

**Islamic Republic of Iran**

**Data Collection Survey  
on Transit Oriented Development (TOD)  
in the Islamic Republic of Iran**

**Final Report**

**May 2018**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**NIKKEN SEKKEI RESEARCH INSTITUTE  
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## Abbreviations

AGT	Automated Guideway Transit
BCR	Building Coverage Ratio
BHRC	Housing and Urban Development Research Center
BPO	Business Process Outsourcing
BRT	Bus Rapid Transit
CBD	Central Business District
DB	Deutsche Bahn
DMU	Diesel Multiple Units
FAR	Floor Area Ratio
GHG	Green House Gas
GMS	General Merchandise Store
ITDP	Institute for Transportation and Development Policy
IKIA	Imam Khomeini International Airport
JICA	Japan International Cooperation Agency
KL	Kuala Lumpur
LRT	Light Rail Transit
MOI	the Ministry of Interior
MRMO	Municipality and Rural Management Organization
MRUD	The Ministry of Road and Urban Development
NGO	Non-Governmental Organization
NTDC	New Town Development Company
ODA	Official Development Assistance
PBO	Planning and Budget Organization
PPP	Public Private Partnership
RAI	The Railways of the Islamic Republic of Iran
RER	Réseau express régional d'Île-de-France
ROW	Right of way
SC	Steering Committee
SPAD	Land Public Transport Commission
SPV	Special Promotion Vehicle
TDM	Transportation Demand Management
TfL	The Transport for London
TOD	Transit Oriented Development
TZS	Traffic Zone System
UMRT	Urban Mass Rapid Transit

## **1. Introduction**

### **1.1 Background**

Air pollution is a serious problem in the metropolitan areas of the Islamic Republic of Iran. Reducing air pollution is one of the priorities in the Sixth Five-Year Economic, Cultural and Social Development Plan for 2016–2021 (hereafter referred to as “the Sixth Five-Year Development Plan”). The promotion of public transport has been listed as one of the measures for reducing air pollution in the Second Clean Air Action Plan in Tehran (2013). Moreover, Tehran Municipality and Rural Management Organization (MRMO) aims to increase the modal share of public transport in Tehran to 75% (30% of railway), up from 68% (13% of railway) in 2014.

The Ministry of Road and Urban Development (MRUD) is formulating a Transit Oriented Development (TOD) Guidelines. Since TOD is a new concept in Iran, MRMO requested the Government of Japan in 2015 to provide technical assistance for the development of policies and institutional structures toward implementing TOD. In response, the Japan International Cooperation Agency (JICA), an implementing agency for Official Development Assistance (ODA) of the Government of Japan, collected part of the relevant information through the Data Collection Survey on Urban Development and Transportation in Iran conducted in 2015-2016. It was judged necessary to conduct a further study for analyzing the issues in implementing TOD in Iran and for examining the possibility of future assistance by JICA. A joint venture of NIKKEN SEKKEI RESEARCH INSTITUTE and PADECO Co., Ltd., two of the leading Japanese consulting firms in this field, was selected to conduct the study.

### **1.2 Study Objectives**

The objectives of this JICA study are as follows:

- to analyze the current situation and identify the issues in order to implement TOD, which has been promoted by the Government of Iran;
- to support the Government in drawing up draft TOD guidelines and confirm the implementation structure for the TOD effort in Iran; and
- to collect and analyze necessary information to formulate assistance measures by JICA for implementing TOD.

### **1.3 Study Area**

The study area surveyed in this study is the Islamic Republic of Iran, focusing especially on the Tehran metropolitan area as shown in Figure 1-1.

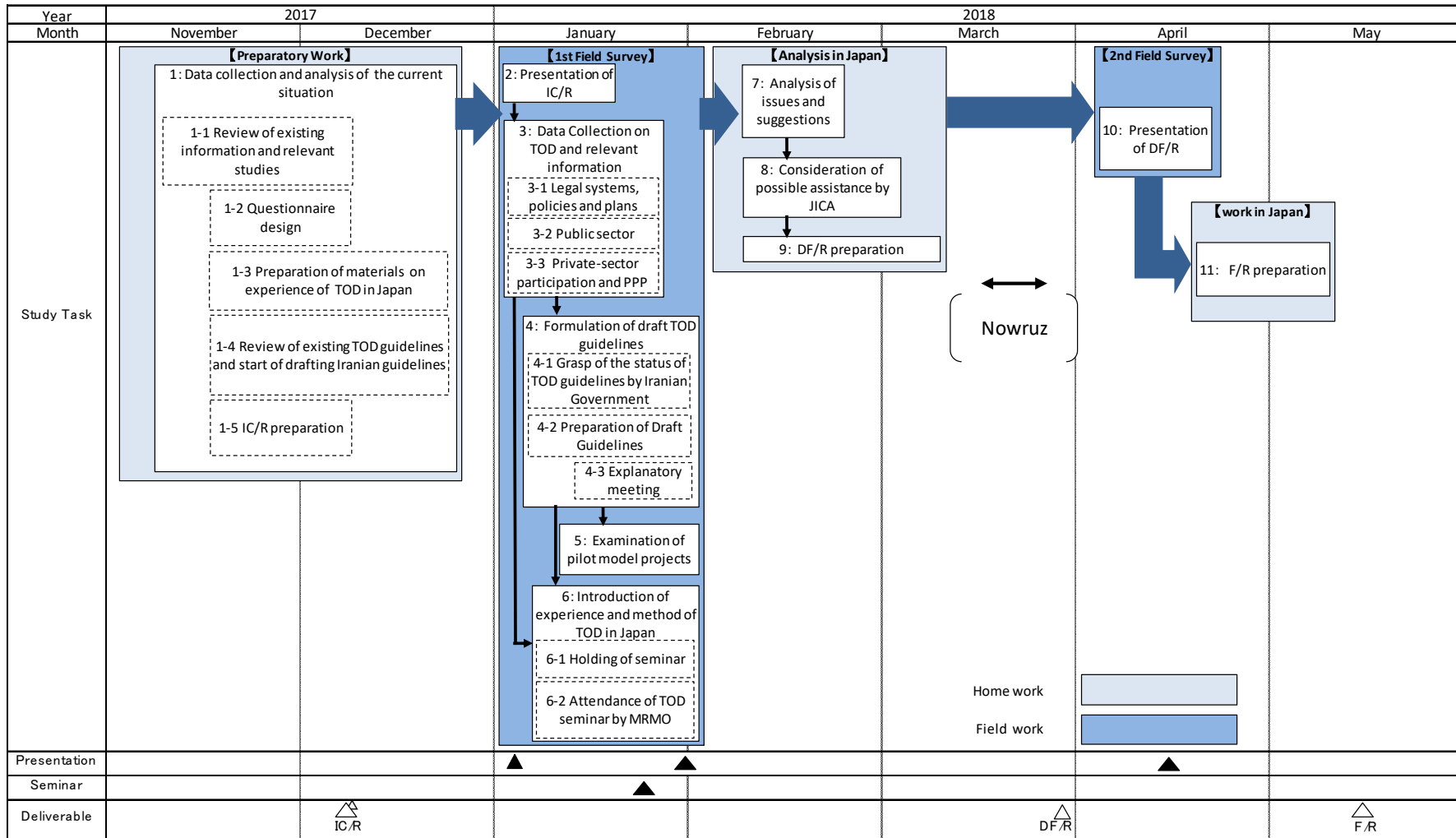


Source: Google, JICA Study Team

**Figure 1-1 Study Area**

#### **1.4 Study Tasks and Flow**

The tasks and the flow of the study are shown in Figure 1-2.



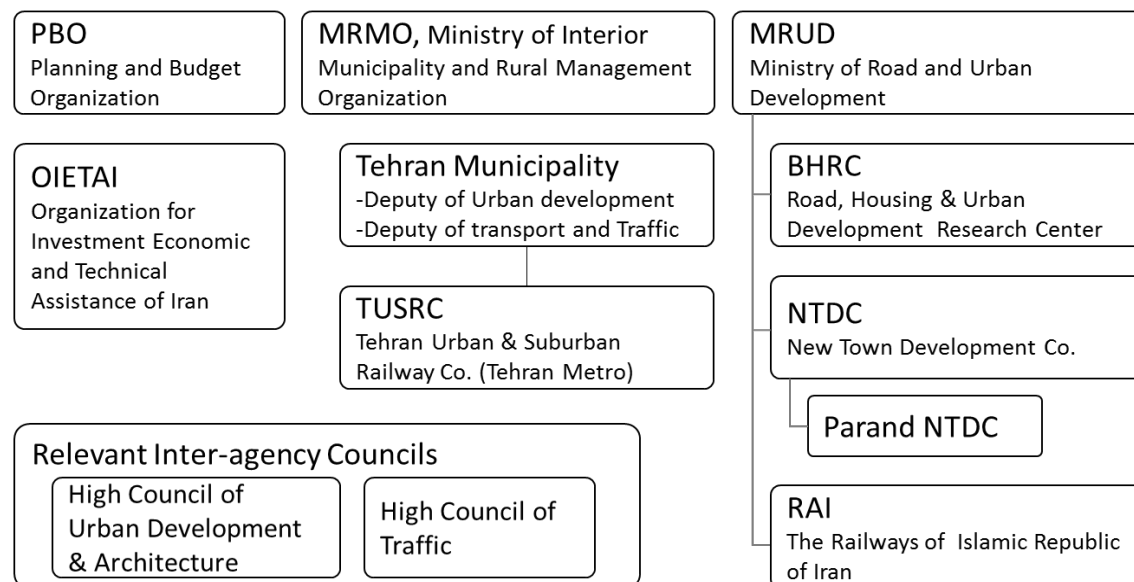
Legend: IC/R: Inception Report, DF/R: Draft Final Report, F/R: Final Report

Source: JICA Study Team

Figure 1-2 Tasks and Flow of the Study

## 1.5 Implementation Structure

Figure 1-3 shows the authorities relevant to the study. The main counterpart agencies of the JICA Study Team are MRMO, which is responsible for urban transportation, and MRUD, which is responsible for intercity transportation and urban planning.



Source: JICA Study Team

**Figure 1-3 Authorities Relevant to the Study**

**Table 1-1 Major Authorities and their Roles**

Major Authorities for the Study	
MRMO Municipality and Rural Management Organization	To manage urban rail and urban development as the competent authorities.
MRUD Ministry of Road and Urban Development	Implementation of programs and policies of government in urban planning, housing and Suburban railway. Mehr Housing Project.
Other Authorities	
PBO Planning and Budget Organization	To examine the budget and approve investment for each project.
OIETAI Organization for Investment, Economic and Technical Assistance of Iran	A One-Stop Institution for Foreign Direct Investment in Iran or Iran's Investment abroad including Private Sector and PPP Scheme
Tehran Municipality, Deputy of Transport and Traffic	Urban planning in Tehran
Tehran Municipality, Deputy of Urban Development	Traffic and Transportation planning in Tehran
Tehran Urban & Suburban Railway Co	Tehran Metro and its extension to the suburbs
BHRC Road, Housing and Urban Development Research Center)	A research institute on housing and urban development under MRUD. In corporation with MRUD, BHRC is drafting the national TOD guidelines.
NTDC New Town Development Company	A subsidiary company for New Town development under MRUD.
RAI The Railways of Islamic Republic of Iran	A national Railway organization under MRUD. To manage urban railway and commuter railway from Tehran.
High Council of Traffic	Council under the president's direct control.
High Council of Urban Development and Architecture	Council under the president's direct control.

Source: JICA Study Team

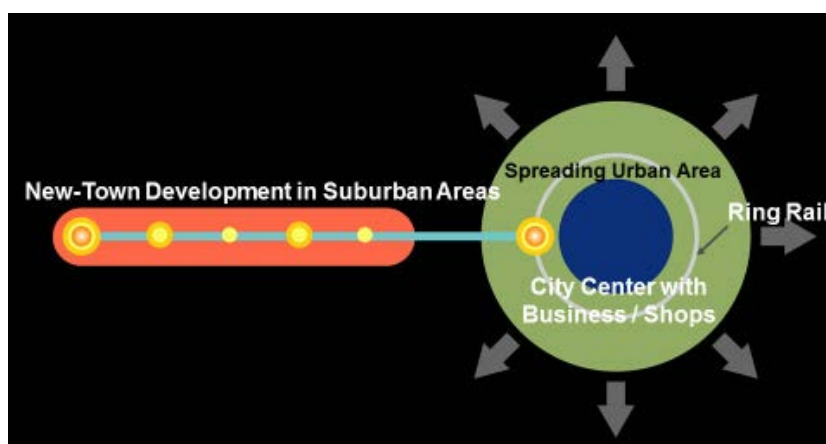
## 2. Study Approach

### 2.1 Introduction of Experiences and Methods of TOD in Japan

In Japan, many new towns along railway lines by private railway companies in the suburbs of metropolitan areas such as Tokyo, Osaka, and Nagoya were developed during the 1960s through the '80s, and urban development in areas along railways in the suburbs of the National Capital Region was initiated by the public sector following the approaches for suburban development by private railways<sup>1</sup>. In the background of such developments were challenges such as needs to address serious traffic congestion and air pollution arising from rampant city expansion, conserve energy as a result of the oil shock, and improve the urban living environment, which are similar to the urban issues currently faced by the large cities of Iran. Although from a historical viewpoint it can be seen that urban planning in Iran has been influenced by the United States and Europe<sup>2</sup>, it seems that the accumulation of urban planning experiences and know-how to address the above-mentioned urban problems in Japan is considered to be beneficial to present-day Iran as well.

Urban development based on railway improvement in large cities in Japan is what is called Transit Oriented Development (TOD). In urban development projects based on TOD, offices, residences, and other facilities are located within walking distance from a train station, thereby enabling people to be less dependent on automobiles. This results in an environmentally friendly city with reduced CO<sub>2</sub> emissions; concentration of urban services in the area around the station, which improves convenience; and a city with universal design spaces that is friendly to children, the elderly, and people who have difficulty moving around.

Figure 2-1 shows a model of TOD based urban development along railroads in major metropolitan areas of Japan. City functions such as business and commercial functions are established around the terminal stations in the city center and the suburbs, which many passengers use, and at the same time railroads connecting these hub stations and urban areas along railroads are developed. These project integrations have made it possible for both railway development and urban development projects to produce high synergy effects.

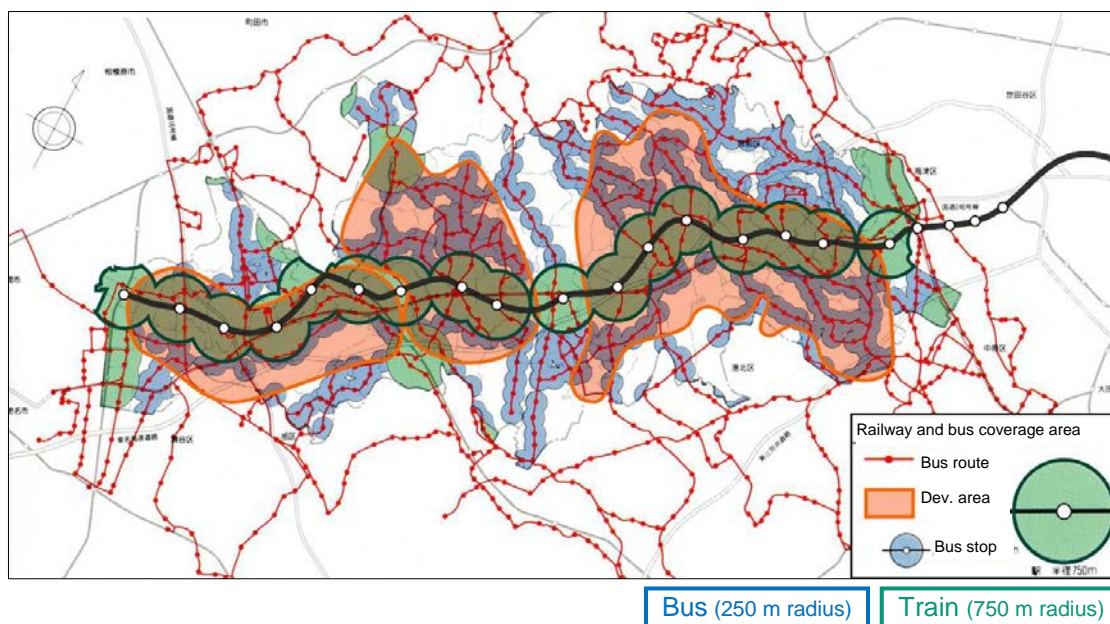


Source: JICA Study Team

**Figure 2-1 TOD Based Urban Development Model in Metropolitan Areas of Japan**

<sup>1</sup> Act on Special Measures Concerning Comprehensive Advancement of Housing Development and Railway Construction in Metropolitan Areas (enacted 1989)

<sup>2</sup> The city planning system in Iran is considered to be influenced by American type zoning system and German type city planning system.



Source: JICA Study Team

**Figure 2-2 Coverage Areas by Public Transportation in the New Town in the Suburb of Tokyo**

In Tama Den-en Toshi City, a typical TOD project in Tokyo, a railway was constructed starting from Shibuya Station as the hub station. In the area along this railway, housing development was implemented in the area within walking distance (within a radius of 750 meters / ten minutes' walk) of each station, and was then expanded over an area covered by a bus network connected to the station (see Figure 2-2). More than 50 years after the launch of the project, over 400,000 people live in a huge residential area of around 5,000 hectares.

Taking note of the similarities between the urban issues that were faced by Japan in the past and the challenges that Iran's large cities are currently up against, this study, upon consideration of the stage of development of cities in Iran and the situation of urban and urban transportation problems they face, provides a systematic introduction of Japan's experiences and expertise concerning TOD, as well as concrete examples of urban development and urban development methodology that can serve as reference. These can be utilized in studying guidelines for TOD in Iran.

## 2.2 Review of TOD Policies and Experiences in the World

Recent years have seen more active efforts to promote TOD throughout the world. Centering on North America, many TOD guidelines and related policy papers have been formulated with contents ranging from those focusing on policy and strategy to those including specific approaches and individual facility design guidelines. In developing nations as well, there are excellent examples such as India's TOD policies and TOD guidelines<sup>3</sup> formulated by major cities. In addition, TOD-related policy papers, guidelines, and other materials issued by the World Bank and related research institutions are also believed to be valuable sources of information.

In addition to referring to the abovementioned TOD experiences and methodologies of Japan, this study also broadly reviews TOD guidelines, policy papers, and other data from around the world

<sup>3</sup> For example, the TOD guideline "Transit Oriented Development - Policies, Norms, Guidelines -" published by the Delhi Development Authority in 2012 includes practical content.

in order to help support the formulation of Iran’s TOD guidelines. In fact, the study team confirmed that the TOD guidelines formulated by MRUD refer to the Institute for Transportation and Development Policy (ITDP) related papers and TOD policy of India as an introduction of the TOD basic policy. In addition, the TOD guidelines proposed by the study team shown in Chapter 4 were examined with reference to the elements of the guidelines indicated in Table 2-1, because some of them include practical contents which could supplement the TOD guidelines formulated in Iran.

**Table 2-1 TOD Guidelines and Related Policies from Around the World**

TOD guidelines	<ul style="list-style-type: none"> <li>• USA: BART (San Francisco), DART (Dallas), Albany City, Kansas City, Allegheny County, etc.</li> <li>• Canada: Toronto, Montreal, Calgary, Edmonton, etc.</li> <li>• Others: Queensland (Australia), Delhi (India), etc.</li> </ul>
Related policy papers, etc.	<ul style="list-style-type: none"> <li>• World Bank: Financing Transit-Oriented Development with Land Values (2015), Transforming Cities with Transit (2013), Eco2 Cities (2010)</li> <li>• JICA : Project for Studying the Implementation of Integrated UMRT and Urban Development for Hanoi in Vietnam: Final Report, TOD Guideline (2015)</li> <li>• Institute for Transportation and Development Policy (ITDP): TOD Standard (2017)</li> </ul>

Source: JICA Study Team

In addition, with development of city railways in Southeast Asia, many TOD-related projects are being planned and implemented. In Bangkok, Thailand, where the development of urban railroads was carried out relatively early, the convenience of connecting to facilities in the area surrounding the station in the city center has improved since the development of pedestrian networks. Also, since housing development has been concentrated in the areas along the railway, the sprawl in the suburbs has been controlled. Meanwhile, in most of the cities in Southeast Asia such as Manila and Kuala Lumpur where urban railway development is progressing, the issues on TOD promotion as shown in Table 2-2 are also observed. In Iran where the promotion of TOD has just begun, taking the issues currently faced by the Southeast Asian countries into consideration seems to be useful for making the TOD policy in Iran, including TOD guideline formulation, more practical.

**Table 2-2 Issues in Promoting TOD in Southeast Asia**

<ul style="list-style-type: none"> <li>• Gap between incentive policies and private sector needs</li> <li>• Lack of platforms for public-private dialogue</li> <li>• Lack of systems ensuring development of public facilities around stations</li> <li>• Lack of development of legislation for promoting TOD; the organizational silos of related government departments</li> <li>• Lack of development of concrete and practical guidelines for materialization of TOD; lack of clarification of the government desk handling the individual requests of private sector companies, etc.</li> </ul>
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Source: JICA Study Team

### **2.3 Appropriate Implementation and Collaboration System for Promotion of TOD**

The government agencies related to the promotion of TOD in Iran can be classified into the two groups shown in the following table.

**Table 2-3 Grouping of Government Agencies Related to the Promotion of TOD in Iran**

<p><b>Group (1) Group aiming for unified development of suburban railways and the areas along the lines</b></p> <p>Ministry of Road and Urban Development (MRUD), Iran Railways (RAI), New Town Development Company (NTDC), Road, Housing and Urban Development Research Center (BHRC), etc.</p>
<p><b>Group (2) Group aiming for unified promotion of urban railways and urban development</b></p> <p>Municipality and Rural Management Organization (MRMO), Transportation and urban planning related institution of each municipality (such as Tehran Urban and Suburban Railway Group of Companies (Tehran Metro), Tehran Municipality Deputy of Transport and Traffic, Tehran Municipality Deputy of Town Planning &amp; Architecture), etc.</p>

Source: JICA Study Team

In order to promote TOD, unified engagement and collaboration that go beyond the boundaries of government administration are needed, but this requires close cooperation between Group (2), which is concerned with the development and operations of railways in the city (urban railways), and Group (1), which is concerned with the development and operations of suburban railways that extend across municipal administrations. However, there is an exception to this organizational silo in Tehran, with Tehran Metro in Group (2) currently extending its metro line to outside the city area<sup>4</sup>.

In this study, under the initiative of MRMO, a Steering Committee (SC) with members from key government agencies that extend across the above two groups was established in order to effectively advance the study. The Planning and Budget Organization (PBO), the main agency responsible for the Iranian government's investment matters and coordination of the state budget, is also a member of the SC. This SC will be beneficial in coordinating views and examining cooperation measures and others for implementation of the TOD project. In addition, expectations are held that it will continue to serve a core role in the implementation of relevant projects based on the guidelines for TOD in Iran that this study will help formulate in Iran.

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<sup>4</sup> Through this extension, the Tehran Metro Line, which connects to Tehran Imam Khomeini International Airport located outside the city, opened for service in August 2017.

### **3. Current Situation of TOD in Iran**

#### **3.1 Policies Related to TOD**

##### **3.1.1 Sixth Five-Year Development Plan for 2016–2021**

The Sixth Five-Year Economic, Cultural and Social Development Plan for 2016–2021 (hereafter referred to as “the Sixth Development Plan”), approved by the Iranian Parliament in March 2017, sets the policies, objectives and goals to be achieved by the country over the next five years. The national development policies for the transport sector are stipulated in “Chapter 11: Transportation and Housing” of the plan. While TOD-specific policies are not depicted in the plan, relevant content mentioned in Chapter 11 include the following:

- Article 52 stipulates policies to strengthen the railway sector, encourage non-governmental sector investment in this area, facilitate and accelerate project implementation, and improve public satisfaction with transport services provided by rail. The policies that may be relevant to TOD are as follows:
  - The non-governmental sector’s investment in the development and utilization of railway transportation within and between cities will be regarded as investment in less developed regions and will be subject to all laws and regulations that govern investment in less developed regions.
  - The Ministry of Road and Urban Development (MRUD) is obligated to establish suburban passenger railway transportation and develop suburban railway lines as a subsidiary of the Railways of the Islamic Republic of Iran (RAI) that is to be established. In cooperation with relevant municipalities, this subsidiary company will be responsible for performing all activities of passenger railway transportation in the suburbs.
- Article 59 stipulates that MRUD and the Ministry of Interior (MOI) are obligated to take actions for the revival, rehabilitation, improvement, reinforcement and recreation of minimum of two hundred seventy blocks in the framework of National Center for Sustained Urban Recreation studies.

