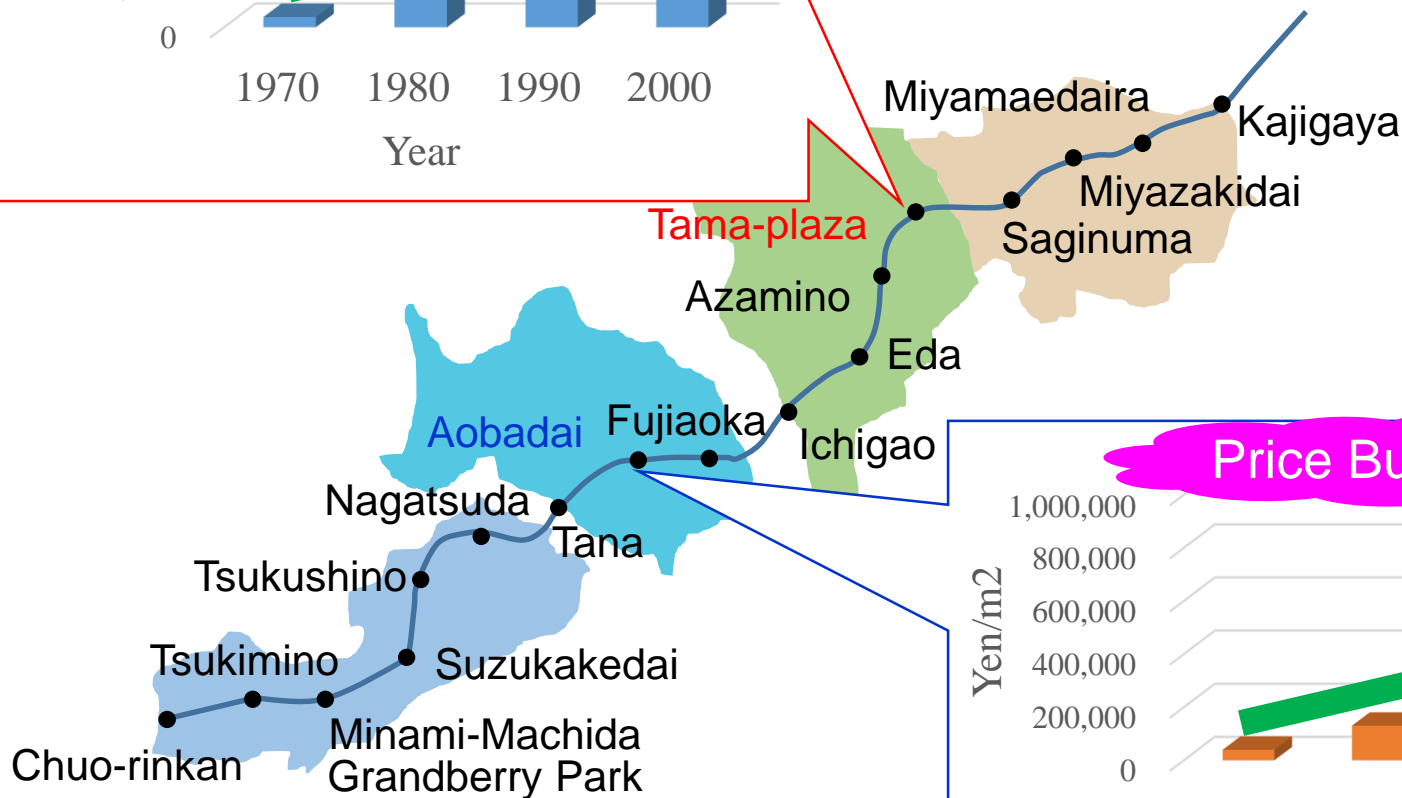
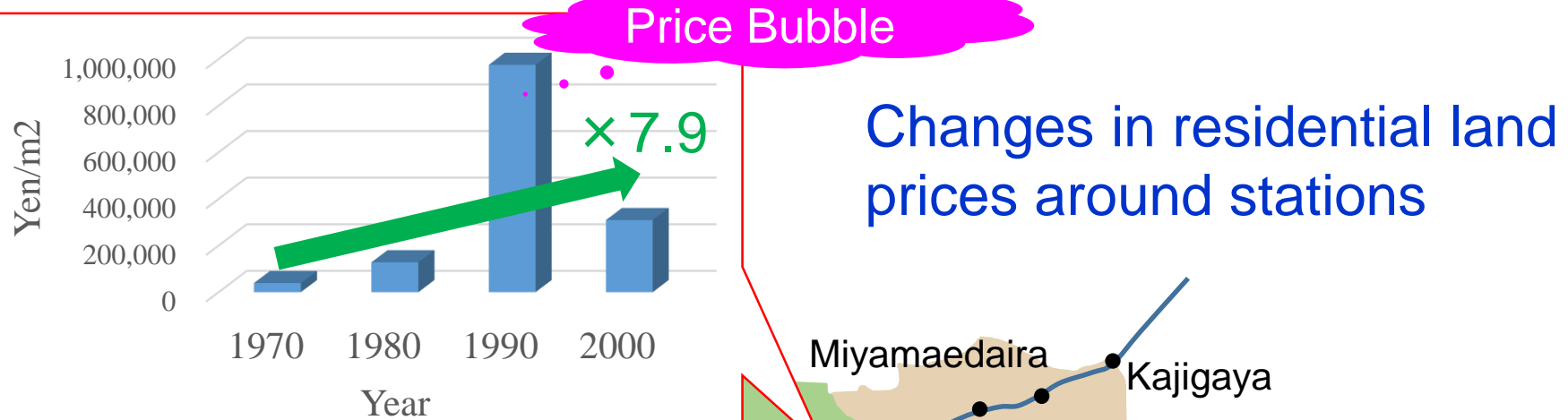
Number of Users in Den-En-Toshi Line

Kajigaya st. - Mizonoguchi st. Section

Based on the urban
transportation annual report



Land Prices Increase along Den-En-Toshi Line



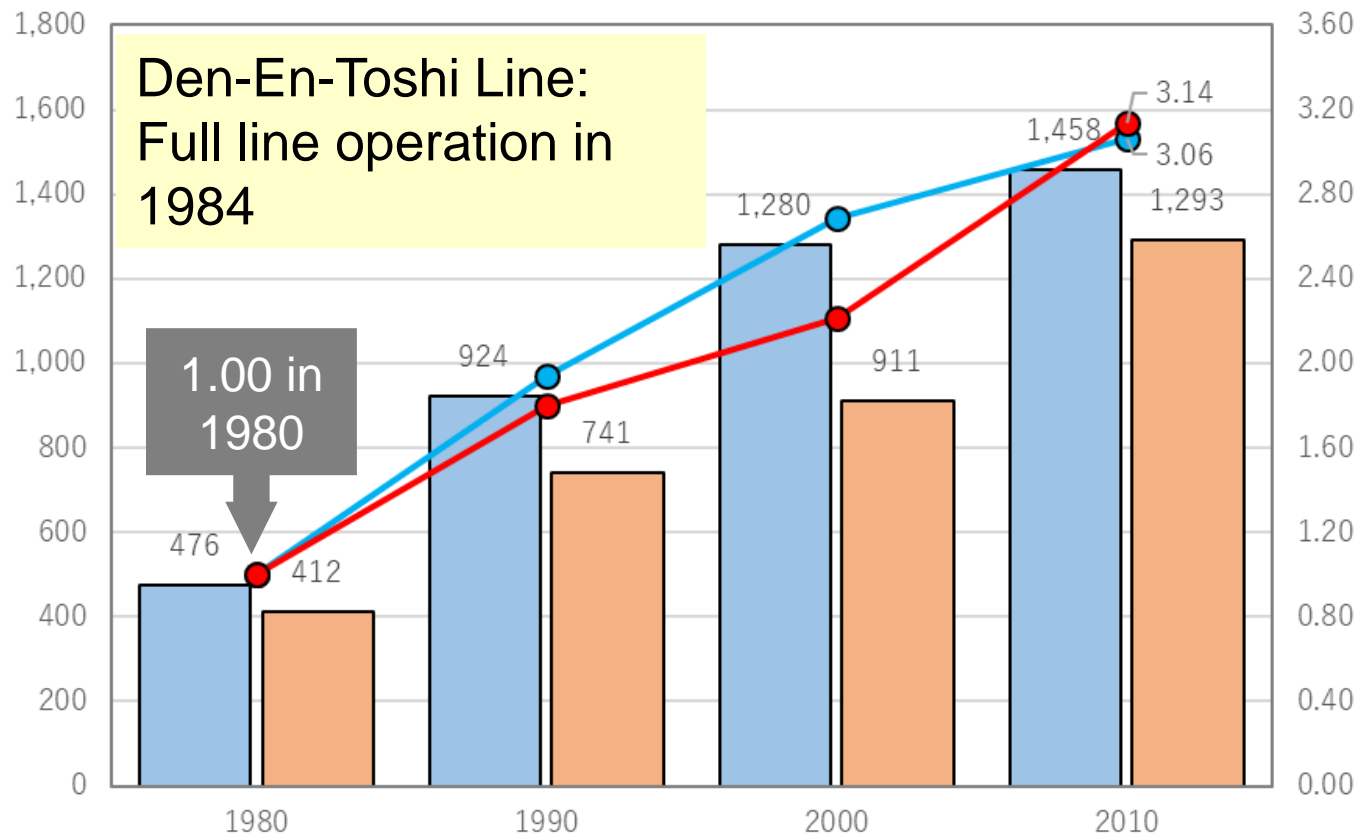
Based on the public assessed value from MLIT

Shares of railway business and real estate business

Profit from railway and real estate business of the Tokyu Railway

As railway and land development along railway are progressing, profit from the railway and real estate industries are also increasing.

