

Socialist Republic of Vietnam
Ho Chi Minh City People's Committee (HCMC PC)
Ho Chi Minh City Management Authority for Urban Railways (MAUR)

**Special Assistance for
Project Impementation (SAPI)
for Ho Chi Minh City Urban Railway Project
(Ben Thanh – Suoi Tien Section (Line 1))
(Improvement of Intermodal Station Access)**

Final Report

**Executive Summary
Part I: General Issues**

August 2014

Japan International Cooperation Agency (JICA)

**ALMEC Corporation
Nippon Koei Co., Ltd.
Nikken Sekkei Research Institute**

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USD 1 = JPY 103.9 = VND 21,036

(Based on the "General Guidelines for the 1st Batch of
FY2014 Japanese ODA Loan Projects")

PREFACE

The output of the “Special Assistance for Project Implementation (SAPI) for Ho Chi Minh City Urban Railway Project (Ben Thanh – Suoi Tien Section (Line 1))”, is organized into the following reports (see table below), each providing detailed findings on specific subjects.

Organization of the Study Output

Final Report

Executive Summary

Part I: General Issues

1. Introduction
2. Urban Development and Transport Contexts
3. Review of the International Experience in Intermodal Transfer Improvement
4. Planning Direction on the HCMC UMRT Line 1 Transit Corridor
5. Travel Demand Forecast
6. Conclusion, Recommendations and Next Steps

Part II: Feeder Bus Network Planning

7. Bus Network Planning
8. Feeder Bus Operation Plan and Institutional Arrangements

Part III: Intermodal Facility Development

9. Concept Plan of Intermodal Facilities
10. Implementation Plan for Intermodal Facilities
11. Environmental and Social Considerations
12. Project Evaluation

Part IV: Station Area Development

13. Concept Plan of Station Area Development
14. Project Implementation Mechanisms and Measures on Station Area Development

Appendices

- Appendix A: Bus Network Planning Maps
- Appendix B: Estimation of Station Plazas
- Appendix C: Breakdown of Cost Estimation
- Appendix D: Environmental Legal and Institutional Framework
- Appendix E: Sensitive Spots along the Feeder Bus Routes
- Appendix F: Meeting Minutes of Task Team Meetings
- Appendix G: Breakdown of Benefits for Project Evaluation

Investment Project Report (Feasibility Study)

Drawings

Drawings: Basic Design of Station Facilities

Executive Summary

EXECUTIVE SUMMARY

Study Objectives and Scope

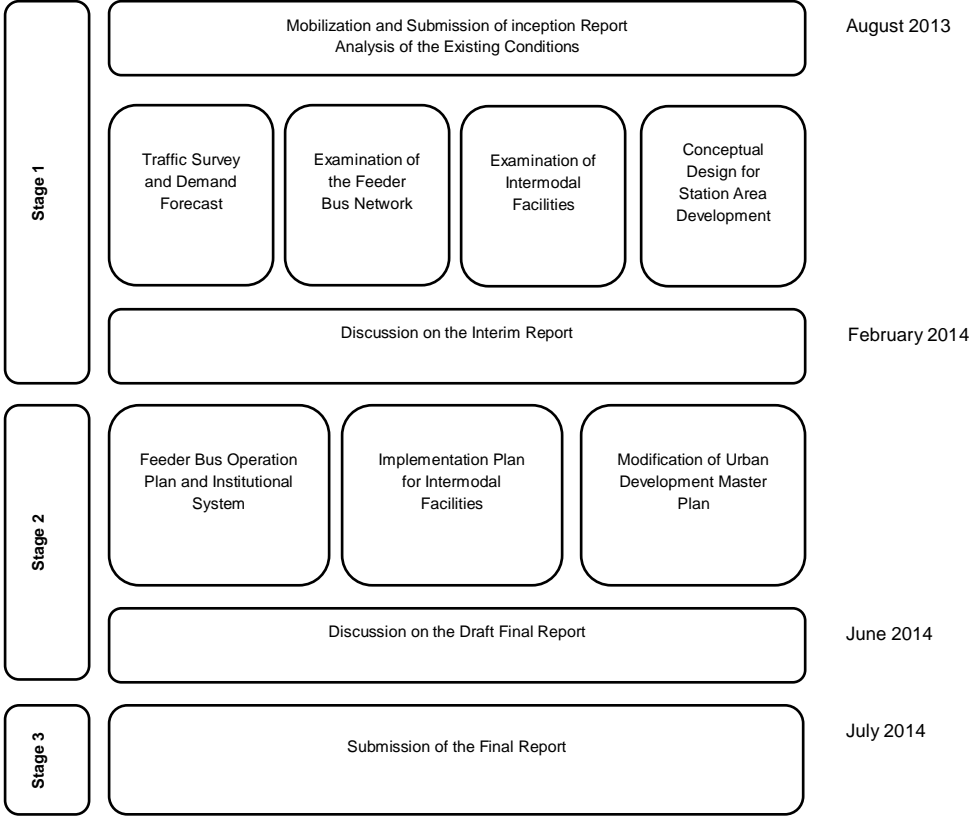
1. The Special Assistance for Project Implementation (SAPI) for the Ho Chi Minh City Urban Railway Project (Ben Thanh - Suoi Tien Section (Line 1)), hereafter known as the HCMC UMRT Line 1, was conducted from August 2013 to July 2014 at the request of the Vietnamese government in order to maximize the effects of the Japanese ODA-funded HCMC UMRT Line 1 project. In order to facilitate greater passenger usage of the HCMC UMRT Line 1, it is necessary that the level of service and environment for intermodal transfer functions be considerably improved. Therefore intermodal facilities such as station plazas, bus stops, pedestrian bridges, car/motorcycle parking and the development of a feeder bus network are necessary.

2. There are three main objectives in this study: (1) to conduct a feasibility study and basic design of intermodal facilities in the station areas of the HCMC UMRT Line 1, (2) to develop an implementation plan of the feeder bus network along the HCMC UMRT Line 1 and (3) to recommend policies and regulations for station area urban development.

3. The scope of the study is the corridor and the 13 station areas (Ben Thanh to Suoi Tien stations) of the 19.7 km long HCMC UMRT Line 1 which lies in Ho Chi Minh City and Binh Duong Province. For the last station on the line, Suoi Tien Terminal, a similar study will be conducted as a separate JICA public private partnership (PPP) study. On the Vietnamese side, counterpart organizations that were included in this study are the Ho Chi Minh People's Committee (HCMC PC), Department of Transportation (DOT), Department of Planning and Architecture (DPA), Department of Planning and Investment (DPI), Department of Construction (DOC), Management Authority of Urban Railways (MAUR) and the Management and Operation Centre for Public Transportation (MOCPT).

4. The overall framework of this study is as follows. It consisted mainly of three main stages. During Stage 1, the tasks of a traffic survey and demand forecasting, examination of the feeder bus network, examination of intermodal facilities and the conceptual design for station area development was conducted from August 2013 to February 2014 and the results were compiled into an Interim Report. During Stage 2, the tasks of developing a feeder bus operation plan and institutional system, implementation plan for intermodal facilities and modification of the urban development master plan was conducted from February 2014 to June 2014 and the results were compiled into a Draft Final Report. Based on feedback from the Vietnamese counterparts, the Draft Final Report was modified and the Final Report was submitted at the end of July 2014. The overall work flow is shown in the following figure.

Figure ES.1 - Overall Framework of the Study



Source: Study Team

Urban Development and Transport Contexts

Urban Plans in Ho Chi Minh City

5. In Vietnam, urban plans were formulated based on a hierarchical order: (1) a regional plan, (2) a city (provincial) level general plan, (3) a district level general plan and (4) a zoning and detailed plan. The urban plans of (1), (2) and (3) indicate the basic development direction, basic land use plan and location of large-scale infrastructure while the urban plans of (4) indicates a land use plan, infrastructure plans and urban planning criteria including the floor area ratio (FAR), building coverage ratio (BCR) and height restriction. From the Urban Planning Law, the district level general plans are not obligatory. In addition, in Ho Chi Minh City, the district level general plans also include the basic planning criteria for the area of several blocks, including average FAR, average building height and planned population.

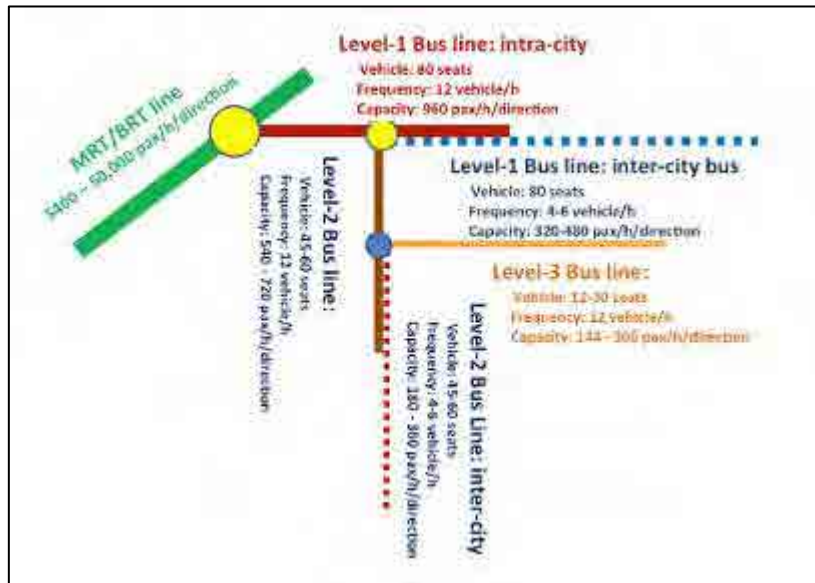
6. The General Construction Master Plan up to 2025 in Ho Chi Minh City as approved by the Prime Minister in 2010 indicates a multi-core urban structure with satellite towns and sub-centers to alleviate the present overconcentration in the central area. In addition, it was emphasized that development in the suburbs should be triggered by the construction of an urban railway. The HCMC UMRT Line 1 forms one of the strategic corridors to promote suburban development and the land use plan along this corridor includes a mix of housing, high-tech development for industry and university facilities.

Urban Transport Master Plan in Ho Chi Minh City

7. The Master Plan for Urban Transport Development until 2020 was approved by the Prime Minister in 2007 and includes a total of 8 urban railway lines, 3 tramways/monorails in addition to 6 BRT lines. The policy direction is to achieve a public transport modal share of 20-25% in 2020, 35-45% in 2030 and 50-60% in 2050 while reducing the private transport modal share.

8. The Master Plan for Public Transport Development until 2025 was developed as the basis for the development of a sustainable public transport system using the concept of a hierarchical network of public transport and the integration of urban railway stations and bus terminals with other modes (especially motorcycles and bicycles). The concept is shown as follows.

Figure ES.2- Hierarchical Public Transport Concept



Source: Master Plan for Public Transport Development in Ho Chi Minh City until 2025

9. Based on the Master Plan for Public Transport Development until 2025, the implementation of the existing bus transport and the HCMC UMRT Line 1 will be implemented using the following three principles: (i) *Removal of overlapping sections of the existing bus routes*, (ii) *Keeping bus routes for backing up the UMRT* and (iii) *Adjustment of bus routes according to the stations*.

The Current Public Transport System in Ho Chi Minh City

10. Buses are the main form of public transport in Ho Chi Minh City currently and radial routes account for 40% of the bus network. It can be said that the bus network basically connects the downtown areas to the suburban areas and the city with adjacent provinces. However, the disadvantage of the existing route network is that it has no hierarchy between the routes with most of the routes designed to connect to the city center or to directly connect between two large travel demand areas. This reduces the possibility of linked trips in the route network and increases the concentration of routes to the gateway of the city.

Current Bus Institutions

11. The organizational structure and operational management of public bus services was defined by Decision No. 321/2003/QD-UB by the HCMC PC. There are three major players in this arrangement, the HCMC PC, the DOT and the MOCPT. Generally, the HCMC PC is the main decision maker for high level decisions while the DOT conducts the planning and lower level decisions and the MOCPT is in charge of the operational aspects which include the selection of bus operators.

Review of the International Experience in Intermodal Transfer Improvement

Integration of the Urban Railway and Bus Network

12. In order to maximize the convenience of using the urban railway and attracting ridership, it is critical to integrate the bus network with the urban railway. The existing bus routes in Ho Chi Minh City will have to be rearranged once the HCMC UMRT Line 1 is operational to make the existing bus routes complementary rather than competing substitutes. Feeder bus routes will also be necessary for several stations.

13. In Japan, Tokyu Corporation (Tokyu) has prior experience in rerouting existing bus routes and the planning of feeder bus routes to accompany the opening of new urban railway lines. Tokyu carried out the rerouting of existing bus lines when the 31.5 km long urban railway, the Tokyu Den-en-toshi Line, opened in stages connecting the central area station of Shibuya with the suburban terminal station of Chuo-rinkan. Similarly, when the 13.1 km extension of the Yokohama Municipal Subway Green Line from Nakayama to Hiyoshi was opened, Tokyu which was the operator of bus services in the corridor carried out rerouting of bus routes based on supply and demand adjustment in accordance to the opening of the line.

Intermodal Facility Planning

14. Intermodal facilities at urban railway stations are necessary for the smooth transfer of passengers from the urban railway to other transport modes such as buses, motorcycles, etc. The lack of intermodal facilities at stations can cause problems like traffic congestion and obstruction to pedestrians in addition to reducing convenience for passengers transferring to other transport modes.

15. Types of intermodal facilities used in other countries that were identified to be suitable for the HCMC UMRT Line 1 are the station plaza, bus stops, pedestrian bridges, parking, access roads and the effective use of the railway station area. Station plazas provide physical space for transferring between the urban railway and buses, taxis and private cars. The establishment of bus stops is utilized when there is not enough physical space to construct a station plaza. The functions of pedestrian bridges are to provide a comfortable way to access the stations, especially since the elevated stations of the HCMC UMRT Line 1 are built along the Hanoi Highway. The establishment of parking facilities is critical in providing smoother intermodal transfers to attract usage from mainly motorcycle users. Access roads such as U-turn bridges are an important element to improve accessibility to stations, especially for buses, for the elevated stations located along the Hanoi Highway. In addition, effective usage of the railway station area, such as the establishment of retail stores under the stations and under the viaducts is another important

element in attracting ridership and providing convenience to users. Examples of intermodal facilities in foreign countries and its usage in the HCMC UMRT Line 1 are shown in the following table. Refer to Chapter 3, Section 3.2 for more details.

Table ES.1 - Summary of Intermodal Facility Planning in Foreign Countries

| Type of Intermodal Facility | | Example |
|-------------------------------------|---|---|
| Station Plaza | Two-side station plazas connecting by pedestrian bridge | <ul style="list-style-type: none"> • JR Inazawa Station, Japan • JR Biwajima Station, Japan |
| | Station plaza under viaduct | <ul style="list-style-type: none"> • JR Niigata Station, Japan • Shakujii-Kouen Station of Seibu Railway, Japan |
| Bus Stop | Column bus stop along arterial road | <ul style="list-style-type: none"> • Busan Station, Korea |
| Pedestrian Bridge | Attractive walk space | <ul style="list-style-type: none"> • JR Kawasaki Station, Japan |
| | Escalator and Elevator | <ul style="list-style-type: none"> • JR Sendai Station, Japan • JR Takasaki Station, Japan |
| | Moving walkway | <ul style="list-style-type: none"> • Sakuragi-cho Station, Japan |
| | Solar panel and illumination | <ul style="list-style-type: none"> • JR Kokura Station, Japan |
| Parking | Car parking under elevated station | <ul style="list-style-type: none"> • Sendai Airport Station, Japan • JR Shin-tosu Station, Japan |
| | Bicycle parking under viaduct | <ul style="list-style-type: none"> • Otagawa Station of Nagoya Railway, Japan |
| Access Road | U-turn bridge | <ul style="list-style-type: none"> • U-turn bridge on Motor way No.7, Bangkok |
| Other effective use of railway area | Retail store under viaduct | <ul style="list-style-type: none"> • Tokyu Store, Takatsu Station of Tokyu Railway, Japan |

Source: Study Team

Station Area Development

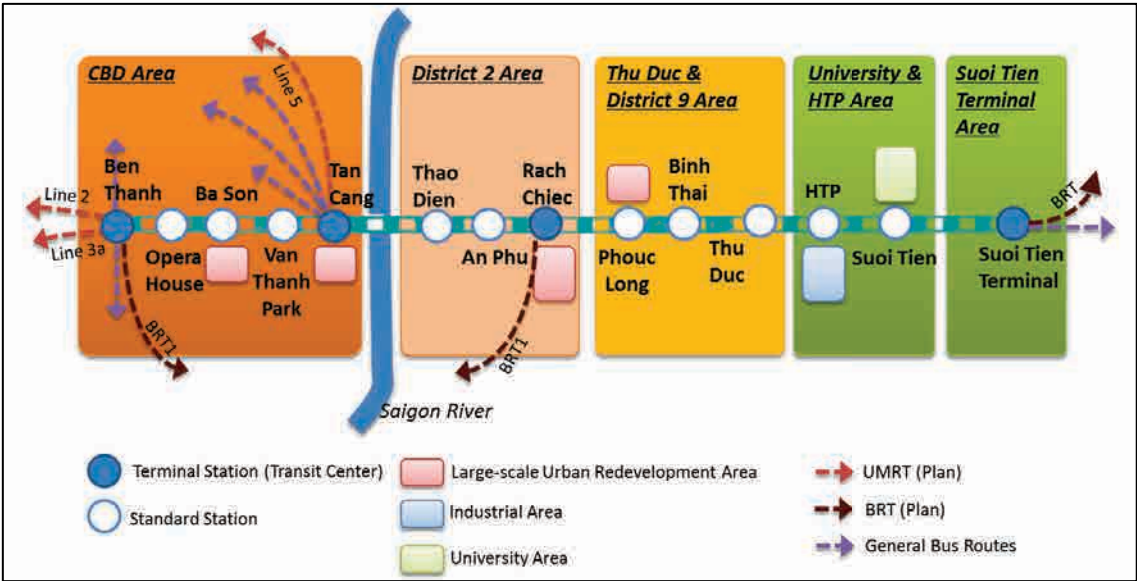
16. In Japan, private railway companies have been involved with non-railway activities such as the real estate business to develop new towns and commercial complexes along its railway lines. These activities unlock value along the railway lines and the railway companies can capture the value in terms of additional income. In addition, the development of new towns and commercial complexes also serve to increase the attractiveness of the railway lines and can help in securing ridership. Some examples are the development of the "Tama Denen Toshi" new town in Kanagawa Prefecture by Tokyu Corporation along its Tokyu Den-en-toshi Line and the development of a large-scale commercial complex, the "Hankyu Nishinomiya Gardens", by Hankyu Corporation at one of its stations in Hyogo Prefecture.