##### **3.1.2 Resolution regarding TOD by the High Council of Urban Planning and Architecture**

The High Council of Urban Planning and Architecture sent a letter to Deputy of Traffic Department, MRUD and the letter has approved TOD related matter on June 12, 2017 that is to place emphasis on TOD in the agenda of national and regional development and in national, regional and local development plans. With the implementation of TOD, it is hoped to move toward the following:

- In social terms: Moving towards increased equality, citizenship rights and social justice
- In economic terms: Easier access of individuals to job opportunities and economic facilities
- In environmental terms with smart urban growth approach: Land use arrangement based on public transport, human-centered development and non-motorized transport, and preserving environmental resources and assets

The objectives and goals of TOD and the obligations and measures indicated in this approved document are as follows:

### **Objectives:**

- The major objective of TOD is to place emphasis on the integration of “urban and local development” and “public transport”, which leads to improving the quality of urban life and the capacity of cities’ livability.

### **Micro Goals:**

- Urban and local development planning, based on the integration of transport terminals, corridors, and public transport networks (including the possibility of improvement to rail-based systems, if necessary)
- Integration between appealing urban land use and stations by providing access to non-motorized transport systems, walking and bicycle riding
- Development of national and regional rail network in line with the situation and location of cities, work and activity centers and residential areas with development potential and in line with national and regional development plans
- Development of transport stations, in consideration of the role of the work and activity centers in urban redevelopment and an emphasis on sustainable urban policies
- Adopting spatial city perspective with maximum involvement of all beneficiaries and stakeholders
- Development of local communities
- Promotion of the sense of belonging among citizens

### **Obligations:**

- In collaboration with relevant authorities, the Deputy of Transport Department of MRUD shall prepare TOD guidelines within two months. The guidelines prepared shall be sent to the High Council of Urban Planning and Architecture for approval.
- Where development plans (at national, regional and local levels) are in the process of revision or preparation, the measures introduced in this document shall be followed.
- All relevant authorities including the MRUD, municipalities and relevant stakeholders shall facilitate the implementation of TOD plans and projects.
- In view of the importance of public transport systems in the national TOD approach, the role of terminals in the cities within the framework of civil and development plans shall be reviewed and strengthened.

### **Measures to be taken:**

- Through consultation with scholars, professionals and experts, this document shall be revised or amended within a particular timeframe, and the outcome shall be sent to the High Council for re-approval. The Deputy of Transport Department of MRUD is responsible for the follow-up of this activity.
- All guidelines associated with this document shall be prepared by the Deputy of Transport Department of MRUD, in collaboration with relevant planning offices and be sent to

higher committees for further assessment. Prioritized implementation of this document is recommended.

- This document and the formerly approved document (dated January 30, 2017) indicate the approach of the High Council of Urban Planning and Architecture regarding the need for integration of “land use planning” and “transport planning with emphasis on public transport” as two major elements of urban and local planning.
- Other TOD plans are prohibited prior to the approval of guidelines associated with this document.
- The Deputy of Transport Department of MRUD shall take the initiative to prepare an instruction to achieve consistency between transport comprehensive plans and urban comprehensive plans. This instruction shall be sent to the High Council of Urban Planning and Architecture within three months.

### **3.1.3 National TOD Guidelines**

As of March 2018, MRUD, and the Road, Housing and Urban Development Research Center (BHRC) under MRUD have prepared a draft of the national TOD guidelines following the abovementioned resolution by the High Council of Urban Planning and Architecture. Details of the draft guidelines are described in Section 4 of this report.

### **3.1.4 Targets for Urban Transport Development**

MRMO proposed a policy on urban transport improvement in 2016 (1395), which was approved by the Cabinet and announced to related agencies, along with the timeline to be achieved<sup>1</sup>. The policy covers 5 sectors and 27 items related to urban transport including traffic safety, public transport promotion, traffic demand management (TDM), freight and passenger services integration, and environmental improvement.

In addition, MRMO proposed similar policy targets for urban transport improvement supporting the Sixth Five-Year Development Plan. In coordination with PBO, MRMO submitted the proposed policy to the national assembly for its approval. Table 3-1 shows the list of the policy targets.

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<sup>1</sup> Cabinet approval 91025/115912.

**Table 3-1 Policy Targets for Urban Transport Development**

#	Category	Policy Targets		Current in 2014	Quantitative Target 2020
		Items	Unit		
1	TDM	Trip generation per person per day	Trip	1.45	1.45
2		Share of motorized vehicles in total trips	%	65%	55%
3	Public transport	Share of public transport (the maximum share of taxicabs can be up to 20%)	%	45.2%	<ul style="list-style-type: none"> <li>• National average: <b>50%</b></li> <li>• 8 cities with more than 1 million population: <b>75%</b></li> <li>• 200,000 to 1 million: <b>50%</b></li> <li>• 50,000-200,000: <b>45%</b></li> <li>• &lt;50,000: <b>40%</b></li> </ul>
4		Average age of buses	Years	7.7	5
5		Average age of taxicabs	Years	12.9	5
6	Traffic safety	Number of fatalities per 100,000 population in urban area	Person	7	5
7		Number of casualties per 100,000 population in urban area	Person	410	300
8	Energy and Environment	Greenhouse Gas (GHG) emission from transport sector	Ton-CO <sub>2</sub> /person	2.60	2.55

Source: MRMO, JICA Study Team

It should be noted that there was a preceding regulation called the Public Transport Development and Fuel Consumption Management Regulation of 2008. The regulation specified the policy target for urban transport including the trip share of public transport of 75% during the period of 2011–2015 for the entire country.

The 2016 transport policy proposed by MRMO revised the 2008 regulation as follows: i) the 75% target for the trip share of public transport was maintained for large cities with more than 1 million population; ii) the target for national average was lowered to 50%, and softened for medium and small cities; and iii) the share of taxi was specified. Moreover, the transport policy target was refined for several categories, adding targets for GHG emission, traffic safety, and age of the vehicles for public transportation services.

These figures were estimated and specified by MRMO, based on the statistics aggregated with the data from municipalities, while the activities for improvement are to be planned and implemented by local governments and municipalities.

## **3.2 Status of Urban and Railway Development in the Tehran Metropolitan Area**

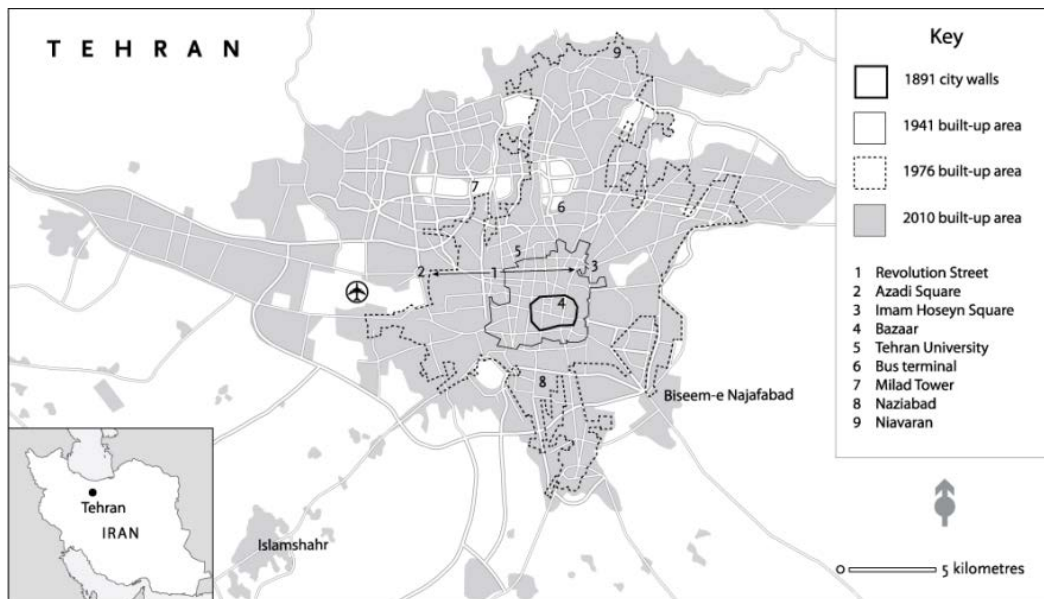
### **3.2.1 Urban Development in the Tehran Metropolitan Area**

#### **(1) Urbanization in Tehran**

Until the 17<sup>th</sup> century Tehran was a small village located to the north of Shahr e Ray, a flourishing city with a history dating back over 6000 years. Qajar King choose Tehran as the capital of Iran in 1796 and the city was expanded with the bazaar as the center of business.

Up until the 1920s, Tehran was surrounded by a wall, and Tehran, Tajirish, and Ray had distinctly separate boundaries. Tehran developed rapidly under the reign of Reza Shah of the Pahlavi dynasty (1925-1979). The city wall was removed as a symbol of the new monarch and the city

was gradually expanded northward. In the 1960's the city was expanded especially to the east as shown in Figure 3-1.

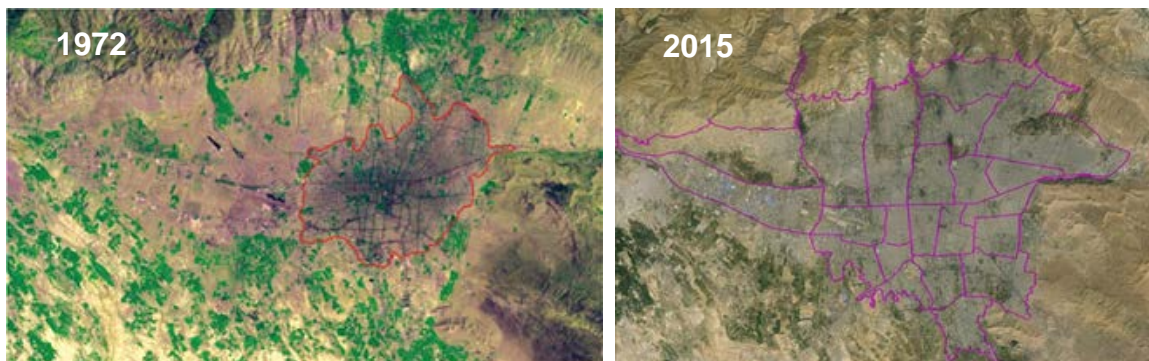


Source: Tehran Municipality

**Figure 3-1 History of Urbanization in Tehran**

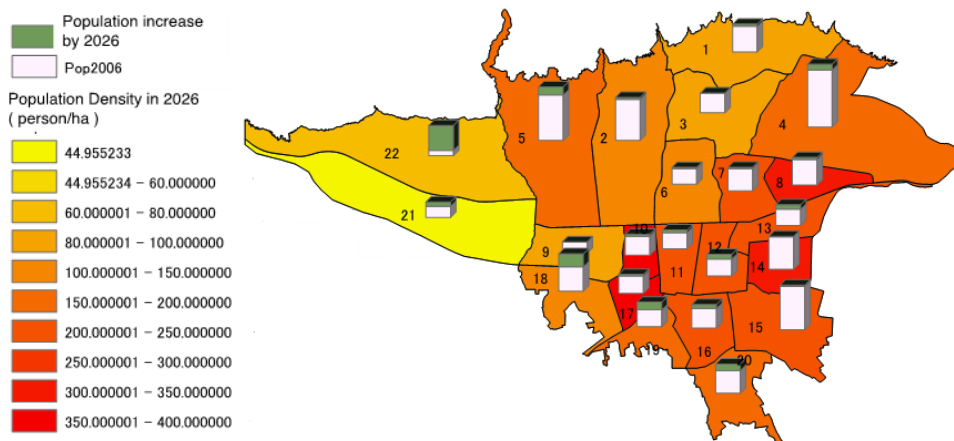
The aerial photos in Figure 3-2 show the state of urbanization of Tehran in 1972 and 2015. It indicates that urban development had taken place in the north-south direction by the 1970s, followed by the westward expansion of the urban areas after the development of the 1968 masterplan. At present, the population of Tehran is 8.20 million, and its density is 10,750 per sq.km (surface area of the municipality is 740 sq.km). The population growth of the whole city was around 0.4% in 2001-2011.

Tehran consists of 22 districts, and its population and population density by district are shown in Figure 3-3. It indicates that central districts of Tehran have a high population density. Generally, the low to middle income inhabitants reside in the southern and eastern areas, while the middle to high income inhabitants reside in the northern areas. The figure also depicts the forecasted population increase by 2026, with District 22 expected to have the biggest growth. Note that District 21, located to the south of District 22, consists of industrial zones and has relatively lower population density.



Source: Tehran Municipality

**Figure 3-2 Urbanization of Tehran in 1972 and 2015**



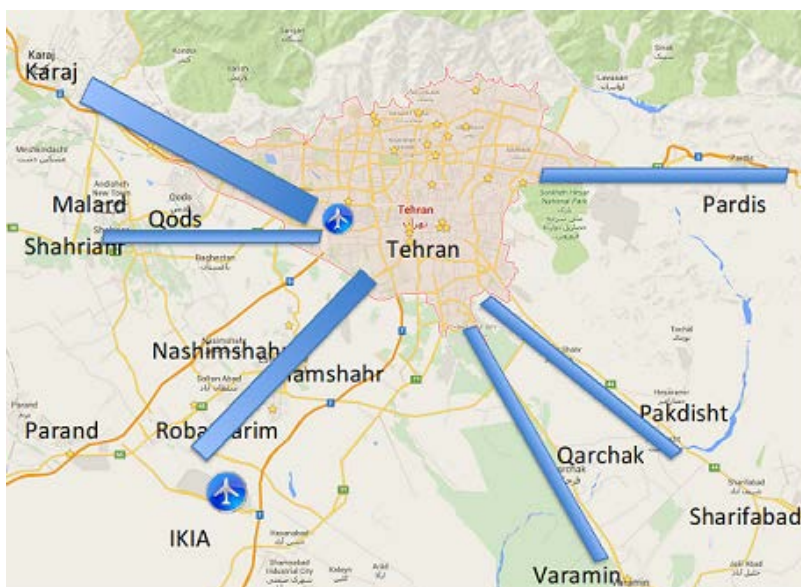
Source: Tehran Municipality

**Figure 3-3 Population by District in 2006 and Future Growth by 2026**

**(2) Development Around Tehran**

There are several major cities located around Tehran, as shown in Figure 3-4. Karaj is the largest with a population of 1.6 million in 2011, followed by Eslamshahr (400,000), Malard (290,000), Qods (280,000), and Soltanabad (270,000). These cities except Karaj are located to the southwest of Tehran. The blue bars in the map provide conurbations and corridors of those suburban cities, and the width of the bar represents relative size of the traffic to Tehran<sup>2</sup>, indicating that Tehran-Karaj is the most heavily traveled corridor, followed by Tehran-southwest.

The average rate of population growth in Iran during 2006-2011 was 1.3% per annum, while its urban population grew at an average rate of 2.1% per annum. Population growth of Tehran Municipality was slow, at an average rate of 0.4% in 2001–2011. Over the period, much of the population growth in the Tehran Metropolitan Area occurred in cities around Tehran.



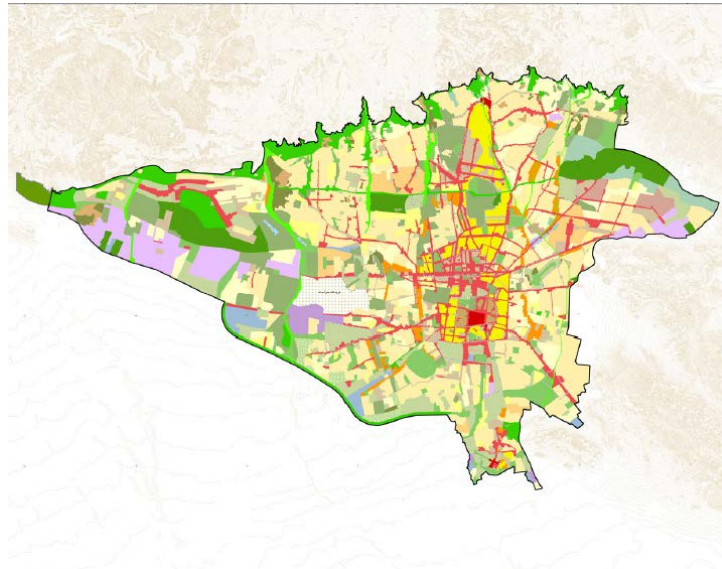
Source: JICA Study Team

**Figure 3-4 Major Cities Around Tehran**

<sup>2</sup> See Figure 3-15 for details.

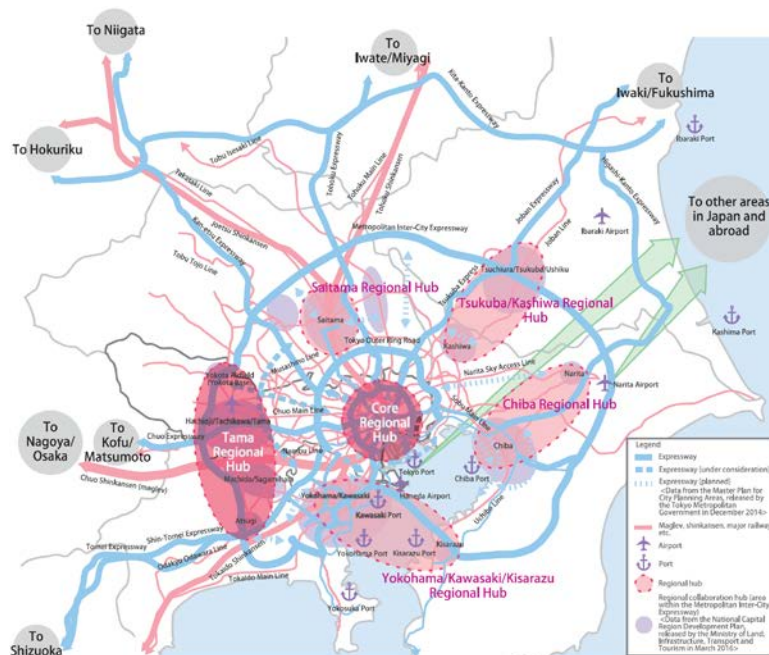
### (3) Urban Planning in Tehran Municipality

The urban planning system in Iran consists of a dual structure, and the city master plan (Comprehensive Plan) sets the population goal of the entire city area and the land use plan. In addition, detailed plans for each district set usage, volume rate, floor height, unification of skyline, etc. Meanwhile, the urban image and urban structure on a regional level which is seen in the master plan of Japan, are not studied. Figure 3-5 shows the land use plan of Tehran on the Comprehensive Plan revised in 2007, Figure 3-6 shows the city structure of Tokyo.



Source: Tehran Municipality

Figure 3-5 Land Use Plan in Tehran



Source: Tokyo Metropolitan Government

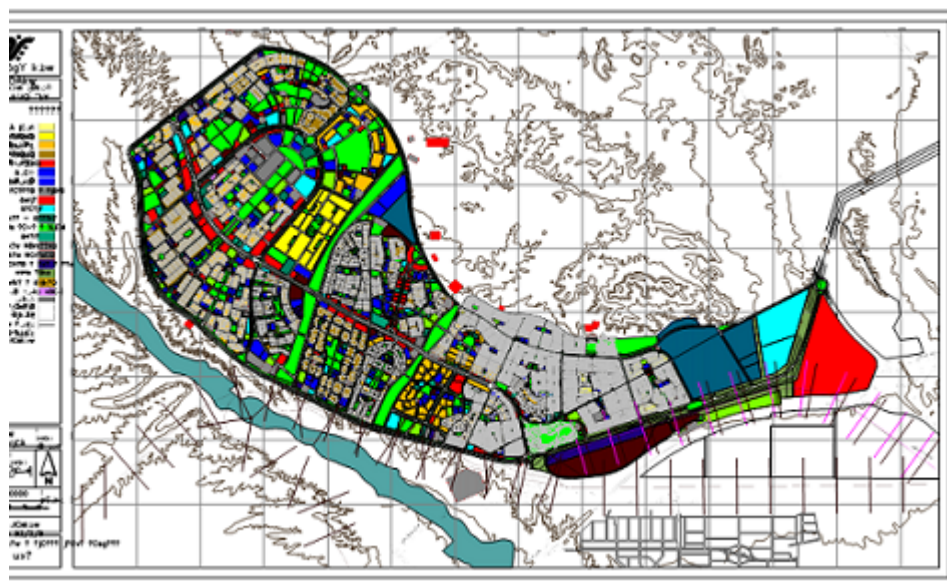
Figure 3-6 Urban Structure Tokyo on a Regional Level

#### (4) Mehr Housing Project

The Mehr Housing Project is a major urban development approach that has been implemented by MRUD in Iran over the past decade. Originally, it was initiated in 2007 as a five-year scheme of affordable housing development led by the national government, although the provision of housing itself has been undertaken by private contractors, not by government entities. Private contractors of the Mehr Housing Project have been granted land for housing from the government and have implemented affordable housing business for low income people. The housing design is standardized as 75 sqm. Tenants can access low interest mortgage loans. The target number of housing is 2 million units in five years. Parand and Pardis, which are described below, are among the targets of the Mehr Housing Project.

#### (5) Parand and Other Cities to the Southwest of Tehran

Parand is a planned city located 30 km southwest of Tehran and its development started in 1997 (see Figure 3-4). The population of Parand is about 200,000 at present and is expected to increase to 500,000. The development has been planned in 0–6 phases. Phases 0 and 1 have been completed, characterized by low density development with flat and low-level apartments. For Phase 2 and 3, medium density development has been undertaken. Phases 4, 5 and 6 are designated as part of the Mehr Housing Project and have been developed to provide affordable housing with high-rise apartments.



Source: JICA Study Team

**Figure 3-7 Zoning Plan of Parand**

Figure 3-8 shows Parand and other major cities to the southwest of Tehran as well as the Imam Khomeini International Airport (IKIA). Several cities along the way to Parand including Eslamshahr, Slaehiye, and Nasirshahr form a part of the Tehran conurbation. Industrial zones and logistics sites are located in these cities. The red line in the map indicates the alignment of Metro Line 1, including the planned extension. The section between Tehran and IKIA was completed and opened in 2017, while the extension to Parand is yet to be started.



Source: JICA Study Team

**Figure 3-8 Parand and Other Cities to the Southwest of Tehran**

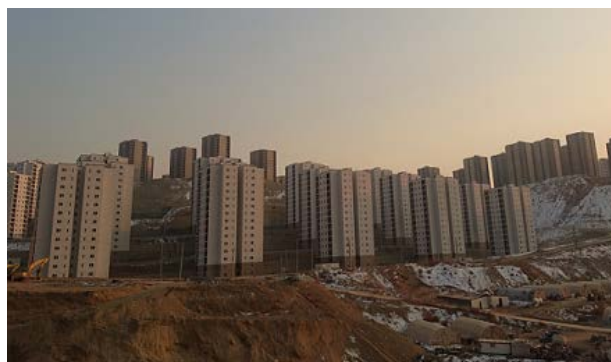
**(6) Pardis**

Pardis is located 20 km east of Tehran (see Figure 3-4) and is served by two expressways. Land development in Pardis has been undertaken in about eleven phases (see Figure 3-9), with the planned population being 450,000. Initial phases were completed ten to fifteen years ago, wherein local communities with commercial, social and religious functions have been developed. Figure 3-10 shows the current development undertaken by a Turkish contractor with 100 to 120 high-rise residential buildings constructed on relatively steep hills. There are bus services both local and to Tehran but on a limited scale, and the residents in the area mostly rely on their own cars.



Source: JICA Study Team

**Figure 3-9 Pardis Development Plan**

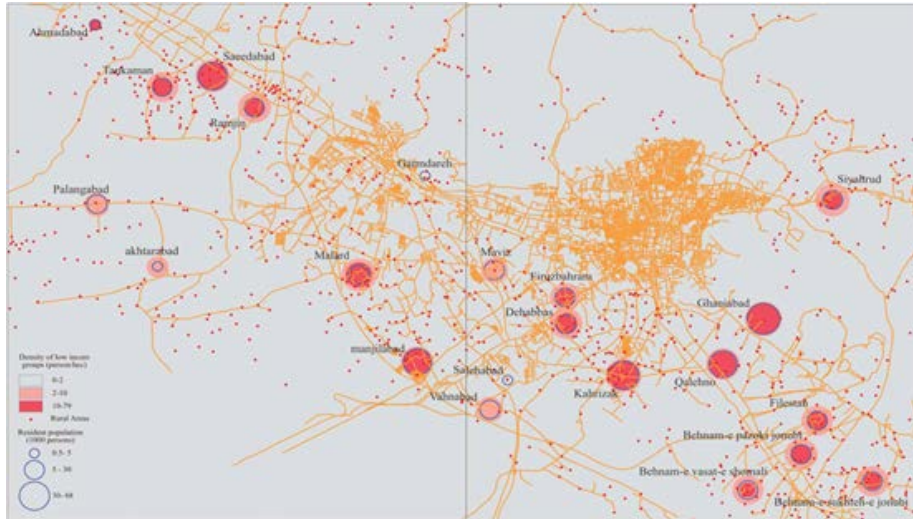


Source: JICA Study Team

**Figure 3-10 Current Development in Pardis**

**(7) Informal Settlements**

There are many informal settlements in the suburbs of Tehran as shown in Figure 3-11. They are mostly located along the expressways and highways to Tehran and provide inexpensive labor forces largely for the light metal and automobile sectors.