Unit: 100 million yen/year



Source: Annual
Railway Statistics
Report

Legend:
■ Rail Business Profit
■ Real Estate Business Profit
● Rail Business Profit Growth
● Real Estate Business Profit Growth

Background of successful TOD along Den-En-Toshi Line

**Residential area development along railway line →
Increase in railway demand → Increase in land price**

- **During the high-economic growth period in Japan**

Rising in income level, Widespread of housing loan systems (from public financial institution)

- **Strong promotion of urban development plans**

Railway company took initiatives in land readjustment program

Strategically Promoting Business through Unified Brand Concepts

Daily life support and service business for local residents



Mr. Keita GOTO

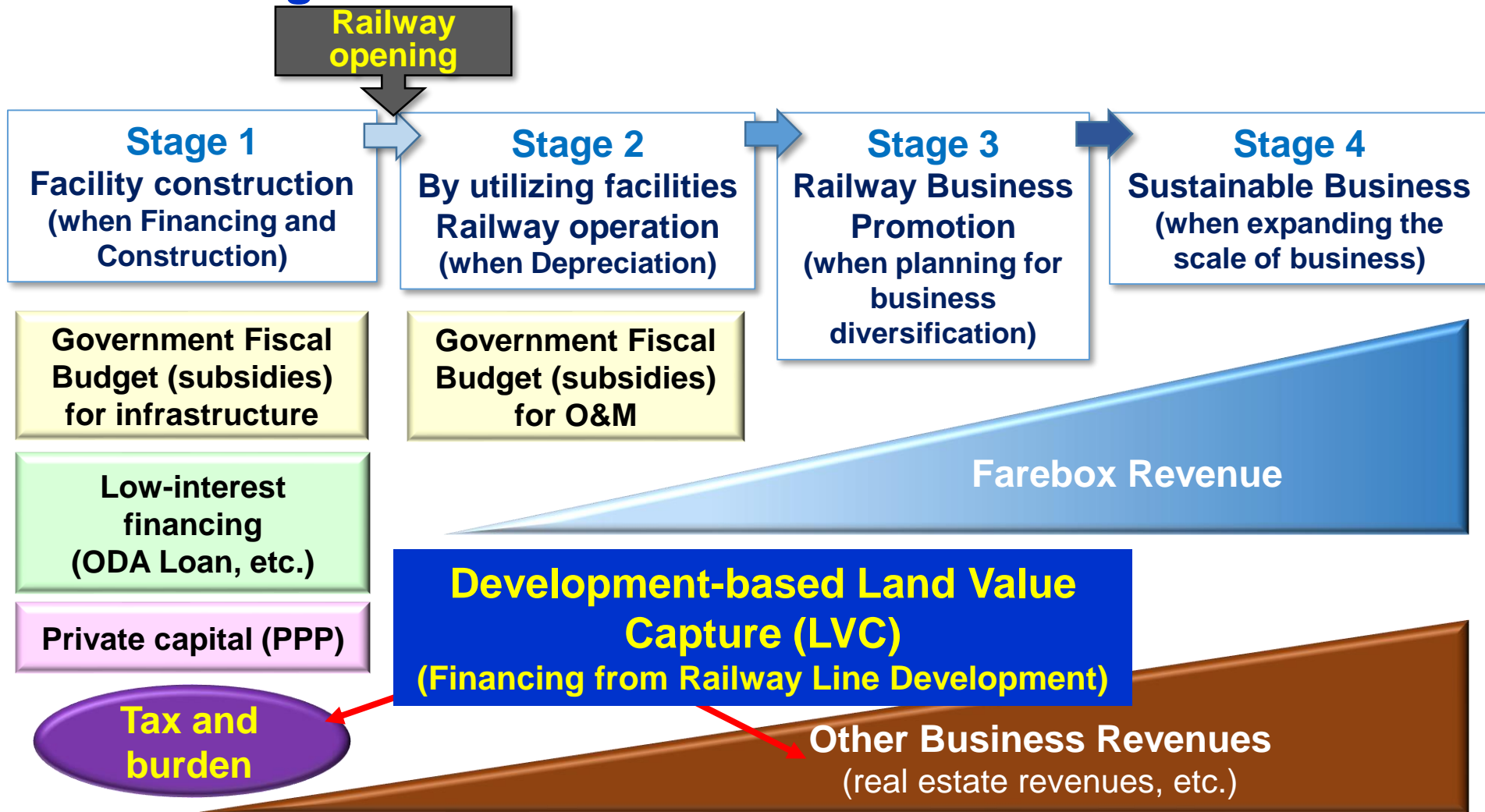
2.1 Collaboration Between Railways and Area Development

◆ Points to be considered in this section

- Residential area along railway line can be developed by,
 - Implementing land readjustment program
 - With the initiative from railway company
- As a result,
 - Land price rose
 - Railway demand increase
- This can be one of the a good examples of the Collaboration Between Railways and Area Development

2.2 Securing Financial Resources for Railway Development

Stages in financing from railway construction to long-term management



Development-based Land Value Capture

Development-Based Land Value Capture (LVC)

The return of the profitability that will be obtained, or has been obtained by development along railway lines to the railway business



Development-Based LVC Scheme

(1) Tax-Based Scheme

Scheme	Contents	Examples
Land & Property Tax	Taxes impose on the value of a land or building. These taxes should be increase based on the development.	(in Japan) Fixed Asset Tax, City Planning Tax, Real Estate Income Tax
User Fee / Beneficiary Charge	Taxes and burdens imposed in advance by central/local government to property owners who will benefit directly from public investment	Beneficiary Charge in Midōsuji Line, Minatomirai 21 Line (Japan) Business Rate Supplement (UK) Development Cost Charge (Canada) Impact Fee (USA)
Financial Measures through Future Tax Increment	Development is funded by municipal/local government loans/bonds. Loans/bonds will be paid by the future increases in tax revenues, such as property tax.	Tax Increment Financing (TIF) (USA)

Blue: will be further discussed

Based on Suzuki, H., Murakami, J., Hong, Y. H., & Tamayose, B. (2015). Financing transit-oriented development with land values: Adapting land value capture in developing countries. The World Bank.

User fee (1)

Beneficiary Payments Scheme, Japan

A part of Minato Mirai 21 Line construction cost was procured as **a payment from large-scale developers along the line**

Minato Mirai Line Investment Cost Breakdown

Capital (Mainly from local governments)	27 billion ¥
Beneficiary Payments	74 billion ¥
Japan Railway Construction, Transport and Technology Agency	129 billion ¥
Loans and Borrowings	27 billion ¥
Total	257 billion ¥

(Source: Yokohama City)

Developers: Mitsubishi Estate, Mitsubishi Heavy Industries, Yokohama City, Urban Renaissance Agency (UR), etc.

Minato Mirai 21 Line

- Construction started in 1992
- opened in 2004
- 4.1km, 6 stations (all underground)



Source: https://www.mm21railway.co.jp/info/route_map.html

User fee (2)

Business Rate Supplement (London, UK)

To support the construction of The Crossrail, the Greater London Authority levy the **additional business rate (property tax) for non-residential (commercial) property** rateable value above £70,000 with additional of 2 pences per pound (2%) of rateable value.

- 2008 Crossrail Act enacted, 2009 Business Rates Supplement Act enacted
- Crossrail Total budget of £17.6 billion (\$23.1 billion)
- £6.6 billion (¥870 billion) were raised through Business Rate Supplement



Route Map

Showing rail and air connections



Crossrail (Elizabeth line from 2021)

- 118km, 41 stations
- Test run scheduled in 2020



<https://www.bbc.com/news/uk-england-london-48054789>, 26 April 2019

<https://www.london.gov.uk/what-we-do/business-and-economy/promoting-london/paying-crossrail-business-rate-supplement>

<http://www.crossrail.co.uk/>

Financial Measures through Future Tax Increment

Tax Increment Financing (TIF) (USA)

Due to the effects of development along railway lines and stations, tax revenue, such as property tax, is expected to increase.

Infrastructure investment funding is procured by borrowing **the expected future increases in tax revenues into financial resources.**

Denver Union Station Redevelopment

- By setting up TIF area, charges can be collected from the increase in property tax (new development), sales tax, and bed tax
- TIFIA (Transportation Infrastructure Finance and Innovation Act) loan provides approximately 30% (\$145.0 6M) of project cost, then repaid by above charges.



Denver Union Station
Main station of the transcontinental railway, built in 1856

Based on: 1. <https://www.transportation.gov/tifia/financed-projects/denver-union-station>
2. Miyamoto and Tsuchiya: 131st JTTRI Colloquium “Urban Railway and Area Development in North America, 2019.7.31

Development-Based LVC Scheme

(2) Development-Based Scheme

Method	Contents	Examples
Land sale /leasing	Sale or rental of land or its development rights at the risen value after the public investment or regulatory changes	Rail Plus Property (R+P) program (Hong Kong)
Air right sale	Governments sell development rights extended beyond the limits specified in land use regulations (e.g., FAR) to raise funds to finance public infrastructure and services.	Tokyo Station Rehabilitation (JP) TDR (USA) CePAC (Brazil)
Land Readjustment	Through land readjustment, landowners lose some of their land in exchange of the new development. Some acquired lands are sold to finance public infrastructure.	Den-En-Toshi Line, Tsukuba Express Line (JP)
Comprehensive Urban Redevelopment	Landowners and developers establish a collaboration to consolidate fragmented lands to create roads and public spaces. Local government revises land-use regulations in redeveloped area, such as FAR bonus, or provide funding for public projects	Shiodome Redevelopment, Toranomon redevelopment (JP) King Cross Station Redevelopment (UK)

FAR (Floor area ratio): Ratio of a building's total floor area to the size of the land on which it is built

Blue: will be further discussed

Based on Suzuki, H., Murakami, J., Hong, Y. H., & Tamayose, B. (2015). Financing transit-oriented development with land values: Adapting land value capture in developing countries. The World Bank.

(C) Mr. MUTO Masai, Japan Transport and Tourism Research Institute, 2020

Air Right Sale (1)

Hudson Yard Development (New York, USA)

- Redevelopment project in railyard area (≈146ha)
- Other incentives to private developers
 - Subway no.7 extension
 - Provision of new public spaces



Air right sales: **T**ransferrable **D**evelopment **R**ight (**TDR**)

Yellow: Eastern Rail Yards TDR

Air right purchase from railyard
Based on TDR, Up to 33.0 FAR can be transferred (mainly commercial area)

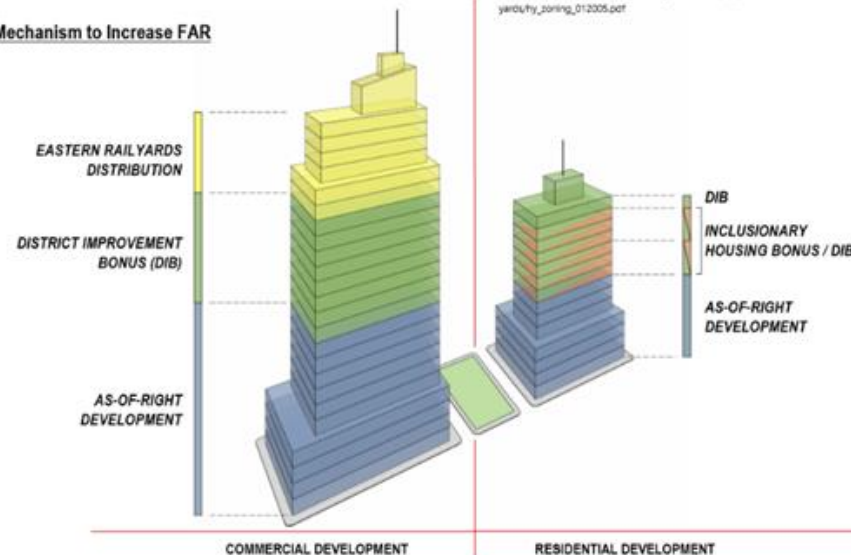
Green: District Improvement Bonus FAR

Up to 8.0 FAR (800%) can be purchased
\$100 per ft² at the beginning of 2005,
Increase by inflation, current price = \$134.63