Planning Direction on the HCMC UMRT Line 1 Transit Corridor

Planning Issues on the HCMC UMRT Line 1 Transit Corridor

17. The HCMC UMRT Line 1 is set in Ho Chi Minh City where the line covers various urban uses from the CBD to the suburban area. Different land uses at the station areas requires an adequate development approach to fit the appropriate socio-economic activities and to encourage the development of the related station areas in an integrated manner. The HCMC UMRT Line 1 transit corridor is shown in the figure below.

Figure ES.3 - HCMC UMRT Line 1 Transit Corridor



Source: Study Team

18. The stations of Ben Thanh, Tan Cang, Rach Chiec and Suoi Tien Terminal will be major interchange stations connecting with other UMRT and BRT lines and the development of seamless transfer facilities and good connections with bus services at these stations will be required to promote usage on the UMRT. As a result, the HCMC UMRT Line 1 transit corridor is categorized into 5 different areas (CBD Area, District Area, Thu Duc & District 9 Area, University & HTP Area, Suoi Tien Terminal Area) and the strategy for the 5 different areas for achieving the desired usage levels on the HCMC UMRT Line 1 is summarized in the following table.

Table ES.2 - Urban/Transport Development Aspects on the HCMC UMRT Line 1 Corridor

| Area | Urban Development Aspect | Urban Transport Aspect |
|------------------------------------|--|---|
| CBD Area | - Promote station area development such as the Ba Son shipyard or Tan Cang port area | - Provide adequate feeder bus services by the rerouting of existing bus routes - Promote seamless transfers at Tan Cang station to buses |
| District 2 Area | - Promote the Sports City Development | - Provide adequate feeder bus services - Rerouting of existing bus routes on the overlapping section with the HCMC UMRT Line 1 - Develop station plazas - Provide parking facilities - Promote the seamless transfer at Rach Chiec Station to BRT 1 - Promote the seamless transfer at Suoi Tien Terminal Station to BRT/buses |
| Thu Duc and District 9 Area | - Promote and lead station area development by using the concept of TOD - Provide organized urban lands ahead of urbanization to prevent sprawl | |
| University and High-Tech Park Area | - Promote the master plan of national university and High-Tech Park | |
| Suoi Tien Terminal Area | - Promote and lead station area development by using the concept of TOD | |

Source: Study Team

19. The planning issues for facilitating the increased usage of the HCMC UMRT Line 1 are summarized as follows:

Accessibility to the Station: Unless proper measures to secure the accessibility to stations are taken such as the development of a feeder bus system or station plaza development, benefits from the operation of the HCMC UMRT Line 1 may not be fully maximized. Smooth, safe, and comfortable service must be provided through well-planned feeder bus systems and intermodal transfer facilities in the station plazas.

Conditions in the Station Area: In order to develop intermodal facilities in the station area, the present conditions of each station area should be evaluated in terms of land availability and the presence of major public utilities along the Hanoi Highway.

Location and Alignment of Stations: Locations of the stations on the east side of the Saigon River are along the Hanoi Highway. In intermodal facility planning, accessibility from the other side of the station has to be taken into consideration after the analysis of the characteristics of the highway.

Present Trip Characteristics and Future Expectation of the HCMC UMRT Line 1

20. In order to understand the current characteristics of travel behavior and the stated preference of potential users of the HCMC UMRT Line 1, data was collected by conducting traffic surveys and a travel behavior interview survey with a local consultant. The collected data was then used to update the travel demand forecast model. It was found that in the corridor of the HCMC UMRT Line 1, the dominant transport mode was the motorcycle, commanding around 70% of the mode share.

21. The following table shows the comparison in observed traffic volume at the survey station near the Saigon Bridge in this study (SAPI) and the previous HOUTRANS (The Study on Urban Transport Master Plan and Feasibility Study in Ho Chi Minh Metropolitan Area) study in 2003. Total traffic volume increased by 23% in 10 years. The number of motorcycles increased by 30% and that of cars almost doubled.

Table ES.3 - Comparison of Traffic Volume in the 2013 SAPI Study and the 2003 HOUTRANS Study at the Saigon Bridge Survey Station

| | Number of Vehicles (24 hours, both directions) | | | | | | |
|-----------------|---|---------|--------|-------|--------|--------|---------|
| | Bicycle | M/C | Car | Bus | Truck | Others | TOTAL |
| SAPI (2013) | 879 | 233,738 | 34,567 | 6,457 | 7,306 | 527 | 283,474 |
| HOUTRANS (2003) | 6,184 | 179,826 | 17,500 | 6,832 | 18,503 | 976 | 229,821 |
| SAPI / HOUTRANS | 14% | 130% | 198% | 95% | 39% | 54% | 123% |
| | Vehicle Composition (24 hours, both directions) | | | | | | |
| | Bicycle | M/C | Car | Bus | Truck | Others | TOTAL |
| SAPI (2013) | 0% | 82% | 12% | 2% | 3% | 0% | 100% |
| HOUTRANS (2003) | 3% | 78% | 8% | 3% | 8% | 0% | 100% |

Source: Study Team

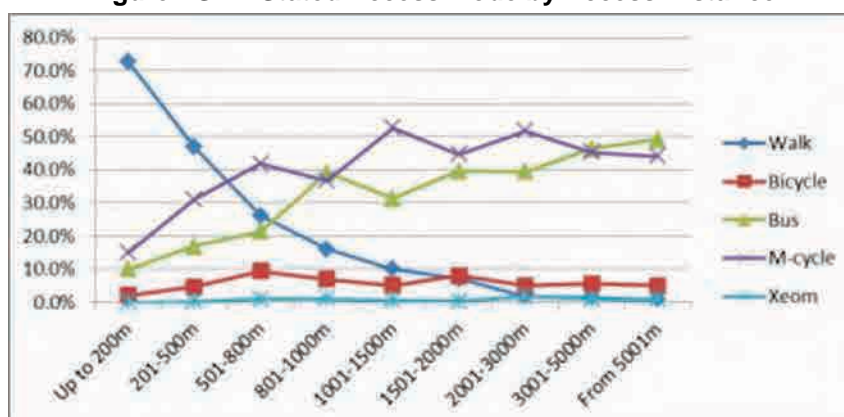
Stated Mode Shift to the HCMC UMRT Line 1

22. To estimate the potential users of the HCMC UMRT Line 1, a stated preference survey was conducted and a total of 3,691 samples were collected. It was found that among all respondents (3,691 samples), 50.3% would consider shifting modes to use the UMRT. Among bus users (760 samples), 49.3% would consider shifting modes to use the UMRT and among the dominant transport mode of the motorcycle (2,931 samples), 50.6% of users would consider shifting modes to use the UMRT.

Stated Access Mode Choice by Access Distance to the Station

23. For most of the respondents, when the access to the distance to stations is 500 m or less, they choose walking as the access mode. On the other hand, when the access distance to stations is 800 m or more, they choose bus or motorcycle as their access mode. This result suggests that it is important to improve the road infrastructure for pedestrians such as sidewalks within a 500 m radius of stations and to provide feeder bus services to areas that are more than a 800 m radius from stations in order to maximize the ridership on the UMRT. The following figure shows the stated access mode choice by access distance.

Figure ES.4 - Stated Access Mode by Access Distance



Source: Study Team

Respondents Opinion on the Importance of Proposed Complementary Measures to Attract Ridership on the UMRT

24. During the travel behavior survey, respondents were asked name the three most important complementary measures to encourage the usage of the UMRT from a list of 12 measures. It was found that the most important complementary measures were: providing facilities for people with disabilities in the station area, providing parking spaces for motorcycles and bicycles at every UMRT station and reducing the fares of the UMRT. Conversely, the three most unpopular measures were: increasing taxes and fees on motorcycle and car usage, restricting motorcycle usage on the Hanoi Highway and restricting car and motorcycle usage in designated areas (e.g., Ben Thanh Market, etc.).

Willingness to Pay for Station Parking and Feeder Buses and Willingness to Wait for Feeder Buses

25. Around 61% of respondents said that they were willing to pay up to 3,000 VND to park their motorcycle at a station while 51% said that they were willing to pay up 2,000 VND or more to park their bicycle at a station. With regards to fares for the feeder buses, 42% of respondents said that they were willing to pay a fare of 5,000 VND while 27% of respondents said that 3,000 VND is a more acceptable fare. With regards to waiting time for feeder buses, 47% of respondents said that a suitable waiting time would be 5 minutes and 41% of respondents accepted a waiting time between 8 to 10 minutes while only 6% accepted a waiting time within 15 minutes.

Development Strategies to Promote UMRT Usage

26. From the viewpoint of the railway user, motivation to choose public transport consists of a well put together judgment of three motivation factors: (i) lower travel cost, (ii) shorter travel time, and (iii) high level of amenity and convenience, compared with private transport such as the car and motorcycle. The travel cost needs to be considered in the operation planning of the UMRT and the feeder bus services. In intermodal facility planning, it is necessary to study the ways of providing shorter travel times and a high level of amenity and convenience to the user. Based on these motivation factors, the common strategy to promote UMRT usage is shown in Table ES.4.

Table ES.4 - Common Strategy to Promote UMRT Usage

| Common Strategy | | |
|-------------------------|---|--|
| Motivation Factor | UMRT and Feeder Bus | Intermodal Facility |
| Travel Cost | <ul style="list-style-type: none"> • Appropriate fare considering the people's motivation to use the railway • Special discounts for commuter tickets, student tickets for the UMRT and bus (institutional measure) • Company subsidy for commuting expenses of commuter passes • Restriction of private car into the CBD | <ul style="list-style-type: none"> • Free parking campaign for the UMRT user |
| Travel Time | <ul style="list-style-type: none"> • Appropriate layout of station-related facilities in considering shorter distances for pedestrian movement • Smartcard system to shorten the time of ticketing and passing through fare gates | <ul style="list-style-type: none"> • Improvement of access roads and installation of appropriate number of berths for the smooth operation of feeder buses • Appropriate layout of transit facilities considering short distances to ticket gates |
| Amenity and Convenience | <ul style="list-style-type: none"> • Barrier-free facilities such as the installation of elevators • Shops within the station building (Kiosk, café) • Digital information displays showing transit timetables • Information service of the route guide and time table by website and smart phone application • Smartcard payment for shopping • Public Wi-Fi service inside the train • Service facilities to meet the users and regional character | <ul style="list-style-type: none"> • Weatherproof pedestrian walkways • Barrier-free facility such as elevators • Amenity space by open space and illumination • Safe access space for pedestrians and bicycles • Service facilities to meet the users and regional character |

Source: Study Team

Travel Demand Forecast

Methodology of the Transport Demand Forecast

27. The travel demand forecast was based on the model used for the HOUTRANS (The Study of Urban Transport Master Plan and Feasibility Study in Ho Chi Minh Metropolitan Area) study of 2003-2004 with the target years of 2018 (scheduled partial opening of the HCMC UMRT Line 1), 2020 (scheduled full opening of the UMRT) and 2040. The model that was used is the conventional four-step method which includes the (1) Trip Generation and Attraction Model - to estimate the number of trips travelling between the traffic zones, (2) Trip Distribution Model - to estimate the number of trips travelling between the traffic zones, (3) Modal Share Model - to estimate the number of trips made using different transport modes and (4) Traffic Assignment Model - to estimate the number of trips on the transport network by different transport modes.

28. In order to update the model used in the HOUTRANS study, the socio-economic framework was updated. More specifically, the planned population according to the master plan of Ho Chi Minh City and the population trends along the HCMC UMRT Line 1 were adjusted and inputted into the travel demand forecast model in order to product the most realistic forecasts possible.

Results of the Transport Demand Forecast

29. The travel demand forecast model with the adjusted socio-economic framework produced a public transport modal share along the HCMC UMRT Line 1 corridor of 17.8% in 2018, 17.7% in 2020 and 16.9% in 2040. The modal share for all modes is shown in the following table.

Table ES.5 - Modal Share in the SAPI Study

| Year | Motorcycle | Car* | Public Transport | Total |
|------|------------|-------|------------------|--------|
| 2018 | 74.6% | 7.6% | 17.8% | 100.0% |
| 2020 | 71.8% | 10.5% | 17.7% | 100.0% |
| 2040 | 55.4% | 27.7% | 16.9% | 100.0% |

* Passenger vehicles only
Source: Study Team

30. The following table shows the demand forecast by station on the HCMC UMRT Line 1 in 2018 (partial opening of the line), 2020 (complete opening of the line) and in 2040.

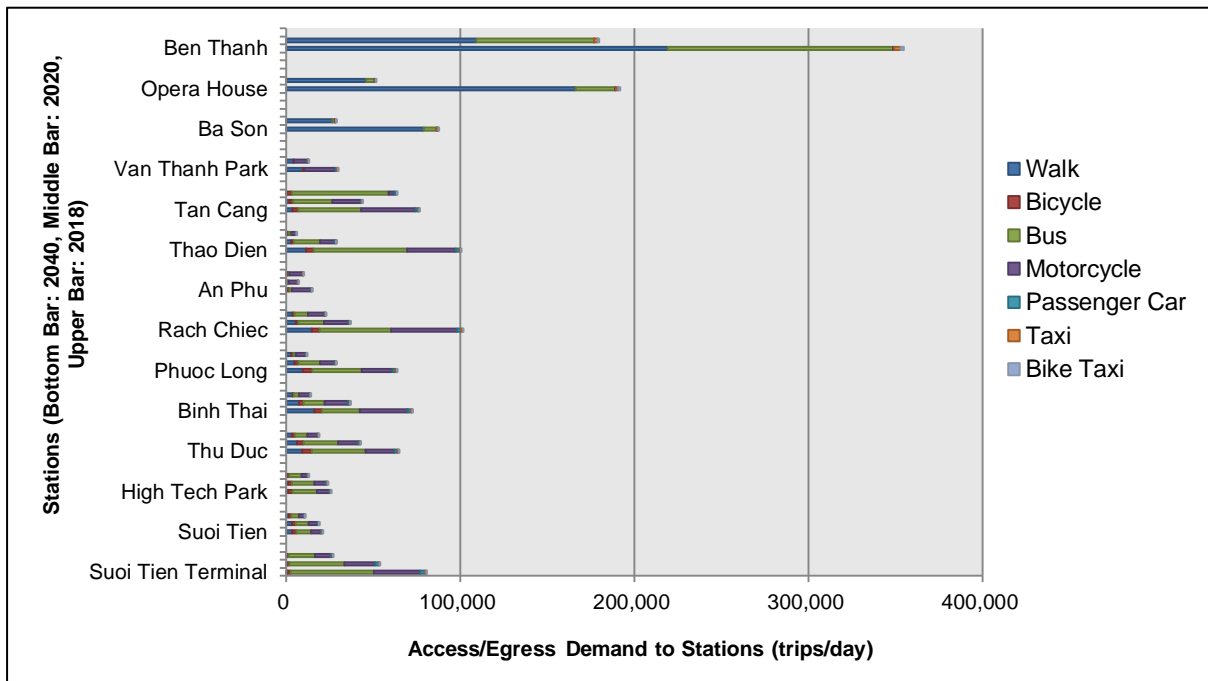
Table ES.6 - Demand Forecast by Station on the HCMC UMRT Line 1

| | Station | 2018 (pax/day) | 2020 (pax/day) | 2040 (pax/day) |
|----|--------------------|----------------|----------------|----------------|
| 1 | Ben Thanh | - | 90,000 | 178,000 |
| 2 | Opera House | - | 26,000 | 96,000 |
| 3 | Ba Son | - | 15,000 | 44,000 |
| 4 | Van Thanh Park | - | 7,000 | 15,000 |
| 5 | Tan Cang | 32,000 | 22,000 | 39,000 |
| 6 | Thao Dien | 3,000 | 15,000 | 51,000 |
| 7 | An Phu | 5,000 | 4,000 | 8,000 |
| 8 | Rach Chiec | 12,000 | 19,000 | 51,000 |
| 9 | Phuoc Long | 6,000 | 15,000 | 32,000 |
| 10 | Binh Thai | 7,000 | 19,000 | 37,000 |
| 11 | Thu Duc | 10,000 | 22,000 | 33,000 |
| 12 | High Tech Park | 7,000 | 12,000 | 13,000 |
| 13 | Suoi Tien | 6,000 | 10,000 | 11,000 |
| 14 | Suoi Tien Terminal | 14,000 | 27,000 | 41,000 |
| | Total | 102,000 | 303,000 | 649,000 |

Source: Study Team

31. The access and egress trips to stations on the HCMC UMRT Line 1 were also forecasted. In the 3 stations of the CBD area, namely Ben Thanh, Opera House and Ba Son, the modal share of walking as access/egress trips are higher than other stations. On the other hand, the share of motorcycles and feeder buses for access/egress trips is high on the elevated stations in the suburban areas. Therefore, the development of intermodal facilities, such as motorcycle parking, physical space for buses and private vehicles is important to attract ridership to the UMRT. The estimation of the access and egress trips is shown in the following figure.