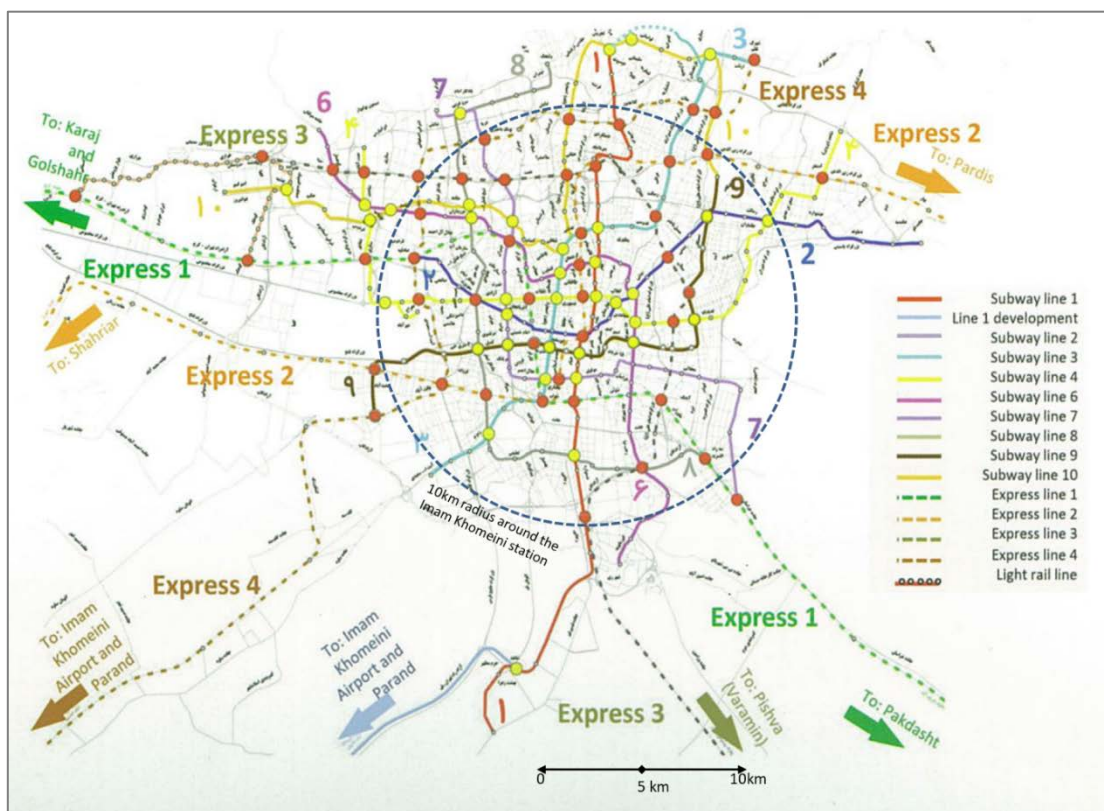
Source: Atlas of Tehran Metropolis

**Figure 3-11 Low Income Settlements in the Suburbs of Tehran**

### 3.2.2 Railway Network Development in Tehran Metropolitan Area

#### (1) Tehran Transport Masterplan 2013

Figure 3-12 shows the metro and railway network proposed in the Tehran transport masterplan prepared in 2010–2013. The target year of the masterplan is 2025. The total length of the proposed network is 747 km, of which about 175 km has been developed.



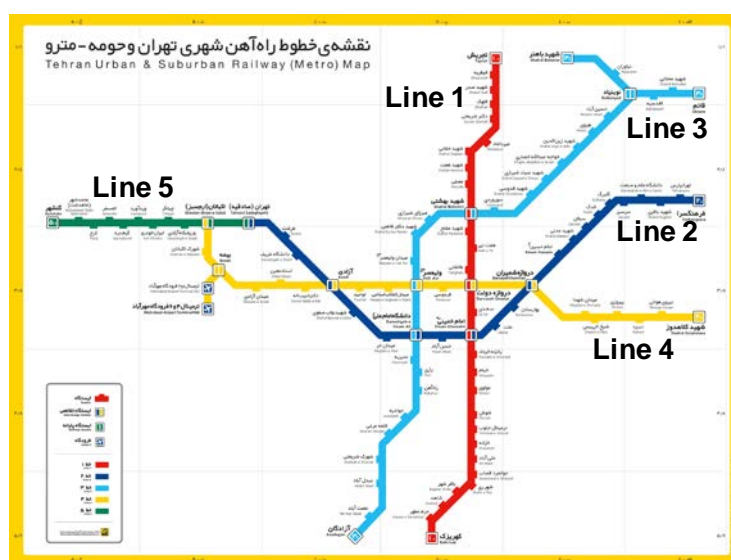
Source: Tehran Municipality, JICA Study Team

**Figure 3-12 Tehran Railway Network in 2013 Transport Masterplan**

Tehran Municipality is now revising and updating the transport masterplan by employing SYSTRA, the consulting firm that prepared the 2013 masterplan. The revision to be made is expected to be minor. Through the interview with the SYSTRA team, the JICA Study Team suggested to the Municipality about the importance of incorporating the TOD concept and application in the revised masterplan.

## (2) Metro Network Development

Currently, there are five metro lines that are operated in Tehran, as shown in Figure 3-13. Lines 1 and 2 were developed first and are running along the historical urban axes, north-south and east-west. Line 1 has been extended to IKIA with its extended section opened in August 2017. Line 5 that connects with Lines 2 and 4 is the first suburban line in Tehran, providing express services along the Karaj–Tehran section. Line 3 that runs in parallel with Line 1 is planned to be extended toward the southwest of Tehran to connect with Eslamshahr and IKIA. Line 4 runs in parallel with Line 2 and has a branch connecting with the Mehrabad Domestic Airport.



Source: Tehran Urban and Suburban Railway Operation Co., JICA Study Team

Figure 3-13 Present Metro Network in Tehran

## (3) Metro Assessment for TOD Aspects

Unfortunately, TOD has not been considered over the period of Tehran metro development. Some of the critical observations regarding the lack of TOD consideration include the following:

- Lack of coordination/convenient connections between the metro stations and surrounding urban development. For example, there are cases that only one exit has been constructed for stations that are located at four-leg junctions. There are even cases that the only exit constructed is located at the corner of less developed blocks.
- Lack of harmonization with passenger flows at and around metro stations. For example, there is lack of convenient connections with BRT/taxi stations, harmonization with surrounding social services such as schools and hospitals, and convenient walking access around metro stations.
- Lack of effectiveness of bus terminal use. There are several bus terminals connected with metro services in urbanized areas, but they have been underdeveloped and there is much room for improvement through TOD approaches to provide convenient intermodal connections.

There are also positive aspects of the Tehran metro in promoting TOD, which include the following:

- Value capture in the development around metro stations: Tehran Metro is selling the development rights to the private companies for the land it owns around the metro stations and is using the proceeds to partly finance the metro construction. This method was used for Shahid Sadr Station of Line 1 and Shahid Bagheri Station of Line 2. It is considered an effective way of financing metro development, using TOD and PPP approaches. On the other hand, Tehran Metro relies on the private sector for the provision of related facilities around stations, including those for improving pedestrian accessibility and intermodal transfer.
- Convenient interconnection: Generally, the interconnection between different Tehran metro lines is convenient, enabling smooth transfer of the passengers. For example, passengers can transfer between Line 2 and Line 5 on the same platform, which is an effective arrangement for mass transit services. The Metro lines have been developed along the historical urban axis, and are connected with major transport nodes, including bus terminals, central station and airports.
- Metro Lines 6 and 7 are almost developed and will be opened in a few years, then the constructions of Metro Lines 8 and 9 are expected to be commenced. Those will enhance the capacity of the metro network of Tehran, which may accommodate the expanded influx from growing suburbs.

#### (4) Future Development of Express Lines

The 2013 Tehran transport masterplan proposed the development of several express lines as shown in Figure 3-12. Although this proposal is at a conceptual level, the provision of express services would be critical as large-scale residential development is further progressed in the suburbs. The concept of the proposed express lines is similar to RER in Paris (Regional Express Network in English), which provides regional express services and facilitates the traversing of urban centers. The Transport for London (TfL) has also developed a similar railway called “Crossrail”, providing high frequency, high capacity services. Crossrail and RER lines are shown in Figure 3-14.



Source: JICA Study Team

Figure 3-14 Examples of Express Lines in Europe

### (5) Start of Suburban Railway Services by RAI

Prior to 2012, NTDC had prepared a plan for the railway service extension to Eslamshahr and Parand, and some actions were taken to provide suburban railway services using RAI's infrastructure, but the plan did not materialize. In 2017, however, RAI procured the rolling stock for suburban services and started operation using RAI's existing railway network in and around Tehran. The services have been provided in four directions, i.e., toward Varamin, Qom, Parand and Karaj, as shown in Figure 3-15. BOX-1 on the next page shows the railway operation to Parand as an example.



Source: JICA Study Team

Figure 3-15 Network of Tehran Suburban Railway Services by RAI

### (6) Suburban Extension of Metro Lines

Tehran Metro also has a plan to extend its existing metro lines including Lines 1, 2 and 3, as shown in Figure 3-16.



Source: MRMO

Figure 3-16 Plan of Suburban Extension of Metro Lines

These suburban lines are partly like the express lines proposed in the 2013 masterplan. As described earlier, Metro Line 1 has been extended up to KIA and is in operation. Note also that the suburban railway services along the line toward Varamin and the line toward Qom (southward from Eslamshahr) have been provided by RAI, as described later.

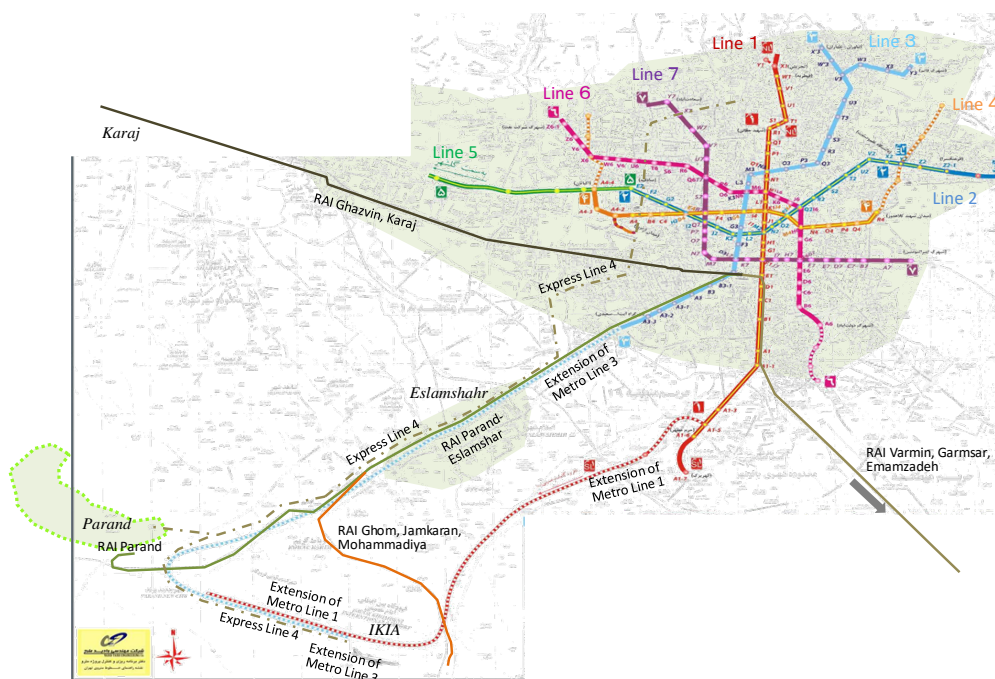
### (7) Development of Suburban Railway Services by MRUD and RAI

In the first TOD seminar held in early 2016, the Minister of MRUD mentioned the priority development of suburban railway services as follows: (i) the lines between Karaj and Varamin (northwest-southeast), (ii) the lines between Pardis and Parand via Eslamshahr and KIA (northeast-southwest), and (iii) development of related terminals and TOD.

In MRUD, the function of suburban railway development is undertaken by the railway department of the New Town Development Corporation (NTDC). Its priority is to develop the suburban line between Tehran and Pardis, and a feasibility study conducted internally has been completed.

### (8) Overlapping among the Suburb Lines

As aforementioned, there are several plans and operations in the suburbs, including operation and plans for the Tehran Metro extension, the Express Lines, and operations of the RAI suburb lines. Figure 3-17 presents the geographic relations among those proposals.



Source: JICA Study Team

**Figure 3-17 Rail Plan and Operation in the Tehran Suburb**

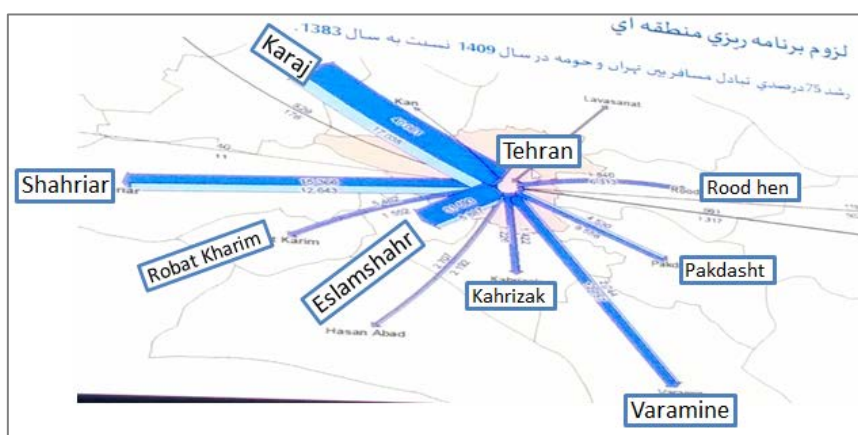
In the figure, the present metro lines from Line 1 to Line 5 and Lines 6 and 7 under construction are depicted. The green shaded areas roughly represent the built-up areas in Tehran and the suburbs. As for lines in the suburbs, the metro line 1 extension to the south, colored in red, has completed, and operation has started up to KIA airport. The metro line 3 extension is under planning, drawn in light blue dotted lines, passing Eslamshahr and Parand and reaching KIA airport. The RAI commuter services are drawn in the map by direct lines with similar color code shown in Figure 3-14. There are mainly four lines of the RAI commuter services, but the Line for

Parand (in green) and the Line for Ghom (in orange) share the alignment up to IKIA airport. The last one is the Express Lines, and Express Line 4 is presented in the figure. The actual alignment of the Express Lines in the suburbs have not been yet clarified, but its destination are defined in the masterplan.

As shown in the figure, the plans and operations of railways are overlapping along the Eslamshahr-Parand corridor. Coordination among the related stakeholders is necessary.

### (9) Demand for Suburban Railway Services

Figure 3-18 shows an example of traffic forecast for suburban railway services around Tehran. It indicates that potential traffic demand for Karaj–Tehran is the biggest among the corridors shown in the figure. The traffic for Eslamshahr–Tehran also has a high growth potential, and if the extension beyond Eslamshahr is considered, the growth potential of this corridor would even be higher.



Note: Light blue bars represent the traffic in 2004, and blue ones show the forecasted traffic in 2030.  
Source: MRUD-RAI TOD Seminar held on January 31, 2016, JICA Study Team.

**Figure 3-18 Traffic Forecast for Suburban Railway Services**

**BOX-1: RAI's Suburban Railway Operation to Parand**

Raja Rail Transportation Company and RAI started the operation of commuter rail services in the suburbs of Tehran in the summer of 2017, including the service in the direction of Parand and Eslamshahr. (Raja Rail is an affiliate body of RAI, undertaking passenger rail operations of RAI.) The rolling stock used is 4-car Diesel Multiple Units (DMUs) called Railbus in the local market, supplied by Hyundai Rotem. Based on the information obtained in January 2018, its operation to Parand covers four round trips in the morning and seven in the evening on weekdays, and two round trips on weekends. It connects Parand with Tehran in 60–70 minutes, stopping at several stations in between. The tariff for Parand–Tehran is 1.3 USD per trip per person.



Train arrival at Parand on time (at 17:20)

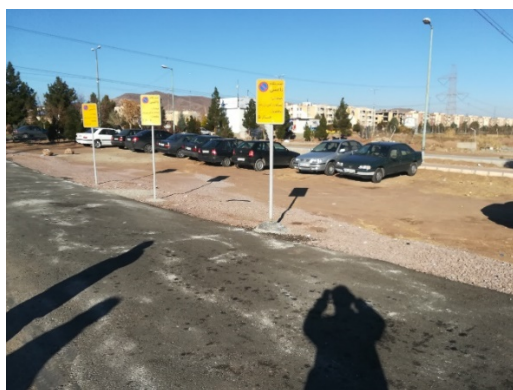
Timetable at Parand Station

[Right] About 150 passengers get off an evening train at Parand. At present, the station has a simple platform and benches without modern station facilities other than lighting. The structure seen in the photo is a platform that was built based on the previous plan but is not used now.



[Right down] Taxis and minibuses are on time, ready to transport railway passengers. Minibuses operate to some districts of Parand, 5–8 km away from the station.

[Left bottom] Park-and-ride free parking has also been developed, although it is unpaved and unguarded at present.



## **(10) Major Planning Issues on the Development of Suburban Railway Services**

As described in this section, various plans have been prepared for the development of suburban railway services in the Tehran Metropolitan Area. Major planning issues in this regard may include the following:

- There are overlaps in the Suburban rail plans by different agencies.
  - For instance, the extension of Metro Line 3 planned by Tehran Metro, Express Line 4 proposed in the 2013 Tehran transport masterplan, and the suburban services currently provided by RAI.
- In the existing line, there are many stations between the suburban areas and Tehran, and this may not be suitable in providing express services.
  - For instance, the extension of Metro Line 1 will provide suburban railway services between Parand and Tehran via IKIA, but there are already many stations.
- The current rail infrastructure of RAI's suburban services is not capable of providing high frequency, high capacity suburban services.
- There should be coordination among the concerned agencies to formulate an integrated plan for the development of suburban railway services.

### **3.3 Major TOD-related Issues in Iran and Potential TOD for the Tehran Metropolitan Area**

This section describes the major TOD-related issues in Iran that are based on the findings in the preceding sections and proposes TOD approaches that may potentially be implemented in the Tehran Metropolitan Area.

#### **3.3.1 Major TOD-related Institutional Issues**

##### **(1) Need for Inter-Agency Coordination for the Development of Suburban Railway Services**

Currently, the division of responsibility for transport planning in Iran includes the following: municipalities are responsible for the urban transport in the areas of their jurisdiction, with MRMO of the Ministry of Interior supporting the activities of the municipalities, while MRUD is responsible for intercity transport. However, with the population growth in the suburbs and expansion of urbanization, it will be increasingly necessary for municipalities to plan and develop transport systems beyond the municipal boundaries. For example, the Tehran municipality has planned the extension of Tehran metro services and the development of express lines, both extending beyond its municipal borders. At the same time, MRUD and RAI have started the operation of suburban railway services in the Tehran Metropolitan Area, which overlaps with the plans of the Tehran municipality.

As mentioned earlier, there should be coordination among the concerned agencies to formulate an integrated plan for the development of suburban railway services. It is important to undertake this coordination within the revision of the Tehran transport masterplan that is currently being conducted.

The JICA Study Team considers that TOD is a good opportunity in which MRUD and the Tehran municipality (with MRMO) can work together and coordinate the activities for transport development, including the planning and development of suburban railway services.

The Study Team understands that personnel exchange between the Tehran municipality and the central government including MRUD and MRMO is becoming active, especially at top and middle management levels. Such personnel exchange had been rare up until a few years ago. This movement is an important step towards realizing effective inter-governmental coordination. It is also extremely beneficial for the promotion of TOD as well as the coordination of transport developments related to TOD.

## **(2) Importance to Recognize the Gap between Housing and Public Transport Developments**

As described in Section 3.2.1, there has been a clear trend of suburban population growth in the Tehran Metropolitan Area. Over the past decade, the development of affordable housing has progressed steadily in the suburbs, including Parand and Pardis, and high occupancy rates have generally been achieved for newly constructed affordable apartments.

On the other hand, the development of public transport to serve the growing suburban population has progressed slowly, leading to a large gap between the supply and demand for transport services in the suburbs. In Pardis, for example, there are bus services both local and to Tehran, but on a limited scale, and the residents in the area mostly rely on their own cars. Due to the need for developing the railway line between Tehran and Pardis, a feasibility study was conducted by NTDC. In Parand, the RAI railway station for suburban services is located at the very edge of the city entrance, forcing passengers to access the station by other transport modes. In addition, while Metro Line 1 has been extended to the IKIA, the extension to Parand is yet to be started.

Given the current supply-demand gap for suburban transport services, the development of rail transport should be prioritized in TOD in the suburbs<sup>3</sup>.

## **(3) Cooperation between Private Developers and Public Railways**

In Japan, private railway companies played a major role in TOD undertaken in the suburbs of Tokyo and Osaka. On the other hand, private companies are not permitted to undertake railway development in Iran. Therefore, it would be realistic to consider a TOD model that does not rely on the potential entry of private companies into the railway development. One practical approach would be that the development of housing is to be undertaken by both public (NTDC) and private developers (local and Turkish) as practiced in the Mehr Housing Project and the railway development by public entities, with the overall implementation to be managed and coordinated by MRUD. This type of TOD model was also implemented in Japan for the development of Tsukuba Express and land development along the line to the northeast of Tokyo, which can be referenced for the planning of suburban TOD in Iran.

## **(4) Competition with Road-Based Transport and Pricing**

One potential barrier against the promotion of TOD in Iran is the high level of dependency on road-based transport. In Iran, passenger cars are produced and sold at prices affordable even for low-income households. Gas prices are also kept low with the provision of gas subsidies. Moreover, an extensive network of highways and expressways has been developed in Tehran with no tolls imposed. It should be noted that area pricing and even-odd number plate regulation have already been implemented in Tehran and other major cities in Iran, which are the most strict traffic demand regulations in the world.

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<sup>3</sup> The detail analysis was given in the report of Tehran Long Term Urban Rail Plan, prepared by Tehran Urban and Suburban Railway Company (TUSRC) and SYSTRA in January 2007. This is the base of the Tehran Transport Masterplan 2013.

The Government of Iran has also been subsidizing the railway services, thereby keeping the tariff at low levels. For example, 70%-75% of the operations and maintenance expenditure of the Tehran metro has been covered by subsidies from the central government and the municipalities, with only 20%-30% financed by farebox and advertisement revenues. Given this situation, expanding the railway services would increase the financial burden on the public sector without implementing other cost recovery measures. As described earlier, Tehran Metro is selling the development rights to private companies for the land it owns around the metro stations, capturing its value for development. This kind of cost-recovery measure should be used extensively in the implementation of TOD.

The low cost of road transport also provides an advantage for the railway services. In Tehran, there is a large supply of shared or informal taxis that are priced at low levels. These taxis can provide railway passengers with transport services that are nearly door-to-door. It would be extremely important to incorporate taxis in the planning of TOD so that the combined railway-taxi transport can provide a higher level of service than the transport by private cars.

### **3.3.2 Major TOD-related Planning Issues**

#### **(1) TOD-related Planning Issues in Urban Areas**

There has been a lack of TOD consideration in the urban areas of Tehran as manifested by the following issues, which is primarily due to the lack of inter-agency or inter-departmental coordination:

- Lack of integration with land use planning of the surroundings of the metro stations, and major transport hubs, including deregulation of volume control
- Lack of coordination/convenient connections between metro stations and surrounding urban development, such as the case that only one entrance has been constructed even for metro stations located in busy areas.
- Lack of convenient connections between metro stations and BRT/taxi stations, harmonization with surrounding social services such as schools and hospitals, and convenient walking access around metro stations, which is primarily due to the lack of inter-agency or inter-departmental coordination (e.g., between Tehran Metro and bus/taxi operating companies).
- Lack of convenient intermodal connections at the bus terminals connected with metro stations in urban areas.
- Lack of public land that can be used for further development in the urban areas of Tehran. In this regard, there are several areas of land owned by the Iranian Military that can be a candidate site for TOD, although the conversion of these areas to service centers is not progressing smoothly.
- Lack of experience with connecting metro stations with underground private sector facilities, which seems to be primarily due to security reasons.

#### **(2) TOD-related Planning Issues in Suburban Areas**

There has been a lack of TOD consideration in the suburban areas of Tehran as manifested by the following issues:

- There is no integration of urban development and transport development. Urban development starts first, and railway development follows.
- Overlapping of the Metro extension and RAI's commuter service operation can be identified. The engineering and rail operation specifications for the metro and the commuter services should be coordinated with the characteristics of the future demand.
- There are no examples for the value capturing planning in the suburbs.

### **3.3.3 Potential TOD in Urban Areas**

#### **(1) Development of Intercity Bus Terminals**

There are some large bus terminals in central, west, south and east Tehran, accommodating intercity and intracity buses, the metro and taxis. Most of the terminals are located at the boundaries of the urban areas, surrounded by high volume highways and kept as an open lot with simple terminal functions for the intercity bus customers. In the peak hours, the concentration and mix of pedestrians and buses bring chaos to the surrounding streets.

The existing terminals are sufficient targets for TOD to implement the integrated development approach with commercial buildings or residential buildings. For the implementation, it will require the relaxing of the volume regulations on the terminal area. Furthermore, the usage of the area as terminals for the suburban railway lines could be considered, particularly for the express line function proposed in the Masterplan.