Blue: Baseline FAR

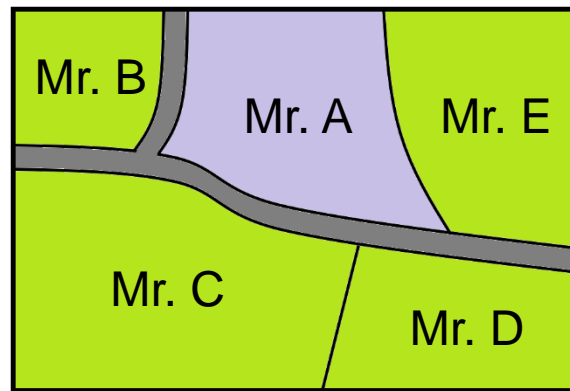
Land Use & Density

Mechanism to Increase FAR

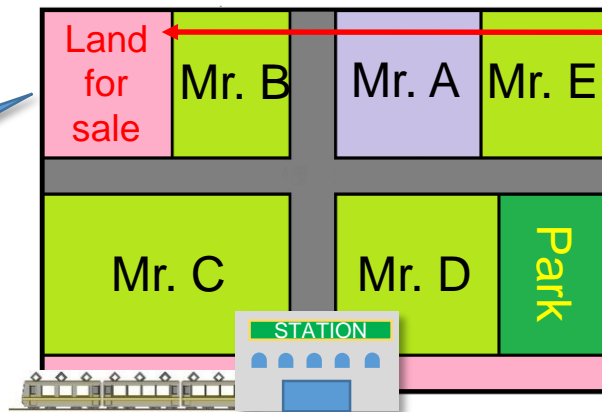


Securing railway ROW through Land Readjustment

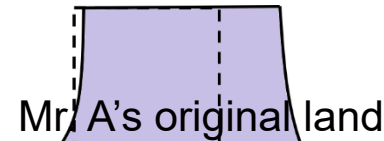
Before



After



Fund for
railway
investment



Mr. A's original land

Mr. A's remaining
after readjustment

readjust

Readjust based on the
data from the MLIT

Public space (**parks**, roads, etc.)
Reserved land (railway land, etc.)

Railway land

Although the amount of land decreases after the readjustment, **landowners have no loss** because their land value will rise from better accessibility

Tsukuba Express

Tsukuba Express and Area Development

58.3km, 20 stations, Opened in 2005

Land readjustment 21area, about 3,000ha



Land Readjustment

Tsukuba Express and Area Development (along Tokyo Pref. - Ibaraki Pref., Japan)

- Integrated planning and implementation of the railway development and land readjustment program through legislation
- In readjustment zone, some land has been acquired in advance so that the land for railway construction can be easily readjusted

Act on Special Measures concerning Comprehensive Advancement of Housing Development and Railway Construction in Metropolitan Areas (1989)

- Urban development plan based on land readjustment program by public entities (Urban Renaissance Agency, Municipalities along the railway line)
- Increased in population and rail users
(rail user, 2006: 195k/day, 2015: 340k/day)

Tsukuba Express (Metropolitan Intercity Railway Company)

- Joint capital from local governments along railway lines
- 58.3km, 20 stations
- Opening 2005



Comprehensive Urban Redevelopment (1)

Toranomon Redevelopment (Tokyo, Japan)

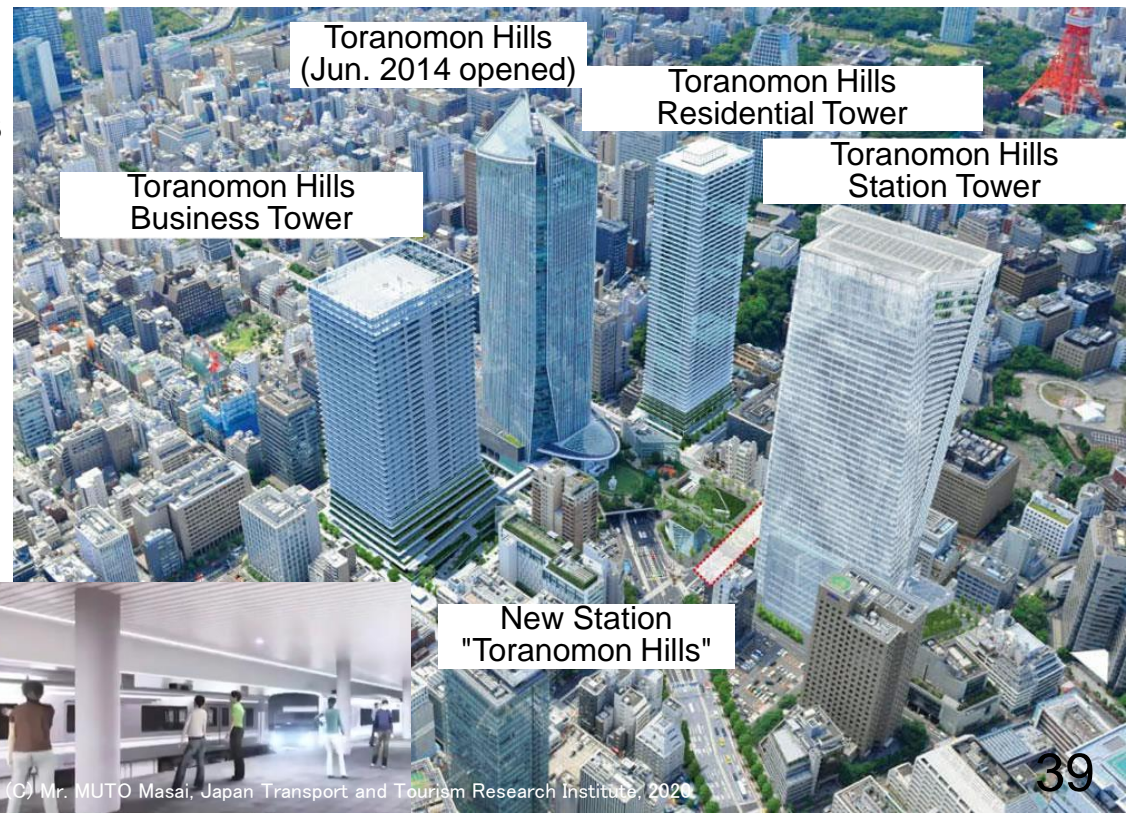
- Incentive to private developers from FAR bonus
- Local government provides the new subway station, as well as the shuttle BRT to Olympic Games venues
- Local disaster prevention functions (support for those who have difficulty returning home, independent-distributed energy systems)

Redevelopment Summary

- Maximum FAR bonus of 1990%
- Planned as an international business center
- Private investment of about 400 billion yen
- Construction of “Toranomon Hills Station” (Completed in June 2020)



Source: Mori Building



© Mr. MUTO Masai, Japan Transport and Tourism Research Institute, 2020

Comprehensive Urban Redevelopment (2)

King's Cross Station Redevelopment (London, UK)

A joint development of a rail operator, LCR (London and Continental Railways) and other private companies

- Railway terminal stations redevelopment project in a conjunction with the construction of the High Speed 1 (HS1) (1996)
- LCR and DHL (logistics company) own the land. LCR is granted the real estate development around the station by the government.
- LCR, DHL and other developers jointly established the development company (2008)
- Redevelopment creates 22,100 jobs and 2,000 residents
- From railway operators, LCR has reorganized into property development company

Granary Square

St. Pancras Station
(next to King's Cross)
Eurostar terminal station



2.2 Securing Financial Resources for Railway Development

◆ Points to be considered in this section

- In railway business, there is a long gap between investment period and recovery period. In many cases, this gap could be longer than expected.
- To compensate for this, central and local government need to support railway development by grants, subsidies, and non-interest loans.
- From the viewpoint of the central and local government, the benefits are
 - Increase in the property tax income due to increase in land price
 - Accessibility improvement for local residents.
- From the examples of LVC, LVC has been proven to be an effective method to raise funding for the investment during the early stage of railway development.

2.3 Providing a High-Quality Railway System

Characteristics and Functions of Urban Railways in the Tokyo Metropolitan Area (TMA)

- **Availability of railway master plan at the metropolitan area level**

Urban railway master plan in the TMA

- **Availability of mass transit systems with variety in functions**

High-speed rail, express and local trains, subways, monorails, AGT, etc.

