Planning and development of urban transportation system
Experience from Tokyo

Sept 22, 2016

Bureau of Urban Development
Tokyo Metropolitan Government
Takahiro ANZAI
• Outline of Tokyo
• Railway Network
• Expressway Network
• For Tokyo 2020 Olympic and Paralympic Games
## Greater Tokyo Area

<table>
<thead>
<tr>
<th></th>
<th>Area (km²)</th>
<th>Population (thousand)</th>
<th>GDP/GRP (billions of USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>377,972</td>
<td>127,110</td>
<td>4,921</td>
</tr>
<tr>
<td>Greater Tokyo</td>
<td>13,562</td>
<td>36,126</td>
<td>1,635</td>
</tr>
<tr>
<td>Tokyo Met.</td>
<td>2,191</td>
<td>13,514</td>
<td>929</td>
</tr>
</tbody>
</table>

Japan

Tokyo Met.
### Greater Tokyo Area

<table>
<thead>
<tr>
<th>Urban Area</th>
<th>Rank</th>
<th>Population (thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tokyo (greater)</td>
<td>1</td>
<td>37,833</td>
</tr>
<tr>
<td>Delhi</td>
<td>2</td>
<td>24,953</td>
</tr>
<tr>
<td>Shanghai</td>
<td>3</td>
<td>22,991</td>
</tr>
<tr>
<td>New York</td>
<td>9</td>
<td>18,591</td>
</tr>
<tr>
<td>Dhaka</td>
<td>11</td>
<td>16,982</td>
</tr>
<tr>
<td>Karachi</td>
<td>12</td>
<td>16,126</td>
</tr>
<tr>
<td>Manila</td>
<td>18</td>
<td>12,764</td>
</tr>
<tr>
<td>Paris</td>
<td>25</td>
<td>10,764</td>
</tr>
<tr>
<td>London</td>
<td>27</td>
<td>10,189</td>
</tr>
<tr>
<td>Jakarta</td>
<td>28</td>
<td>10,176</td>
</tr>
<tr>
<td>Seoul</td>
<td>29</td>
<td>9,775</td>
</tr>
</tbody>
</table>
Tokyo Metropolis

Outlying Islands in Tokyo

Population: 13.5 million
GRP: 929 billion (USD)
Area: 2,191 km²

Tama area
23 special wards

Saitama Pref.
Kanagawa Pref.
Chiba Pref.

National proportion
GDP
Population
Area

19%
10%
0.6%

Data SOURCES: NOAA, U.S. Navy, NGA, GEBCO, Image Landsat
Tokyo Metropolis (Designated Zoning Area)

**Tama area** 26 cities & 5 towns

23 special wards

- **Zoning areas** are divided into three types of districts:
  - Residential districts (7 categories)
  - Commercial districts (2 categories)
  - Industrial districts (3 categories)
Tokyo Metropolis (Designated Zoning Area)

1. Residential districts
   Den-en-chofu, Ota-ward

2. Commercial districts
   Near the Tokyo Station, Chiyoda-ward

3. Industrial districts
   Bay area, Koto-ward
Tokyo is the second most liveable city in the world, according to Monocle’s 2014 Quality of Life survey.

<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Copenhagen</td>
</tr>
<tr>
<td>2</td>
<td>Tokyo</td>
</tr>
<tr>
<td>3</td>
<td>Melbourne</td>
</tr>
<tr>
<td>4</td>
<td>Stockholm</td>
</tr>
<tr>
<td>5</td>
<td>Helsinki</td>
</tr>
<tr>
<td>6</td>
<td>Vienna</td>
</tr>
<tr>
<td>7</td>
<td>Zurich</td>
</tr>
<tr>
<td>8</td>
<td>Munich</td>
</tr>
<tr>
<td>9</td>
<td>Kyoto</td>
</tr>
<tr>
<td>10</td>
<td>Fukuoka</td>
</tr>
</tbody>
</table>
Urban Railway Network

- JR Yamanote Line
  - Shinjuku
  - Shibuya

- Oedo Subway Line
  - Shinjuku
  - Shibuya
  - Akihabara
  - Tokyo
## Urban Railway Network

### Status of railway

<table>
<thead>
<tr>
<th>Type</th>
<th>Length</th>
<th>Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR lines (Ex-National railways)</td>
<td>419km</td>
<td>141</td>
</tr>
<tr>
<td>Private lines (7 major companies)</td>
<td>383km</td>
<td>293</td>
</tr>
<tr>
<td>Subway (2 major companies)</td>
<td>300km</td>
<td>234</td>
</tr>
<tr>
<td>Monorail, New transport system</td>
<td>76km</td>
<td>101</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,178km</strong></td>
<td><strong>769</strong></td>
</tr>
</tbody>
</table>
Period 1 : Early stage 1872～1940’s
Period 2 : Developing stage 1950’s～1980’s
Period 3 : Matured stage 1980’s～
History of Railway Development

Period 1: Early stage 1872～1940’s

1885

Yamanote line

Tokaido line (for Yokohama)

1926

Keio Line

Keisei Line

Tobu Isesaki Line

1955

Urban area

JR lines (Ex-National railways)

Private lines

0 5km
History of Railway Development

Period 2: Developing stage 1950’s～1970’s

Population rapid growth

- End of trams operation (to secure road traffics)
- Development of subway network
- Development of urban railways for suburb towns
History of Railway Development