#### **(2) Improvement in Accessibility of Existing Metro Stations**

The metro stations are the key functions for TOD in the urban areas. Improvement of the accessibility of various transport modes with metro services would be the suitable approach of TOD in the urban areas, enhancing its integration of urban services and transport services.

### **3.3.4 Potential TOD in the Suburbs**

#### **(1) Railway Development to Connect Tehran and Suburban New Cities**

There are several suburban railway development plans in Tehran. The development of suburban rail services is an effective approach to materialize the TOD in Tehran. The high level of population density in central Tehran and the pressure of population growth in the metropolitan area will accelerate the urbanization in the suburbs.

There are institutional difficulties in the implementation of the railway development plans. However, the institutional integration among municipal and central governments is progressing, and the time is about right to consider the railway development utilizing TOD approaches (see (3) of this section for a further approach of railway planning in the suburbs).

It is important to consider the transport market economics in pursuing the suburban railway development, as mentioned earlier. The road transport costs are arbitrarily kept low in the market, and passenger car users in the suburbs currently have low incentive to use the railway. Moreover, the low tariff of passenger rail services may not attract new investment to the rail infrastructure.

#### **(2) Integrated Development of RAI Property and Railway Services**

RAI is the key organization for the development of suburban railway services. However, so far, its approach for development is focused on the procurement of new rolling stock for suburban services. RAI owns a lot of unused lands along the corridors to Eslamshahr, Karaj and Varamin, which can be effectively utilized for the development of new housing. Some are close to international and domestic airports as well as the RAI network.

According to the interview with RAI, the organization requires justification of the new investment plans for the new railway services. The Study Team suggests the integrated development of those unused lands, including the scheme to capture the land value. The expected increase in land value will become the source of investment in the railway development, such as the track doubling, rehabilitation of the station structures, signaling and electrification. With the incorporation of the TOD approaches, RAI will be able to sustainably maintain its passenger demand as the residents can access their destination with railways. Under this scheme, RAI would be the major stakeholder, and other stakeholders would be public corporations in Iran, including the New Town Development Corporation. This will allow avoiding the PPP scheme, which is still an unfamiliar scheme in Iran.

### **(3) Development of Feeder Services in the Suburban Cities**

The transport services at the suburban cities are designed to rely only on the road-based transportation so far. The number of residents is increasing, but it does not give a large impact to the housing market of Tehran, as the new residential areas are not so attractive to commuters to Tehran. The railway extension plans are expected to be implemented, although the residents must use taxis, buses or Park and Ride to fill the gap of the “last one mile” to their houses. These mode transfers decrease user satisfaction of the transport services, as there is a time gap between the feeder services and heavy rails, and users are always forced to wait for the feeder buses and taxis at the terminal.

The TOD approach always recommends the integration of the development of the heavy rail and residential areas. The Study Team suggests the extension of the suburban railway into the residential area, as a form of an integrated feeder service. The residential area has a wide road network which can accommodate the railways in the median. LRTs or elevated LRTs are possible approaches to fill the gap of feeder services. Considering the hilly terrains of the new residential areas in Pardis and District 21/22 in Tehran, the tire-based transport services, including Automated Guideway Transit (AGT) systems or monorails, can be considered.

## 4. Proposed TOD Guidelines

### 4.1 Formulating TOD Guidelines and Proposed Technical Guidelines

The JICA Study Team reviewed the content of the TOD guidelines<sup>1</sup> being formulated by the Iranian Government. Although the guidelines for TOD are based on current urban planning-related systems and organizational systems, as a guide for specific planning, they appear to go no further than making generalizations. Points of the TOD guidelines currently under formulation that are considered commendable and points requiring additional information are summarized below.

#### (1) Points of the TOD Guidelines under Formulation that are Commendable

- Organization of plan contents according to each level of development  
The TOD guidelines currently under formulation establish levels for advancement of TOD ranging from macroscale to microscale, such as the regional level, corridor level, and station level, and arrange points including matters requiring attention and consideration to promote TOD at each of these levels. It is thought that the guidelines will be useful for the study of plans from the perspectives of level and progress of development.
- Specific guidance based on the current legal system  
Specific guidance has been provided on how to incorporate TOD content in plans (i.e., urban complex plans, comprehensive plans, etc.) under the current urban planning system.
- Clarification of actions to be taken by each related organization  
Actions to be implemented by each organization involved in realizing TOD (national and local governments, businesses, consultants, NGOs, others) are clearly indicated in the guidelines.

#### (2) Points of the TOD Guidelines under Formulation that Require Additional Information

- Necessity to clarify Iranian-style TOD  
The content of the TOD plan is said to refer to guidelines from other countries, including those of the United States and India. Although it mentions the need for an Iranian-style TOD that considers the issues and actual situations in cities in Iran based on these guidelines, this is not specifically mentioned.
- Necessity of an institutionalized approach to realize TOD  
It would be necessary to present organizational and systemic promotional policies in order to specifically realize TOD based on these guidelines; however, this point is not necessarily explained in a clear manner. Several approaches are described in the “Executive Approaches” section of the Appendix, but it would be necessary to specify these approaches in a more concrete manner.

#### (3) Approaches for Implementation

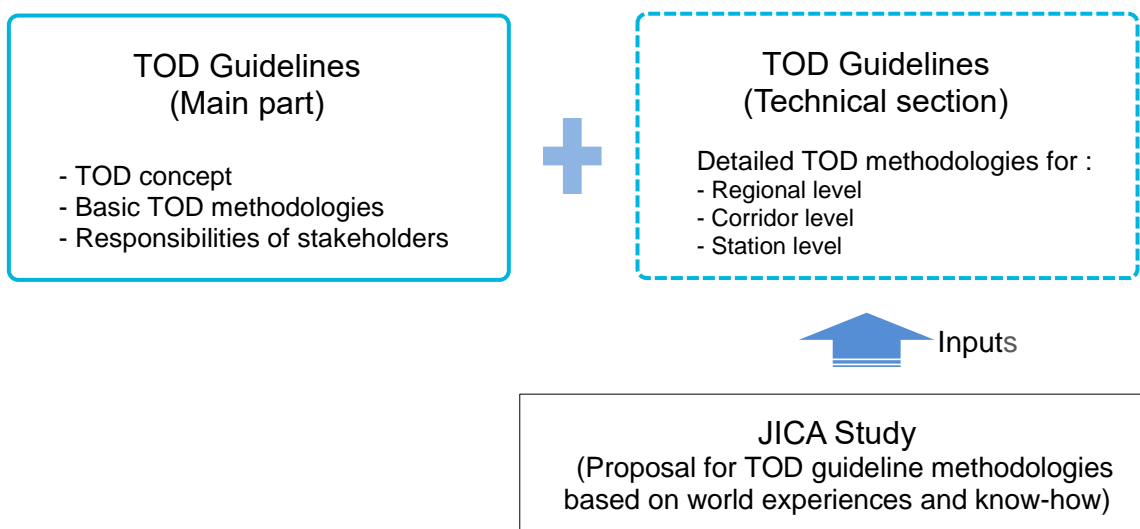
The following kinds of approaches for implementation can be considered based on the above commendable points and points that require additional information.

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<sup>1</sup> Draft version obtained from MRUD in February 2018.

- Clarification of an Iranian-style TOD and examination of concepts based on case analyses, other  
In order to clarify an Iranian-style TOD, it would be necessary to examine planning concepts after a broad analysis of cases in Iran and overseas, based on an understanding of issues, such as current development in cities and around stations. Basic approaches are described in section 4.2.
- Development of legal systems and cross-sectoral organizations for implementation  
Along with dispersing roles for the implementation of TOD among various departments, it is necessary to discuss and resolve issues in this regard in a comprehensive manner. To that end, cross-sectoral organizations and legal systems for support are needed. The basic approach for this will be outlined in section 4.4.
- Realization of a specific pilot project  
In order to advance the above, it would first be necessary to establish a specific site and study ways to achieve an Iranian-style TOD through the form of a pilot project. The advancement of the pilot project will have to be ceded to the next stage, but site possibilities and the approaches for implementation are described in Chapter 5.

Based on the above implementation approach, the figure below shows the association between the items proposed in this study and the TOD guidelines under formulation by the Iranian government. As indicated by this figure, the proposals of this study are assumed to form the base of the TOD guidelines (technical section).



Source: JICA Study Team

**Figure 4-1 Relationship between TOD Guidelines under Development and Items Proposed in the Survey**

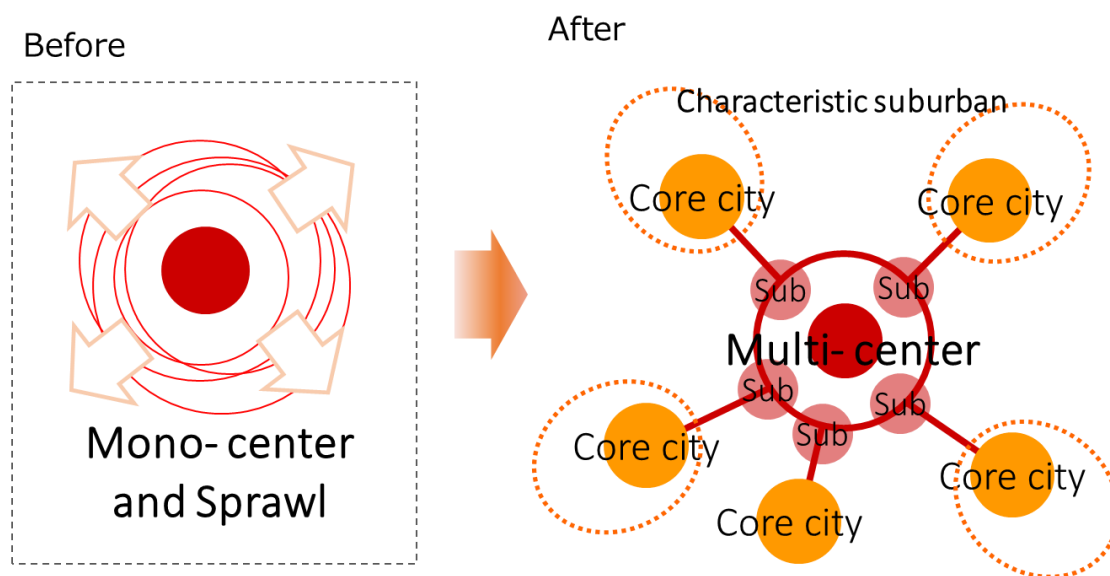
## 4.2 Proposed TOD Guidelines

### 4.2.1 Regional Level TOD

The current urban structure of the Tehran Metropolitan Area is a mono-center urban structure, where traffic congestion and air pollution are escalating due to the use of private transport, such as automobiles. The following points are indicated as potential solutions for rectifying these points from the perspective of urban structure.

#### (1) Transition from Mono-Center urban Structure to a Multi-Center urban Structure

Considering the current scale of the population in the Tehran Metropolitan Area and its serious urban problems, such as traffic congestion and air pollution caused by the mono-center urban structure of the area, a transition to a multi-center urban structure, such as that shown in Figure 4-2, is inevitable. To this end, it is necessary to clearly position sub-city centers and satellite cities in urban planning master plans and other relevant plans at the urban area level and develop legal systems to promote these urban policies. These policies must be coordinated with the direction of development for the entire urban area, such as population placement and industrial location policies. In the Tokyo Metropolitan Area in Japan, factory location laws are implemented as industrial location policies, in addition to the formulation of urban planning master plans in the metropolitan area and each city (see examples on the following pages).



Source: JICA Study Team

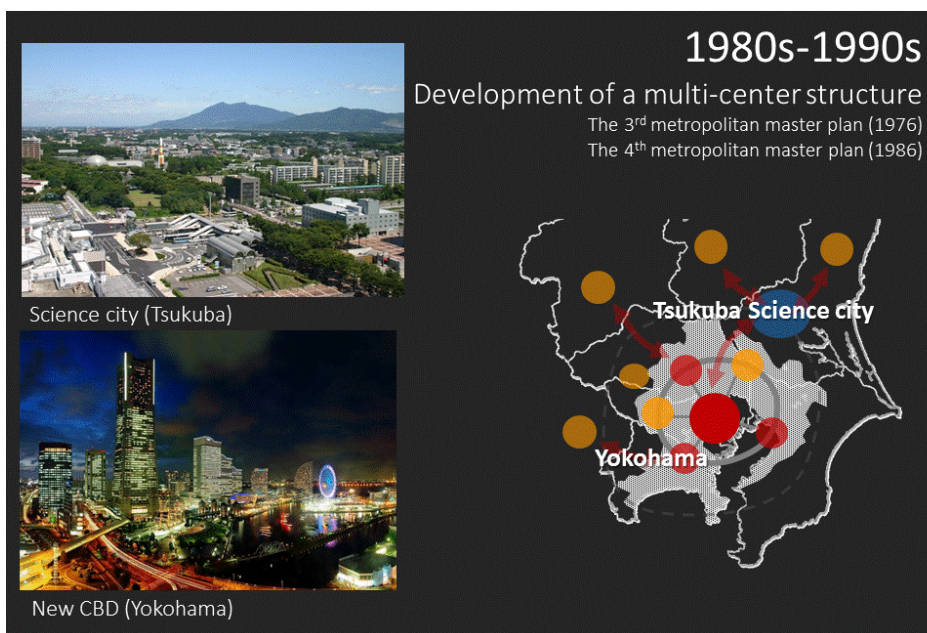
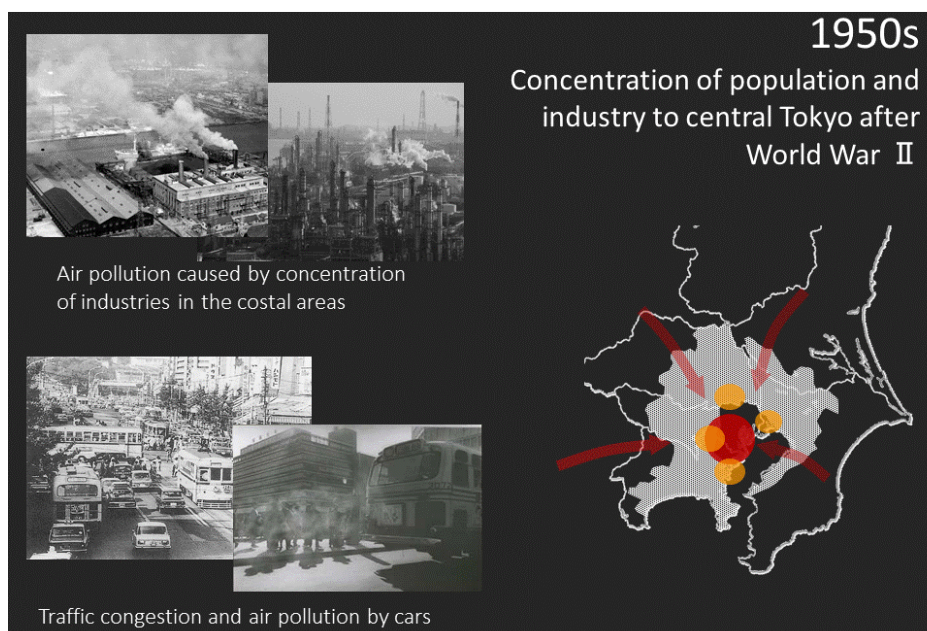
Figure 4-2 Transition to a Multi-Center Urban Structure

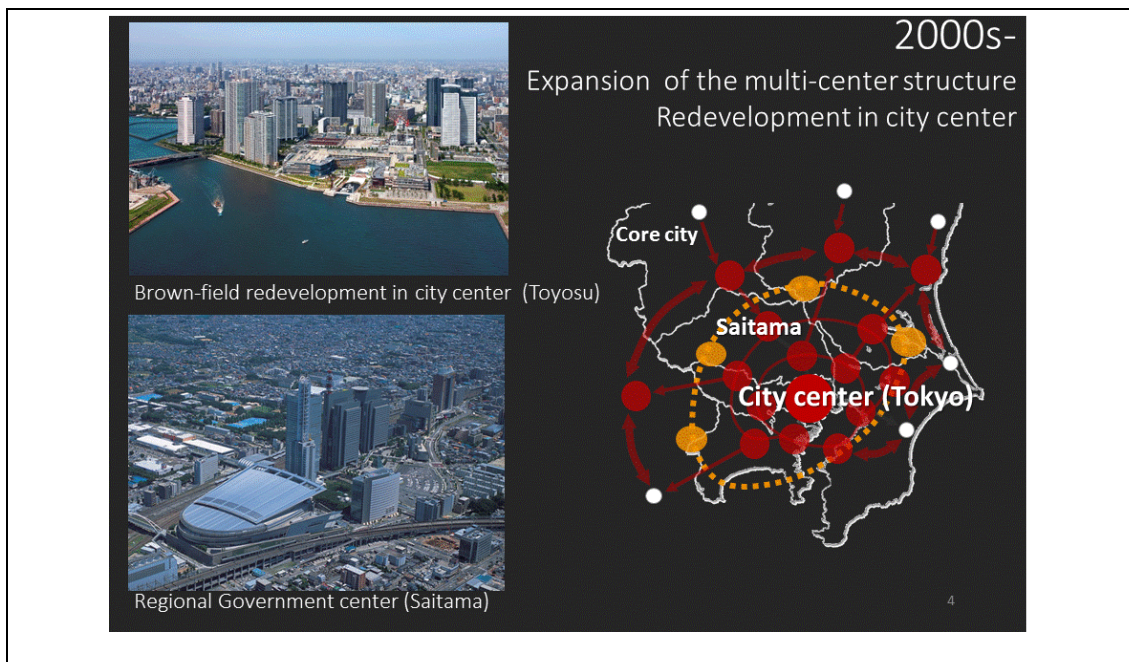
### Case Study: Policy shift to multi-center urban structure (Tokyo Metropolitan Area)

Both before and after WWII, mono-pole development progressed in the Tokyo Metropolitan Area. However, the area underwent a shift to a multi-pole urban structure through various urban policies in order to cope with urban issues, such as traffic congestion and environmental pollution, and create an optimal arrangement for the rapidly increasing population and industries.

Specifically, the cores of the city center and suburbs were clarified in the development plans of the Tokyo Metropolitan Area, which guided the relocation of factories and universities to the suburbs.

The Tokyo Metropolitan Area integrated the location of these urban functions and development along railroads connecting the city center with the suburbs, resulting in the development of a multi-center urban structure with public transportation as its main function.

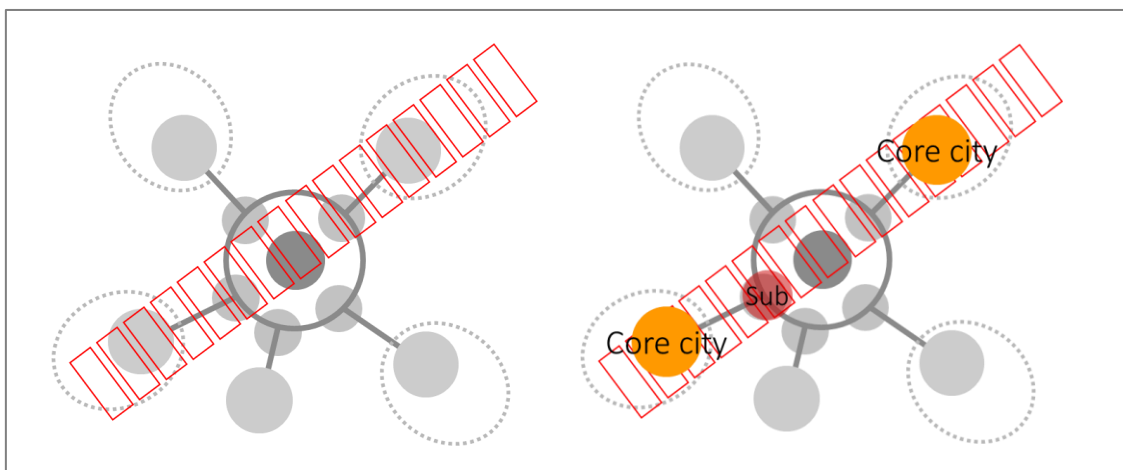




Source: JICA Study Team

## (2) Setting Priority Development Axes and Nodes

Priority developmental axes are set to expand and develop existing core cities as an action plan to achieve the above. The future direction of development will be clarified to offer guidance on public transportation along these axes and urban development associated with them. In addition, nodes will be clearly set in order to exert a pull on the abovementioned priority development axes (see Figure 4-3). These nodes correspond to sub-cities and satellite cities in multi-pole urban structures. It is necessary to comprehensively assess this area based on the land situation (environment and land ownership, other), so that sub-cities and satellite cities can be developed at an early stage. Examples from Copenhagen (Denmark), Denver (USA), and Kuala Lumpur (Malaysia) related to these matters are shown on the following pages.



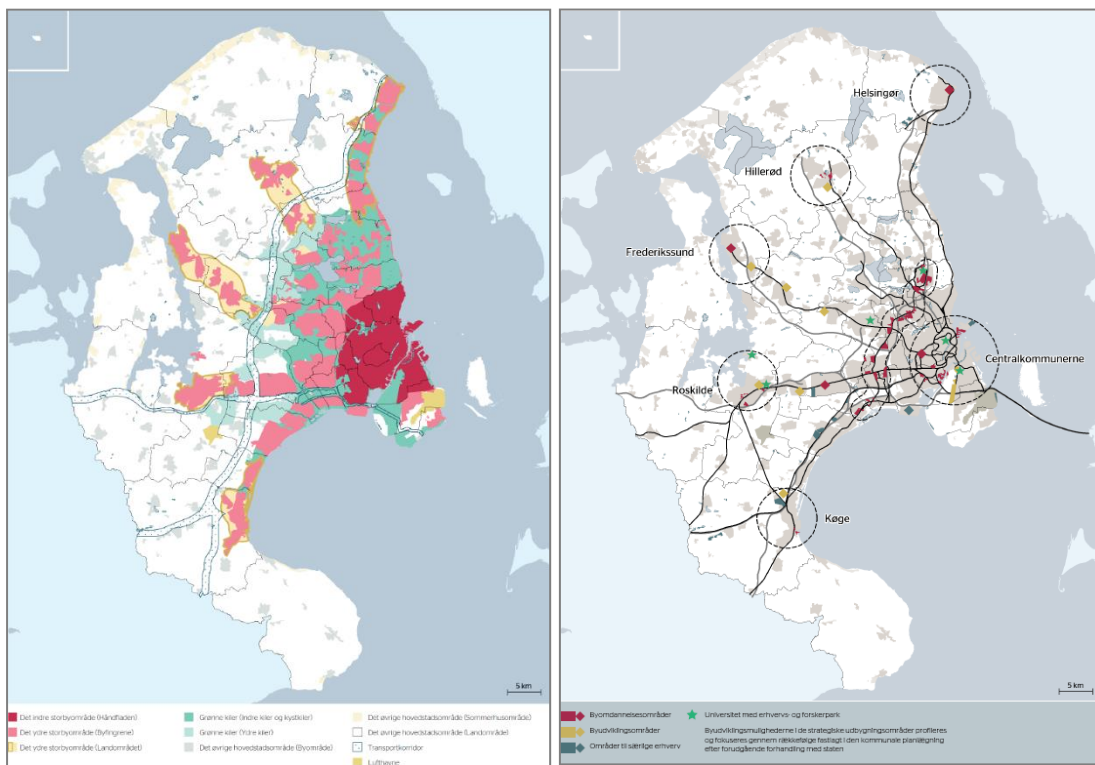
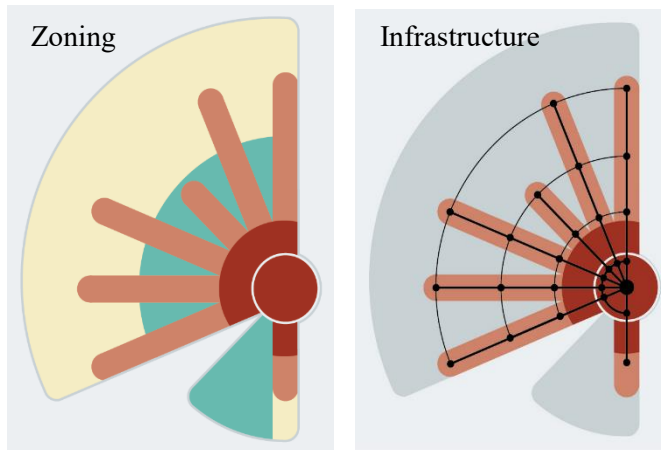
Source: JICA Study Team

**Figure 4-3 Setting Priority Development Axes and Nodes**

### Case Study: Guidance for urban structures linked with transportation networks (Copenhagen, Denmark)

Copenhagen presents an urban structure linked with transportation networks in “Fingerplan 2013”, the city’s comprehensive urban policy. Specifically, the plan shows the following four geographical zones and the location of traffic infrastructure and development of nodes.