- **Through operation**

Direct service between suburban rail and urban subway

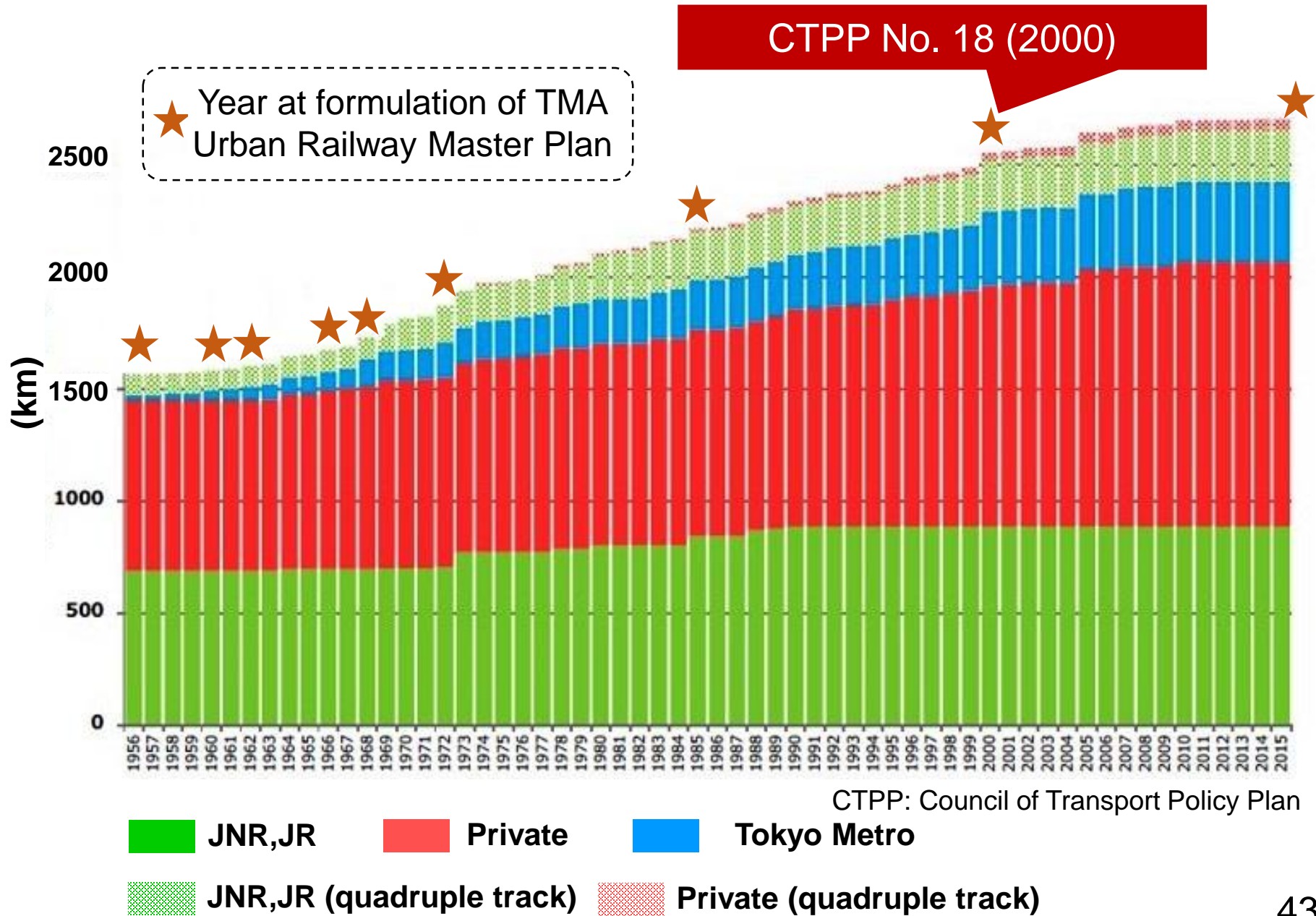
- **High-capacity loop line**

Circulating terminal stations at the edge of urban centers

- **Cooperation between railways and buses**

Bus as a feeder mode

TMA urban railway network

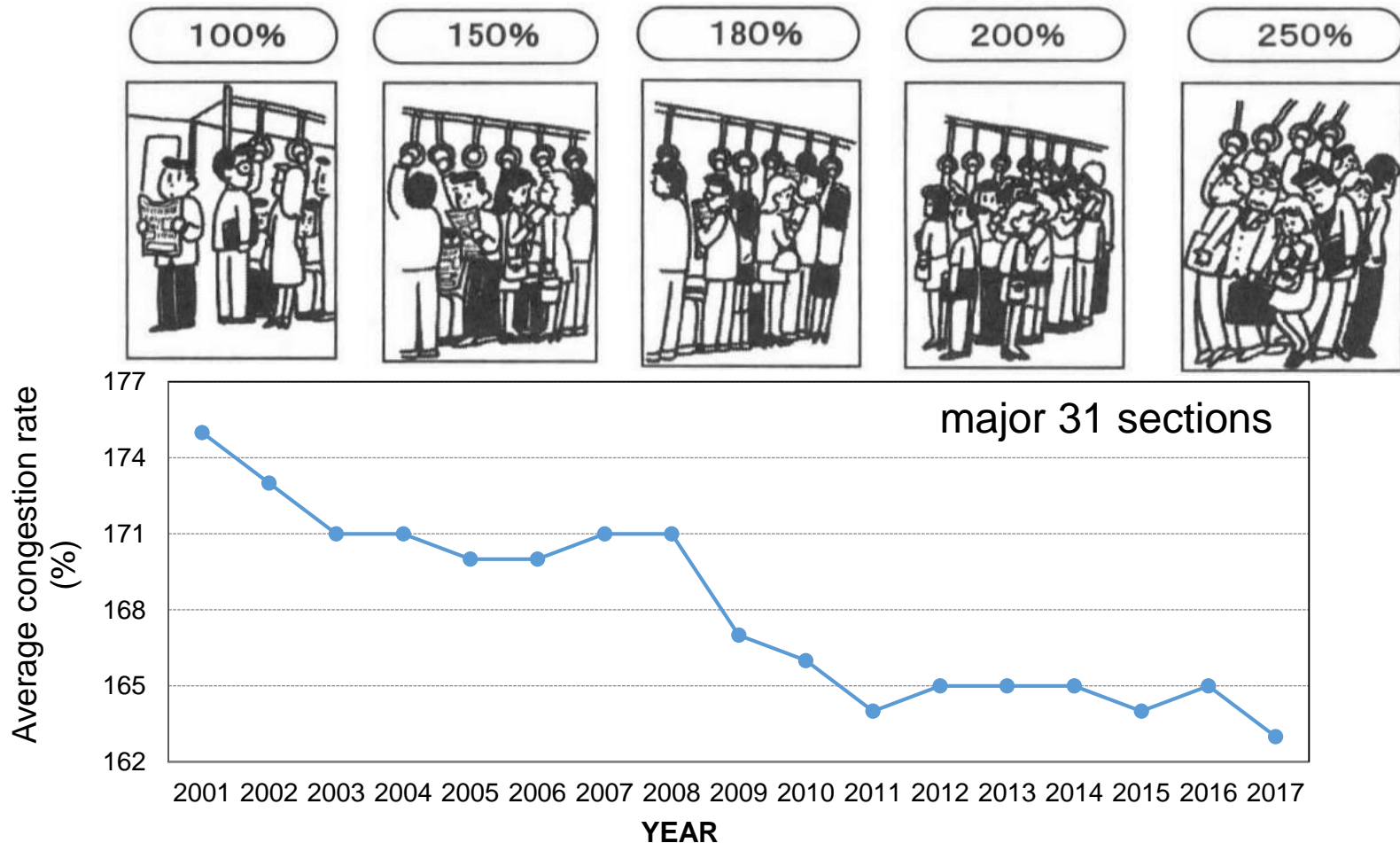


CTPP No. 18: Highlights (1)

Setting policy issues

Alleviation of in-train congestion

Targeted peak-hour congestion rate of 150% or less for major 31 sections, and 180% or less for other lines



CTPP No. 18: Highlights (2)

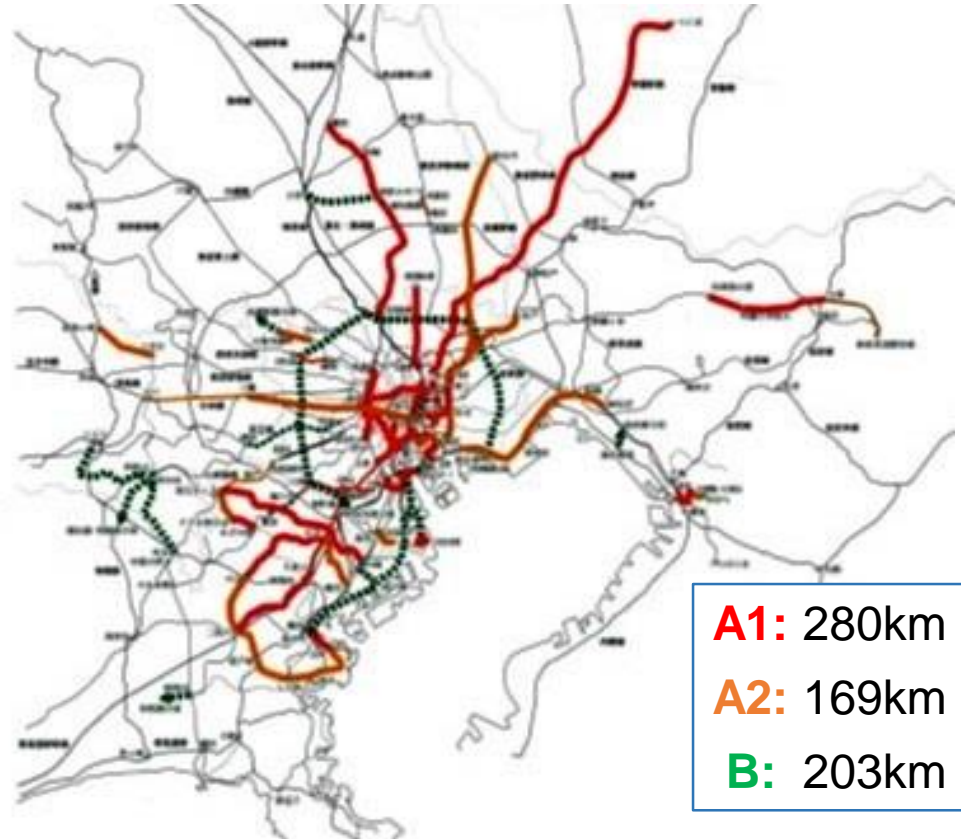
Investment Priority

A1, **A2**, and **B** priority settings

Priority evaluation criteria


- Demand trend
- Socio-economic impact
- Cost Effectiveness
- Financing (revenue and expenditure)
- Vision of implementing body


Overall Score



[Setting Investment Priority: Target Year = 2015]