Figure ES.5 - Access/Egress Trips to Stations on the HCMC UMRT Line 1



Source: Study Team

Bus Network Planning

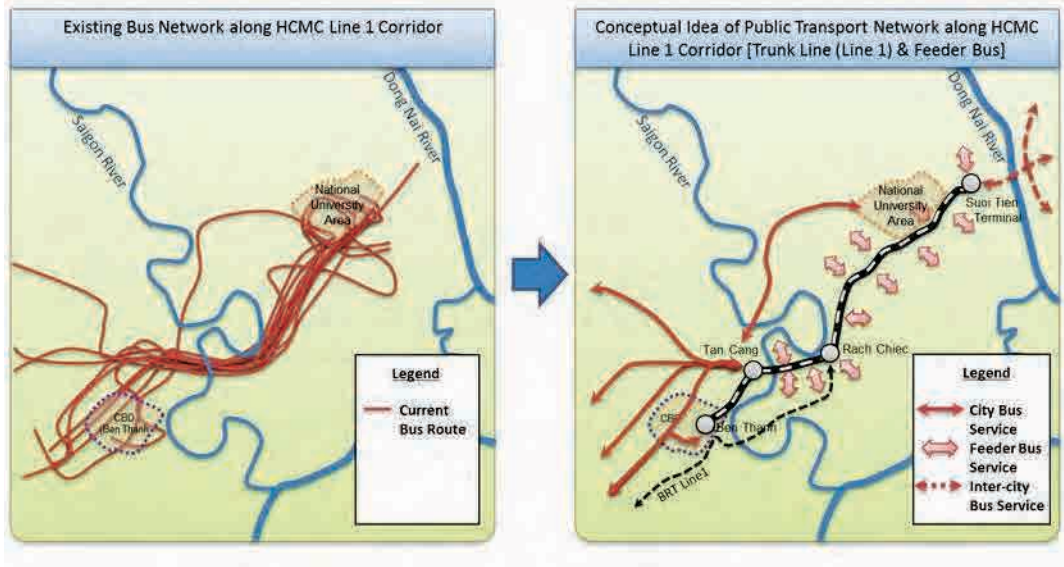
Key Planning Principles

32. In order to achieve the latest government policy of reducing the modal share of private transport while increasing the modal share of public transport to 20-25% in 2020, 35-45% in 2030 and 50-60% in 2050, the restructuring of the existing bus network and the introduction of a new feeder bus system to cover the catchment area of UMRT stations is necessary in order to implement the concept of a hierarchical public transport network with integration of UMRT stations and bus terminals with other modes.

33. In order to attract more ridership on the HCMC UMRT Line 1 by maximizing public transport access, the following principles were followed in the planning of the bus network on the HCMC UMRT Line 1 corridor. The concept is shown in the following figure.

- Develop a new public transport system where the backbone of the network is the urban railway (UMRT)
- Provide a feeder bus network to extend the catchment area of UMRT stations on the eastern side of the Saigon River
- Existing bus routes will be replaced by feeder buses or adapted to the new transport conditions
- Tan Cang and Suoi Tien Terminal stations on the UMRT Line 1 will be terminals for city buses and for the interprovincial bus network

Figure ES.6 - Concept of the Hierarchical Public Transport System along the UMRT Line 1 Corridor

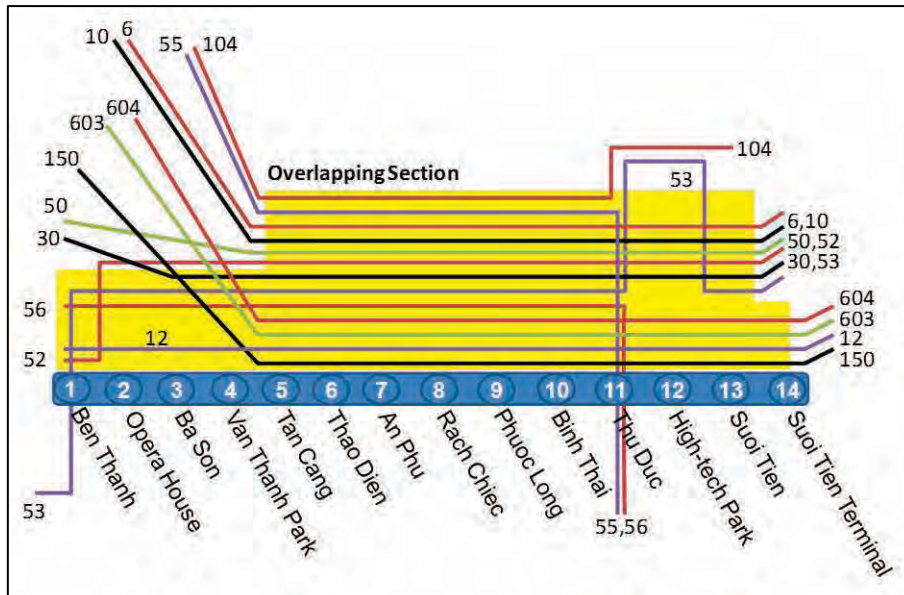


Source: Study Team

Methodology for Redesigning Existing Bus Routes

34. The following figure shows the overlapping section between the HCMC UMRT Line 1 and the existing bus routes. There are 13 existing bus routes that overlap with the UMRT Line 1 corridor. The 13 routes that overlap with the UMRT between Tan Cang and Thu Duc stations for more than 8 km were examined in more detail in this study.

Figure ES.7 - Overlapping Section between the HCMC UMRT Line 1 and the Existing Bus Routes

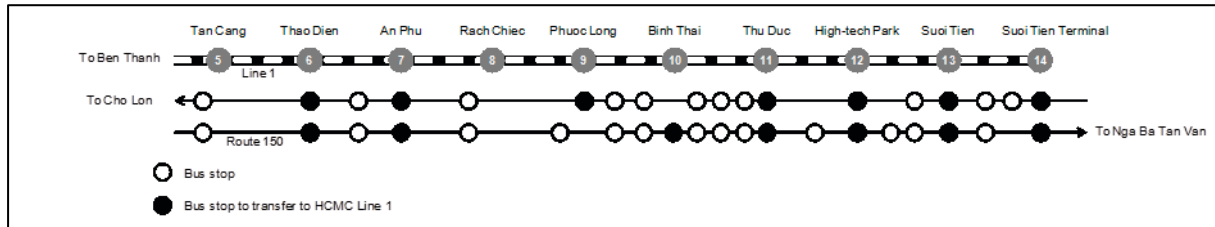


Source: Study Team

35. The following points were used in the methodology in redesigning the existing bus routes and in the design of a new feeder bus service.

- Some of the existing bus routes that overlap with the HCMC UMRT Line 1 will continue to operate in parallel with the UMRT while also serving the role of feeder services for passengers accessing the UMRT. For example, this concept is demonstrated by Route 150 in the following figure.

Figure ES.8 - Location of Bus Stops for Route 150 along the Hanoi Highway



Source: Study Team

- Long distances served by existing routes will be adapted where possible to connect with the UMRT.
- The planning of feeder bus routes is based on assisting passengers that live in a station catchment area of up to a 5 km radius, as per the demand indicated from the stated preference survey that was conducted on the UMRT corridor.
- The design of actual feeder bus routes is based on the actual condition of the existing road conditions and future road plans with feeder bus routes connecting potential high demand areas such as apartment complexes, educational institutions, commercial and retail facilities to the HCMC UMRT Line 1.

Modified Bus Routes

36. The 13 existing bus routes that overlap for more than 8 km in the UMRT corridor between the stations of Tan Cang and Thu Duc are routes 6, 10, 12, 30, 50, 52, 53, 55, 56, 104, 150, 603, 604.

37. Based on the methodology was mentioned before. The proposed modifications are as follows:

- Routes 6, 10, 30, 50, 56 and 104 will be terminated at Tan Cang station. The eliminated portion of these routes will be covered by the HCMC UMRT Line 1, proposed feeder bus routes and modified existing bus routes
- Route 52 will be eliminated and service on this route will be covered by the HCMC UMRT Line 1, proposed feeder bus routes and modified existing bus routes.
- Routes 12, 603, 604 functions as the trunk line of existing public transport on the Hanoi Highway corridor. This function will be replaced by the HCMC UMRT Line 1 after the opening. Therefore, these routes will be terminated at Suoi Tien Terminal station with the westbound portion being eliminated and the eastbound portion retained. Suoi Tien Terminal station will be the new starting and ending station for these routes.
- Routes 53 and 88 will be required to have some minor modifications. In the case of Route 53, the route should cover the Linh Trung area instead of Route 104. In the case of Route

88, the route will overlap with the BRT 1 from Mai Chi Tho Street to the city center and so this route should be connected to Rach Chiec station to connect with both the HCMC UMRT Line 1 and the BRT 1.

- Routes 55 and 150 will not be modified.

Figure ES.9 - Modified Bus Routes



Source: Study Team

Proposed Feeder Bus Routes

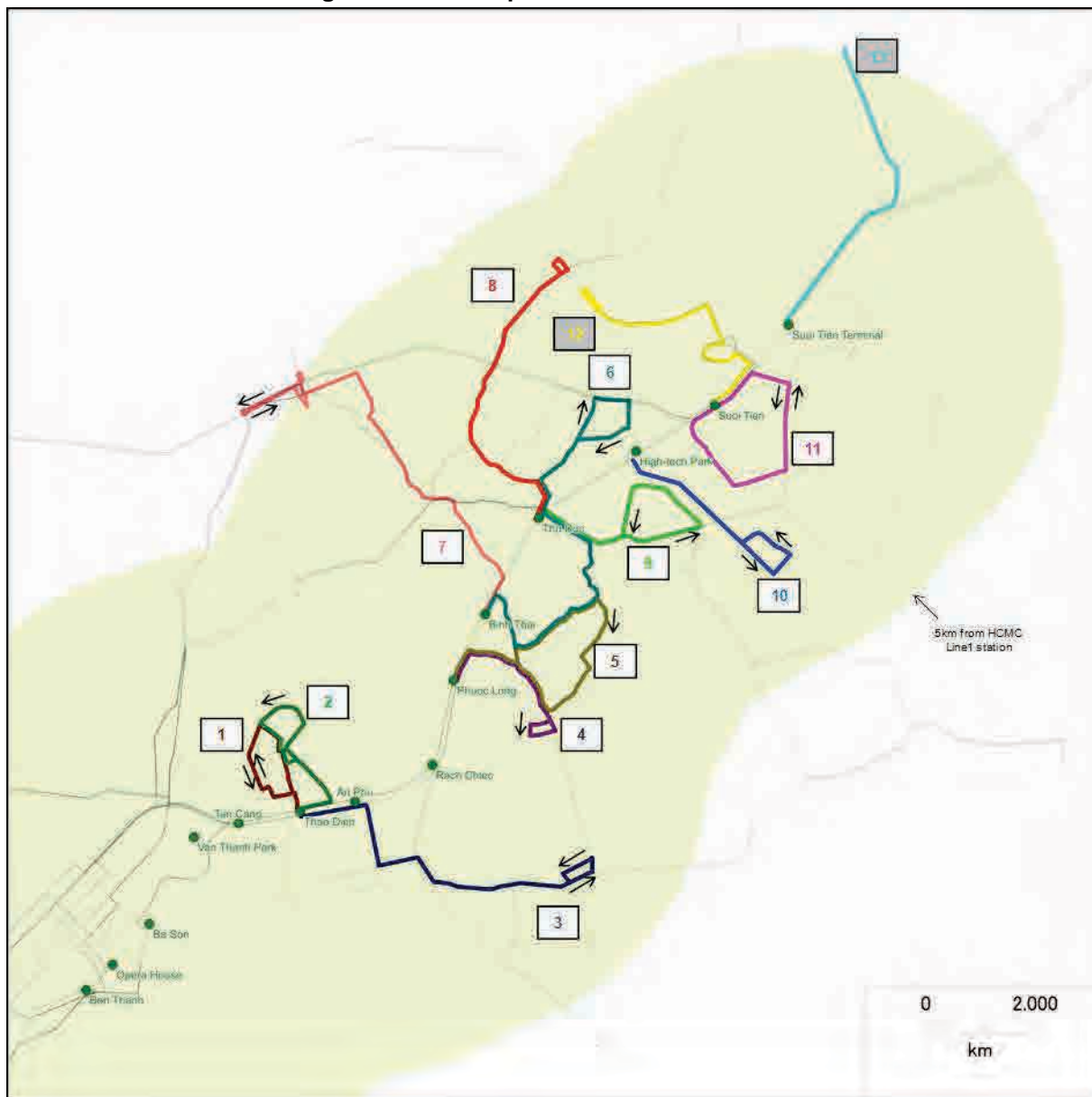
38. Based on examining the physical road conditions and potential demand within a 5 km radius station catchment area, 13 feeder bus routes are proposed.

39. For the 5 stations in the CBD area, Ben Thanh, Opera House, Ba Son, Van Thanh Park and Tan Cang, no new feeder bus services are proposed because there are many existing bus routes that can be modified to service the new UMRT stations. In addition, as many of the access

roads in the CBD are narrow inner city streets, emphasis should be made on improving the walking environment to the UMRT stations.

40. With the exception of Rach Chiec station, feeder bus routes are proposed for all of the stations east of the Saigon River. In the case of Rach Chiec station, the area with potential demand for the UMRT is located within walking distance of the station so feeder bus services are not necessary.

Figure ES.10 - Proposed Feeder Bus Routes



Source: Study Team

Improvement of Transfers between Buses and the HCMC UMRT Line 1

41. Four stations, namely Ben Thanh, Tan Cang, Rach Chiec and Suoi Tien Terminal will be the major interchange stations with other UMRT lines, BRTs and general bus routes.

Ben Thanh Station: Ben Thanh station will be a major transport hub in the centre of Ho Chi Minh City. According to the 2020 master plan, there are plans to have connections with other UMRT lines (Line 2, Line 3A and Line 4) as well as BRT Line 1 and in addition, there are plans for an underground bus terminal in the area as well. Regarding the connection with UMRT Line 2, Line 3A and Line 4, because there is a separate study going on, this study will not make any special proposals with regards to this.

Tan Cang Station: Tan Cang station is a major transport hub located west of the Saigon Bridge at the junction between Dien Bien Phu Street and Nguyen Huu Canh Street. It functions as a transport hub on the eastern edge of the central area of Ho Chi Minh City and in the transport master plan, there are plans for the connection of the UMRT Line 5 at this station as well so this will become an even more important transport hub in the future. Including city buses and interprovincial bus lines there are currently 15 bus routes that serve this station and cross over the Saigon Bridge. With the proposal to readjust existing bus routes, with the exception of a couple of routes, a majority of existing bus routes originating from the west of the Ho Chi Minh City will terminate at this station.

Rach Chiec Station: In the future, this station will become a transfer point between the UMRT Line 1 and the BRT 1 so it is necessary to establish a bus stop in front of the station and to plan for the smooth and convenient transfer between the UMRT and BRT.

Suoi Tien Terminal Station: Suoi Tien Terminal station is positioned to become a major transport hub for buses and the UMRT and for intercity connections between Ho Chi Minh City and other cities in the provinces. For this study, although the detailed study of the intermodal facility at Suoi Tien Terminal station will not be considered because it will be part a separate study (the JICA PPP F/S), the required functions of this intermodal facility and the required cost will be proposed. This study focuses on the proposal of feeder bus route 13 originating from Suoi Tien Terminal station as well as the proposal for existing bus routes 12, 150, 603 and 604 to originate from this station.

Feeder Bus Operations Plan and Institutional Arrangements

Operational Plan for the Proposed Feeder Bus Routes

42. The proposed feeder bus fleet size was basically determined based on the demand from the peak hour and the width of the road. The size of the feeder bus vehicles for each route is shown in the following table.