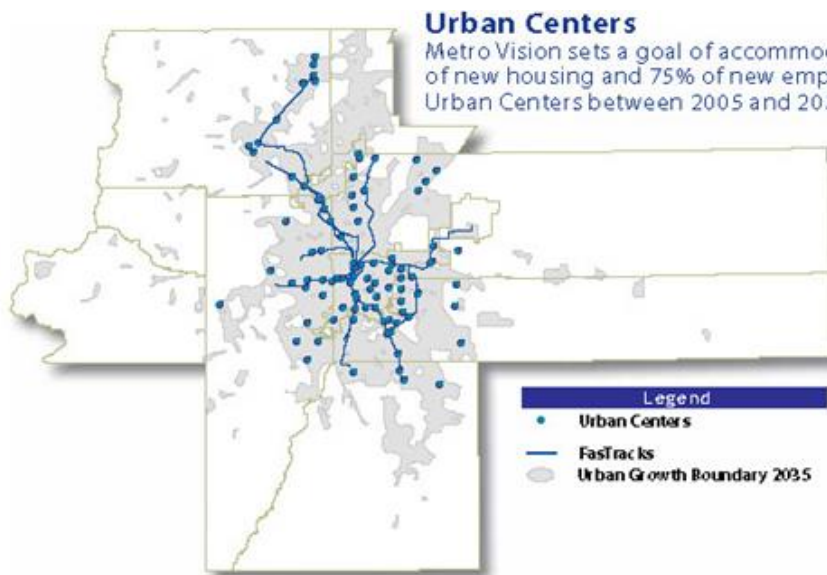
The four geographical zones:  
Core urban region  
Peripheral urban region  
Green wedges  
Rest of Greater Copenhagen



Source: Danish Ministry of the Environment (2013)

Case Study: Public transportation networks linked with urban centers (Denver, USA)

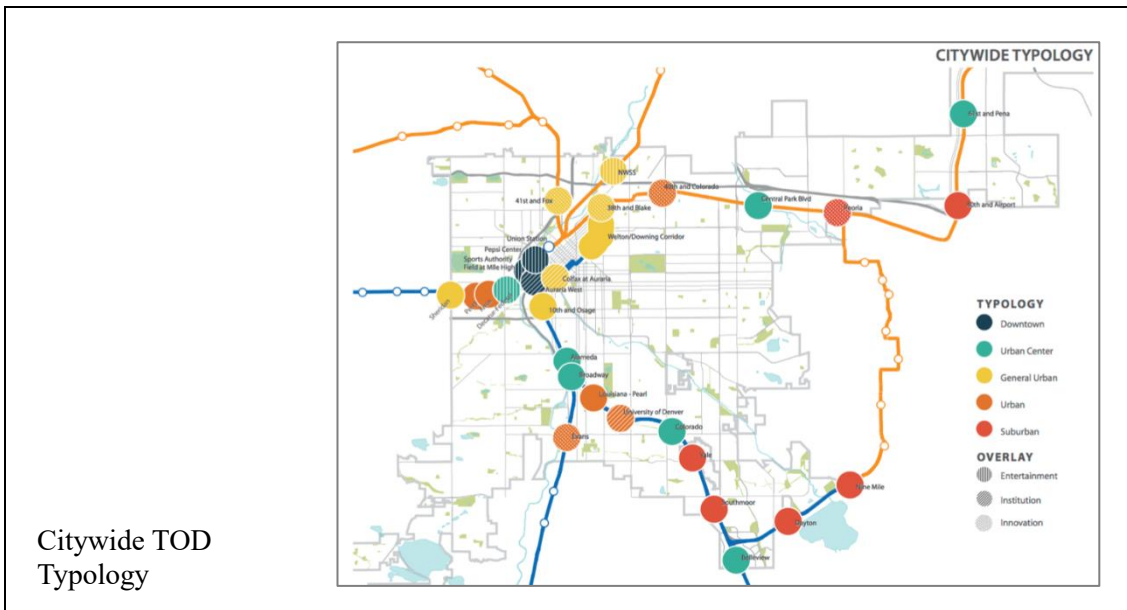
Urban Centers in Denver are set as the future image of the city in its “Metro Vision 2035”. These centers are connected to public transportation, with a concentrated arrangement of future functions, such as for housing and offices.



In addition, a comprehensive TOD strategy is defined in the Strategic Plan for Transit Oriented Development, a public transportation strategy that also includes a public transportation corridor and development strategy for individual stations (TOD Typology).

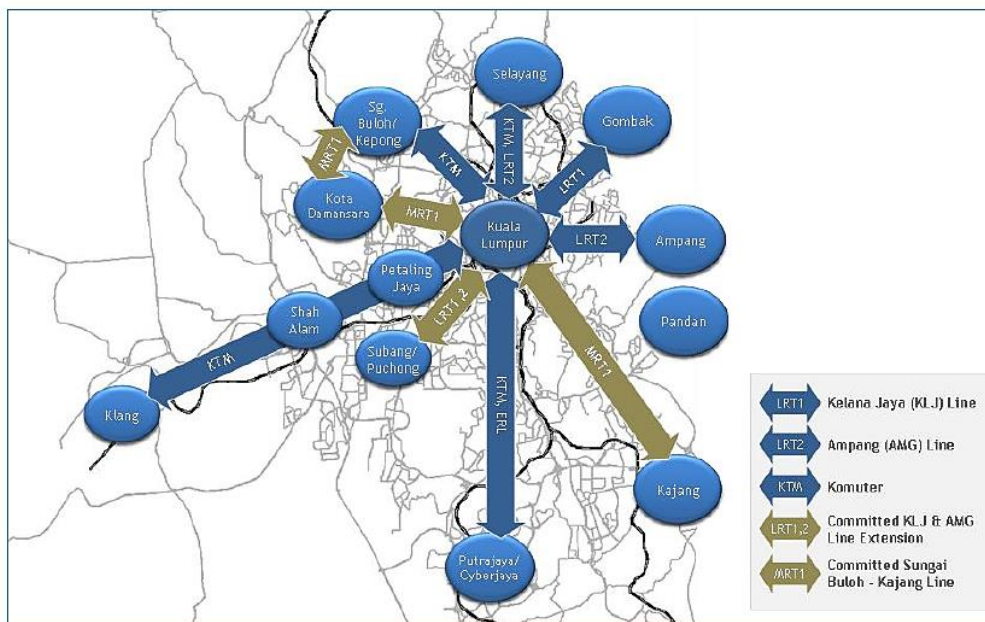


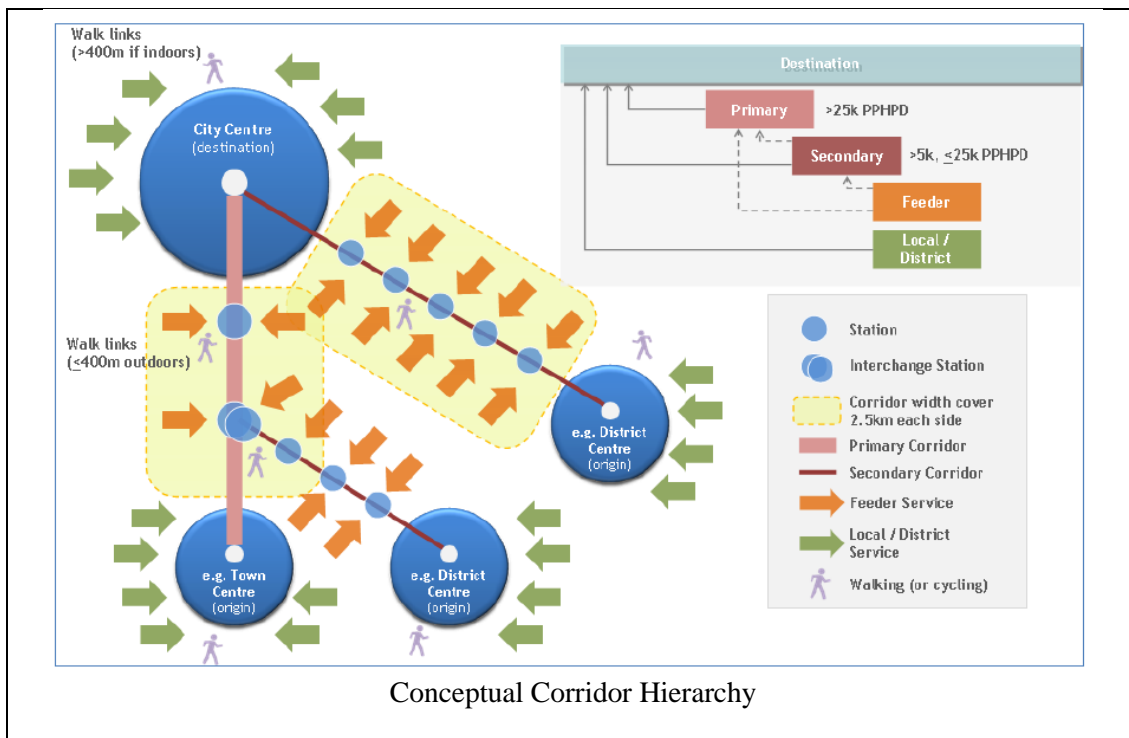
FasTracks System Plan



Case Study: Placement of TOD corridors in the metropolitan area (Kuala Lumpur, Malaysia)

TOD corridors and peripheral nodes are positioned in the Kuala Lumpur Metropolitan Area centered on Greater Kuala Lumpur. Specifically, the contents of the figure below are set in the Greater KL/Klang Valley Land Public Transport Master Plan (prepared by the Land Public Transport Commission (SPAD) and published in June 2013). In addition, each corridor is classified into levels, and distance for walking areas is also set. Transit Zones centered on stations are set based on corridors positioned in this master plan to try to properly guide land use and density around stations in the KL Metropolitan Area. Although these approaches are still under development, they may be of reference to newly emerging economies.





#### 4.2.2 Corridor Level TOD

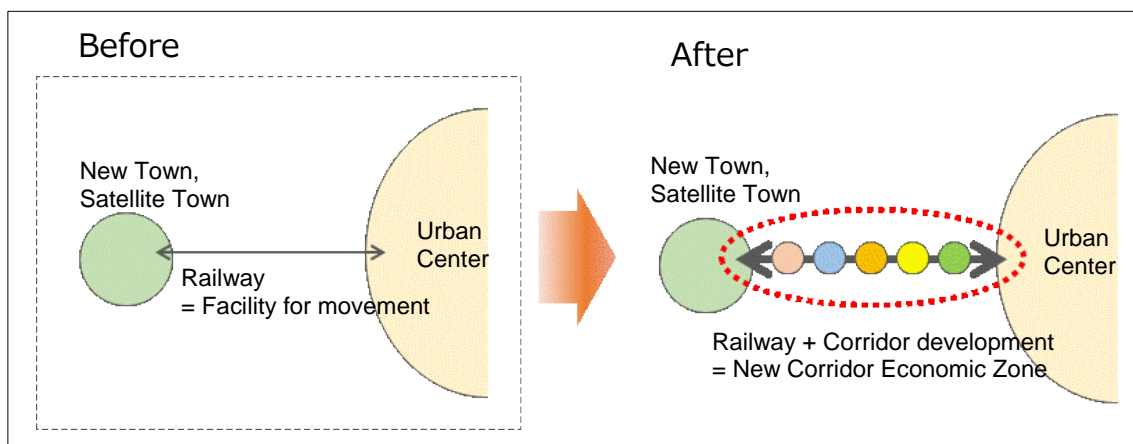
Several suburban new towns are being constructed in the Tehran Metropolitan Area. However, these new towns are not being integrated with the planning and development of commuter railroads connected to the city center. One of the reasons for this is that most people commute from the suburbs to the city center by car and the needs of railway users are not high, which lowers the priority of railway development. It is also common to regard new towns only as railway terminal points with a concentration of housing, no progress in the development of complex urban functions, and little development other than sprawling residential areas along railway lines leading to terminal stations.

Points for promoting TOD for Corridor Level in the Tehran Metropolitan Area are shown below.

##### (1) Creation of new urban economic zones along railways

It is important to look at railways as economic zones integrated with urban functions along railway lines, not merely as a means of movement connecting the city center with the suburbs. The ultimate goal of an economic zone is the sound development of the city, inducement of urban functions along the railway, and solutions to social issues (see Figure 4-4).

Business models for private railways in metropolitan areas in Japan (see examples on the following pages) contain plans to arrange urban functions (offices, housing, universities, entertainment, other) along railway lines from the perspective of realizing a future suburban lifestyle, in addition to increasing the number of passengers using the railway.



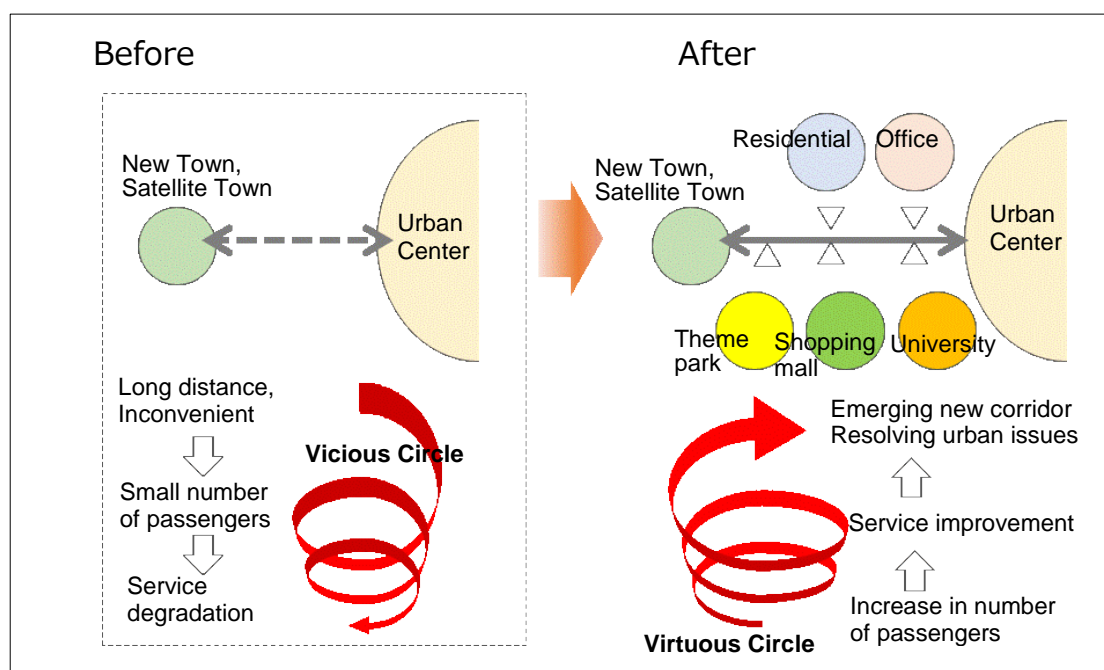
Source: JICA Study Team

**Figure 4-4 Creation of Economic Zones along Railway Lines**

**(2) Guidance and arrangement of functions along railway lines and clarification of positioning of each station**

In order to achieve the above, it is necessary to strategically examine the types of urban functions that should be arranged at the starting and ending points along the line. It is also important to clarify the positioning of each individual station. Figure 4-5 shows the guidance and arrangement of urban functions along railway lines.

Examples promoting a corridor-type TOD in Japan related to these matters, as well as case studies in Amsterdam where the public sector develops corridors in master plans, are illustrated on the following pages.

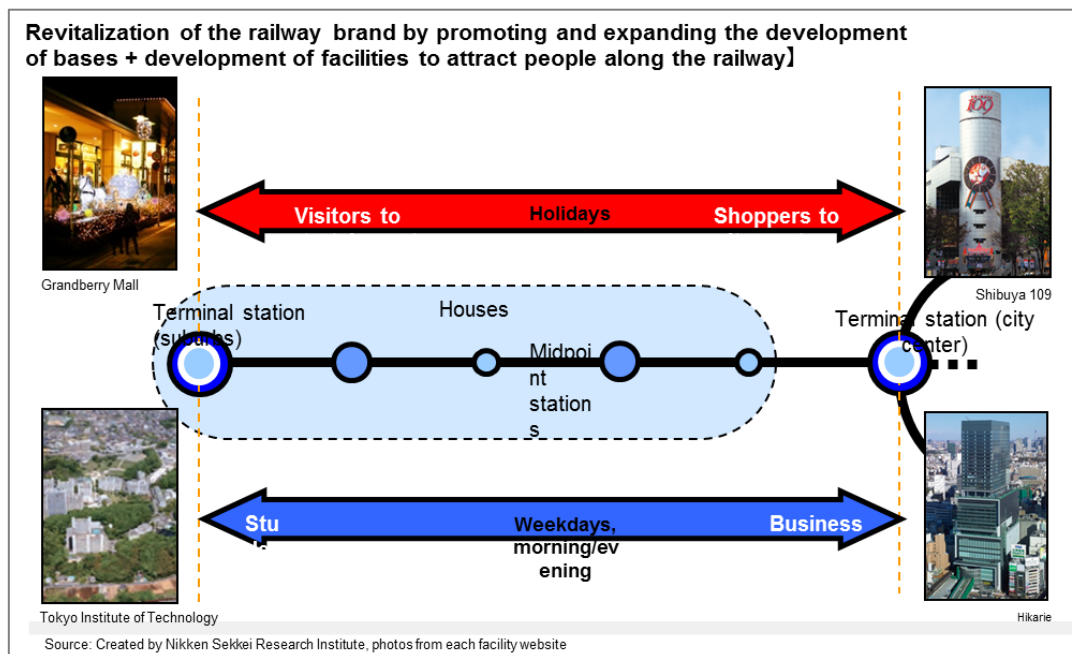


Source: JICA Study Team

**Figure 4-5 Guidance and Arrangement of Urban Functions along Railway Lines**

### Case Study: Model for the development of private railway lines in Japan's metropolitan areas (Tokyu Corporation)

Railroads and railway line development by private railways companies have been integrated in metropolitan areas of Japan. One example of this is an introduction to the efforts by Tokyu Corporation.



The basic concept of this model is the development and induction of commercial and office concentrations around terminal stations in city centers and the development and induction of facilities with a high level of purpose, such as universities and entertainment facilities, around suburban terminal stations. The midpoint is the improvement and inducement of housing functions, making it possible for various users to always use the railway regardless of whether it is morning or night, a weekday or holiday. This can be regarded as an excellent business model from the perspective of Land Value Capture, in which real estate value along railway lines can be improved as a result of the railway business.





■ Proposals for new suburban communities

Development in the area along the TX is being carried out for new communities with mixed academic, industrial and cultural functions, such as the Tsukuba Science City and Kashiwanoha Campus City.

Information is actively being disseminated under the slogan of "Tsukuba Style" in order to convey the attraction of cities blending the natural environment and knowledge.

【Kashiwanoha Campus City】



Source: Mitsui Fudosan website

【Tsukuba Style website】



Source: Tsukuba Style website

■ Linkages and exchange of railway-oriented cities

The Tsukuba Science City is directly connected to central Tokyo by the TX, which enhances collaborative exchange and promotes the mutual development of diverse cities along the railway through the medium of railways.

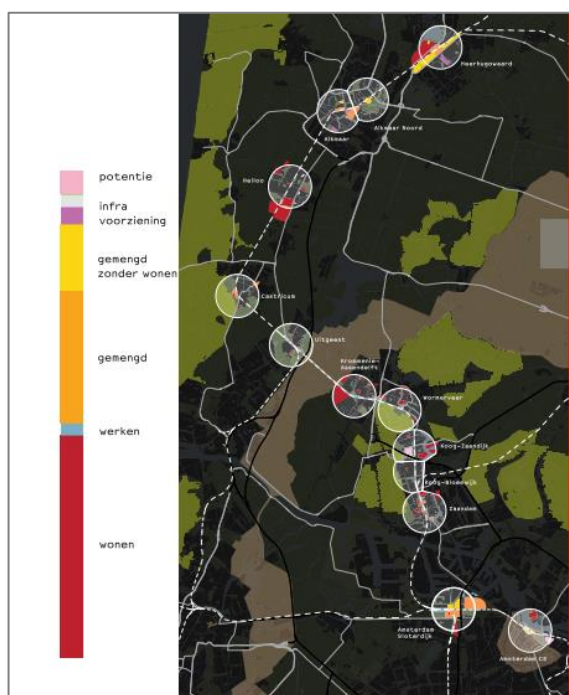
Source: Development of Railroads and Cities Along Railway Lines (Tosh Takatsu, Seizendo-Shoten Publishing Co., Ltd. 2008)

Case Study: Planning for each station on a corridor scale (Zaanccorridor, Amsterdam)

In Amsterdam, the railway corridor is considered to be a suitable level for coordinating transport and land use development. One of the corridors defined in TOD strategy (Maak Plaats!) is the Zaanccorridor indicated in the figures below.



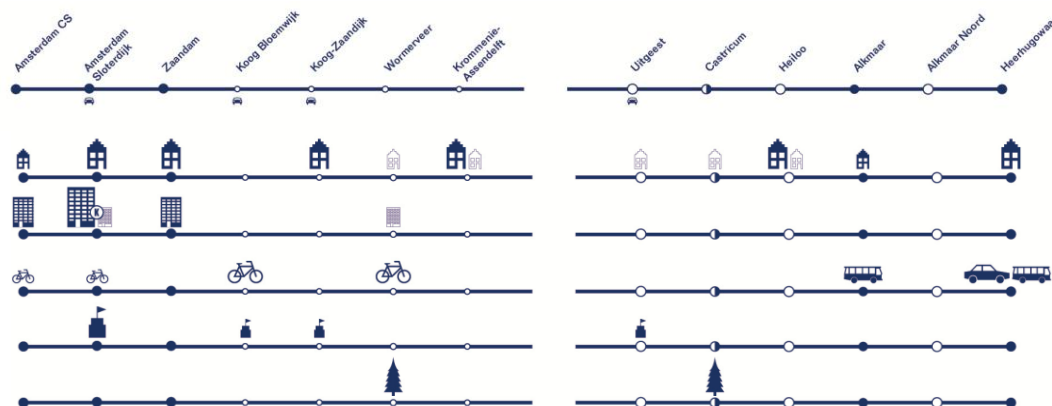
Source: Province of Noord-Holland & Deltametropolis Association (2013)



Source: Deltametropolis Association (2013)

### Challenges for each station

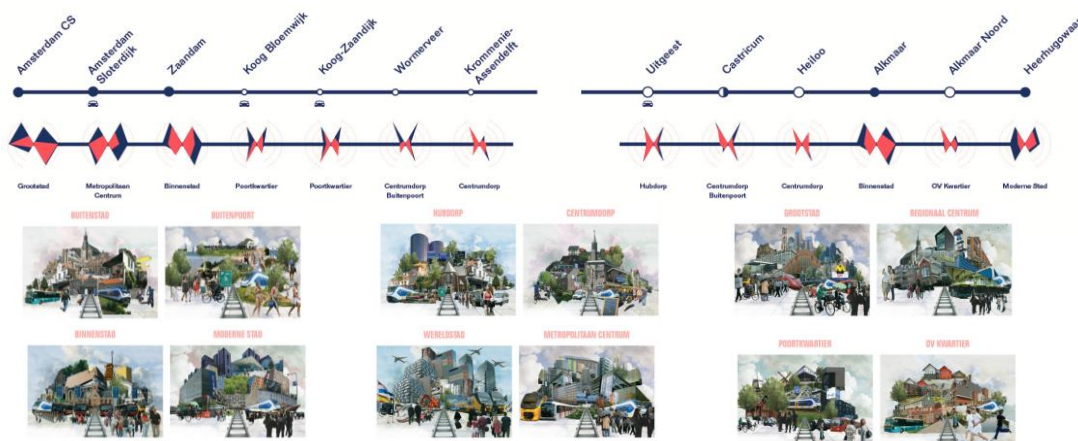
For each of the stations along the Zaancorridor, the challenges in terms of housing, offices, chain mobility, amenities, and recreation are described.



Source: Province of Noord-Holland & Deltametropolis Association (2013)

### Station typologies

Twelve promising station typologies have been developed. Such typologies allow each station along a railway line and in a railway network to develop complementarily, so that they do not compete with each other.