A1: Routes that are appropriate to be opened by the target year

 In 2015, about 80% (223km) of A1 was opened

A2: Routes that are appropriate to start construction by the target year

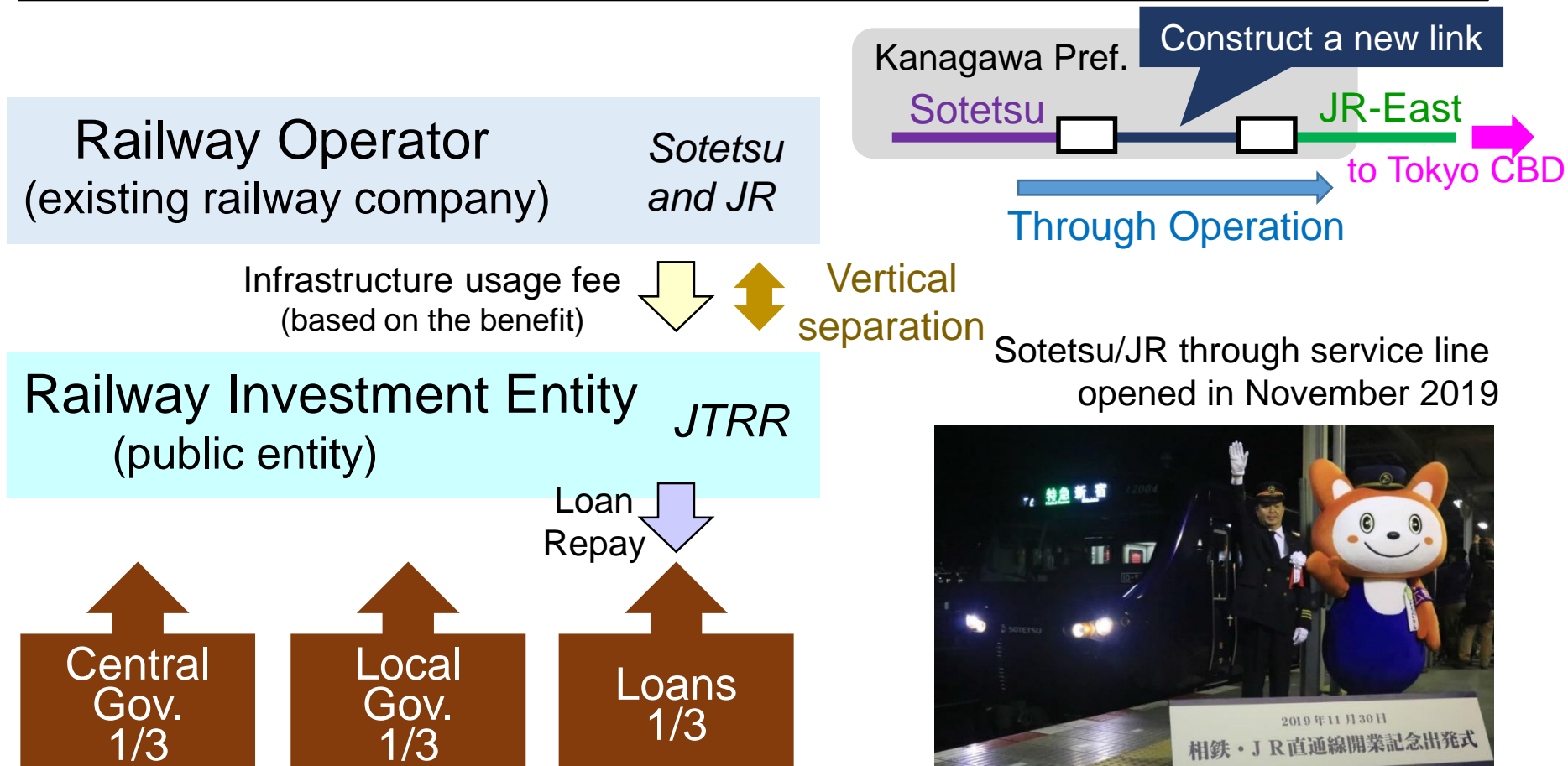
B: Routes to be considered (after considering the needs and investment method)

CTPP No. 18: Highlights (3)

Legislation to support CTPP No. 18

Act on Enhancement of Convenience of Urban Railways,
etc. (2005)

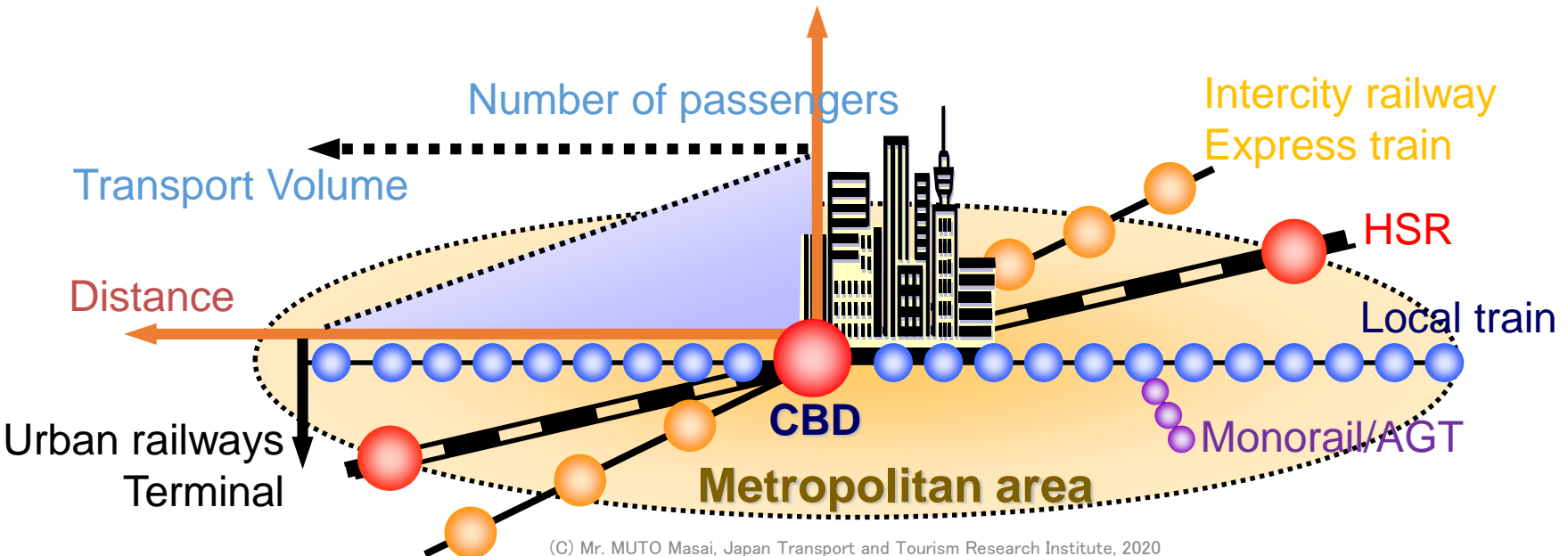
Law enacted to support through operation between two (or more) lines



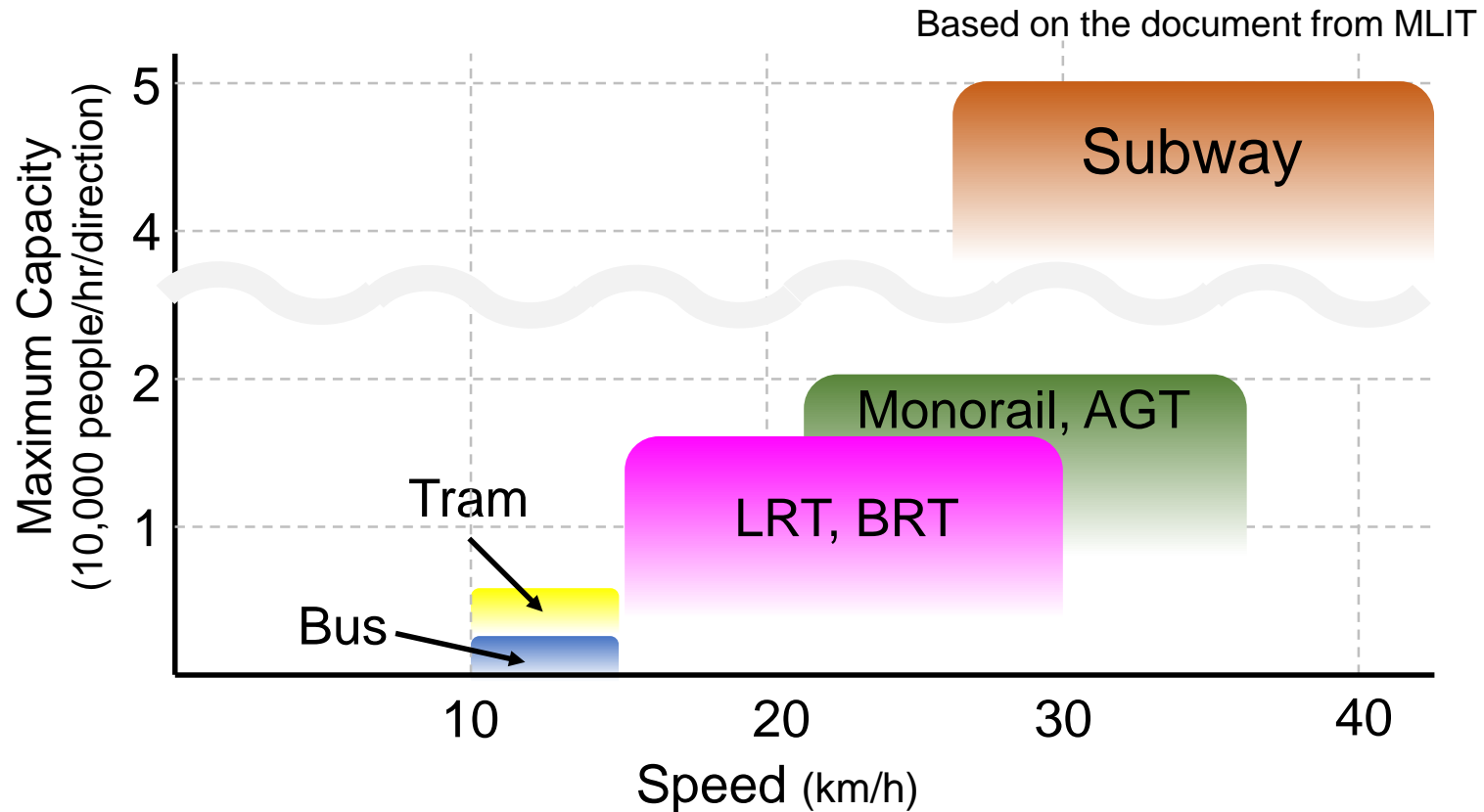
JTTR: Japan Railway Construction, Transport and Technology Agency

Hierarchical Urban Railway Network in Tokyo

Type of railway	Distance between stations	Operating speed
Shinkansen (high-speed railway)	30 - 50 km	120 - 130 km / h
Inter-city railway (JR)	5 - 6 km	50 - 60 km / h
Express train (private railway)	1 - 2 km	40 - 45 km / h
Local train (private railway)	0.5 - 1 km	30 - 35 km / h
Subway	0.5 - 1 km	20 - 30 km / h
Monorail/AGT	0.5 - 1 km	