Table ES.7 - Proposed Feeder Bus Fleet Size

| Route No. | Peak Hour Demand (pax/hour) | | Bus Type | Number of Seats | Bus Type Selection Reasoning |
|-----------|-----------------------------|-------|----------|-----------------|--|
| | 2018 | 2020 | | | |
| 1(A)* | 180 | 210 | Small | 30 | There are sections of the road where the road width is very narrow and if small sized buses are not used, it is difficult to guarantee the safe and timely operation with other through traffic |
| 1(B) | 180 | 210 | Small | 30 | |
| 2 | 190 | 200 | Small | 30 | |
| 3 | 770 | 1,770 | Large | 80 | After 2018, there is a trend of rapidly increasing demand, so the bus operations route is changed to one that can accommodate large sized buses in order to run large sized buses in order to improve the operational efficiency of the route |
| 4 | 640 | 760 | Medium | 55 | Based on guaranteeing the safe and timely operation considering the road width (the existing bus routes are also using medium sized buses) |
| 5 | 660 | 770 | Medium | 55 | |
| 6 | 600 | 1,080 | Medium | 55 | |
| 7 | 290 | 530 | Medium | 55 | |
| 8 | 650 | 940 | Large | 80 | This is a route where large sized buses can be used and it is estimated that from 2018 onwards, the demand will increase so in order to increase the operational efficiency, large sized buses will be used |
| 9 | 370 | 490 | Medium | 55 | Medium sized buses used because of fuel efficient operations along with a gradual increase in the demand |
| 10 | 210 | 210 | Medium | 55 | After the establishment of the feeder bus route, it needs to be re-examined based on the development of the High Tech Park |
| 11(A) | 250 | 210 | Small | 30 | On the same loop route but different direction 11(B), small sized buses are used so considering the operational efficiency of using the same type of buses on the same route, small sized buses are used. In addition, it is planned to run the buses in short headways to increase the convenience to users |
| 11(B) | 90 | 90 | Small | 30 | The demand is not really that big so fuel efficient small sized buses will be used in short headways to increase the convenience to users. |
| 12 | 220 | 300 | Medium | 55 | After the establishment of the feeder bus route, it needs to be re-examined based on the development of the National University Area |
| 13 | 510 | 1,010 | Large | 80 | This is a route where large sized buses can be used and from 2018 onwards, it is estimated that demand will rapidly increase so operationally efficient large sized buses will be used |

Source: Study Team

43. The feeder bus operations plan at the opening stage of the HCMC UMRT Line 1 in 2018 was determined based on the estimated passenger demand from the peak hour and from the estimated bus fleet size. This is shown in the following table.

Table ES.8 - Proposed Feeder Bus Operations Plan

| Route No. | Frequency in Peak Hour | Frequency in Off-Peak Hour | Required Bus Fleet |
|-------------|------------------------|----------------------------|--------------------|
| 2018 | | | |
| 1 (A) | 8 | 13 | 3 |
| 1 (B) | 8 | 13 | 3 |
| 2 | 8 | 13 | 4 |
| 3 | 5 | 8 | 11 |
| 4 | 4 | 6 | 8 |
| 5 | 4 | 6 | 9 |
| 6 | 5 | 8 | 15 |
| 7 | 10 | 16 | 7 |
| 8 | 7 | 11 | 8 |
| 9 | 8 | 13 | 4 |
| 10 | 15 | 25 | 3 |
| 11 (A) | 6 | 10 | 5 |
| 11 (B) | 13 | 21 | 3 |
| 12 | 13 | 21 | 4 |
| 13 | 9 | 15 | 6 |
| Total | | | 93 |
| 2020 | | | |
| 1 (A) | 7 | 11 | 3 |
| 1 (B) | 7 | 11 | 3 |
| 2 | 8 | 13 | 4 |
| 3 | 2.5 | 4 | 22 |
| 4 | 3.5 | 5 | 9 |
| 5 | 3.5 | 5 | 10 |
| 6 | 2.5 | 4 | 29 |
| 7 | 5.5 | 9 | 12 |
| 8 | 4 | 6 | 13 |
| 9 | 5.5 | 9 | 6 |
| 10 | 15 | 21 | 3 |
| 11 (A) | 7 | 11 | 5 |
| 11 (B) | 13 | 21 | 3 |
| 12 | 9 | 15 | 6 |
| 13 | 4 | 6 | 14 |
| Total | | | 142 |

Source: Study Team

44. The proposed number of parking spaces and number of bus vehicles at each UMRT station was also calculated. For off-peak hours, it was assumed that the number of bus vehicles will be 60% of that required in the peak hour, so it is necessary to secure parking spaces for the remaining 40% of bus vehicles during the off-peak hours. Locations at each UMRT station for the parking of feeder buses were identified and are explained in greater detail in the main study.

45. In the future, as passenger demand from the feeder buses increases, the number of bus vehicles required will need to be increased gradually, at the same time, it is necessary to consider the expansion of the bus parking facilities. However, for this proposal which is based on the operations plan for 2020, the facility planning is based on the required number of bus vehicles for the operations plan for 2020. The following table shows the number of operating buses and required parking spaces at each UMRT station.

Table ES.9 - Proposed Feeder Bus Operations at UMRT Stations

| UMRT Station | Route No. | 2018 | | | 2020 | | |
|--------------------|-----------|---------------------------|--|-------------------------------|---------------------------|--|-------------------------------|
| | | Number of Operating Buses | Number of Parking Spots for Buses at UMRT Stations | Total Parking Spots for Buses | Number of Operating Buses | Number of Parking Spots for Buses at UMRT Stations | Total Parking Spots for Buses |
| Thao Dien | 1(A) | 3 | 2 | 11 | 3 | 2 | 15 |
| | 1(B) | 3 | 2 | | 3 | 2 | |
| | 2 | 4 | 2 | | 4 | 2 | |
| | 3 | 11 | 5 | | 22 | 9 | |
| Phuoc Long | 4 | 8 | 4 | 8 | 9 | 4 | 8 |
| | 5 | 9 | 4 | | 10 | 4 | |
| Binh Thai | 6 | 15 | 6 | 10 | 29 | 12 | 17 |
| | 7 | 7 | 4 | | 12 | 5 | |
| Thu Duc | 8 | 8 | 4 | 6 | 13 | 6 | 9 |
| | 9 | 4 | 2 | | 6 | 3 | |
| High-Tech Park | 10 | 3 | 2 | 2 | 3 | 2 | 2 |
| Suoi Tien | 11(A) | 5 | 2 | 6 | 5 | 2 | 7 |
| | 11(B) | 3 | 2 | | 3 | 2 | |
| | 12 | 4 | 2 | | 6 | 3 | |
| Suoi Tien Terminal | 13 | 6 | 3 | 3 | 14 | 6 | 6 |
| Total | | 93 | 46 | 46 | 142 | 64 | 64 |

Source: Study Team

Required Bus Fare System

46. Based on the proposed operation plan, the feeder bus operation cost was calculated based on the total distance travelled by kilometers. The cost per kilometer was based on the level from 2012. The required fare level for each feeder bus route was different because of the different operations schedules however it was calculated that a required fare level of 3,716 VND was required for profitable operations of the feeder bus routes.

47. In the case after the opening of the UMRT, when passengers transfer between the UMRT and feeder buses, the payment of multiple fares becomes necessary and compared to the current situation, the travel cost for users will rise. Therefore it is necessary to consider discounted fares for students and for people with lower incomes.

48. A discounted fare of 1,000 VND was assumed because this is half the cost of the current buses' discounted fares and the length of the feeder bus routes is shorter. So based on the 1,000 VND discounted fare and by estimating the percentage of users (regular users, discounted fare, free-fare) for each feeder bus route, the base fare (workers fare) was calculated to be 6,489 VND. This is the required bus fare for the feeder buses with discounted fares for profitable operations. The following table shows the details regarding the cost and fare for each feeder bus route.

Table ES.10 - Required Fare for the Proposed Feeder Bus System

| Route No. | Route Type | Total No. of Pax per Day | Total Cost (VND) | Users Ratio (%) | | | Passengers <Fare (VND)> | | | Workers Fare <X> (VND) | Average Fare <Without Others> (VND) |
|-----------|------------|--------------------------|------------------|-----------------|----------|--------|-------------------------|------------------|---------------|------------------------|-------------------------------------|
| | | | | Workers | Students | Others | Workers <X> | Students <1,000> | Others <Free> | | |
| 1(A) | 1 | 2,329 | 7,715,837 | 55 | 35 | 10 | 1,281 | 815 | 233 | 5,386 | 3,680 |
| 1(B) | 1 | 2,329 | 7,715,837 | 55 | 35 | 10 | 1,281 | 815 | 233 | 5,386 | 3,680 |
| 2 | 1 | 2,099 | 10,228,996 | 55 | 35 | 10 | 1,154 | 735 | 210 | 8,225 | 5,415 |
| 3 | 1 | 22,147 | 105,378,405 | 55 | 35 | 10 | 12,181 | 7,751 | 2,215 | 8,015 | 5,287 |
| 4 | 2 | 16,571 | 28,309,775 | 30 | 60 | 10 | 4,971 | 9,943 | 1,657 | 3,694 | 1,898 |
| 5 | 1 | 16,571 | 36,697,993 | 55 | 35 | 10 | 9,114 | 5,800 | 1,657 | 3,390 | 2,461 |
| 6 | 1 | 30,692 | 100,063,390 | 55 | 35 | 10 | 16,881 | 10,742 | 3,069 | 5,291 | 3,622 |
| 7 | 1 | 7,468 | 44,972,310 | 55 | 35 | 10 | 4,108 | 2,614 | 747 | 10,312 | 6,691 |
| 8 | 1 | 20,330 | 57,241,819 | 55 | 35 | 10 | 11,181 | 7,115 | 2,033 | 4,483 | 3,129 |
| 9 | 2 | 5,168 | 19,576,182 | 30 | 60 | 10 | 1,550 | 3,101 | 517 | 10,627 | 4,209 |
| 10 | 3 | 2,600 | 7,612,960 | 100 | 0 | 0 | 2,600 | 0 | 0 | 2,928 | 2,928 |
| 11(A) | 1 | 1,300 | 14,792,363 | 55 | 35 | 10 | 715 | 455 | 130 | 20,052 | 12,643 |
| 11(B) | 1 | 550 | 6,723,801 | 55 | 35 | 10 | 303 | 193 | 55 | 21,591 | 13,583 |
| 12 | 4 | 2,988 | 17,195,295 | 20 | 80 | 0 | 598 | 2,390 | 0 | 24,779 | 5,756 |
| 13 | 1 | 7,925 | 59,996,464 | 55 | 35 | 10 | 4,359 | 2,774 | 793 | 13,128 | 8,412 |
| Total | | 141,068 | 524,221,427 | | | | 72,277 | 55,243 | 13,548 | 6,489 | 4,111 |
| | | | | | | | 51% | 39% | 10% | | |

Note:

- *For the bus routes where the percentage of student passengers are not that high, based on the percentage from routes 88 and 150, a preliminary calculation was done and based on different feeder bus routes, the following conditions were assumed.

- Route Type is divided into 4 groups: 1) General bus route (Workers 55%, Students 35%, Other 10%), 2) Bus route along universities/schools (Workers 30%, Students 60%, Other 10%), 3) Bus to the National University Area (Workers 20%, Students 80%, Other 0%) and 4) Bus Route to the Industrial Park (Workers 100%, Students 0%, Other 0%)

- Workers: Regular base fares, Students: student discounted fare, Other: Free (senior citizens, war victims)

Source: Study Team

49. For existing bus routes (routes 53, 55, 99, 150) running parallel with the HCMC UMRT Line 1 that will be retained after the opening of the UMRT, after comparing the case of fares from UMRT users and fares from interprovincial buses where fare subsidies are not allowed, the fares for the retained existing bus routes should be set as the same as the interprovincial bus routes, that is, the fares should be based on a distance-based zone system. The distance-based zone system for fares for interprovincial buses is shown as follows.

Table ES.11 - Distance-Based Zone Fare System for Interprovincial Buses

| Route No. | Starting Point - End Point | Total Distance | Segment | | | |
|-----------|---|----------------|------------------|--------------------|--------------------|------------------|
| | | | Usage Distance | | | |
| | | | Fare | | | |
| 5 | Bx Chợ Lớn - Lê Hồng Phong - Biên Hòa | 38 km | Mien Dong | Ngã 4 Bình Phước | Ngã 4 Xuân Hiệp: | Bienoa |
| | | | 5,000 VND | 8,000 VND | 10,000 VND | 14,000 VND |
| 12 | Bến Thành – Thác Giàng Điền | 52 km | 0 - 1/3 of route | 1/3 - 1/2 of route | 1/2 - 2/3 of route | 2/3 - 1 of route |
| | | | 17.3 km | 26.0 km | 34.7 km | 52.0 km |
| | | | 5,000 VND | 10,000 VND | 15,000 VND | 20,000 VND |
| 603 | Bến xe Miền Đông – Khu Công nghiệp Nhơn Trạch | 58.5 km | Ngã 4 Thủ Đức | Tân Vạn | Bến Gỗ | Nhơn Trạch |
| | | | 10,000 VND | 15,000 VND | 20,000 VND | 25,000 VND |
| 604 | Bx Miền Đông - Hồ Nai | 32.0 km | 0 - 1/3 of route | Up to 2/3 of route | | 2/3 - 1 of route |
| | | | 10.7 km | 21.3 km | | 32.0 km |
| | | | 10,000 VND | 15,000 VND | | 20,000 VND |

Source: Study Team

Required Fare Policy and Smartcards

50. The fare policy was developed based on the aim of accommodating affordability issues, generating extra revenue where there is a "willingness to pay" (for better quality) or creating value for customers that generate patronage which in turn creates value for the operating company. The fare policy was developed based on the following set of principles.

Principle 1: All services must be paid for. Someone has to meet the cost of any discounts and concessions. Discounting fares will increase the subsidy burden, affecting the sustainability of the system. Finding extra revenue from "value added services" can pay for discounts.

Principle 2: Affordability is not a single benchmark. It is influenced by the type of user; their willingness or ability to pay; and their travel patterns.

Principle 3: Use technology to control discounts and concessions. Smartcards can accurately target users when applying discounts and concessions (and also limit the amount of concessions applied by avoiding open-ended entitlements)

Integrated Fares and Ticketing

51. Integrated fares and ticketing should be applied to the feeder bus to rail connection and eventually across the entire bus and UMRT network in Ho Chi Minh City. It will create a "seamless" network for passengers which are a critical element to win over passengers from private travel.

Facilitation of Interoperability for the Smartcard

52. The DOT is developing its own technical standard for the public transport smartcard system focusing on the existing bus system. The MAUR is implementing the HCMC UMRT Line 1 construction and the establishment of the O&M organization for the UMRT which includes the technical support to develop the server system for the smartcard.

53. Therefore, the establishment of an "Intra-city Server" will be required for interoperability. It will be required to develop the Intra-city Server in order to coordinate between the HCMC UMRT Line 1, BRT Line 1 and feeder bus routes until 2018.

Institutional Design

54. For the institutional design and business model for the feeder bus services, two scenarios are examined, one being the "business as usual" scenario where the feeder bus services are provided by private bus operators under the existing MOCPT licensing scheme the other being the "innovative commercial business model" scenario to manage the business.

Scenario 1 - Business As Usual: Feeder bus services are operated by private sector operators, under the present licensing regime managed by the MOCPT.

This option is generally favored as it requires little modification to the existing institutional set-up, where the MAUR/O&M company will manage the rail system and the DOT manages and subsidizes the bus operations.

Scenario 2 - The Innovative Business Model: This scenario evaluates the situation where the UMRT O&M company is the sole operator of the feeder bus services, under a commercial business model and directly appointed by the HCMC PC. It will self-fund the feeder bus services without any direct bus subsidy from the DOT.

The strongest argument for this option is that the UMRT O&M company is reliant on the feeder services to support its business case and financial viability. The aim is to increase rail passenger volumes, increase system revenue and ultimately reduce the subsidy requirements of the HCMC UMRT Line 1. Under this option, the UMRT O&M company will need to apply to become a "bus operator" under the existing regulatory framework.

Recommendations: The innovative commercial business model scenario addresses all the objectives identified regarding incentives for revenue growth passenger service and efficient operations. It will maximize the value of the UMRT in attracting ridership, promoting efficient transport and make the system more sustainable by reducing the need for subsidies. It will also reduce the present overall rail and bus subsidy burden on the city.

Proposed Action Plan for the Feeder Bus Development

55. The Study Team recommends the implementation of the following programs before the opening of the HCMC UMRT Line 1 to maximize the ridership potential of the line.

- A. Modification of the Existing Bus Routes for City Buses
- B. Modification of Existing Bus Routes for Interprovincial Buses
- C. Development of a Feeder Bus Network
- D. Coordination on Intermodal Facility Development
- E. Institutional Development and Other Measures

Concept Plan for Intermodal Facilities

56. Elements of the intermodal facility which will be provided at each station are examined based on the traffic demand, land availability, and existing urban development among others. Phase 1 of the concept plan in 2018 is for the partial opening of the HCMC UMRT Line 1 from Tan Cang to Suoi Tien Terminal. Phase 2 of the concept plan will be in 2020 with the full opening of the UMRT line and 2020 is the target year to develop station plazas in cooperation with the committed urban developments. Phase 3 of the concept plan will be scheduled for completion after 2020. A summary of the concept plan for intermodal facilities is shown in the following table.