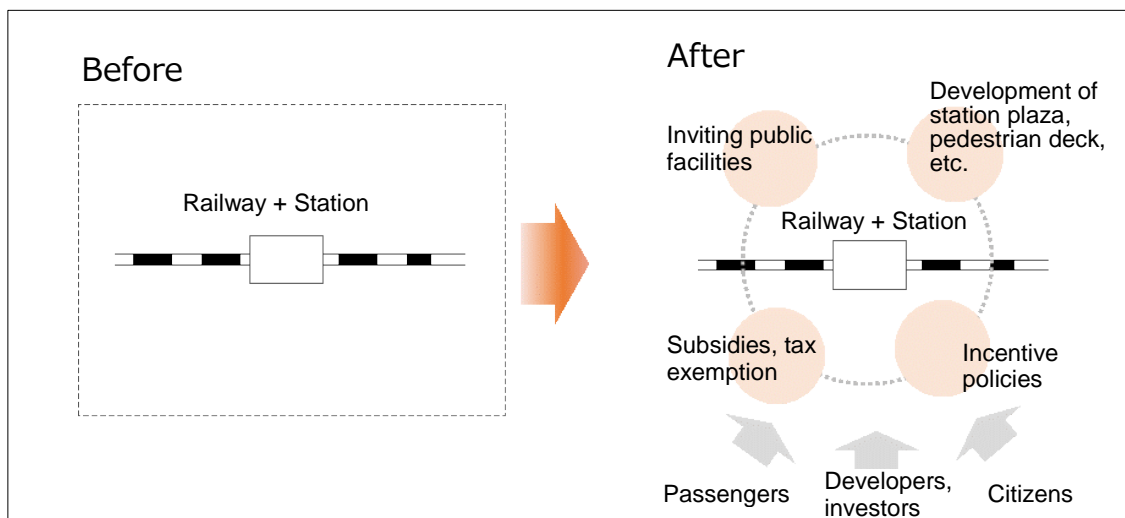
Source: Province of Noord-Holland & Deltametropolis Association (2013)

### (3) Examination of Legal Systems and Incentives to Induce Development along Railway Lines

In order to induce development of the above corridors, it is necessary not only to develop stations and railways as has been done conventionally but also to design legal systems and incentives to induce the development of business through public-private cooperation (see Figure 4-6). This requires the guidance of administrative and public functions in the early stages of development and the introduction of incentives (subsidies, reductions in tax, relaxation of floor area ratio (FAR), etc.) to encourage private development. On the contrary, if the potential for development around the stations is high, development can be controlled with the collection of contributions for development and appropriation to railway infrastructure development costs. Policies to promote

this type of development along railway lines should be appropriately assessed and applied according to individual situations.

Examples from Japan, London (UK), and Hyderabad (India) are shown on the following pages as policies to guide development along railways and the mechanism of Land Value Capture.

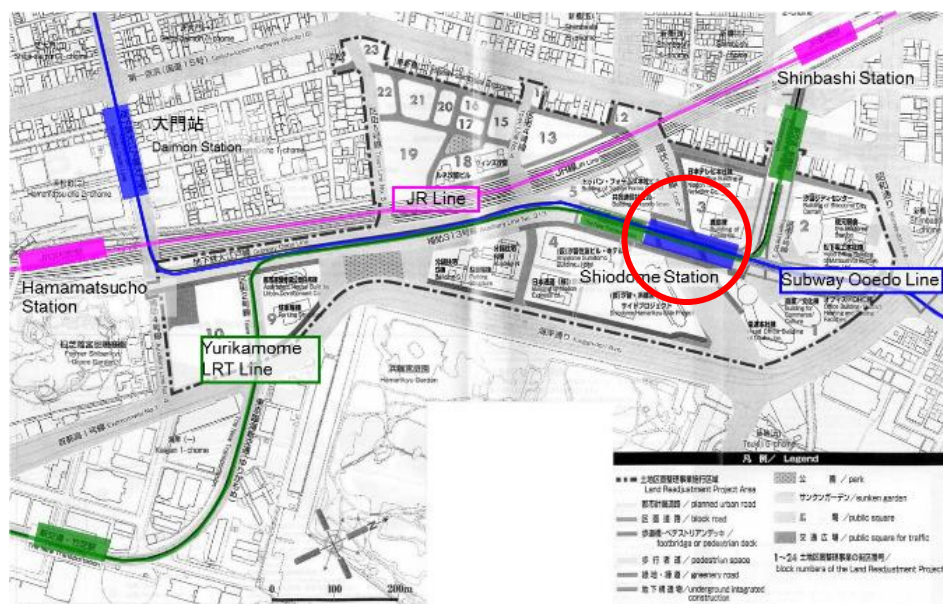


Source: JICA Study Team

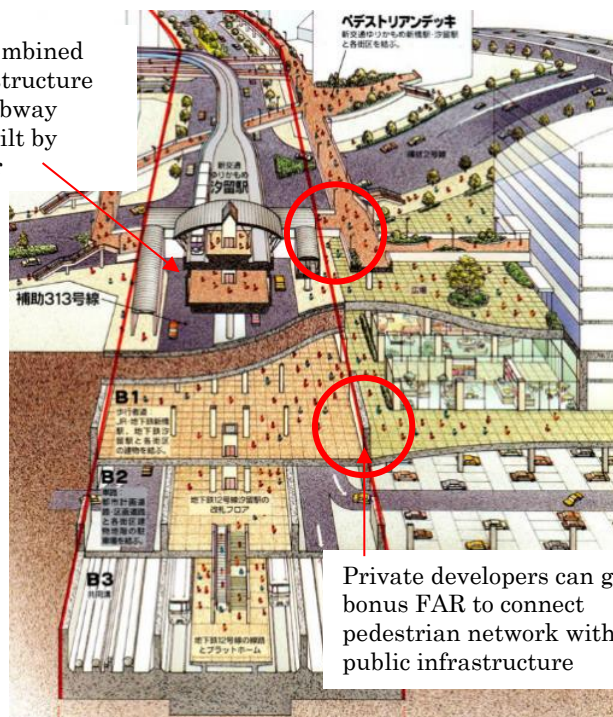
**Figure 4-6 Legal Systems and Incentives to Induce Development along Railway Lines**

Case Study: Promotion of TOD through master plans and incentives (Shiodome Sio-site)

The Shiodome Sio-site is a type of large-scale urban development around Shinbashi Station in central Tokyo. Public urban functions, such as the station plaza, as well as pedestrian decks and underground pedestrian networks connecting to public transportation, are positioned in the master plan. Based on this, it is a “carrot and stick” measure where FAR bonuses are provided in the case of development by private industries. While the public sector can encourage intentional city development, private businesses can also receive bonuses that correspond to this.



Vertically combined urban infrastructure including subway station is built by public sector



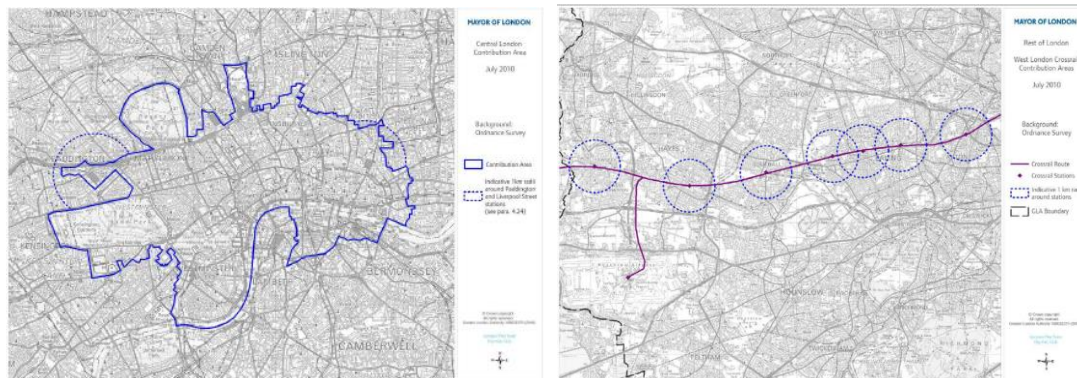
Private developers can get bonus FAR to connect pedestrian network with public infrastructure

Public

Private

### Case Study: Collection of development charges from development along railway lines (London)

In London, certain charges are levied on developers including those of offices and commercial facilities around public transportation stations. The amount of contribution is determined by area and application.

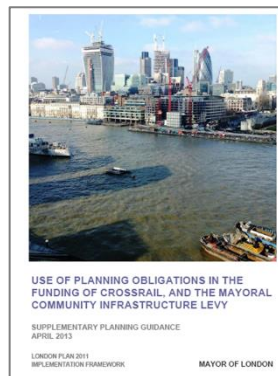


Target areas for charges (left: central area, right: around railway station)

Table 2: Indicative Level of Charge per sq.m, by land use and location as at July 2010

type of dev	central London (See Annex 1)	Isle of Dogs (see Annex 2)	rest of London (See Annex 3)
	Including approximate 1 km indicative radii outwards around Paddington and Liverpool Street Stations	Including approximate 1 km indicative radius outwards around the proposed Canary Wharf station at West India Quay inclusive of and south of the Poplar DLR lands	Including approximate 1 km indicative radius outwards around the proposed Canary Wharf station at West India Quay north of the Poplar DLR lands as well as such radii around all other stations outside the Central Contributions Areas apart from Woolwich Arsenal.
office	£140	£190	£31
retail	£90	£121	£16
hotels	£81	£84	-

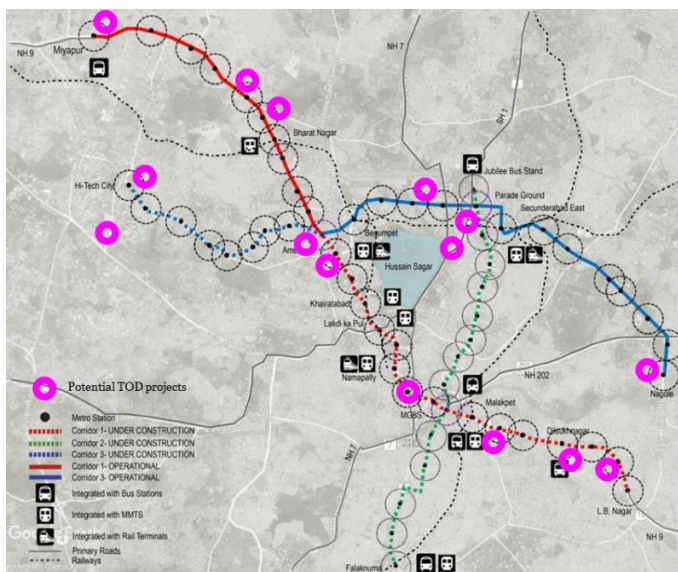
Amount of charges



### Case Study: Integrated development of railways and along railway lines in concession-type development (Hyderabad)

A metro with three lines is currently being planned (partially opened) in Hyderabad. It is a concession style of development, where business operators that develop and operate railway infrastructure gain the right to urban development around the station in return.

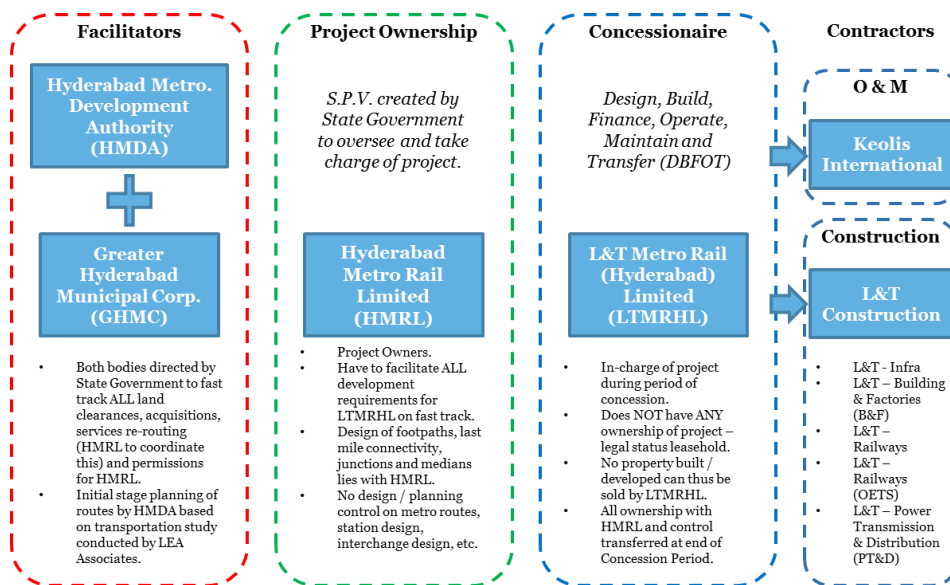
Specifically, the Special Promotion Vehicle (SPV) and Hyderabad Metro Rail Ltd., the main bodies for railway improvement and development, were established, facilitated by the regional government and public development corporations. From this SPV, Design, Build, Finance, Operate, Maintain and Transfer are collectively outsourced to private enterprises in a concession style of development. For the government, while it is possible to outsource the development of the railway and along the railway, private businesses have the benefit of acquiring development rights around the station.



LEGEND  
 - - - - Metro tracks  
 Workshop & Maintenance area  
 L&T office  
 Utilities  
 Probable Location of L&T TOD

Metro lines and land for urban development (pink circles)

Urban development sites (purple area)

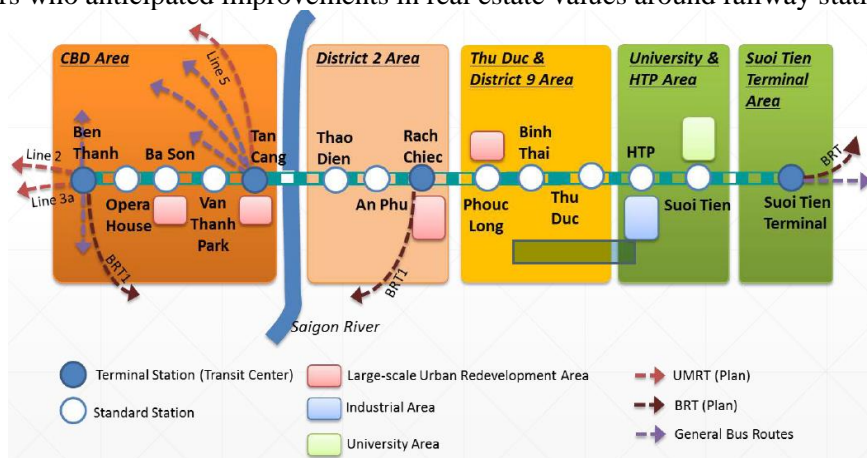


Roles shared by each entity

**BOX: TOD issues in cities in newly emerging economies(Example of Ho Chi Minh City in Viet Nam)**

In large Asian cities, public transport such as urban railways is being introduced at a rapid pace in response to the emergence of urban issues that have accompanied the rapid increase in population. However, often only traffic functions are prioritized and responses from the perspective of urban planning, including land use along railways, tends to fall behind. This has resulted in a number of situations where disorganized cities have developed along railway lines and do not lead to solutions to urban issues, such as alleviating traffic congestion and improving environmental pollution through the introduction of public transportation, which is its original purpose.

In Ho Chi Minh City in Viet Nam, although the development of the UMRT Line No. 1, the first railway in the city, is a priority, the city is facing a situation where sufficient measures cannot be taken by the government, as a result of the unorganized purchase of land by private developers who anticipated improvements in real estate values around railway stations.



Overview of UMRT Line No. 1 in Ho Chi Minh City

As shown in the figure below, urbanization is moving forward in most of the areas around the planned station area, so TOD-type urban development cannot be promoted.



### 4.2.3 Station Level TOD

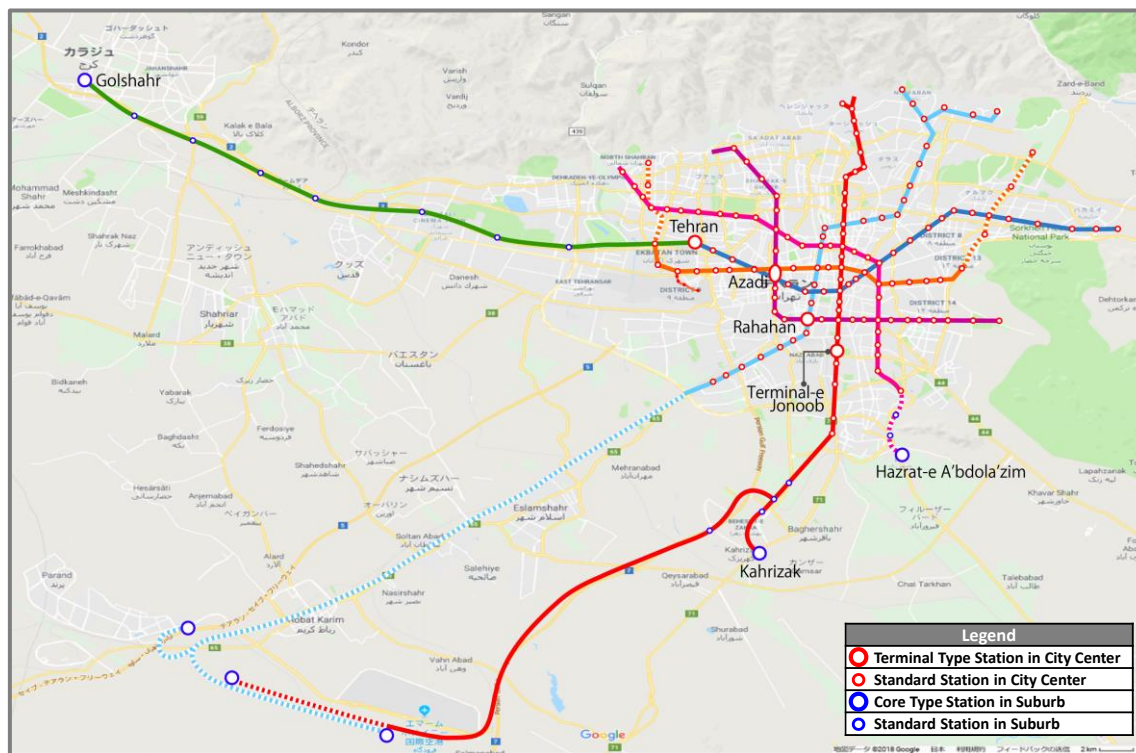
The four types of stations indicated in Table 4-1 are set when indicating the Station Level TOD guidelines. Different requirements will be indicated for each type of TOD in the guidelines.

**Table 4-1 Hierarchy of Station in the TOD Guidelines**

Type of Station	Overview and Requirements
a) Terminal Type Station in City Center	Transfer terminal type station with multiple intersecting lines located in the center of the city. Recommended for use as a city base through high-volume and mixed use.
b) Standard Station in City Center	Station located in city center. Although its potential drops in comparison with transfer terminal type stations, it is recommended for this type of station to be developed into a base for mixed use that can accommodate the number of passengers.
c) Core Type Station in Suburb	Core type station with multiple intersecting lines located in the suburbs. Recommended for residential, commercial, and business functions to be concentrated in medium to high density in this type of station.
d) Standard Station in Suburb	Station located in the suburbs. Recommended to have suitable functions in place to support daily life, with the main application of low- to medium-rise housing.

Source: JICA Study Team

The following figure illustrates a draft idea for the above station types in the Tehran Metropolitan Area. The type of station will ultimately be decided after consultations with counterpart organizations.



Source: JICA Study Team

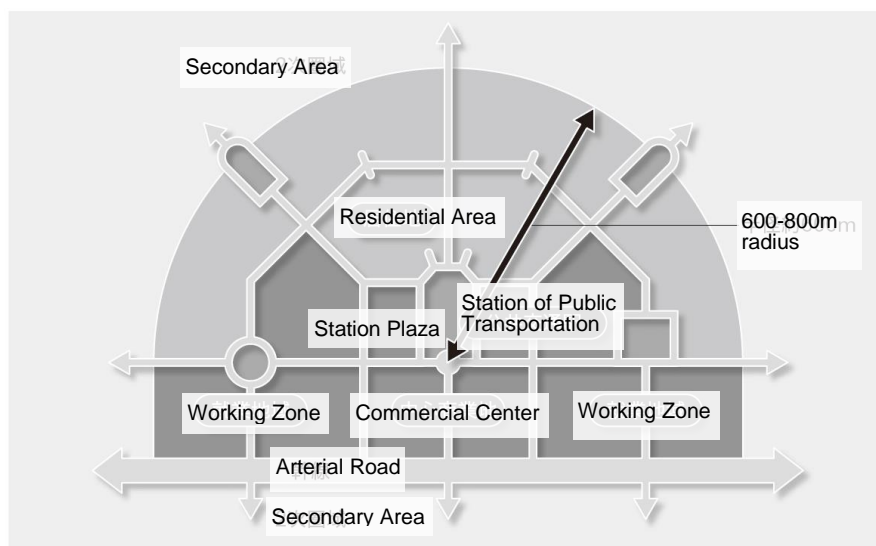
**Figure 4-7 Map of Rail Network in the Tehran Metropolitan Area (draft idea)**

## (1) Land Use

- Current Issues in Iran
  - The use of land in areas surrounding stations does not take advantage of the increase in potential for urban development through improvements to railway stations.
  - Urban functions that can fully demonstrate the functions of railway stations are not in place in areas around stations.
  - Land is not secured to develop an intermodal facility, such as a station plaza and parking lots in adjacent areas around the station.
- Basic Orientation of Guidelines
  - Setting land use regulations (applications, volume, height regulations) in areas surrounding the station that utilize the effects of station improvements.
  - Development of urban functions (intermodal facilities and facilities suitable for the station area) in order to fully demonstrate the effects of improvements to railway stations.
  - Secure appropriately-sized land for the development of intermodal facilities through urban planning (prohibit development for other applications).

### a) Basic Land Use for the Station Area

Figure 4-8 shows the basic orientation for land use in areas around stations. The figure shows the arrangement of areas around a public transport station where commercial functions are concentrated, areas where work functions are located, and areas where residential functions are located. However, in order to improve energy efficiency and convenience for pedestrians, it is preferable for the area around the station to have a mix of various applications in medium to high density and to significantly change countermeasures depending on the station type, urban development of target areas, and the development situation of infrastructure.



Source: The Next American Metropolis: Ecology, Community, and the American Dream by Peter Calthorpe (1993).

**Figure 4-8 Basic Orientation of Land Use for the Station Area**

Table 4-2 shows the preferred type of basic land use for development in areas around stations. Based on these types of land use, different land use patterns will be set according to the four types of stations mentioned above. For example, development for office use is limited in Core Type

Station in Suburb and Standard Station in Suburb. And convenient facilities for Standard Station in Suburb will be small-scale.

**Table 4-2 Basic Land Use for the Station Area**

<ul style="list-style-type: none"> <li>• Convenient facilities: Commercial (Retail, restaurants, GMS)</li> <li>• Convenient facilities: Public facilities</li> <li>• Intermodal facilities (station plazas (bus berths, taxi bays, spaces for Kiss &amp; Ride), car and bicycle parking areas, spaces for pedestrian networks, amenities such as green and open spaces)</li> <li>• Amenity facilities: Green areas, parks, open spaces</li> <li>• Housing</li> <li>• Offices</li> </ul>
---

Source: JICA Study Team

**b) Volume of Facilities Located in the Station Area**

The main planning criteria for determining the preferred volume of a facility that will be located in an area around a station are floor area ratio (FAR), building coverage ratio (BCR), and height restrictions.

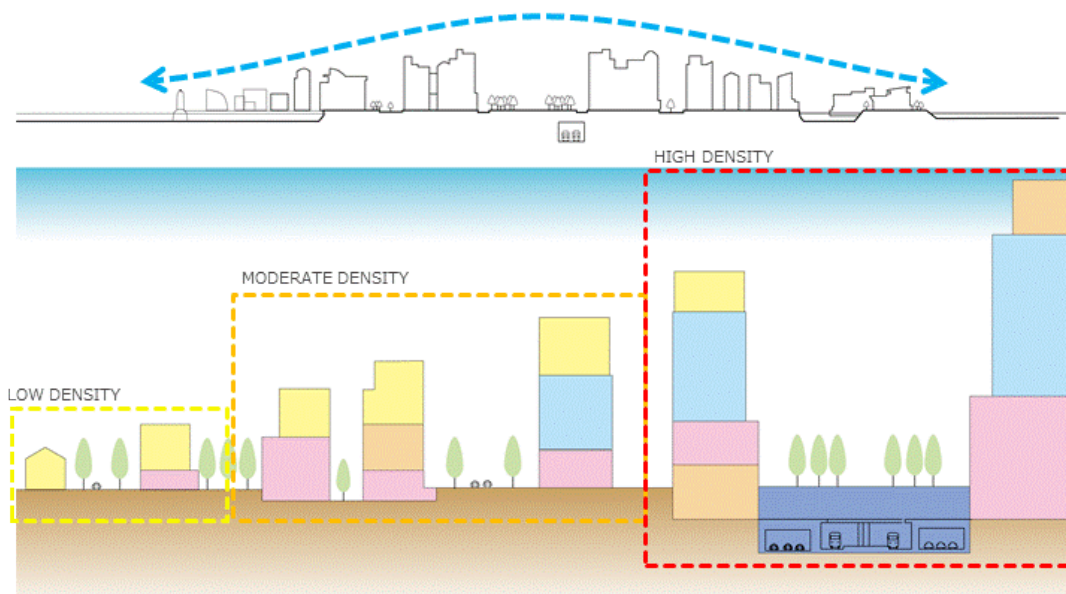
First, the standard FAR reference values for each station type are shown in Table 4-3. FAR is the most important planning criterion for determining volume. Setting an excessive reference value for FAR may result in an acute situation in areas surrounding the city center, such as traffic congestion and a shortage of supply for various city services. Therefore, when setting FAR, it is necessary to carefully consider the state of development of infrastructure such as roads in the target area.

**Table 4-3 Standard FAR by Station Type**

Type of Station	Standard FAR (net)
a) Terminal Type Station in City Center	400%-600%
b) Standard Station in City Center	
c) Core Type Station in Suburb	300%-400%
d) Standard Station in Suburb	200%-300%

Source: JICA Study Team

Figure 4-9 shows the formation of a basic skyline based on setting the facility development density oriented around a station. As shown in this figure, by setting facility density into high, medium, and low density in order from areas closest to the station, it is possible to take complete advantage of the benefits of station development and urban functions concentrated in the area around the station based on movement by foot.