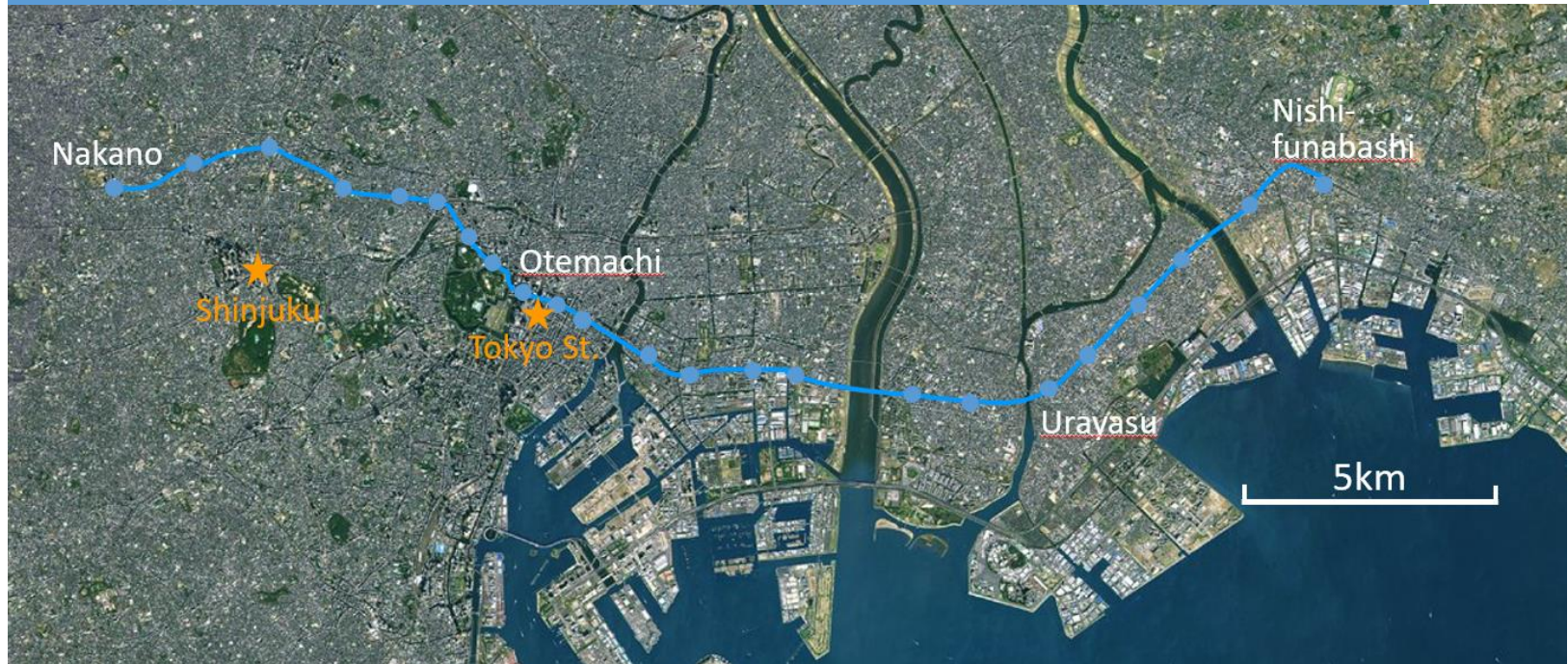


Mass Transit System by Capacity-Speed Chart



Mass transit systems should be determined based on the future demand and land constraint (location)

Tokyo Metro Tōzai (East-West) Line (30.8 km)



【東西線15000系】 Copyright © Tokyo Metro Co., Ltd. All rights reserved.



Commuter Line: High Capacity with Express Service

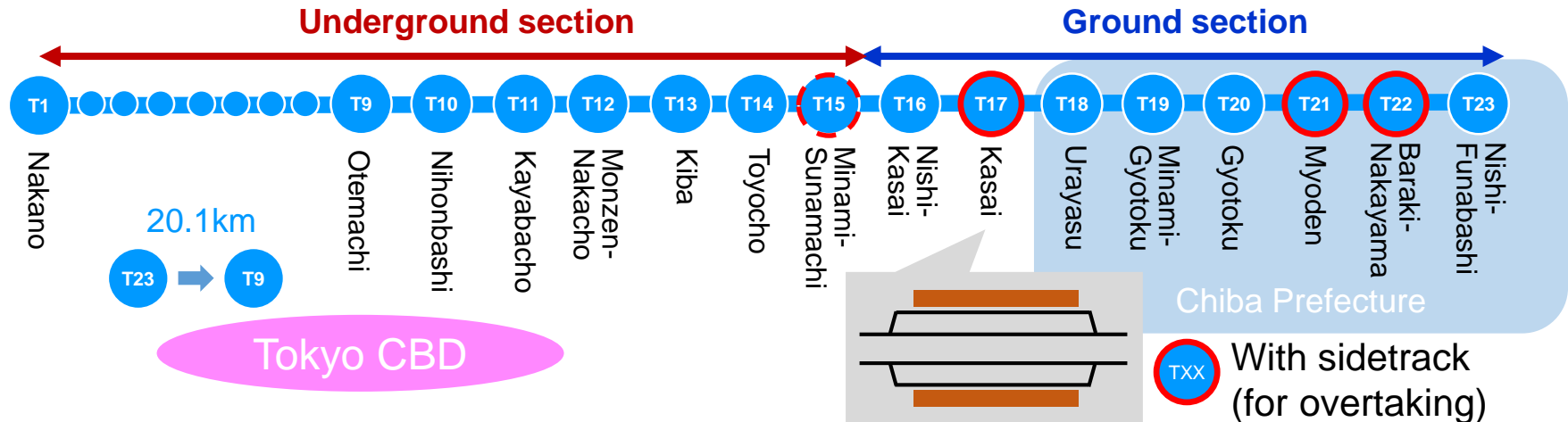
Tokyo Metro Tōzai Line (East Section)

High capacity operation with rapid service

10-car train

Inbound peak hour headway:

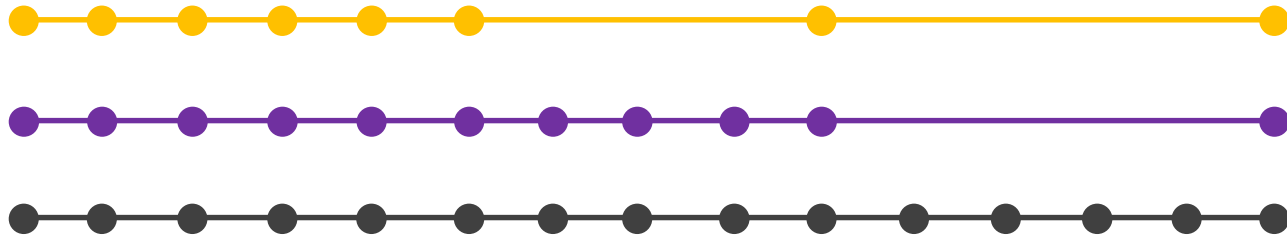
7:00-7:59 = 19 trains



Rapid Service
(23~26min.)

Commuter Rapid
(29~36min.)

Local
(31~43min.)



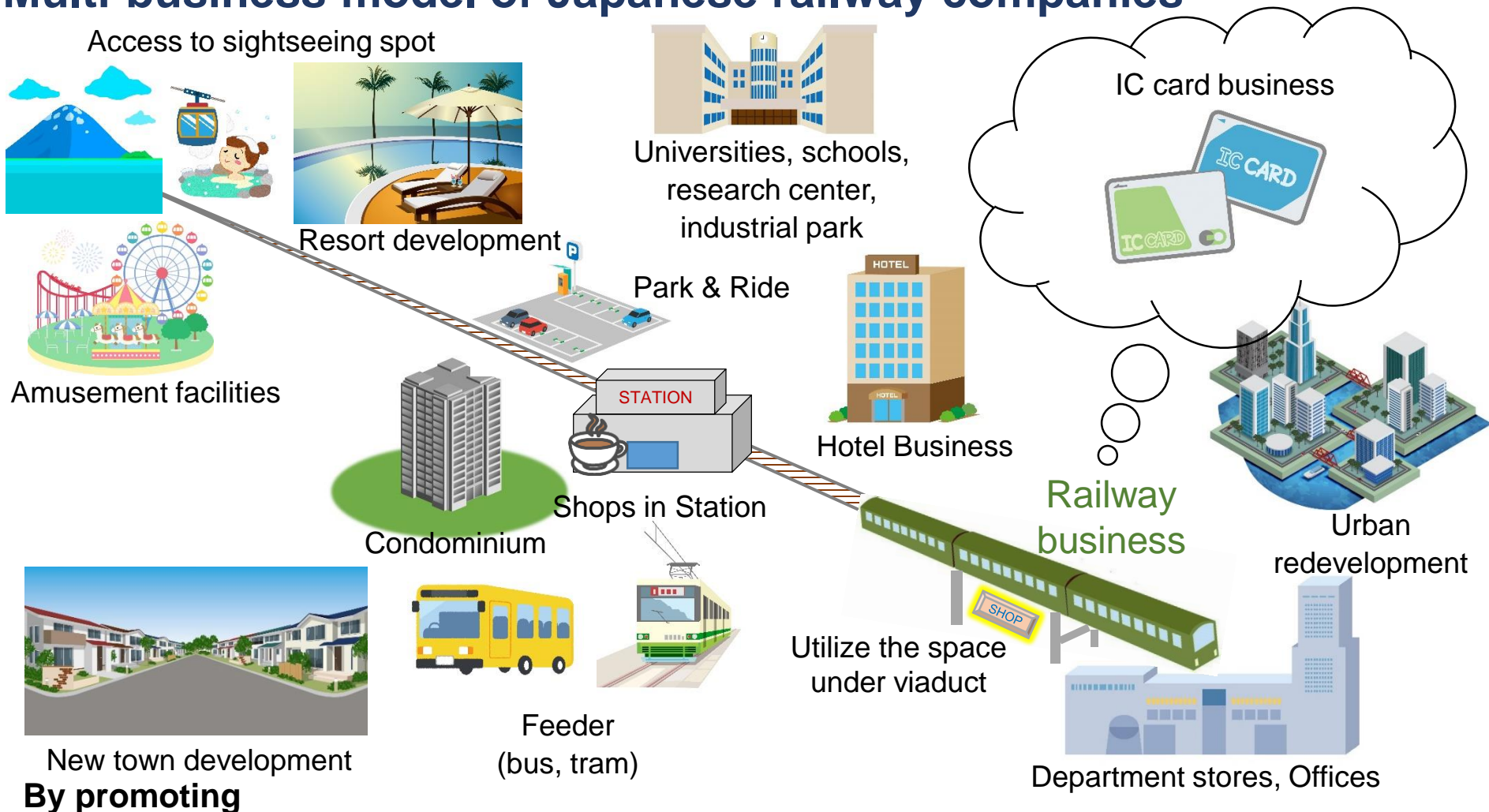
Sectional volume
(round trip: thousand
people/day)