Table ES.12 - Summary of the Concept Plan of the Intemodal Facilities

| No. | Station | Layout | Proposed Intermodal Facility | | | | | | | | | | | | | | | | | | |
|--|--------------------|--------|------------------------------|----|-----|------------------------------------|----|-----|---------|---|---|-------------|---|---|--|----|-----|---|----|-----|-----------------|
| | | | Station Plaza | | | Bus Stop/Taxi Stop/Motorcycle Stop | | | Parking | | | | | | Upgrade and extension of pedestrian bridge | | | Improvement of Access road and pedestrian space | | | Bicycle sharing |
| | | | I | II | III | I | II | III | Car | | | MC/ bicycle | | | I | II | III | I | II | III | II |
| A. CBD Zone | | | | | | | | | | | | | | | | | | | | | |
| 1 | Ben Thanh | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | ● | - | ● |
| 2 | Opera House | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | ● | - | ● |
| 3 | Ba Son | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | ● | - | ● |
| 4 | Van Thanh Park | North | - | ● | - | - | - | - | - | - | - | ● | - | - | - | - | - | ● | - | ● | - |
| | | South | ● | - | - | - | - | - | - | - | - | ● | - | - | ● | - | - | ● | - | - | - |
| 5 | Tan Cang | North | ● | - | - | - | - | - | - | - | - | ● | - | - | ● | - | - | ● | - | - | - |
| | | South | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | ● | - | - | - | - |
| B. Development Zone in District 2 | | | | | | | | | | | | | | | | | | | | | |
| 6 | Thao Dien | North | ● | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | ● | - |
| | | South | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7 | An Phu | North | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| | | South | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| C. Existing Urbanized Zone | | | | | | | | | | | | | | | | | | | | | |
| 8 | Rach Chiec | West | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | ● | - | - | ● | - |
| | | East | - | - | ● | ● | - | - | - | - | ● | ● | - | - | ● | - | ● | - | - | ● | - |
| 9 | Phuoc Long | West | - | ● | - | - | - | - | - | - | - | ● | - | - | ● | ● | - | - | - | ● | - |
| | | East | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| 10 | Binh Thai | West | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | ● | - | - | - |
| | | East | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| 11 | Thu Duc | West | - | - | ● | ● | - | - | - | - | ● | ● | - | - | ● | - | ● | - | - | - | - |
| | | East | - | - | ● | ● | - | - | - | - | ● | ● | - | ● | - | - | ● | - | - | - | - |
| D. University and High-tech Park Zone | | | | | | | | | | | | | | | | | | | | | |
| 12 | High-tech Park | West | - | - | - | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| | | East | ● | - | - | - | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| 13 | Suoi Tien | West | - | - | ● | ● | - | - | - | - | - | ● | - | - | ● | ● | ● | - | - | - | - |
| | | East | - | ● | - | - | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - |
| 14 | Suoi Tien Terminal | East | ● | - | - | - | - | - | ● | - | - | ● | - | - | - | - | - | - | - | - | - |

Source: Study Team

Concept Plan for Ben Thanh, Opera House and Ba Son Stations

57. These stations are underground stations located in the CBD and the only proposed intermodal facilities are the establishment of bus/taxi/motorcycle stops, improvement of the pedestrian space and introduction of a bicycle sharing network.

Concept Plan for Van Thanh Park Station

58. The concept plan for this station is as follows.

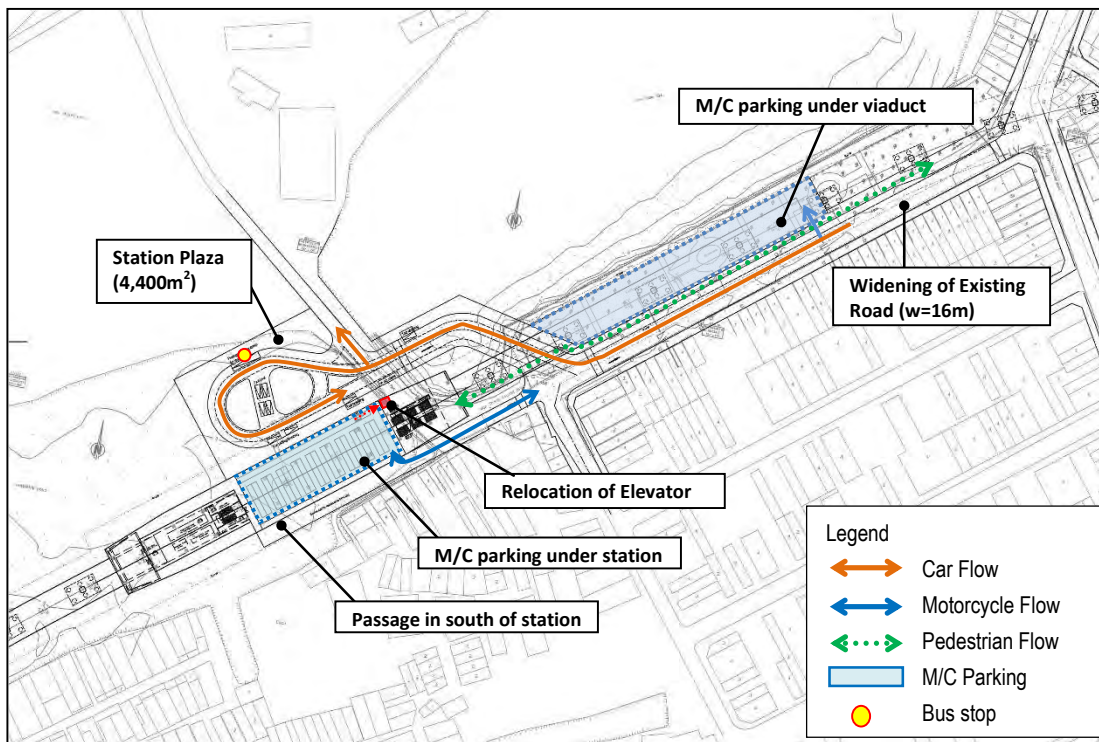
Station Plaza: 4,400 m² station plaza located in Van Thanh Park

Parking: Public motorcycle parking within 200 m of the entrance of the UMRT station with a total capacity of 1,100 located on the ground floor of the station and under the viaduct

Access Road: Widening the existing street to 16 m to secure the safety of pedestrians. Proposal of a 6 m width passage in the south of the station to access the motorcycle parking and station building maintenance room.

Station Facility: The elevator in the station building is proposed to be shifted to the north side of the station to secure accessibility between the ticket gate and Van Thanh Park

Figure ES.11 - Concept Plan of the Van Thanh Park Station Area (Phase I and II)



Source: Study Team

Concept Plan for Tan Cang Station

59. A station plaza plan was already approved south of the station but in consideration from the viewpoint of smoothness of bus operations and passenger convenience, the station plaza is proposed to be on the north side of the station instead of on the south side. In the future, the south side plaza is proposed to be developed based on future demand. The concept plan for this station is as follows.

Station Plaza: A station plaza with an area of 13,000 m² is proposed at the existing green area to the north of the station and under the viaduct.

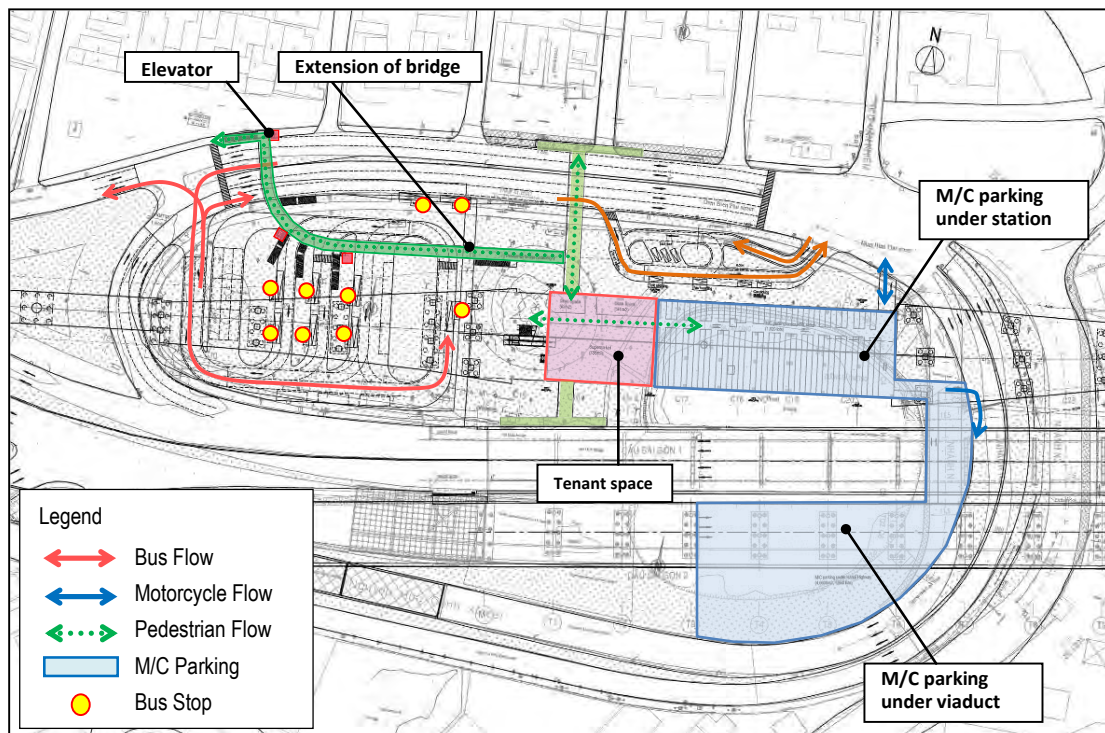
Parking: Motorcycle parking was laid out on the ground floor of the station and under the viaduct of the new Saigon Bridge.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to secure the accessibility and to implement the barrier-free concept. The south side extension of the pedestrian bridge is proposed to connect to the south station plaza in the future.

Access Road: Improvement of two intersections at Dien Bien Phu Street is proposed to secure safety in the entering and exiting to/from the bus terminal zone and taxi/car zone.

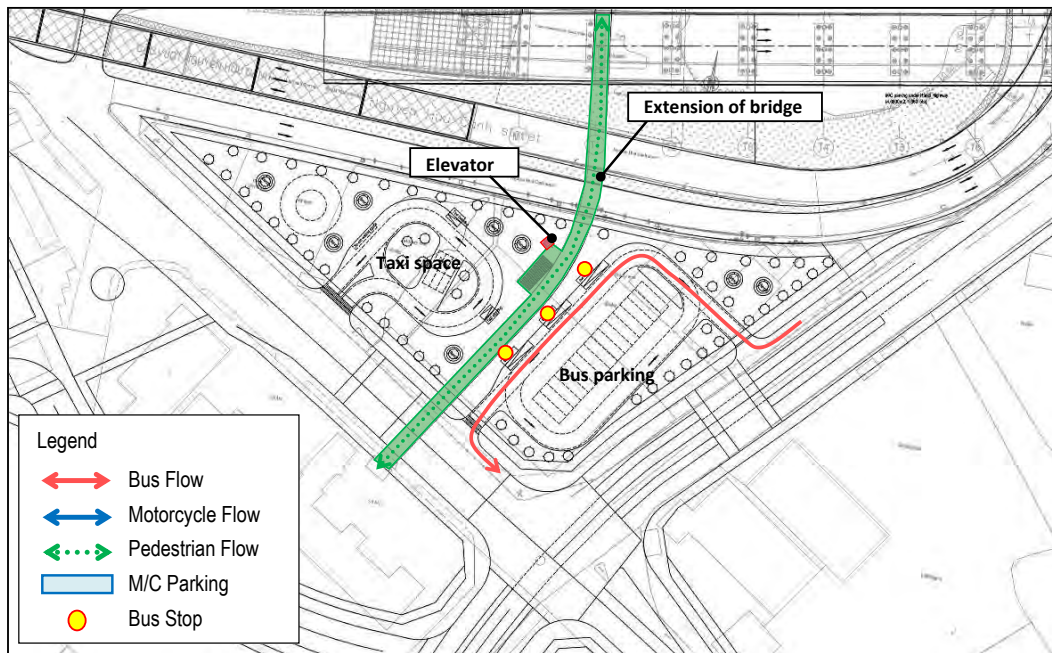
Commercial Facility: Tenant space for retail shops and a supermarket in the ground floor of the station building is proposed for the convenience of transiting passengers.

Figure ES.12 - Concept Plan of the Tan Cang Station Area (upon UMRT opening)



Source: Study Team

Figure ES.13 - South Station Plaza at Tan Cang Station (in the future)



Source: Study Team

Concept Plan for Thao Dien Station

60. Thao Dien station is an elevated station located along the Hanoi Highway and the concept is as follows.

Station Plaza: The north plaza with an area of 1,500 m² and the south station plaza with an area of 4,200 m² are proposed.

Bus Stop: For two feeder bus routes operated in the northern urban area, bus stops are set up on Quoc Huong Street and the service road and bus parking is laid out under the viaduct.

Taxi/Car Space: The taxi berth, private car berth and motorcycle taxi space are laid out on the service road to the north of the station.

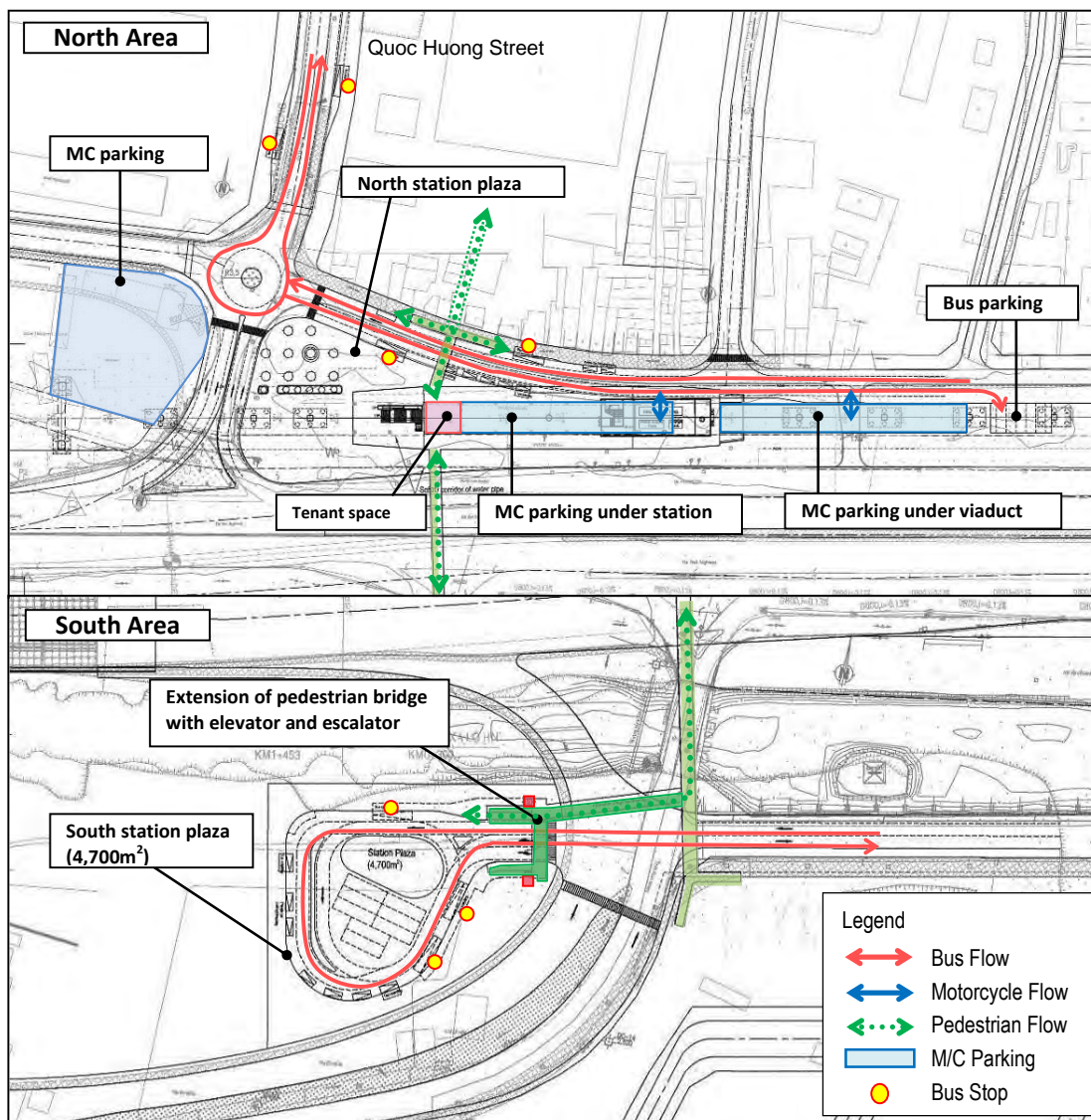
Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Extension of the pedestrian bridge was proposed to access to the south station plaza. The extension includes the installation of elevators and escalators. Extensions of the pedestrian bridge to commercial developments in the north of station were already planned by the private developer.

Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Access Road: For the comfort and safety of bicycle users, improvement of the existing road in the north urban area is proposed as future development.