Source: JICA Study Team

**Figure 4-9 Concept of Setting Station-Oriented Skylines**

**c) Size of Station Plaza**

It is necessary to secure land adjacent to the station in urban plans in order to develop intermodal facilities, such as station plazas and parking for cars and bicycles, and permanently eliminate urban development for other applications in that area. Table 4-4 shows the scale needed for the standard development of a station plaza according to the number of passengers at the station. The figures shown in this table are only a guide. In actual urban planning, it is necessary to designate scale taking into consideration bus routes connected to each station and the area required for taxi bays and Kiss & Ride.

**Table 4-4 Standard Size of Station Plazas by Number of Passengers\***

Daily Ridership (No. of passengers per day)	Standard Size of Station Plaza
Less than 5,000	1,000-3,000 m <sup>2</sup>
5,000-10,000	2,000-4,000 m <sup>2</sup>
10,001-20,000	3,000-5,000 m <sup>2</sup>
20,001-30,000	4,000-7,000 m <sup>2</sup>
30,001-50,000	5,000-10,000 m <sup>2</sup>
More than 50,000	More than 7,000 m <sup>2</sup>

\*Indicates only standard values. In actual planning, it is necessary to designate scale by taking into consideration bus routes connected to each station and the area required for taxi bays and Kiss & Ride.

Source: JICA Study Team

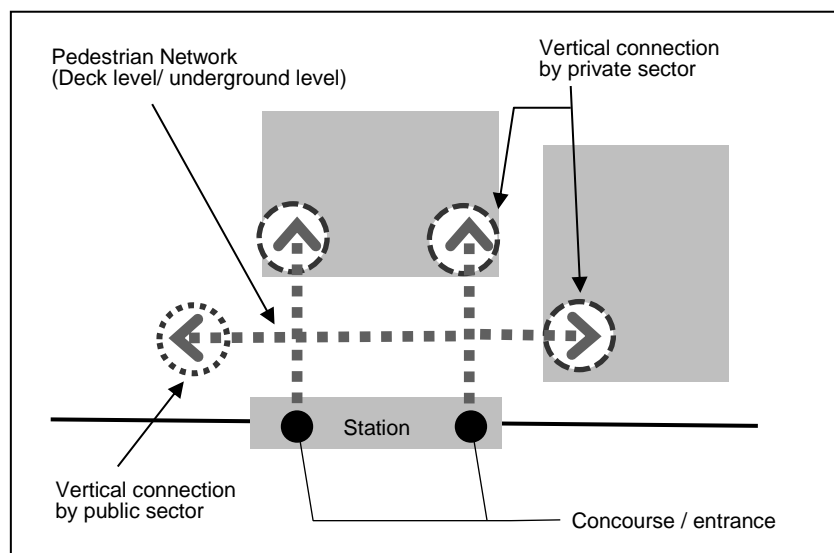
## (2) Pedestrian Network

- Current Issues in Iran
  - The volume of traffic is generally high in the central areas of large cities. Traffic is particularly concentrated in areas where railway stations have been developed.
  - Roads intersect in many of the areas around railway stations, turning the area into an environment where pedestrians are unable to walk in an unbroken line.
- Basic Orientation of Guidelines
  - A pedestrian network should be developed where pedestrians can safely and comfortably access surrounding areas directly from the station.
  - A universal-design pedestrian network should be developed so that it can be used by the elderly and people with disabilities.

### a) Development of continuous pedestrian flow lines from the station

Pedestrian flow lines should be developed to allow pedestrians to directly access surrounding areas from the station. By developing pedestrian flow lines, an environment can be secured that allows pedestrians to walk safely and comfortably without crossing vehicle traffic flow lines as much as possible.

Figure 4-10 shows the basic idea of the development of a continuous pedestrian network from the station to neighboring areas. The pedestrian network should be secured that continues on to surrounding areas, preferably at the underground or deck level (2F-level above ground), to avoid requiring pedestrians to cross roads from the entrances/exits of the station concourse to surrounding areas. Facilities for vertical connections (underground and aboveground level or aboveground and deck level), such as stairs, elevators, and escalators, should be suitably arranged in the network to improve convenience for pedestrians. Facilities for vertical connections can be made more convenient for pedestrians through cooperation between the public and private sectors.

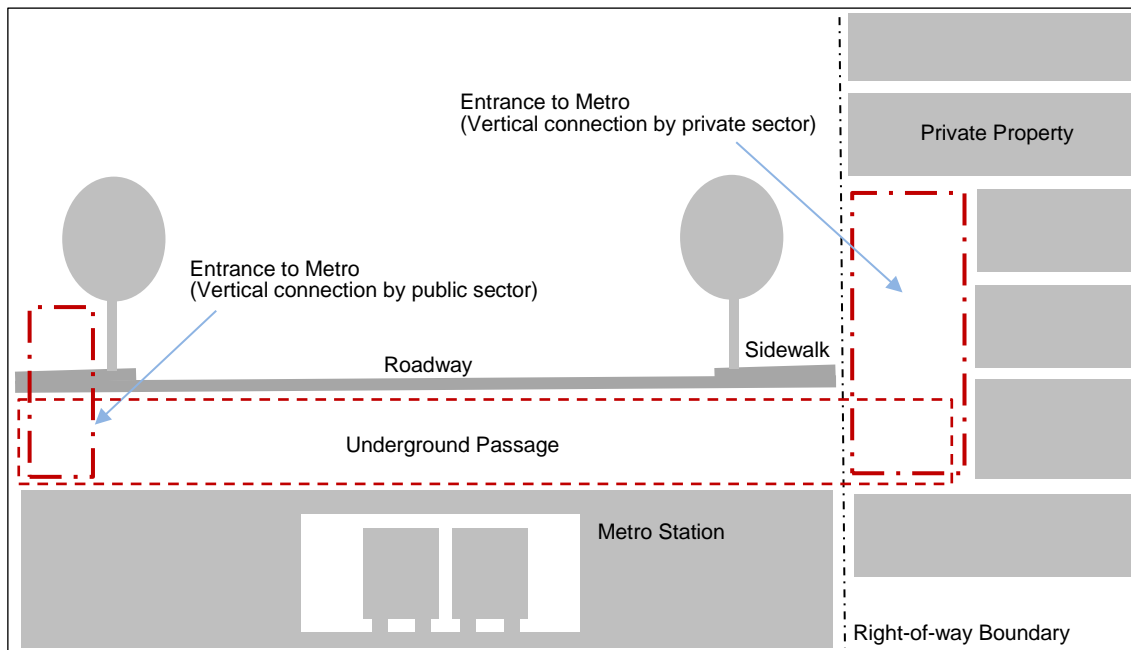


Source: JICA Study Team

**Figure 4-10 Concept of Development of Pedestrian Network**

For an underground station, as many entrances as possible should be set to the underground area to reach the target direction without requiring pedestrians to cross roads. As shown in Figure 4-11, it is possible to secure a number of safe and comfortable connections to underground stations

by using vertical connections such as escalators and elevators that have been developed on private property located next to a station facility.

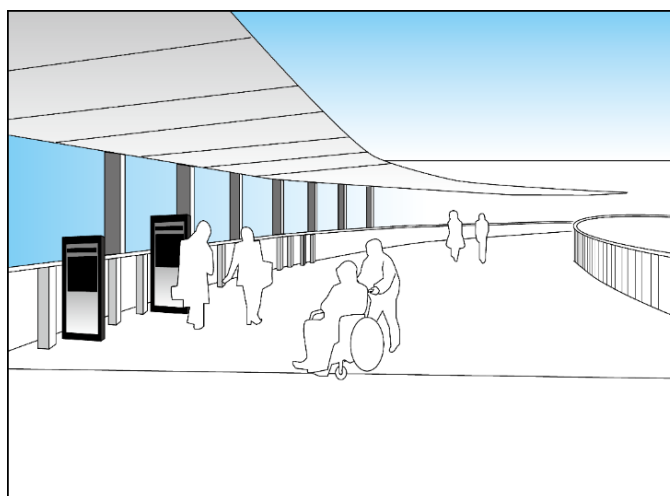


Source: JICA Study Team

**Figure 4-11 Concept of Development of Pedestrian Networks  
in Underground Stations**

b) Development of universal design for pedestrians

Pedestrian networks must be developed in a universal design to ensure that the elderly and persons with disabilities are able to use the network easily. To this end, consideration must be paid to (1) securing comfortable walking spaces without level differences, (2) developing shelters such as continuous roofs so that pedestrians can walk even when it is raining, and (3) installing signs that take people who are visually impaired into consideration. Figure 4-12 shows an image of a universal design space.



Source: JICA Study Team

**Figure 4-12 Image of Universal Design Space in a Pedestrian Network**

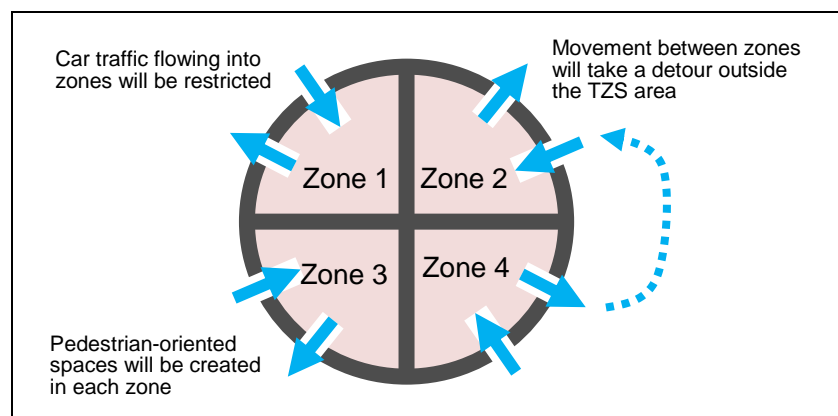
### (3) Traffic Network

- Current Issues in Iran
  - There is a shortage of access roads to properly handle generated traffic at stations that function as bases, such as Terminal Type Station in City Center and Core Type Station in Suburb.
  - Since vehicular traffic around stations can be chaotic, it makes walking difficult for pedestrians.
- Basic Orientation of Guidelines
  - In stations that function as bases, a walkable environment should be developed by improving basic access roads and controlling vehicular traffic flowing into the area around stations.

#### a) Introduction of Traffic Zone System (TZS) to create a pedestrian priority area

A Traffic Zone System (TZS) should be introduced in areas around stations that function as area bases, such as Terminal Type Station in City Center and Core Type Station in Suburb in order to convert the entire area into a pedestrian priority space, while also securing the basic access roads needed for station functions. Figure 4-13 illustrates the basic concept of TZS.

TZS is a system developed to create a walkable environment and reduce vehicular traffic by setting an entire area and combining traffic control measures (pedestrian-only roads, one-way streets, road narrowing, etc.) and detour measures (development of ring roads and underground passages, etc.). The TZS was first implemented in Europe (Bremen, Gothenburg) from about 1960, and today, has been adopted in many cities that are promoting urban development with a priority focus on pedestrians.

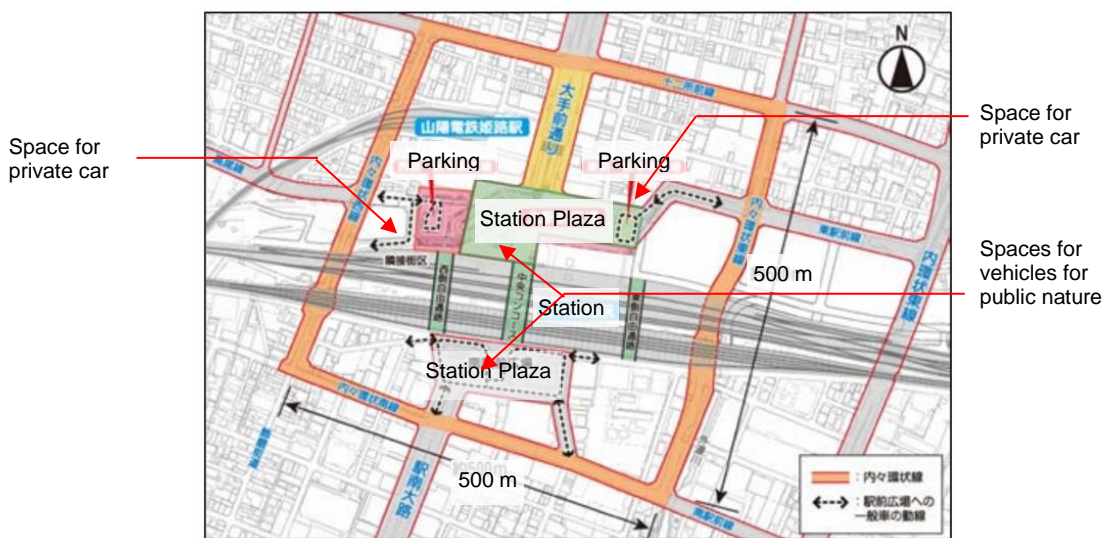


Source: JICA Study Team

**Figure 4-13 Basic Concept of Traffic Zone System (TZS)**

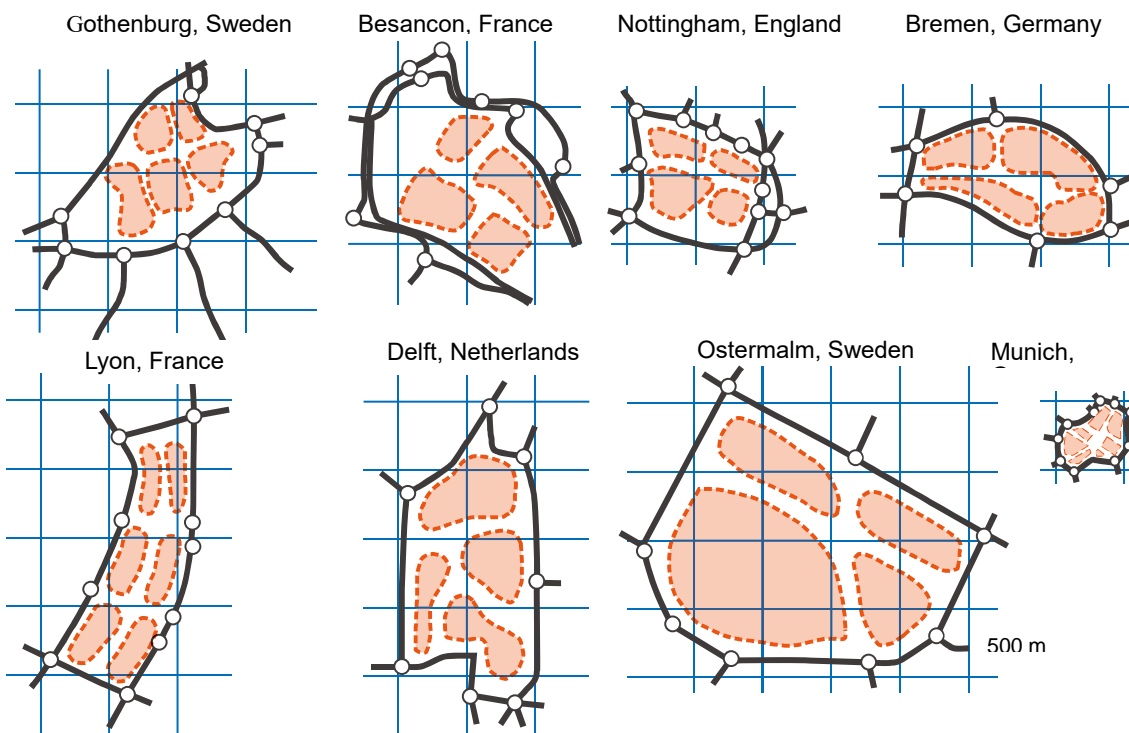
Figure 4-14 shows an example as reference for a traffic network in a Station Area (case of Himeji City in Japan). In this reference example, a traffic plan has been formulated based on the concept of TZS. That is, the roads accessible to the station squares are secured on both sides of the station, private cars are restricted to enter the squares except in designated places, and only vehicles of public nature such as buses and taxis are allowed to enter and stop. The entire station area is planned as a pedestrian priority area by designating most of the roads as a one way traffic and restricting vehicular traffic.

In addition, Figure 4-15 shows the same scale of the area where TZS was introduced in European cities.



Source: JICA Study Team based on Himeji City Urban Planning Information

**Figure 4-14 Example of Station Area Traffic Network Plan**



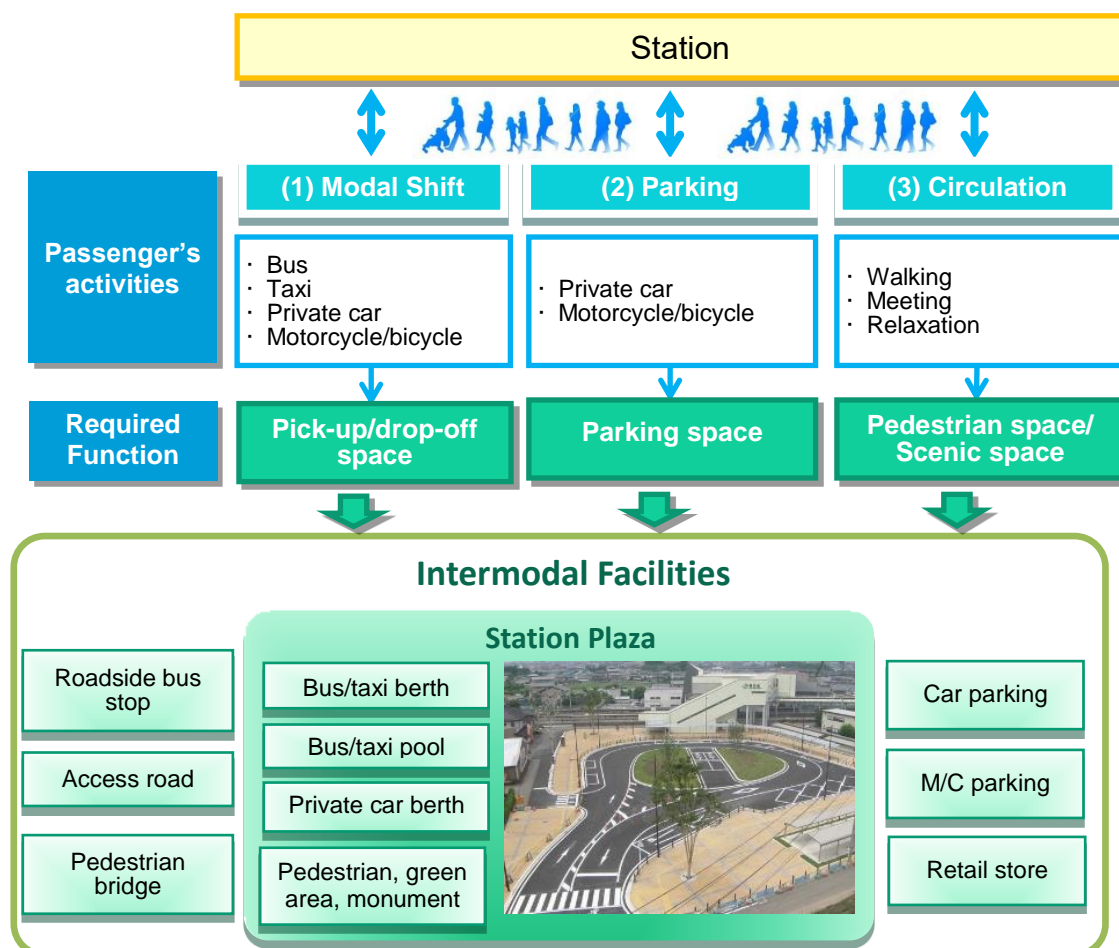
Source: JICA Study Team

**Figure 4-15 Same Scale of the Cities in Europe where TZS was Introduced**

#### (4) Intermodal Facilities

- Current Issues in Iran
  - Means for users to easily access stations are not in place.
  - Facilities to allow the use of feeder modes, such as buses and taxis, are not adequately developed. (In many stations, bus berths and taxi bays are not located close to the station. If they are, they cannot be easily accessed.)
  - Coordination among transportation operators (metro, bus, BRT, taxi, etc.) is not properly conducted in developing related facilities.
  
- Basic Orientation of Guidelines
  - Development of functions to improve accessibility to railway stations for feeder modes, such as buses and taxis (Improvement of station plazas equipped with appropriate functions).
  - Development of facilities for Park & Ride and Kiss & Ride (car and bicycle parking, spaces for Kiss & Ride).
  - Creation of space for pedestrians and amenities to support these functions.

##### a) Basic Component of Intermodal Facilities



Source: JICA Study Team

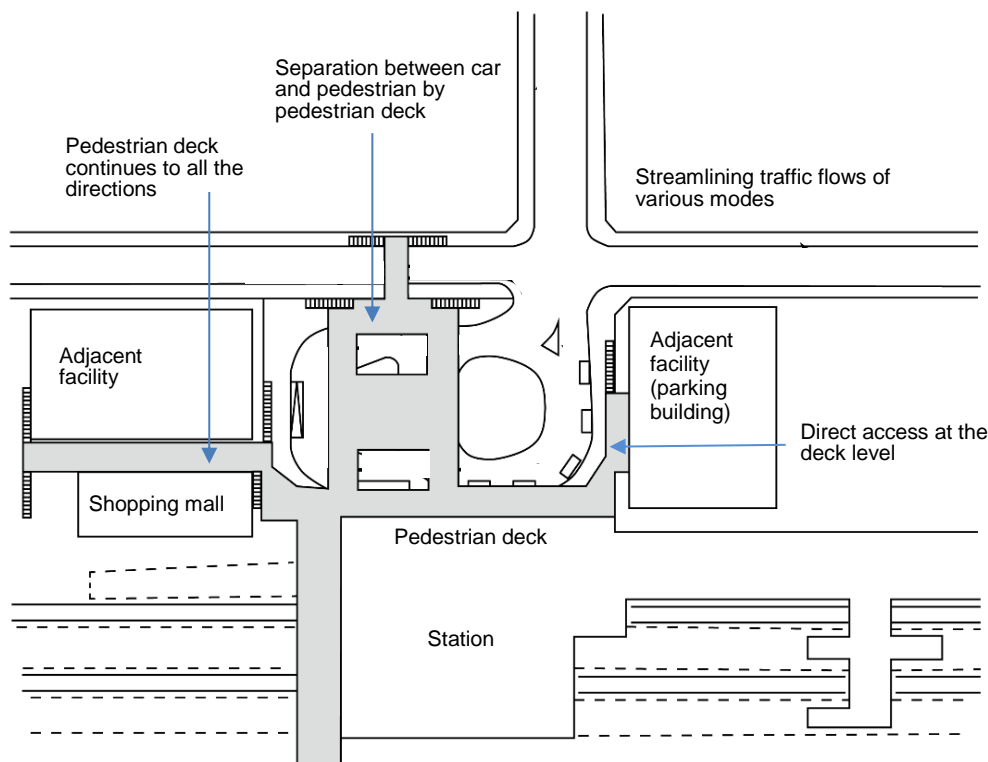
**Figure 4-16 Basic Component of Intermodal Facilities**

Figure 4-16 shows the basic components of intermodal facilities. As shown in this figure, intermodal facilities consist of three elements: (1) facilities for transferring (modal shift) between railways and other transport modes, such as buses, taxis, private cars, motorcycles, and bicycles; (2) parking spaces for private transport, such as cars, motorcycles, and bicycles; and (3) circulation spaces for buses and cars, as well as amenity spaces, such as green areas and open spaces (including space for retail stores).

The scale for these components is set in consideration of the type of station, passengers, bus routes and required size/number of taxi bays connecting to the station on adjacent land. In order to effectively demonstrate the functions of each component, placement plans must be formulated for each element oriented on the station plaza. Of the types of stations mentioned above, there may be cases where intermodal facilities are not needed, such as for the Standard Station in City Center, or where only spaces for Kiss & Ride would be required.

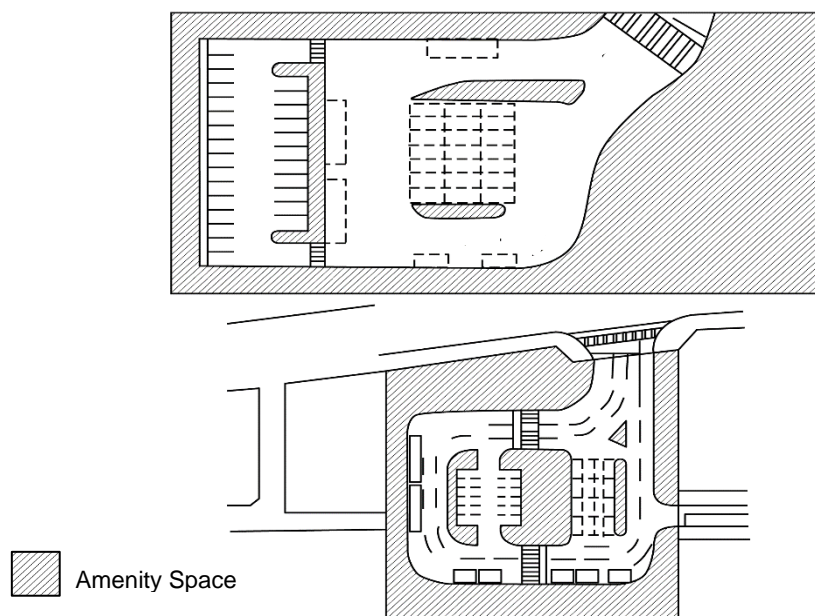
### b) Basic Layout Plan of Intermodal Facilities

Figure 4-17 shows an idea of the basic arrangement plan for intermodal facilities in the suburbs. First, it is possible to develop continuous pedestrian decks from stations to surrounding areas in order to separate car traffic and pedestrians, as well as to provide access to adjacent facilities and malls and allow pedestrians to cross main roads and move to the opposite sides of the railway tracks. In addition, station plazas that can smoothly handle the flow of traffic for bus berths, taxi bays, and Kiss & Ride should be centrally located in front of the station. In some cases, these facilities may need to be located on both sides of station's railway lines. Furthermore, parking facilities for Park & Ride will be needed next to the station plaza.