Based on the urban transportation
annual report 2013

Highest congested section in the TMA

2.4 Integration of Railway Development with Social Infrastructure

Multi-business model of Japanese railway companies

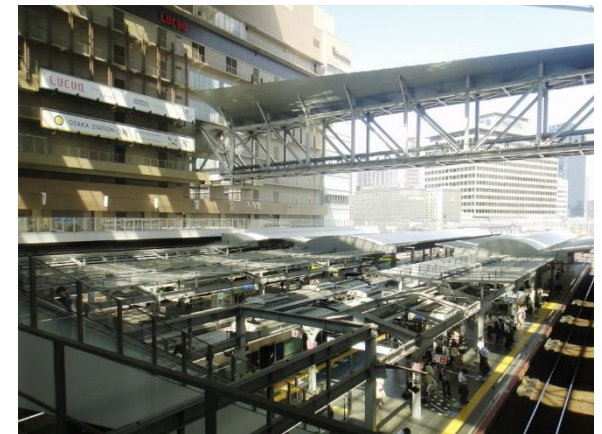


CBD: Commercial and Entertainment
Suburb: University and Leisure facility

Weekday: Reverse direction trip
Weekend: More demand

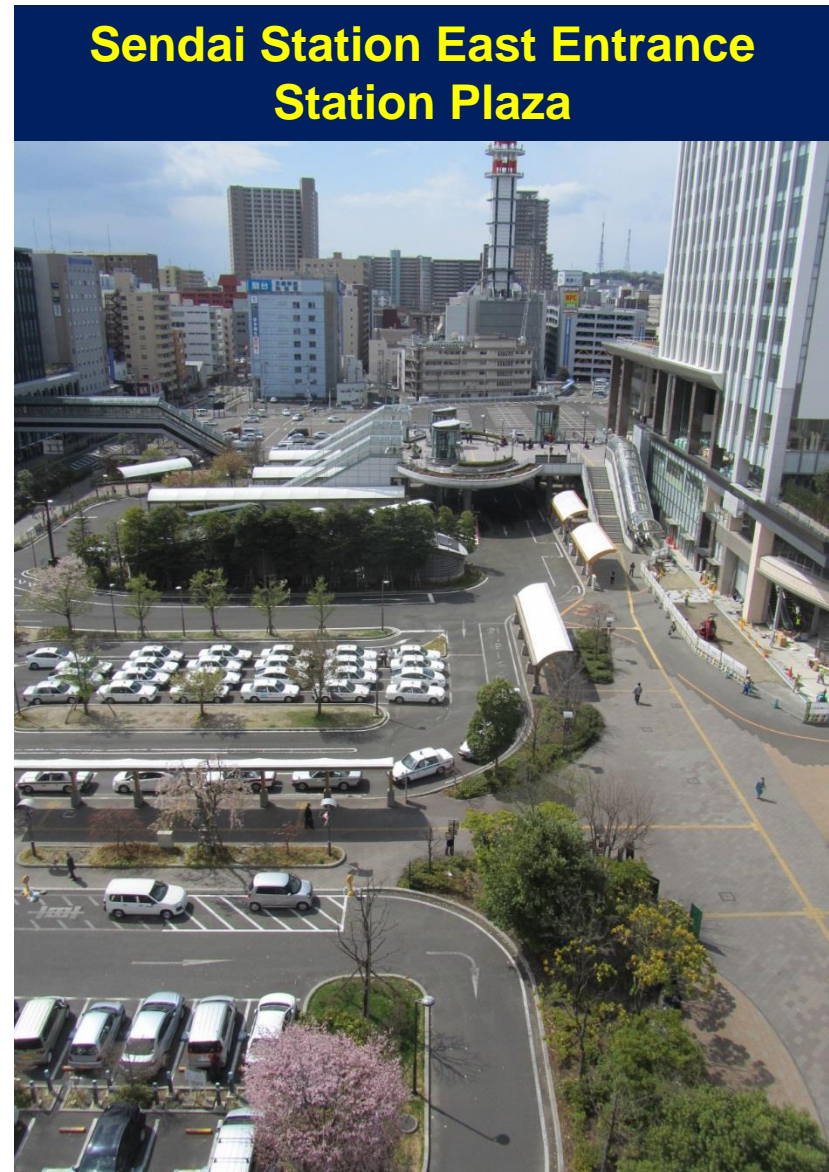
Connection between railway station and surrounding area

- As offices and commercial areas are developed around the station, tunnels, overbridges and skyways should be considered so that user can walk without crossing the road.
- In Japan, there are many underground shopping districts connecting stations and surrounding commercial areas
- Japanese railway companies earn a huge revenue from shop and restaurant rents inside the station.



Station Plaza

- The station square is designed not only for feeder modes, but also for development around the station.
- In Japan, there is a design manual for the station plaza. The design must meet the future demand of pedestrians, private cars, kiss & ride, buses, taxis, bicycles, etc.
- Railway companies and local government share an investment cost. Central government also provide some subsidies. In some cases, railway operators and developers bear all the costs.



Economically Sustainable Fare Setting

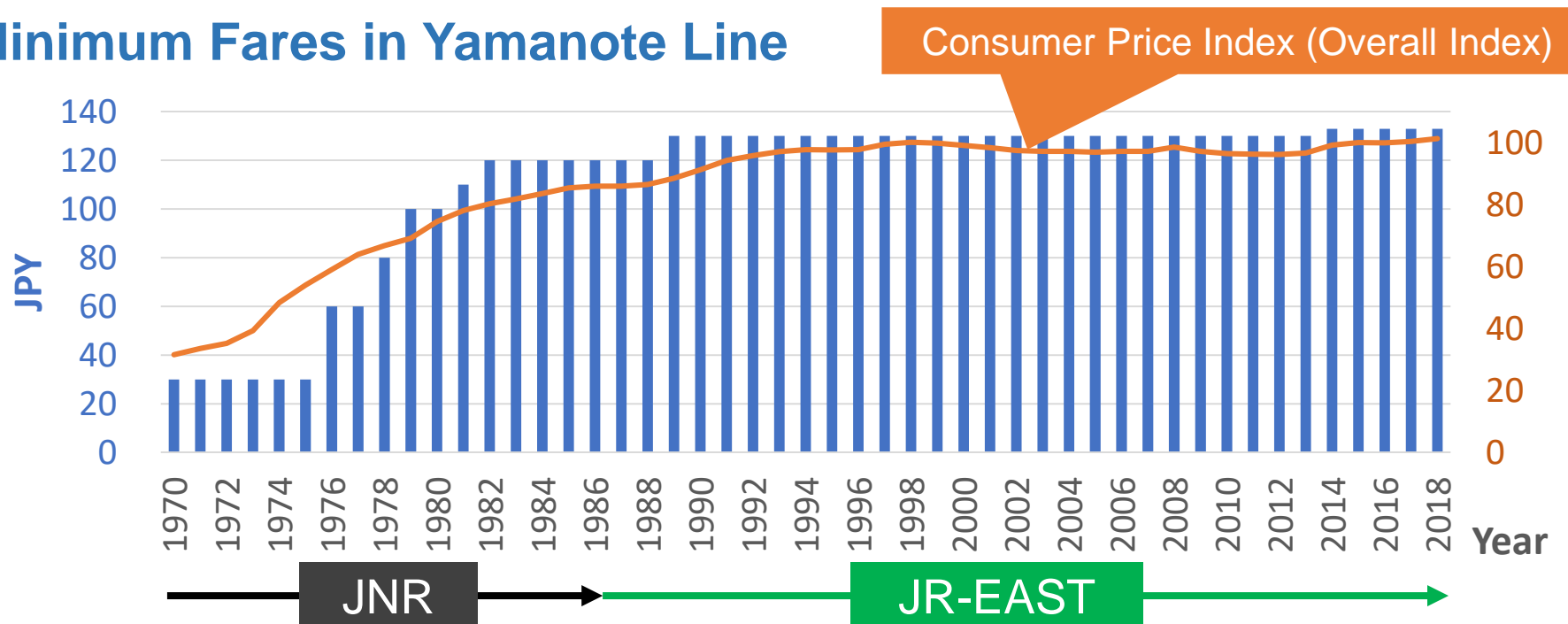
◆ Fare Regulations and Political Decisions

- Political decision tends to set the fares too low
- Fare setting should consider the total cost, which includes an appropriate profit in the total cost

◆ Fare Setting with The Consideration of Economic Growth

- Price indexing system

Minimum Fares in Yamanote Line



Business-Class Commuter Car

Why don't higher income people shift from car to rail?



JR-EAST Green Car

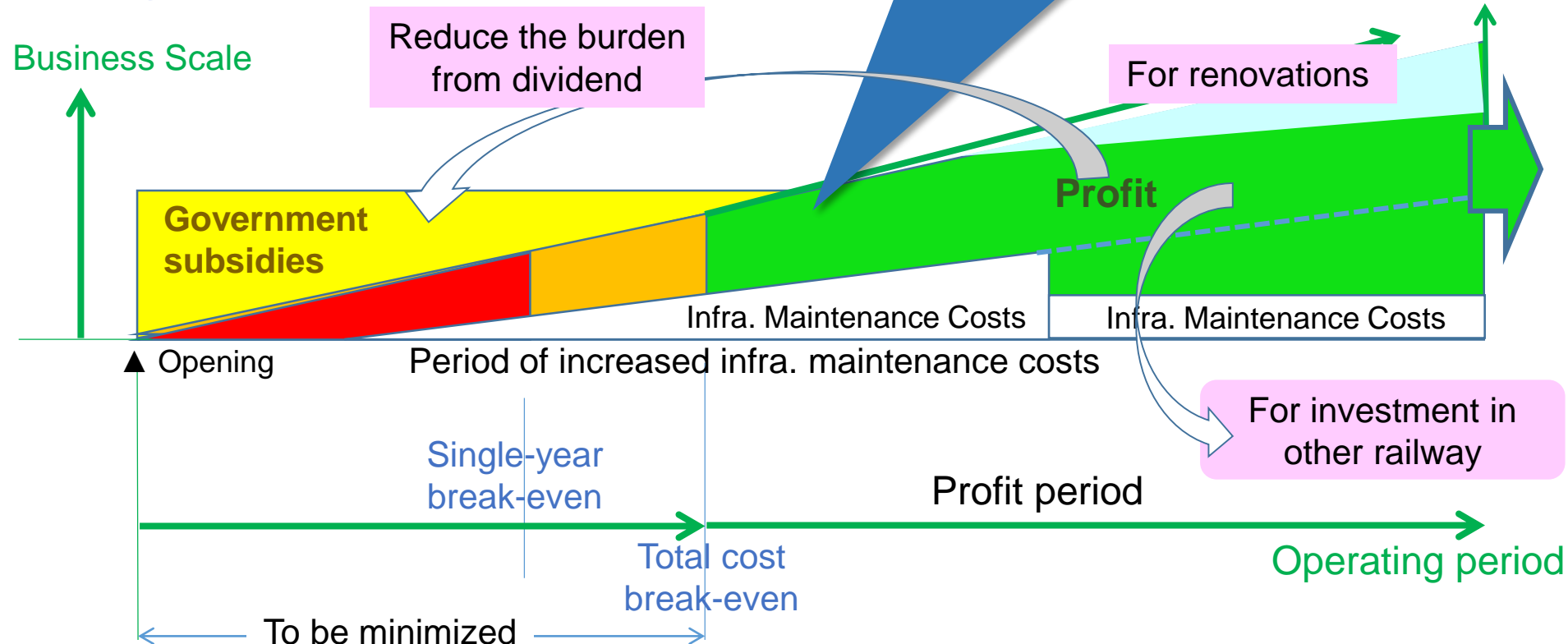


Fare =
Basic Fare + 3 to 10 USD

Seibu Laview

Towards Sustainable Urban Railway Management

Concept of Sustainable Railway Management



- Borrow from low-interest loan source
- Operating cost reduction
- Increase profit (demand creation and expansion in related business)
- Efficient operation (infrastructure maintenance cost reduction)