Figure ES.14 - Concept Plan of the Thao Dien Station Area (upon UMRT opening)



Source: Study Team

Concept Plan for An Phu Station

61. An Phu station is an elevated station along the Hanoi Highway. Due to a lack of available space, a station plaza was not proposed for this station.

Bus Stop: Separated bus stops in the south connecting with the service road are proposed for the proposed feeder bus operation.

Taxi/Car Space: The taxi and car space under the viaduct with an area of 850 m² is proposed.

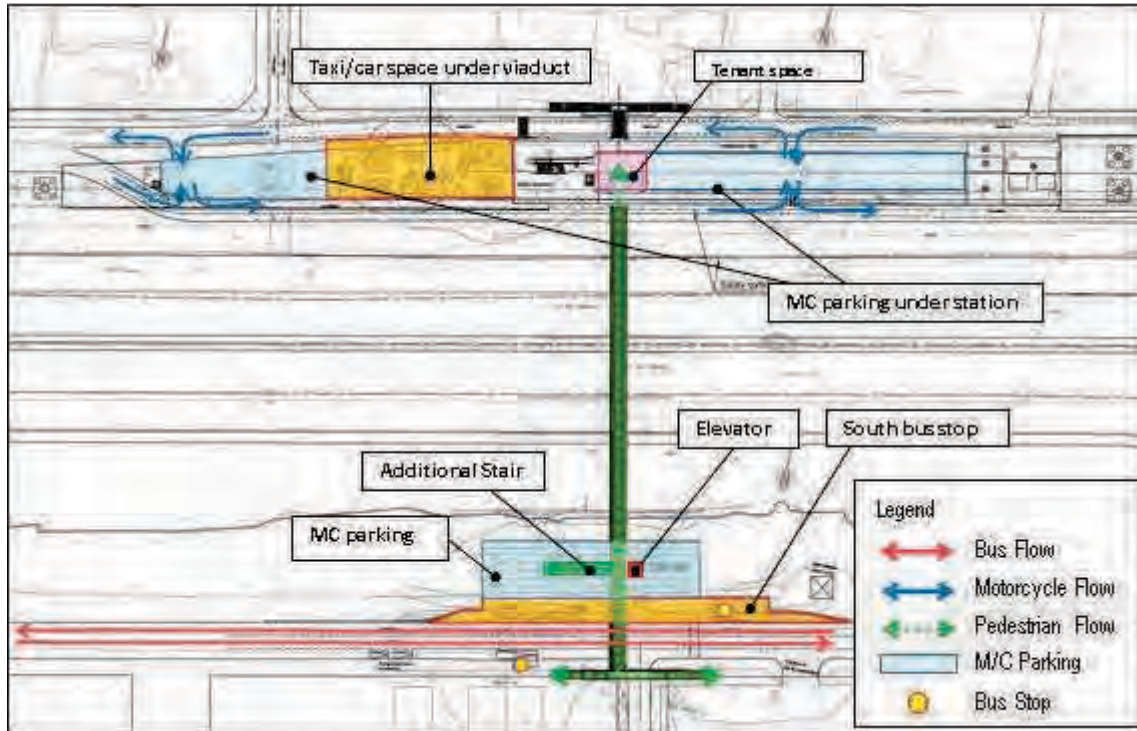
Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the south of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to access the proposed southern bus stop and the motorcycle parking.

Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Access Road: As a future facility, a U-turn bridge on the Hanoi Highway was proposed to improve north-south accessibility. For the comfort and safety of bicycle users, development of executive bicycle lanes in the north urban development area is proposed.

Figure ES.15 - Concept Plan of the An Phu Station Area (upon UMRT opening)



Source: Study Team

Concept Plan for Rach Chiec Station

62. The concept plan for Rach Chiec station is as follows.

Bus Stop: Bus stops on the east side of the station building and the separated bus stops with an area of 1,500m² in the green area of Hanoi Highway are proposed in consideration of the land availability by the time of the UMRT opening.

Taxi/Car Space: The taxi berth, private car berth and motorcycle taxi space are laid out on the service road to the north of the station.

Station Plaza: As a future plan, the east station plaza with an area of 4,800m² is proposed for the integrated sports city urban development in the eastern area.

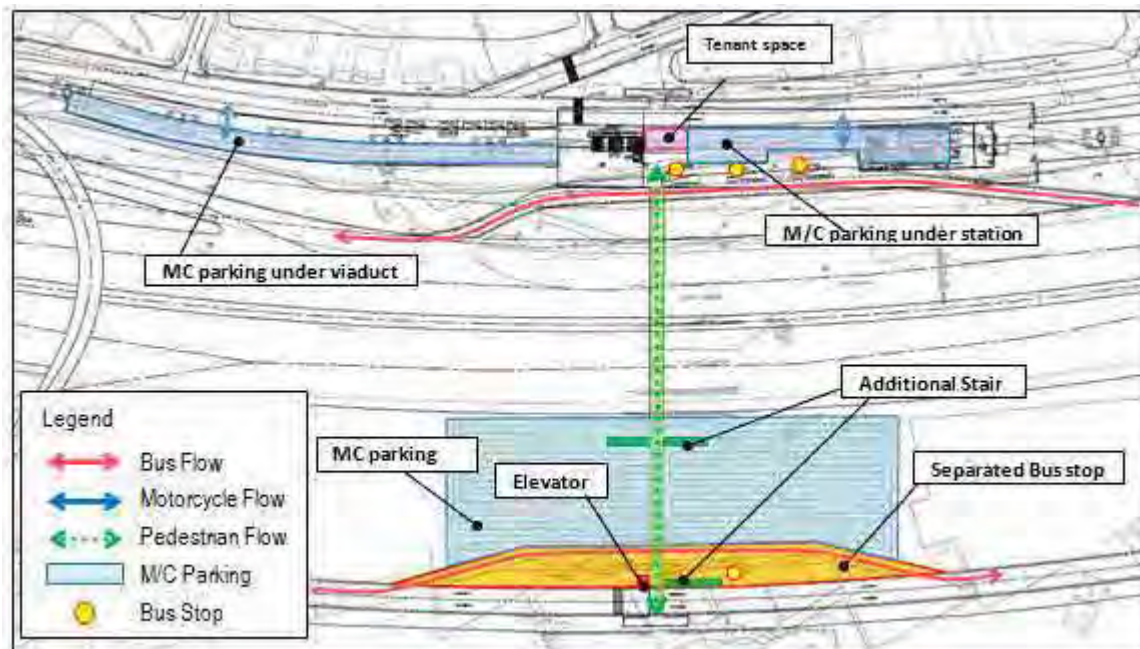
Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to improve the capacity and to access the proposed separated bus stop in the east and the motorcycle parking.

Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Access Road: For the comfort and safety of bicycle users, improvement of the existing road in the western urban area is proposed.

Figure ES.16 - Concept Plan of the Rach Chiec Station Area (upon UMRT opening)



Source: Study Team

Concept Plan for Phuoc Long Station

63. The concept plan for Phuoc Long station is as follows.

Station Plaza: The west station plaza with an area of 4,300m² is proposed for integrated urban development in the current factory area.

Bus Stop: As temporary development until the development of the west station plaza, the bus stop and taxi stop on the service road and bus parking under the viaduct are proposed.

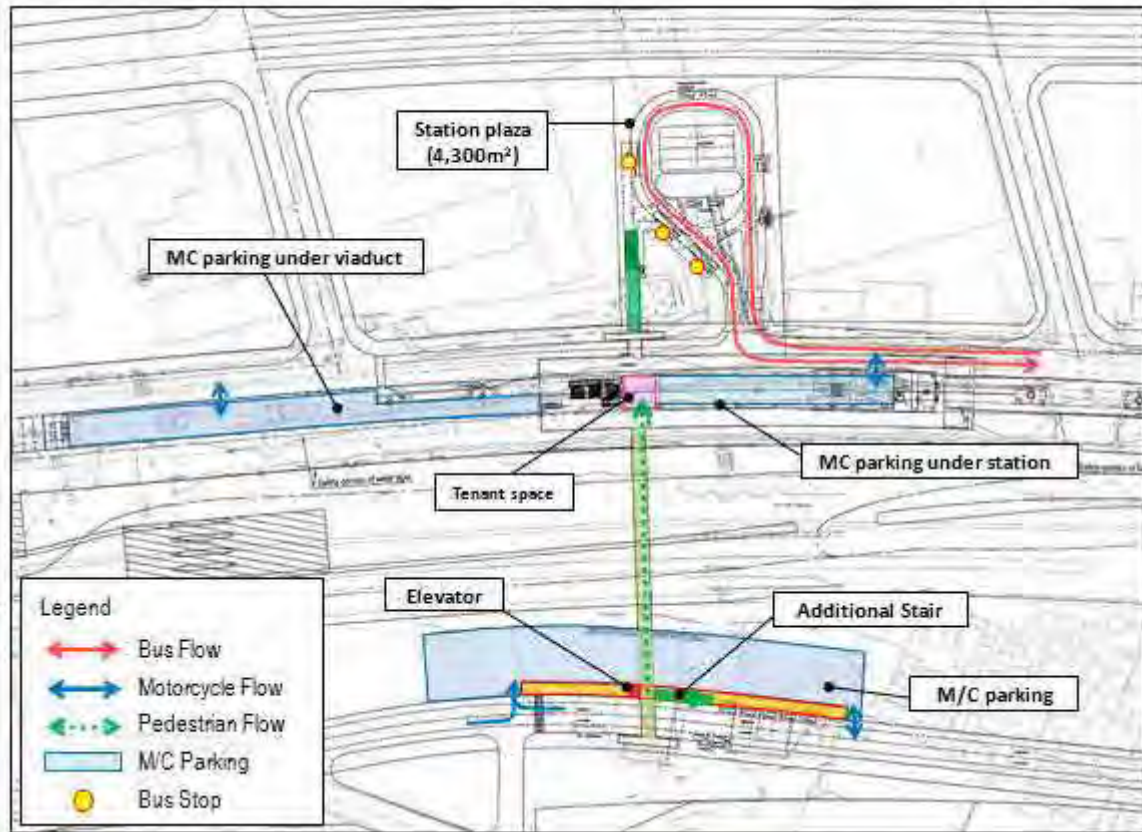
Taxi/Car Space: On the east side, a 500 m² taxi and car space on the service road is proposed.

Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to access the proposed east taxi and car space and motorcycle parking lot. Extension of the pedestrian bridge was proposed to access the west station plaza and the west urban development area.

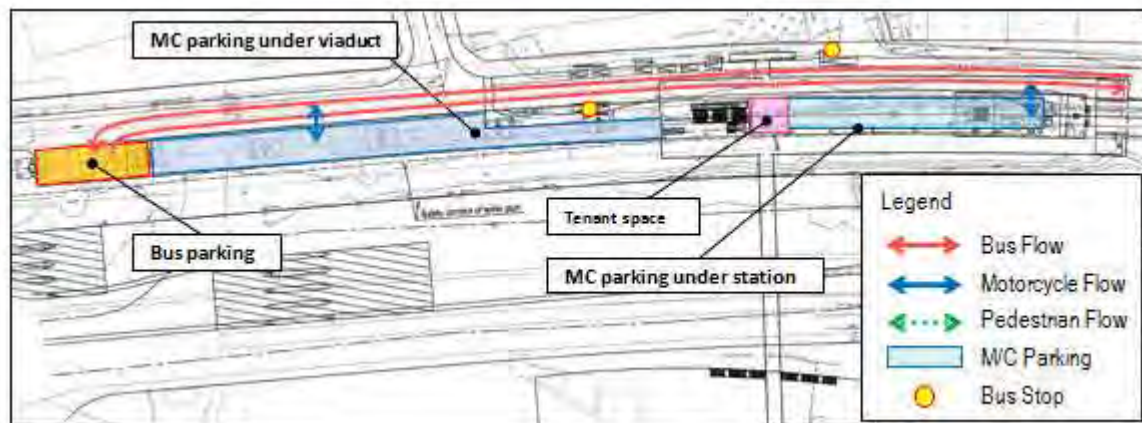
Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Figure ES.17 - Concept Plan of the Phuoc Long Station Area (Phase II)



Source: Study Team

Figure ES.18 - Temporary Development Plan in the Phuoc Long Station Area (upon UMRT opening)



Source: Study Team

Concept Plan for Binh Thai Station

64. The concept plan for Binh Thai station is as follows.

Bus Stop: Bus stops on the western service roads are proposed in consideration of the limited land availability.

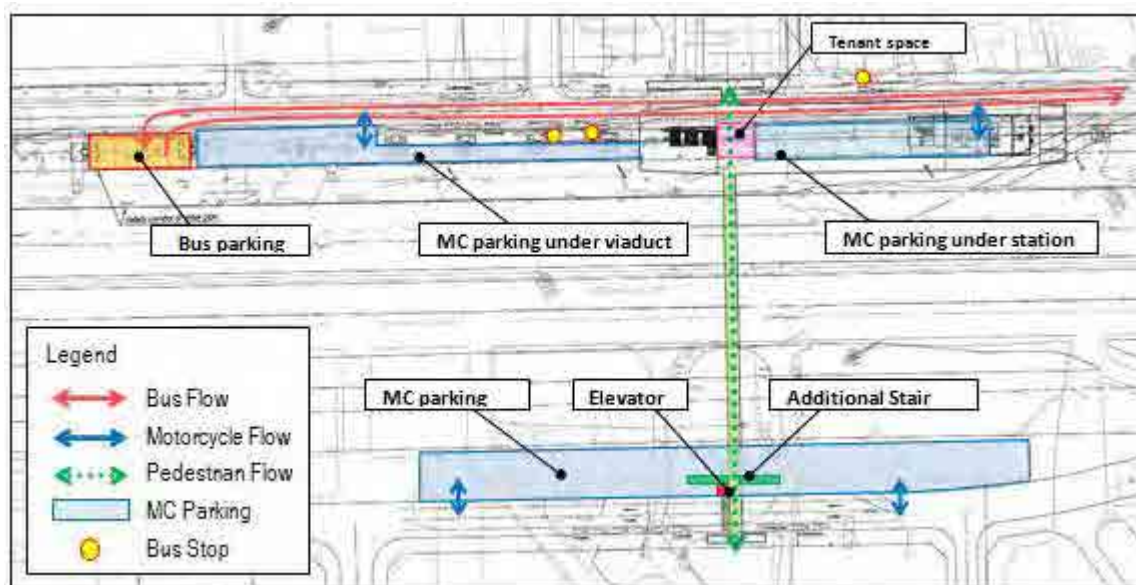
Taxi/Car Space: Taxi and car space on the service road is proposed for both sides of the Hanoi Highway.

Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to access the proposed eastern taxi and car space and motorcycle parking lot.

Commercial Facility: Tenant space for retail shops and cafes in the ground floor of the station building is proposed for the convenience of transit passengers.

Figure ES.19 - Concept Plan of the Binh Thai Station Area



Source: Study Team

Concept Plan for Thu Duc Station

65. The concept plan for Thu Duc station is as follows.

Bus Stop: The road side bus stops on both the service roads for the UMRT opening are proposed in consideration of the limited land availability.

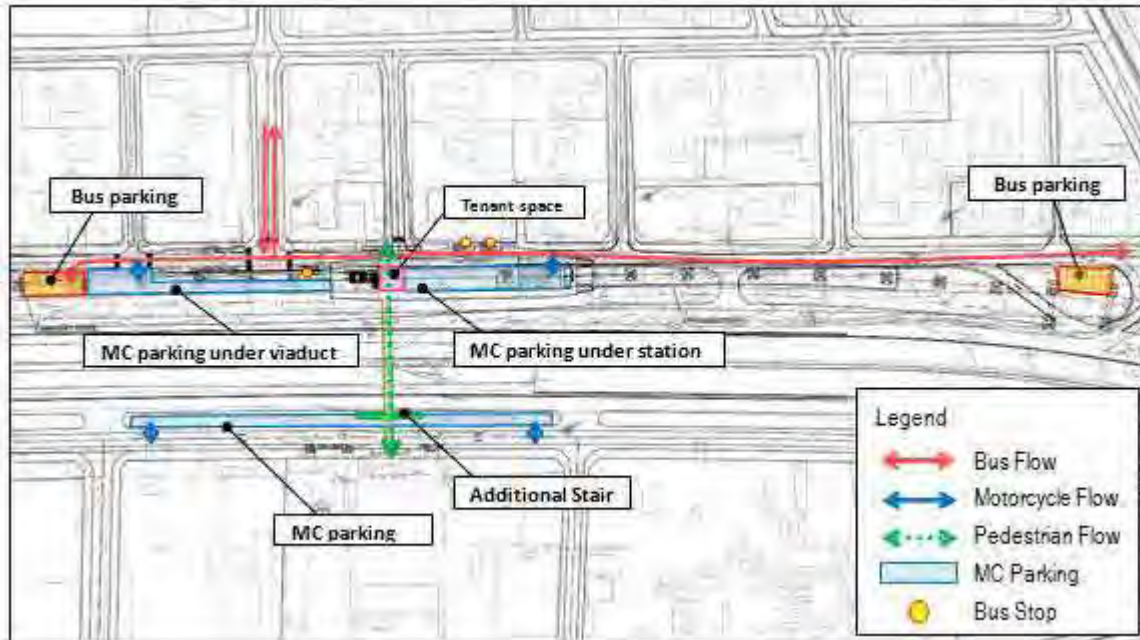
Station Plaza: As a future plan, the west station plaza with an area of 4,300m² and the east station plaza with an area of 4,700m² with the access road are proposed for the operation of the feeder bus service.

Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to access the proposed east taxi and car space and the motorcycle parking lot.

Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Figure ES.20 - Concept Plan of the Thu Duc Station Area (upon UMRT opening)



Source: Study Team

Concept Plan for High-Tech Park Station

66. The concept plan for High-Tech Park station is as follows.

Station Plaza: The east station plaza with an area of 5,000m² is proposed to be located at the existing green area in the entrance of the High-Tech Park.

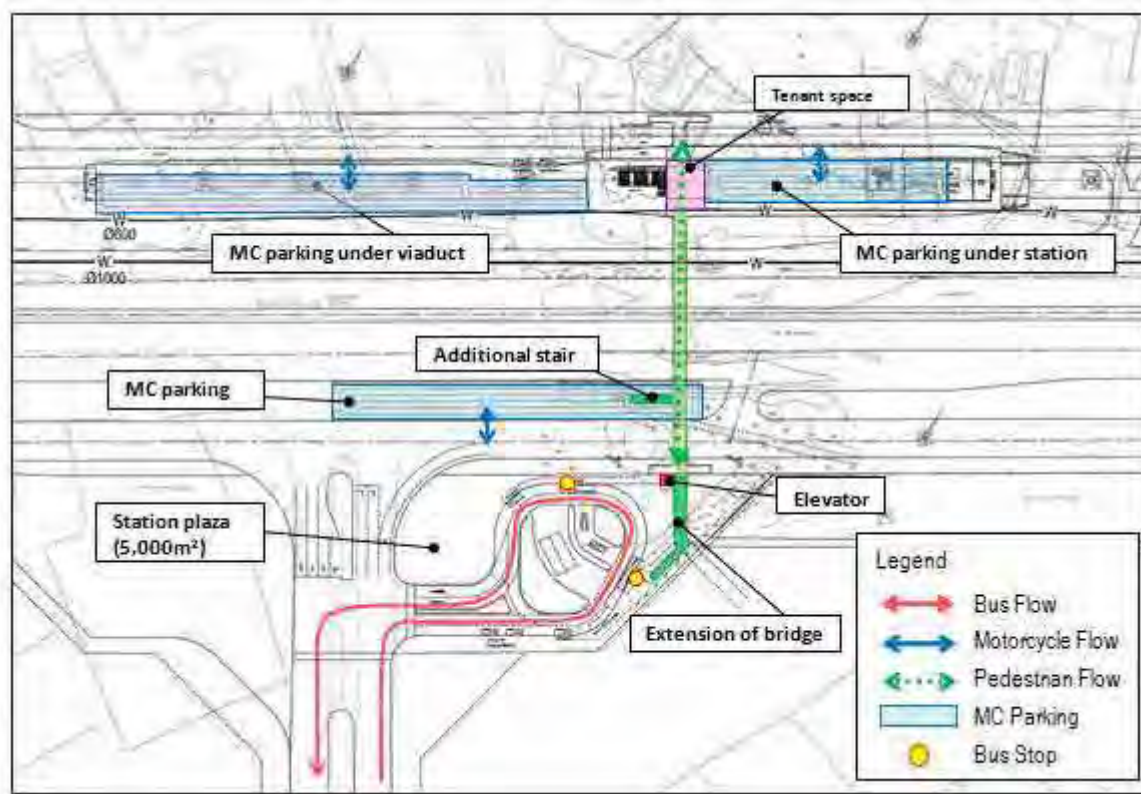
Taxi/Car Space: Taxi and car space on the service road is proposed on the west side of the Hanoi Highway.

Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to access to the east motorcycle parking lot.

Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Figure ES.21 - Concept Plan of the High-Tech Park Station Area



Source: Study Team

Concept Plan for Suoi Tien Station

67. The concept plan for Suoi Tien station is as follows.

Station Plaza: The east station plaza with an area of 3,000m² is proposed to be located at the urban development area of Suoi Tien Park.

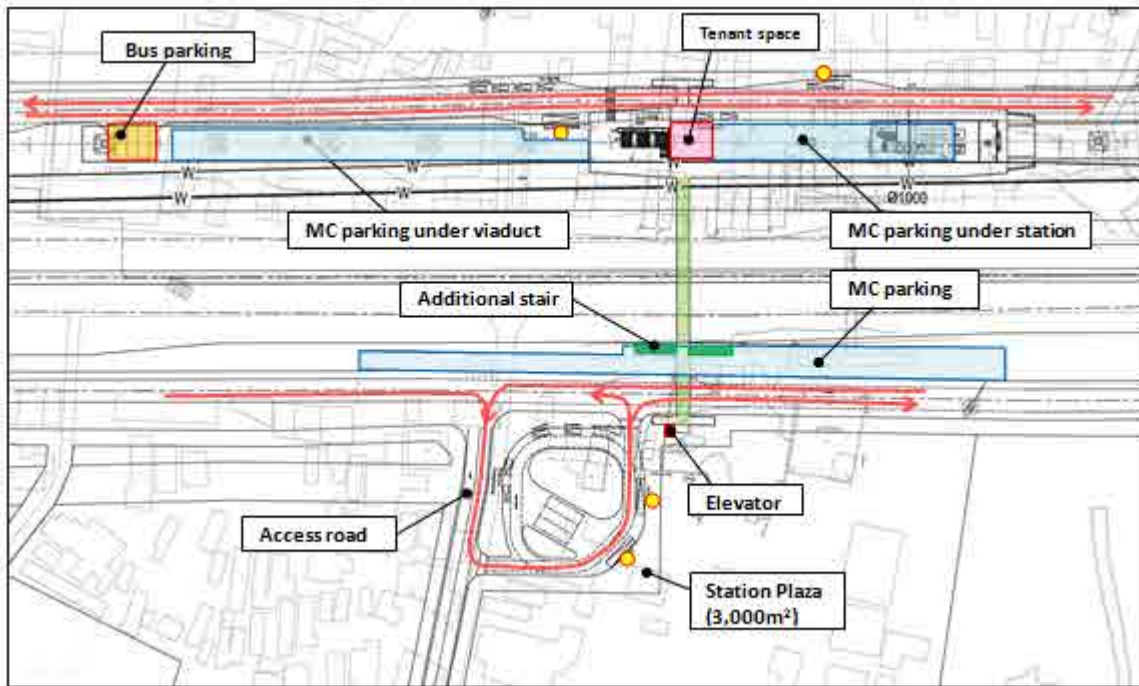
Bus Stop: The west roadside bus stops on the service road and the bus parking under the viaduct are proposed in consideration of the land availability on the west side of the existing urban area until the opening of the UMRT.

Parking: Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed.

Pedestrian Bridge: Upgrading of the pedestrian bridge is proposed to access to the east motorcycle parking lot. Extension of the pedestrian bridge with an elevator was proposed to access to the west station plaza and the surrounding urban development area.

Commercial Facility: Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.

Figure ES.22 - Concept Plan of the Suoi Tien Station Area (Phase II)



Source: Study Team

Concept Plan for Suoi Tien Terminal Station

68. The conceptual plan for Suoi Tien Terminal station will be studied in a separate project, the JICA PPP F/S study. For this study the technical requirements are as shown in the following table.

Table ES.13 - Requirements of Intermodal Facilities at Suoi Tien Terminal Station

| Item | | Capacity/No. of Berths | Quantity | Development phase | Remarks |
|---------------|--------------------|---|---------------------|-------------------|---------|
| Station Plaza | West Station Plaza | Bus berth: (boarding:4, alighting:2) Bus parking: 6 Taxi berth (boarding:1, alighting:1) Taxi waiting: 3 Private car berth: 2 Motorcycle taxi berth: 1 | 6,700m ² | Phase II | |
| Parking | M/C parking | M/C and bicycle:3,000 lots | 7,500m ² | Phase I | |
| | Car parking | Private Car: 213 lots | 3,900m ² | Phase I | |

Source: Study Team

Land Acquisition for Intermodal Facilities

69. Due to the limitations of land availability along the UMRT Line 1, most of the intermodal facilities were proposed to be located on the existing public land such as the right of way of the UMRT Line 1 and the Hanoi Highway. However, the following proposed facilities require the land acquisition procedure in order to be located outside of the right of way because of the land limitations as mentioned above.

- Station plaza at Van Thanh Park station

- Station plaza at Phuoc Long Station
- Station plaza at High-Tech Park station
- Station plaza and access road at Suoi Tien station

70. Considering the current conditions of the land management and urban development projects in these station areas, two kinds of measures are proposed as follows: (1) Changing the Land Administrator on the Existing Public Land and using (2) Land Recovery in the Urban Development Project Area. Measure (1) is proposed for Van Thanh Park and High-Tech Park stations and measure (2) is proposed for Phuoc Long and Suoi Tien stations.

Proposal for the Detailed Design of Pedestrian Bridges for CP2

71. For the additional pedestrian bridges proposed by this SAPI study to improve the convenience for UMRT users, technical countermeasures are needed to reconcile the structural design of the main pedestrian bridge as per the Pre-Design of Construction Package No. 2 of the UMRT Line 1 Project.

72. It is proposed that the main bridge shall be structurally separated at the connection with the additional stairs and extension of the bridge proposed by the SAPI study and for the separation, an additional pillar shall be installed to support the separated main bridges at the connection point.

Cost Estimation for the Intermodal Facility Development

73. It is estimated that the construction cost of intermodal facilities in the Phase 1 partial opening of the HCMC UMRT Line 1 in 2018 will be 2,330,800,000 yen and the Phase 2 complete opening of the line will be 460,800,000 yen. The total cost of both phases of intermodal facility development will be 2,791,600,000 yen. The cost breakdown for each station is shown in the following table.

Table ES.14 - Cost Estimation for the Intermodal Facility Development

| | Station | Phase 1 in 2018 (mil. JPY) | Phase 2 in 2020 (mil. JPY) | Phase 1 + Phase 2 (mil. JPY) |
|----|--------------------|-------------------------------|-------------------------------|---------------------------------|
| 1 | Ben Thanh | 0.0 | 0.0 | 0.0 |
| 2 | Opera House | 0.0 | 0.0 | 0.0 |
| 3 | Ba Son | 0.0 | 0.0 | 0.0 |
| 4 | Van Thanh Park | 70.0 | 257.0 | 327.0 |
| 5 | Tan Cang | 502.4 | 0.0 | 502.4 |
| 6 | Thao Dien | 285.5 | 0.0 | 285.5 |
| 7 | An Phu | 183.4 | 0.0 | 183.4 |
| 8 | Rach Chiec | 622.2 | 0.0 | 622.2 |
| 9 | Phuoc Long | 124.7 | 75.5 | 200.2 |
| 10 | Binh Thai | 126.9 | 0.0 | 126.9 |
| 11 | Thu Duc | 104.5 | 0.0 | 104.5 |
| 12 | High-Tech Park | 221.6 | 0.0 | 221.6 |
| 13 | Suoi Tien | 89.6 | 128.3 | 217.9 |
| 14 | Suoi Tien Terminal | 0.0 | 0.0 | 0.0 |
| | Total | 2,330.8 | 460.8 | 2,791.6 |

Source: Study Team

Implementation Plan for Intermodal Facilities

74. The Management Authority for Urban Railways (MAUR) has been assigned as the project owner of the HCMC UMRT Line 1 but intermodal facilities are not included in the UMRT Line 1 project. The intermodal facilities have two functions, one as a station related facility and the other has a road transport related facility. In Ho Chi Minh City, matters related to road transport are under the jurisdiction of the Department of Transportation (DOT) so it is necessary to clarify the responsibilities of each organization in the implementation of intermodal facilities on the UMRT Line 1.

75. The components of intermodal facilities are (1) station plaza, (2) bus stop, taxi stops, (3) parking, (4) pedestrian bridge, (5) access road and (6) commercial facility. There are three options proposed for the project owner of the intermodal facilities project: Option 1 - All MAUR, Option 2 - All DOT and Option 3 - MAUR and DOT split responsibilities.

Table ES.15 - Project Owner Options

| Project Owner | All MAUR | All DOT | MAUR & DOT |
|---|---|--|---|
| | Option 1 | Option 2 | Option 3 |
| Explanation | MAUR is the project owner of all the intermodal facilities | DOT is the project owner of all the intermodal facilities | MAUR is the project owner of facilities within the Line 1 project boundary, namely, parking, pedestrian bridge and service facilities. DOT is the project owner of the rest. |
| Coordination with the Line 1 Project | Good coordination can be secured because MAUR will be in charge of both. | Extra effort will be necessary to secure coordination between MAUR and DOT during both the design and construction stages. | Extra effort will be necessary to secure coordination between MAUR and DOT during both the design and construction stages. However, the coordination effort will be less compared to Option 2 because MAUR will be the project owner of the parking spaces and pedestrian bridge. |
| Coordination with other transport modes | Coordination between MAUR and DOT will be required. | Good coordination can be secured because DOT has extensive experience with transport related facilities development. | Coordination can be secured because DOT has experience with transport related facilities development. |
| Implementation Schedule | Quick, because it may be possible to include the construction into the Line 1 Project. | Slow, because it will be necessary to establish a new Project and a new Loan Agreement. | (The same as in the left) |
| O&M | Transfer procedure is required after the completion of the intermodal facility development. | (Same as in the left) | Project owner and the agency responsible for O&M are same. The transfer procedure is not required. |

Source: Study Team

76. The O&M for the intermodal facilities is carried out by various agencies and the demarcation of responsibilities is shown in the following table.

Table ES.16 - Demarcation of Responsibilities of O&M for the Intermodal Facilities

| ITF Component | Main Agency | Related Agency | Layout Image of the ITF Component |
|------------------------|------------------|-------------------|-----------------------------------|
| 1. Station plaza | - DOT | - MAUR - MOCPT | |
| 2. Bus stop, taxi stop | - DOT - MOCPT | | |
| 3. Parking | - MAUR | | |
| 4. Pedestrian Bridge | - MAUR | | |
| 5. Access road | - DOT | - Traffic Police | |
| 6. Commercial facility | - MAUR | | |

Source: Study Team

Table ES.17 - Allocated Roles in the Construction Stage for the Project Owner Options

| One Project Owner (by MAUR or DOT) | Multiple Project Owners (by MAUR and DOT) |
|--|--|
| <p>Option 1 and 2</p> <p>Either MAUR or DOT has responsibility for all the components shown below.</p> <p>MAUR / DOT</p> | <p>Option 3</p> <p>Responsibility of MAUR: 3. Parking, 4. Pedestrian Bridge and 6. Commercial Facility</p> <p>Responsibility of DOT: 1. Station Plaza, 2. Bus Stop and Taxi Stop and 5. Access Road</p> |

Source: Study Team

77. The Study Team recommends the MAUR to be the project owner for all of the intermodal facilities because the MAUR is the most efficient in terms of coordination with the HCMC UMRT Line 1 project.

Project Implementation Scheme

78. There are two options with regards to the implementation scheme.

Option 1 - "New construction package under the current loan (HCMC UMRT Line 1 Project)" requiring an additional loan for the new package at the 3rd L/A of the Line 1 Project.

Option 2 - "New construction package under a new loan (New Project)"

79. The two options are briefly summarized in the following table.

Table ES.18 - Options and Brief Explanations for the Project Implementation Schemes

| Option | Fund Source | Project Owner | Contractor | Assumed Timing for Completion | Remarks |
|--|---|---------------|-------------------------------------|-------------------------------|--|
| 1. New construction package under the current loan | Funds of an additional L/A for the HCMC Line UMRT 1 Project | MAUR | The contractor awarded in tendering | Jul. 2018 | Construction will be conducted in the new construction package to be funded in an additional loan at the 3 rd L/A of the Line 1 Project*. |
| 2. New construction package under a new loan | New ODA by JICA | MAUR | The contractor awarded in tendering | Dec. 2019 | New loan will be established for the construction. |

Note: * 3rd L/A is assumed to be signed at the end of financial year 2014 (March 2015)

Source: Study Team

80. Based on the recommendation of the MAUR as the overall project owner, the 2 options for project implementation schemes are compared in the following table. In conclusion, it seems that Option 1 is the best option to smoothly and quickly develop the intermodal facilities for HCMC UMRT Line 1.

Table ES.19 - Comparative Assessment of the Project Schemes

| Option | Option 1: New construction package under the current loan | Option 2: New construction package under a new loan |
|----------------------|---|--|
| Project Owner | MAUR | MAUR |
| Schedule | Intermodal facilities will be available when the commercial operation of the HCMC UMRT Line 1 is commenced. | Assumed completion of intermodal facilities will be Dec. 2019 (It will not be ready in time for the HCMC UMRT Line 1 opening). |
| Coordination | Coordination can be shortened compared to the alternatives of "All DOT" and "MAUR and DOT" even if coordination with the DOT will be required for the facilities related to road transport. | (Same as in the left) |
| O&M | Transfer procedure is required after the completion of the intermodal facility development. | (Same as in the left) |

Source: Study Team

Summary of the Project Cost

The project cost of the two implementation schemes, Option 1: New construction package under the current loan and Option 2: New construction package under a new loan, are shown in the following table. Option 2 is roughly 3% more expensive than Option 1 because of the difference in price escalation caused by the difference of the implementation schedule.