**Figure 4-17 Basic Layout Plan of Intermodal Facilities in Suburban Station**

Spaces to improve amenities are needed to improve station plazas, such as spaces for placing benches for people to rest and spaces for green areas, in addition to spaces for pedestrians to take buses and taxis and to wait. The size of these Amenity Spaces should be set to about 50% for station plazas that are a standard scale of 4,000 to 10,000 m<sup>2</sup> (see Figure 4-18).



Source: JICA Study Team

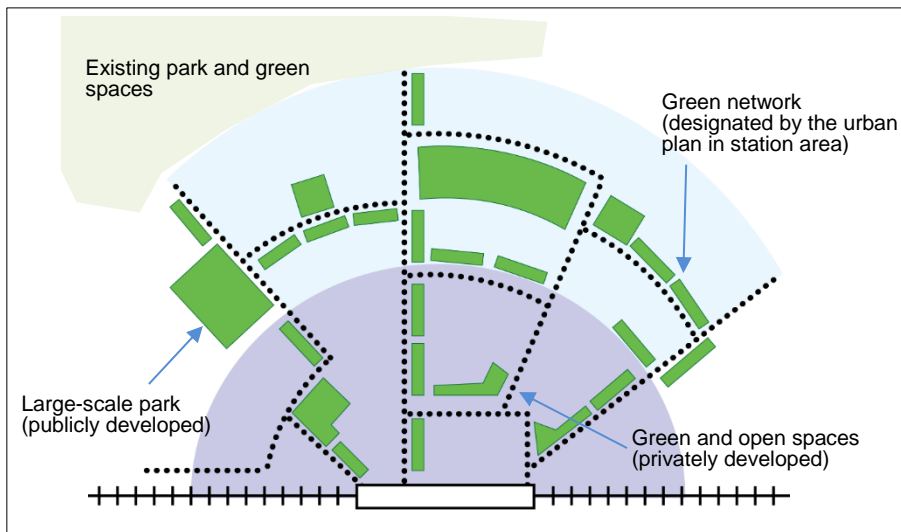
**Figure 4-18 Amenity Space for Station Plaza**

## (5) Green and Open Space Network

- Current Issues in Iran
  - There is a lack of amenity spaces, such as green and open spaces, in areas around stations both in city centers and the suburbs.
  - There are no vibrant, comfortable spaces using these types of amenity spaces in areas around stations.
- Basic Orientation of Guidelines
  - Development of a continuous network of green areas and open spaces from the station to surrounding areas.
  - Systematic consideration of networks where urban functions, such as commercial functions, and amenity spaces are integrated to create a vibrant space.

### a) Development of Green and Open Space Network connecting the Station and Surrounding Blocks

Figure 4-19 shows an image of green and open space networks connecting the station and surrounding blocks. As shown in this figure, green and open space networks are formed by connecting amenity spaces in various ways through public-private partnerships. For example, continuity in amenity spaces can be secured by connecting spaces designated for development through urban planning in areas around stations, spaces such as large-scale parks needed in the target area, and spaces created by opening up private green areas and spaces to the public.

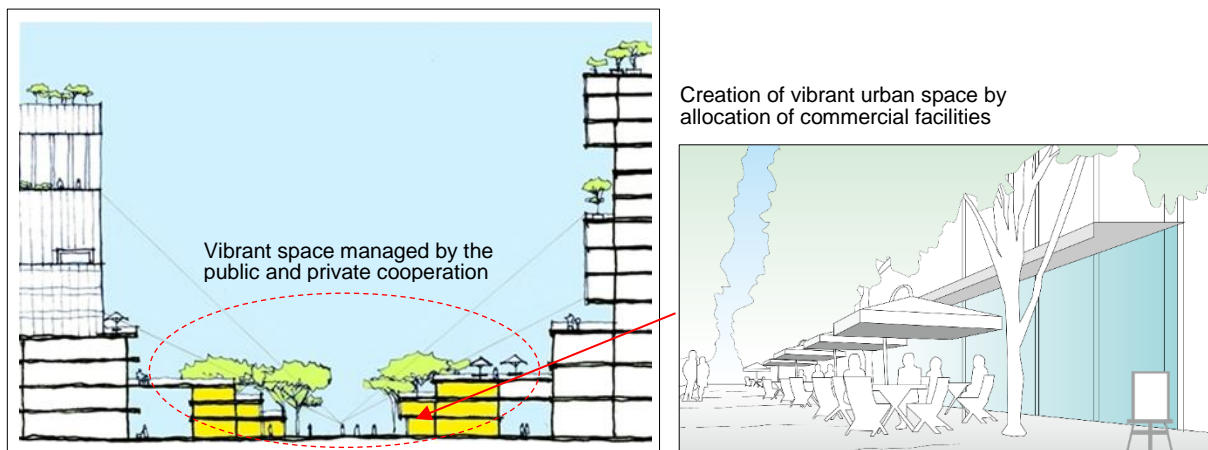


Source: JICA Study Team

**Figure 4-19 Image of Green and Open Space Network Connecting between the Station and Surrounding Blocks**

**b) Creation of vibrant spaces along green and open space networks**

Vibrant spaces can be created by guiding the development of commercial facilities, such as shops, through urban planning along the green and open space network mentioned above. It is also possible to create green and open space networks as spaces that are always vibrant and can continue to be used comfortably through cooperation and management by the public and private sectors (see Figure 4-20).



Source: JICA Study Team

**Figure 4-20 Creation of Vibrant Urban Space by Allocation of Commercial Facilities**

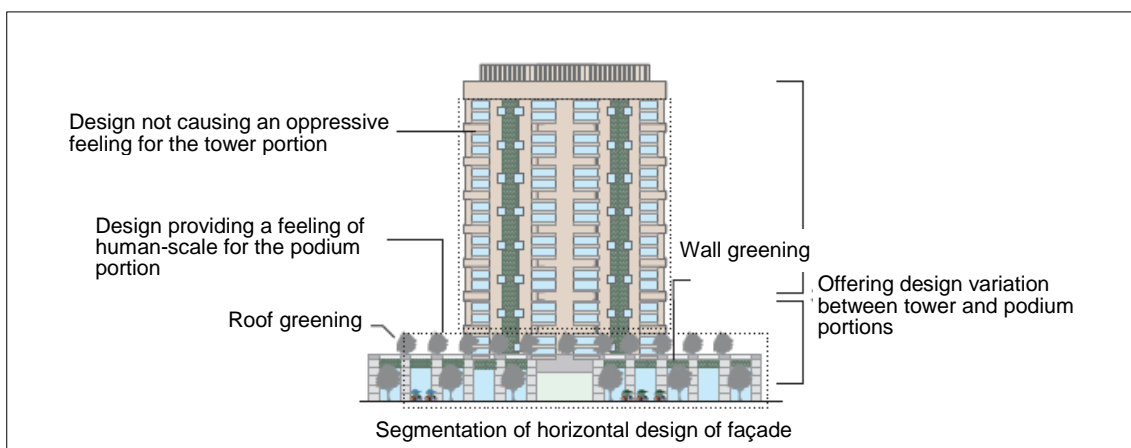
## (6) Building Design

- Current Issues in Iran
  - Spaces have not been developed for pedestrians to move comfortably because buildings located in the vicinity of railway stations have been built without consideration for pedestrians, such as ground levels.
  - Construction and urban planning regulations are insufficient for improving building spaces to allow pedestrians to pass the time comfortably and easily move around and to form attractive cityscapes.
- Basic Orientation of Guidelines
  - Create comfortable pedestrian network spaces and attractive cityscapes around the station by proceeding with the development of pedestrian networks that can smoothly access peripheral blocks connected from the station, as indicated in (2), and guiding the appropriate design of buildings located along the network.

### a) Introduction of design guidelines for buildings in order to form comfortable walkable spaces in areas around the station

Blocks in areas surrounding stations in the suburbs are likely to be large in scale. Buildings constructed in these types of large-scale blocks are likely to overstep human scale, which may cause pedestrians to feel cooped up and oppressed. For this reason, design guidelines should be introduced for buildings to form spaces for pedestrians of human scale, as shown in Figure 4-21. Also, the guidelines include provisions for forming attractive cityscapes in the station area.

- Segment buildings by design in order to change extended wall surfaces in a horizontal direction.
- In high-rise buildings, apply changes to the designs for the podium and tower portions.
- Use materials that have a human scale in the podium portion.
- Devise methods to approach human scale by utilizing natural materials, such as natural stones and trees in the podium portion.
- Provide a visual contribution to the surrounding area by greening the walls and rooftops on the podium section.
- In cases where highly reflective exterior materials are used, such as glass, give due consideration to the reflection and glare on the surrounding area.



Source: JICA Study Team based on the Guidelines of Yokohama City

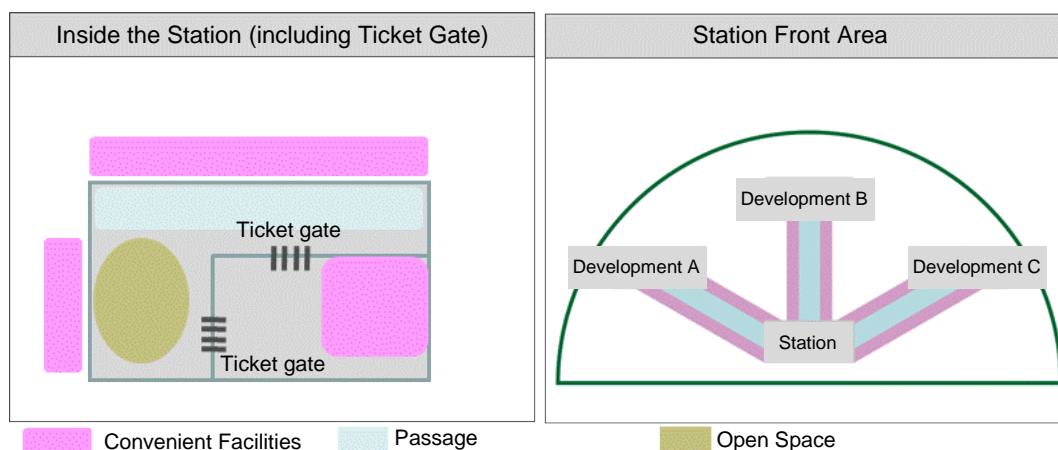
**Figure 4-21 Concept of Design Guidelines for Podium Portion of Buildings**

## (7) Convenient Facilities

- Current Issues in Iran
  - Currently, urban functions developed in the station and areas around the station are limited. The development potential of stations that attract large crowds is not being fully utilized.
  - Facilities such as commercial and public facilities are often located in places that are removed from the station, which impedes the improvement of convenience and appeal of the station.
- Basic Orientation of Guidelines
  - Creation of a vibrant, appealing space by improving convenient facilities within the station and in the Station Front Area around the station.
  - Improve convenience of the area around the station by constructing public facilities, daycare centers, and stores, such as supermarkets, along the pedestrian network in the station front area.

### a) Placement and function of convenient facilities

By placing lifestyle convenient facilities inside the ticket gates of the station, along the pedestrian passages in the Station Front Area, and in the podium portion of development around the station, station convenience will be improved and create a vibrant space (see Figure 4-22). Table 4-5 shows examples of convenient facilities that would be recommended for development in areas around stations.



Source: JICA Study Team

**Figure 4-22 Concept of Placement of Convenient Facilities**

**Table 4-5 Example of Recommended Convenient Facilities for Development in Areas around Stations**

• Branches of government offices	• Supermarkets
• Post offices	• Retail stores
• Libraries	• Restaurants
• Clinics, dentist offices	• Entertainment (movie theaters, cultural facilities)
• Banks, ATMs	• Co-working spaces
• Daycare centers	

Source: JICA Study Team

## (8) Underground Development (Confirmation of Development Plans for Underground Spaces Formulated by Tehran Metropolitan Government)

- Current Issues in Iran
  - Although Iran is not carrying out the full-scale development of underground spaces at this time, there is a high likelihood that underground development will be promoted in the future, utilizing underground stations that will draw a number of users.
  - In this case, safety standards and guidelines to improve amenities in underground spaces will be required for the development of underground spaces.
- Basic Orientation of Guidelines
  - Establishment of safety standards for underground development.
  - Creation of guidelines to improve amenities in underground spaces.

### a) Establishment of Safety Standards

In underground development, it is necessary to establish appropriate safety standards and develop spaces according to those standards. In particular, if a fire occurs in an underground space, it could result in a life-threatening situation, which makes it necessary to develop facilities and equipment based on expectations of responding to fires. Table 4-6 shows the items required as safety standards in underground development.

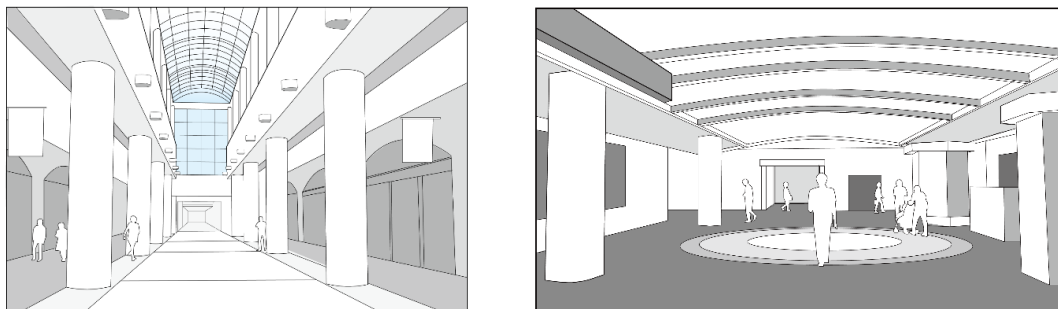
**Table 4-6 Items Required as Safety Standards in Underground Development**

- |   |
|---|
| <ul style="list-style-type: none"><li>▪ Prohibited usage</li><li>▪ Underground passage (evacuation distance, minimum width and height, slope, etc.)</li><li>▪ Criteria for stairs and elevator equipment</li><li>▪ Fire protection (division by fire walls or shutters, etc.)</li><li>▪ Smoke extraction (placement of smoke ventilation, smoke partition, etc.)</li><li>▪ Ventilation (ventilated capacity)</li><li>▪ Building service equipment (emergency light, drainage facility, etc.)</li><li>▪ Central control system, etc.</li></ul> |
|---|

Source: JICA Study Team

### b) Development of guidelines to improve amenities

Underground spaces tend to be enclosed, dark, and monotonous. Therefore, in order to incorporate a feeling of openness and brightness in an underground space, measures should be devised to incorporate natural light. With further improvements, it is possible to create a space that is comfortable for those users who may be directionally challenged to easily know their location and direction. Guidelines to improve these types of amenities should be developed (see Figure 4-23).



Source: JICA Study Team

**Figure 4-23 Image of Amenity Space for Underground Development**

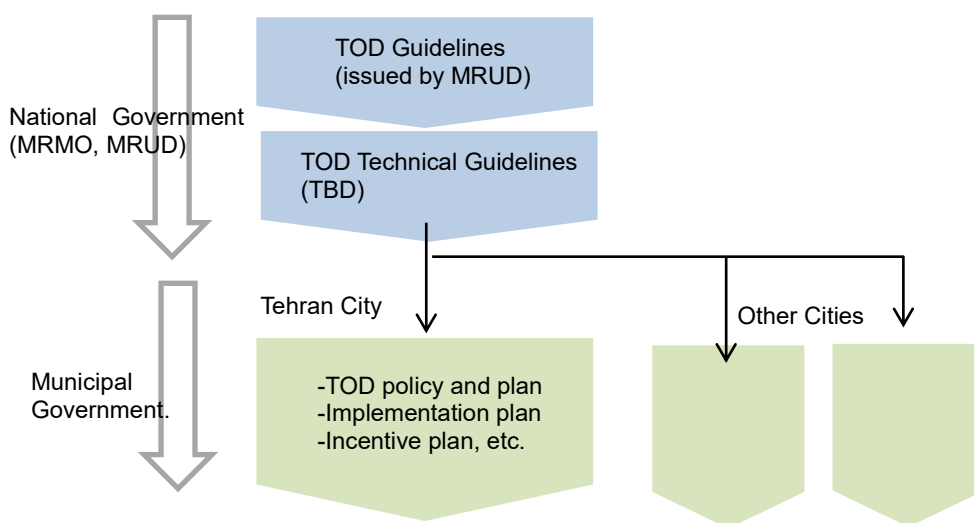
### 4.3 Proposed Institutional Framework for TOD Implementation

In order to promote TOD in each city in Iran in the future, it is necessary to develop mechanisms to promote TOD according to the actual situations in each city and region based on the TOD guidelines currently being formulated by MRUD. It will also be necessary to promote the development of an area management mechanism for TOD to be sustainable, with local governments taking the initiative and cooperating with railway operators and private businesses that will actually carry out development.

#### (1) Formulation of TOD Master Plans and Local Rules at the Local Government Level

MRUD’s TOD guidelines target cities throughout Iran. However, in reality, there are various targets, ranging from major cities, such as Tehran, to regional cities with populations of a few hundred thousand, each with its own urban issues. In order to realistically solve these issues, it is necessary to prepare local rules such as policies and plans on TOD at the local government level. Basically, these local rules will be formulated based on the existing urban and transportation planning system in Iran, but if necessary, a new planning framework such as TOD master plan will be considered (see Figure 4-24).

Specifically, it is necessary to set corridors in each metropolitan area, set major nodes, and consider master plans around each station, as well as determine local rules (deregulation, subsidies, etc.) to promote TOD in these areas.

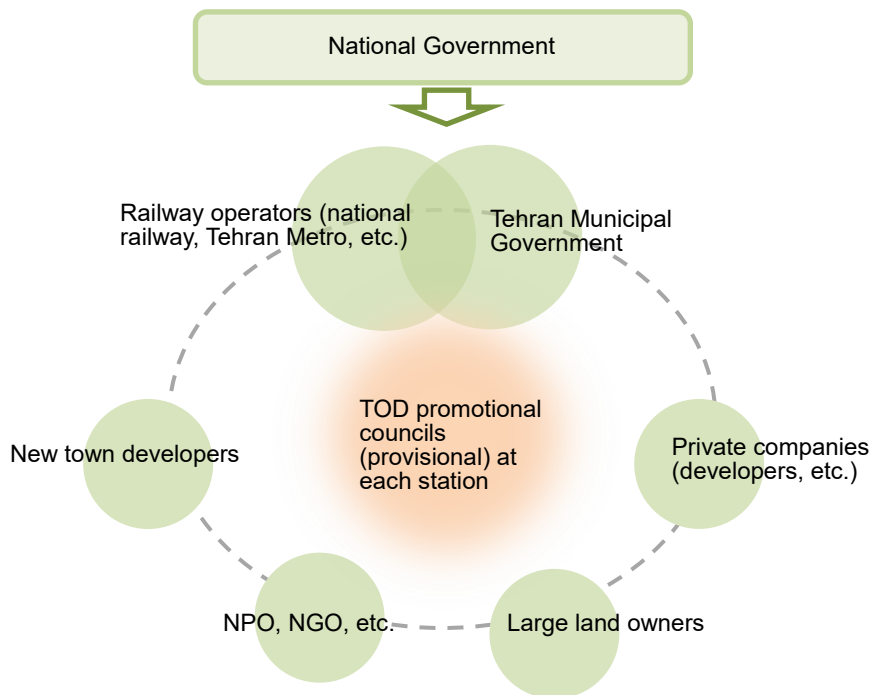


Source: JICA Study Team

Figure 4-24 Necessity for TOD Policies and Plans at the Local Government Level

#### (2) Composition of Councils in each Area around Stations

In order to create TOD master plans in each station and in surrounding areas, it is necessary to set up a place where stakeholders can meet and discuss plans for the future image of the area and the process to achieve this. For example, with the core members of Tehran City and railway operators, it is conceivable that a place can be arranged to gather members together, such as new town development operators, other private companies, and civic groups, according to the situation in areas around stations and according to need (see Figure 25).

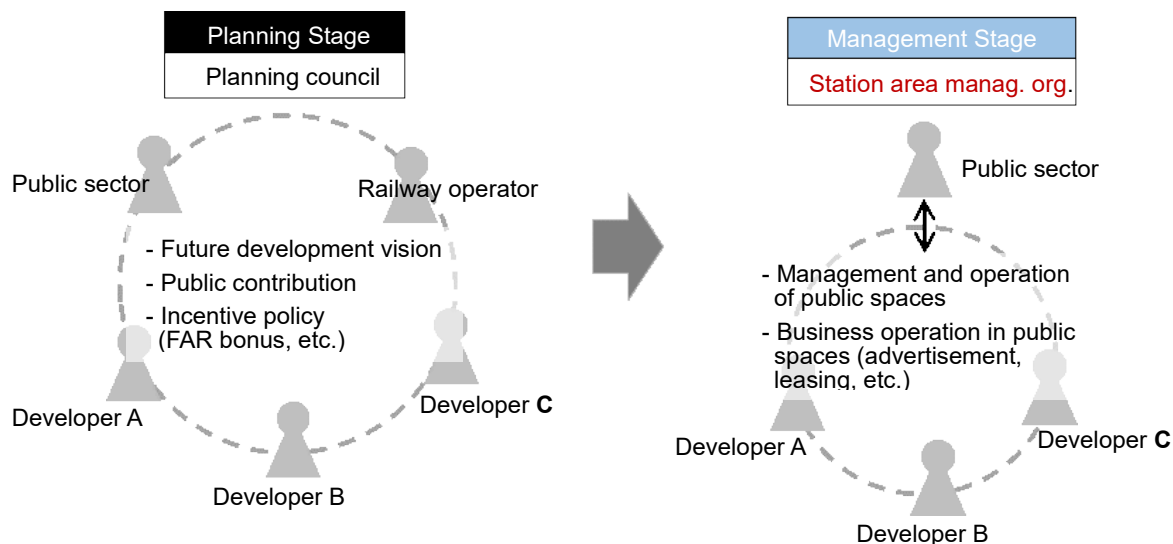


Source: JICA Study Team

**Figure 4-25 Image of TOD Promotional Councils at Each Station**

### (3) Promotion of Station Area Management

After TOD is achieved at each station and in surrounding areas, it is effective to carry out the practice of station area management to maintain and improve the area’s appeal and convenience for residents, as well as to improve real estate values.



Source: JICA Study Team

**Figure 4-26 Image of Promotion of Station Area Management**

For example, there is a possibility that station spaces and pedestrian decks and public spaces connecting these spaces are not sufficiently maintained and managed. It is conceivable that area management groups will take over these issues and carry out integrated maintenance and management, including for stations and facilities in the surrounding area. It is also possible to organize town events around stations and create an identity that includes residents in surrounding areas. Specifically, it is conceivable to expansively formulate the aforementioned councils as area management groups. Figure 4-26 illustrates the image of promotion of area management in areas around each station.

Examples of area management in Japan and the United States are shown on the following pages.

### Case Study: Area management in Shiodome Sio-side

#### ■ Overview of area management

Shiodome Sio-site is a large-scale redevelopment project of a former railroad yard around Shinbashi station in central Tokyo.

A council was created for the redevelopment of the area with the government railroad companies and several developers to consider ideas about how to manage the town from the planning stage. Underground public spaces and other areas were developed using the power of the private sector by relaxing floor area ratios. After completion, the council was reorganized as an area management group, carrying out cleanup of developed public spaces and small-scale maintenance through contracts with the government that owns the area. In addition, efforts are also being made to increase the name recognition and value of the area by carrying out events and managing a website for area branding of the Shiodome Sio-site.



Developed public spaces

Seasonal event

#### ■ Operation of profit-making businesses in public spaces

Project costs are reduced by renting out spaces to shops in underground passages and using pillars and walls as advertising space, as well as through investment from group members, in order to maintain and manage public spaces and carry out small-scale repairs in a stable manner. The government also permits area management organizations to occupy public spaces for city planning. Out of the annual operating costs of JPY 300 million, JPY 100 million is generated from these types of profit-making businesses (the remaining amount is generated from costs outsourced by the government and contributions from developers).



Advertisements in underground passage



Shops in underground passage

**Case Study: Developing collaborative systems with various stakeholders (Denver, USA)**

To promote TOD in the city of Denver in the US, a broad collaborative system, including local stakeholders, the local government, private developers, and external organizations, has been created, as shown in the figure below.