Period 3: Matured stage 1980’s～

Population stable growth

- Effective utilization of existing railway network
  ⇒ Mutual direct operation
- New line development
  ⇒ Oedo subway line

1900 1950 2000
(mil)

- Green: JR Yamanote line
- Red: Oedo subway line
- Brown: Subway
- Blue: JR / Private line
# Financial Support for Railway Development

## Early stage
- Railway company's own resources
  - Development of housing along railways
  - Development of commercial facilities near stations

## Developing stage
- Subsidy for railway construction
  - Subway network
  - Urban railways for suburb towns
  - From double-track to quadruple-track

## Matured stage
- Subsidy for function improvement
  - Speed enhancement
  - Congestion mitigation
  - Access for airport

### Image of initial cost allocation

<table>
<thead>
<tr>
<th>Railway company</th>
<th>National government</th>
<th>Local government</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>1/4</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>1/4</td>
<td>1/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>
Road and Railway Grade Separation Projects

JR Yamanote Line

Legend
- Completed
- Underway

Before

After
Effect of Railway Development

Transition of the congestion rate

Source: Ministry of Land, Infrastructure and Transport
Effect of Railway Development

The population growth in greater Tokyo area
To Meet Universal Requirements

Progress in making stations barrier-free

Installation of elevators, etc.

91.5%  
691/755  
(completed stations/total stations)

Installation of platform screen doors

31.1%  
235/755  
(completed stations/total stations)

More multilingual signage
Improving Shibuya Station

Before

JR Yamanote Line
Tokyu Line
Hachiko Square

After

Concourse for Transfer
JR Saikyo Line
JR Yamanote Line
Hachiko Square
Improving Shibuya Station
Three Loop Expressways (Central Circular Route)

Shortening travel time

Before completion

C1 Via Inner Circular Route

Approx. 40 min.

C2 Via Central Circular Route

Approx. 19 min.

Shinjuku → Haneda Airport

Shortened by approx. 21 min.

Approx. 50% decrease
The inside of the Tokyo Metropolitan Expressway Central Circular Route

Before completion (10,000 vehicles/hour)

After completion (10,000 vehicles/hour)

2.84

1.56

24
Three Loop Expressways (Tokyo Outer Loop Road)

**Current**
Local streets

**After completion**
Improving environmental condition

**CO₂ emissions reduction**
About 300 thousand ton / year
Equivalent to 30 thousand hectar forest absorbing

**NOₓ emissions reduction**
About 400 ton / year
Equivalent to 2.6 million trucks exhausting
Three Loop Expressways (Ken-o-do)

Before

After

Expressway toll fare
- Higher than average
- Average
- Cheaper than average
- Different by mileage
- Suburb

Expressway toll fare
- Average
- Alleviation of radical reform
- Suburb
At Tokyo 1964 Games

Tokaido Shinkansen
(In service from October 1964)

Tokyo metropolitan expressway
For Tokyo 2020 Games

Functional enhancement of Haneda airport

- Number of International flights (flights/day)
  0 (2002) ⇒ 100 (2015 winter)
- Chartered flight only ⇒ 26 cities worldwide

[Diagram of Haneda airport with labeled runways and terminals]
For Tokyo 2020 Games

Departures and arrivals (international + domestic)

Flight slots (set): 710,000

All forecasted demand will exceed available slots in the 2020s.

Aviation demand forecast: High growth
Medium growth
Low growth
For Tokyo 2020 Games

Introduction of BRT system

Toranomon Bus Terminal

Connecting Bus

The ring road 2 (under construction)

Olympic Village

Tokyo

Toranomon area

No. 2 Ring Road

Shiodome

Hamamatsucho

Kachidoki

Shio-mae

Toei Mita line

Yurikamome

Odaiba Kaisin Koen

Shinagawa

Rinkai line

Tennouzu Isle

Possible site of MICE

Yurikamome materiel

国际展示場前門

Kokusai tenjijo-seimon

お台場海浜公園

Toyosu

Shiokaze Park

Ariake

Odaiba

Yurikamome

Yurikamome

Hamamatsucho

Kachidoki

Shio-mae

Toei Mita line

Yurikamome

Odaiba Kaisin Koen

Shinagawa

Rinkai line

Tennouzu Isle

Possible site of MICE

Yurikamome materiel

国际展示場前門

Kokusai tenjijo-seimon

お台場海浜公園

Toyosu

Shiokaze Park

Ariake

Odaiba

Yurikamome

Yurikamome

Hamamatsucho

Kachidoki

Shio-mae

Toei Mita line

Yurikamome

Odaiba Kaisin Koen

Shinagawa

Rinkai line

Tennouzu Isle

Possible site of MICE

Yurikamome materiel

国际展示場前門

Kokusai tenjijo-seimon

お台場海浜公園

Toyosu

Shiokaze Park

Ariake

Odaiba

Yurikamome

Yurikamome

Hamamatsucho

Kachidoki

Shio-mae

Toei Mita line

Yurikamome

Odaiba Kaisin Koen

Shinagawa

Rinkai line

Tennouz
After Tokyo 2020 Games

Population tends by age group

32.5% 39.3%

Projection

Young population (under 15) Working-age population (15-64) Elderly population (65-74) Elderly population (75 and older)
After Tokyo 2020 Games

Number of visitors to Japan/Tokyo

The number of visitors dropped for a time due to the 2008 financial crisis and the 2011 Great East Japan Earthquake, but has recovered since then and is expected to go on increasing as the Tokyo 2020 Games near.
Thank you for your attention!