Chapter 3: Toward Responding to Urban Transport Issues

Situation of the Metro Manila Subway Line 9 (Mega Manila Subway)

(Please refer to slide 9 for the route map)

◆ Project Progress Status

- The minimum of 104.5 billion yen ODA loan (about 48.8 bil PHP, first part in 2018) was agreed under “Special Terms for Economic Partnership (STEP)”
- Implementing Body: **Department of Transportation (DOTr)**
- Groundbreaking Ceremony in **February 27, 2019**
- Partial operation (3 northern stations, along with train depot) by 2022,
Full operation (remaining 12 stations) by 2025

Reference:

https://www.jica.go.jp/press/2017/20180316_02.html

<https://gineersnow.com/industries/train/the-metro-manila-subway-project-details>

Route Plan about 36km
(all 15 underground stations)

《Trunk Line》

Mindanao Avenue - Quirino Highway Station
~ FTI (Food Terminal Inc.) Station

《Spur Line》

~ NAIA Terminal 3 Station

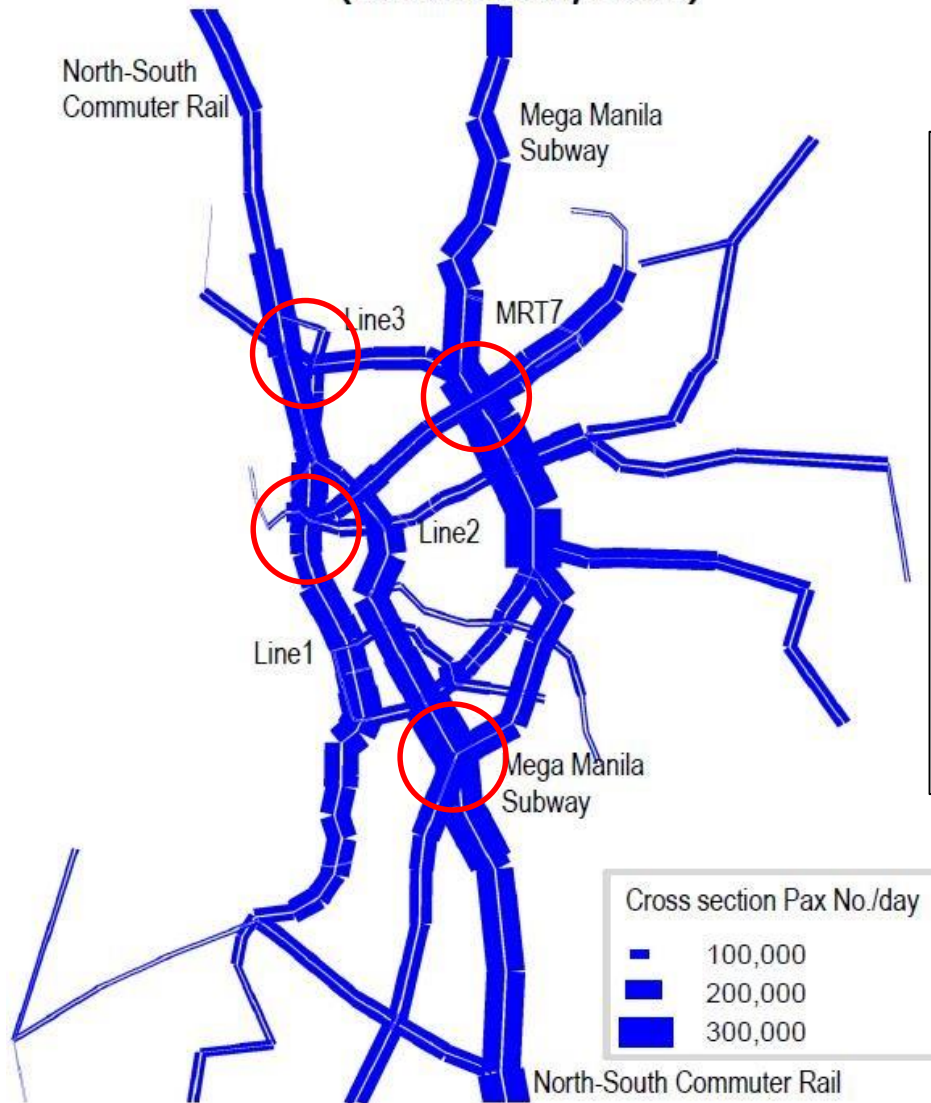


https://www.ph.embjapan.go.jp/itpr_ja/00_000799.html

Toward Responding to Urban Transport Issues

for Manila

□ Distribution of Mass-transit Demand (Dream Plan, 2030)



Toward Future Expansion of Railway Networks

- Development of transfer stations as nodes
Commercial facility
Potential to be a transport hub
- Effective use of wide area railway network

Consistency between TOD and urban planning

Source: JICA

JTTRI Future Prospect (DRAFT)

JTTRI

[The Morichi Committee "Research Group on Railway and Area Development"]

Research and development support for strategies and business schemes

Academic experts, MLIT, JICA, UR, JRRT, Railway Companies, etc.

ASEAN Transport Policies

A Support for the development of urban railways in ASEAN

Manila/Bangkok/Jakarta/Hanoi/Others

Consideration of policy support measurements

MLIT, MOFA, METI, embassy of various
countries, etc.

Consideration of public financial support measures

JICA, JOIN, JBIC, JRRT, NEXI, etc.

Support and cooperation

Support and cooperation

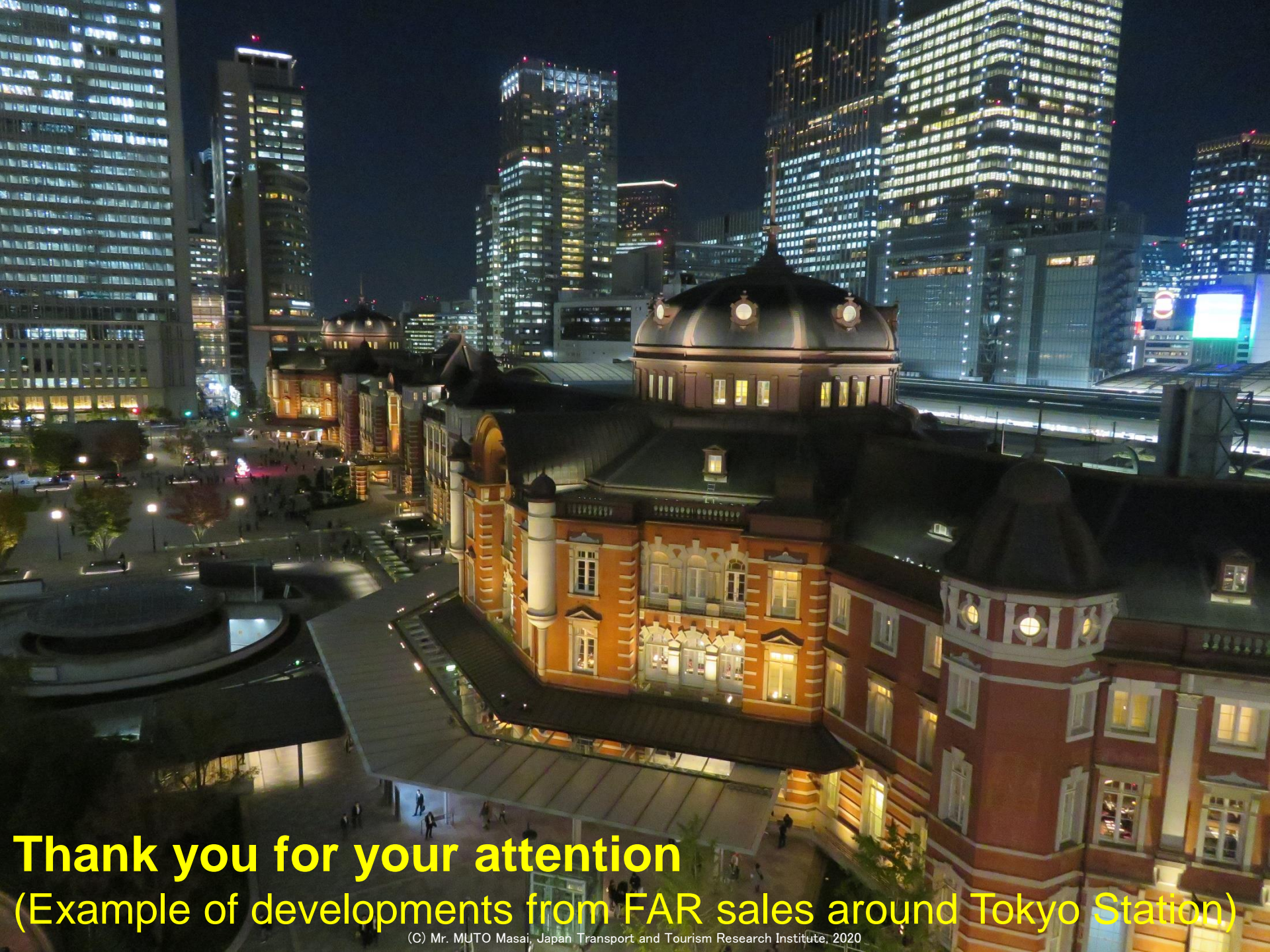
JTTRI ASEAN Office

Coordination with ASEAN countries through inter-governmental agreement, and
support for the development of urban railway projects

Urban Railway Development and Related Companies

Trading companies, railway operators, consultants, construction company, etc.

Support for Urban Railway Development Projects in ASEAN



Thank you for your attention
(Example of developments from FAR sales around Tokyo Station)