Table ES.20 - Comparison of the Project Cost for the Two Implementation Schemes

| | Item | Option 1 | Option 2 |
|------------|--|----------------|----------------|
| I. | Eligible Portion | 3,570.4 | 3,682.5 |
| 1. | Construction Cost | 3,351.9 | 3,460.1 |
| | 1-1. Construction Base Cost (as of 2014) | 2,791.6 | 2,791.6 |
| | Phase 1: | 2,330.8 | 2,330.8 |
| | Phase 2: | 460.8 | 460.8 |
| | 1-2. Price Escalation of Construction Cost | 400.7 | 503.8 |
| | Phase 1: | 330.0 | 414.9 |
| | Phase 2: | 70.7 | 88.9 |
| | 1-3. Physical Contingency | 159.6 | 164.7 |
| | Phase 1: | 133.1 | 137.2 |
| | Phase 2: | 26.5 | 27.5 |
| 2. | Design, Tendering and Supervision Cost | 211.8 | 215.5 |
| 3. | Interest during Construction | 6.7 | 6.9 |
| II. | Counterpart Funds | 763.5 | 782.0 |
| 1. | Project Administration Cost of the Employer | 167.6 | 173.0 |
| 2. | Tax and VAT | 373.3 | 384.6 |
| 3. | Land Acquisition & Compensation Cost | 180.0 | 180.0 |
| 4. | Front end Fee | 42.6 | 44.4 |
| | TOTAL (I. + II.) | 4,333.9 | 4,464.5 |

Source: Study Team

Environmental and Social Considerations

81. Based on the result of the environmental scoping, it was concluded that an environmental impact assessment (EIA) was necessary for the development of intermodal facilities at Van Thanh Park station, while an initial environmental examination (IEE) impact assessment was required for the remaining stations. The following table shows a summary of the results from the environmental scoping.

Table ES.21 - Summary of the Results from the Environmental Scoping

| Station Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------------------------|---|----------------|----------|-----------|--------|------------|------------|-----------|---------|----------------|-----------|
| Station Name | | Van Thanh Park | Tan Cang | Thao Dien | An Phu | Rach Chiec | Phuoc Long | Binh Thai | Thu Duc | High-Tech Park | Suoi Tien |
| Socio-Economic Environment | | | | | | | | | | | |
| 1 | Involuntary resettlement | - | - | - | - | - | - | - | - | - | - |
| 2 | Local economy such as employment and livelihood | C+ | B+ | B+ | C+ | C+ | C+ | C+ | C+ | C+ | C+ |
| 3 | Land use and utilization of local resources | C+ | C+ | C+ | C+ | C+ | C+ | C+ | C+ | C+ | C+ |
| 4 | Existing social infrastructure and services | - | - | - | - | - | - | - | B | - | C+ |
| 5 | Misdistribution of benefits and damages | C | C | C | C | C | C | C | C | C | - |
| 6 | Cultural heritage | - | - | - | - | - | B | B | - | - | - |
| Natural Environment | | | | | | | | | | | |
| 7 | Soil erosion | - | - | - | - | - | - | - | - | - | - |
| 8 | Hydrological situation | B | B | B | B | - | - | - | - | - | - |
| 9 | Flora, fauna and biodiversity | B | - | - | - | - | - | - | - | - | - |
| 10 | Landscape | B | - | - | - | - | - | - | - | - | - |
| Pollution | | | | | | | | | | | |
| 11 | Air pollution | A | B | B | B | B | B | B | B | B | B |
| 12 | Water pollution | A | B | B | B | B | B | B | B | B | B |
| 13 | Waste (including waste soil) | A | B | B | B | B | B | B | B | B | B |
| 14 | Noise and vibration | A | B | B | B | B | B | B | B | B | B |
| 15 | Accidents, traffic congestion | A | A | A | A | A | A | A | A | A | A |
| 16 | Sunshine shading | - | - | - | - | - | - | - | - | - | - |

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact

Source: Study Team

82. Accordingly, a draft EIA report was prepared by the SAPI Study Team for the intermodal facility development planned in the station area of Van Thanh Park station. In addition, a draft IEE report was also prepared by the Study Team which describes the IEE-level environmental assessment for the intermodal facility development planned at the other 9 station areas of the HCMC UMRT Line 1.

83. For the draft EIA report for Van Thanh Park station, a baseline environmental survey and a socio-economic survey were carried out. The draft EIA report was prepared in line with the JICA Guidelines and Vietnam regulations on EIA.

84. According to Vietnam's laws and regulations on EIA, consultation with affected local people from the project is not obligatory but two rounds of local stakeholder consultation meetings were organized in the affected commune in accordance with JICA's Guidelines for Environmental

and Social Considerations. Based on the two local stakeholder consultation meetings, the following were concluded.

- Local stakeholders in Ward 22 near Van Thanh Park Station understand that the UMRT Line 1 project and the development of intermodal facilities for the station will bring a lot of socio-economic benefits to the locality, and have no opposition to the project.
- Local residents are worrying about the adverse impacts, especially impacts of noise, dust, vibration, caused by the on-going construction works of the UMRT. It seems that these impacts are excessive and unbearable to residents. This bad practice should be considered as a lesson-learned for the future project, and should be avoided when constructing the intermodal facilities for the station.
- Local stakeholders agreed with the consultant on the impact mitigation measures as proposed in the draft EIA report.

Project Evaluation

Economic Evaluation on Intermodal Facility Development

85. The intermodal facility development as proposed in this study was evaluated to determine its economic viability based on the Economic Internal Rate of Return (EIRR) estimate through a benefit cost analysis over the life of the project.

86. The following table shows a summary of the results from the economic evaluation. The threshold value to judge the economic feasibility of a project is 12% in Vietnam. The EIRR was estimated to be 20.7%, which proved to be feasible from an economic viewpoint.

Table ES.22 - Summary of the Benefit Cost Analysis for Intermodal Facility Development

| Indicator | Value |
|---|--------|
| EIRR | 20.7% |
| B/C (at discounted rate of 12%) | 2.22 |
| NPV ('000 US\$ at discounted rate of 12%) | 26,932 |

Source: Study Team

Financial Evaluation for Intermodal Facility Development

87. A financial evaluation was conducted to evaluate the project's financial viability. Intermodal facility development is expected to promote private investment in station areas and commercial facilities will be developed in these areas. Therefore, it was assumed that the collection of tenant fees from private companies is a major source of revenue for the operational company of the intermodal facility development. In addition, parking fees were counted as revenue. A cash flow analysis was conducted and the evaluation indicator is the Financial Internal Rate of Return.

88. The cash flow analysis show that the FIRR is -3.1% and the project is not financially feasible when the construction cost is included. This is because revenue from fees is not large enough compared with a large amount of the project cost. Therefore, from the financial point of view, public money should be utilized for the construction of ITFs. However, it was estimated that total revenue is much larger than the O&M cost as shown in the following table.

Table ES.23 - Comparison of O&M Costs and Revenues

Unit: '000 US\$

| | O&M Cost | Revenues | | |
|------|----------|--------------|-------------|---------|
| | | Parking Fees | Tenant Fees | Total |
| 2018 | 548 | 3.12 | 1,588 | 1591.12 |
| 2019 | 548 | 5.06 | 1,588 | 1593.06 |
| 2020 | 548 | 8.46 | 1,588 | 1596.46 |
| 2040 | 548 | 12.16 | 1,588 | 1600.16 |

Source: Study Team

Economic Evaluation of Intermodal Facility and Feeder Bus Development

89. A benefit cost analysis was also conducted to determine the economic feasibility of the intermodal facility development along with the development of the feeder bus network. The same methodology was used in the case of the economic evaluation of the intermodal facility development.

90. It was calculated that the EIRR was 12.6% and the B/C was 1.03 which reveals that the project including intermodal facility development and the development of a feeder bus network is economically feasible. The following table shows a summary of the results.

Table ES.24 - Summary of the Benefit Cost Analysis for Intermodal Facility and Feeder Bus Development

| Indicator | Value |
|---|-------|
| EIRR | 12.6% |
| B/C (at discounted rate of 12%) | 1.03 |
| NPV ('000 US\$ at discounted rate of 12%) | 2,767 |

Source: Study Team

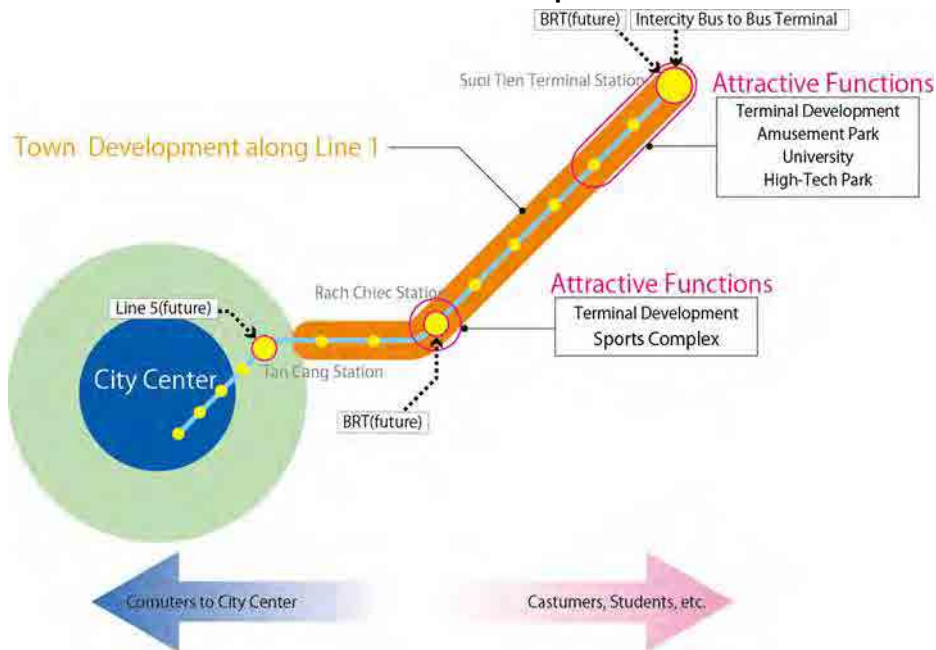
Concept Plan of Station Area Development

Basic Concept of Urban Development for the HCMC UMRT Line 1 Corridor

91. Urban development along the HCMC UMRT Line 1 corridor is proposed to be based on the transit oriented development (TOD) concept. In the city center, west of the Saigon River, zoning plans have already been formulated in which was TOD concept is adopted. However on the eastern side of the Saigon River, there are not enough urban plans following the TOD concept.

92. To attract ridership to the UMRT, urban plans on the UMRT Line 1 corridor east of the Saigon River have to be formulated or amended. In particular, accessibility to existing and planned facilities needs to be improved by the urban plans such as sports, recreational, educational and large employment facilities near the stations. The image of urban development along the UMRT Line 1 corridor is as follows.

Figure ES.23 - Image of Urban Development along the HCMC UMRT Line 1 Corridor based on the TOD Concept

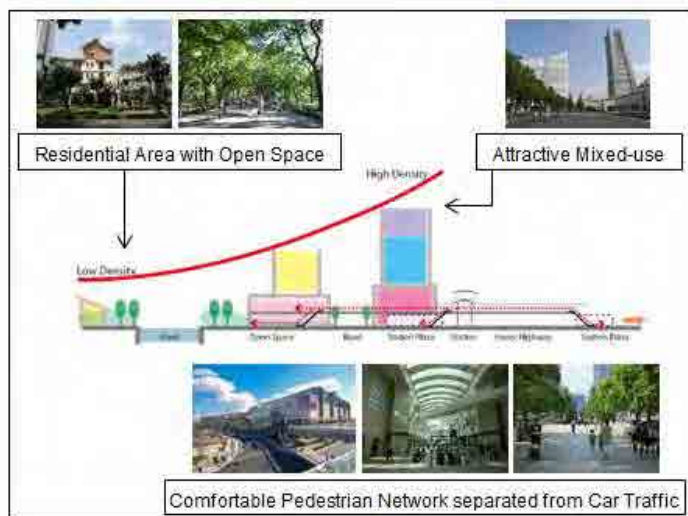


Source: Study Team

Development Concept in the Vicinity of Stations based on TOD

93. The development concept for the areas near the stations is based on the TOD concepts of *walkability, high density and mixed use and public space for modal shift*. Since the HCMC UMRT Line 1 on the eastern side of the Saigon River is elevated along the Hanoi Highway, the establishment of elevated pedestrian networks separated from car traffic to connect the stations with the surrounding areas is important for providing access/egress to and from the stations. It is proposed that mixed use high density development to be located at or near the center of the stations with density gradually levelling off as you go further away from the station.

Figure ES.24 - Development Concept in the Vicinity of Stations based on TOD



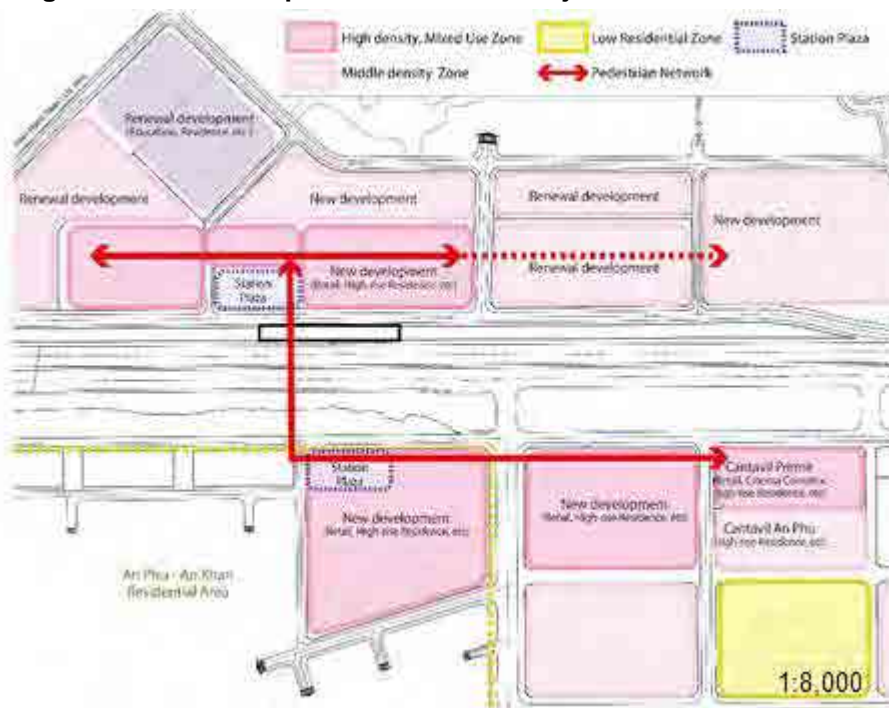
Source: Study Team

Proposed Station Area Urban Development Concept

Urban Development Plan for An Phu Station

94. The concept for An Phu station is for high density mixed use development to be developed by utilizing the vacant areas near the station. Also, station plazas, a U-turn route and pedestrian decks connecting all of the development areas are proposed.

Figure ES.25 - Concept Plan of the Area Adjacent to An Phu Station

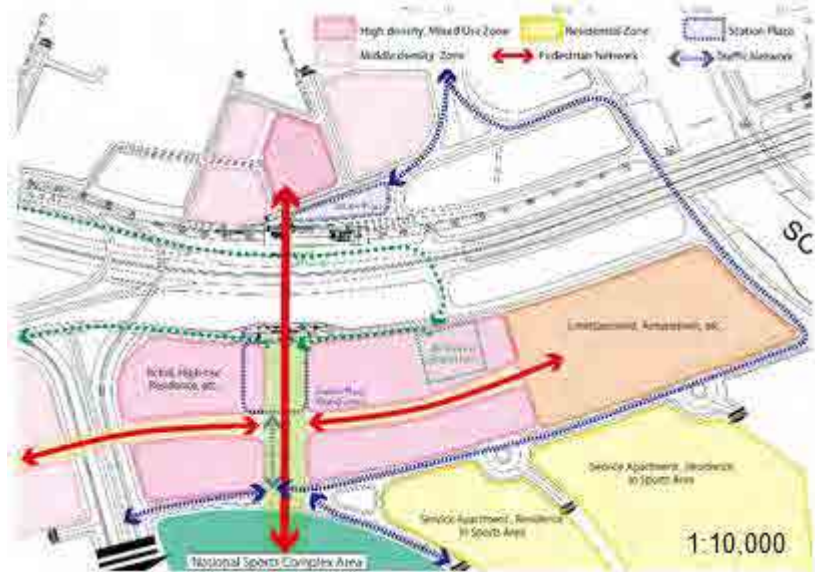


Source: Study Team

Urban Development Plan for Rach Chiec Station

95. Near Rach Chiec station, there is a sports complex that is planned along with the Saigon Sports City development which is a mixed use residential and sports facility. Therefore, the concept for this station is for a pedestrian network and station plaza to be developed with sufficient width to accommodate a large number of pedestrians during a sports event. In addition, new access roads with bicycle lanes separated from car traffic and sidewalks are proposed for the smooth operation of feeder buses.

Figure ES.26 - Concept Plan of the Area Adjacent to Rach Chiec Station

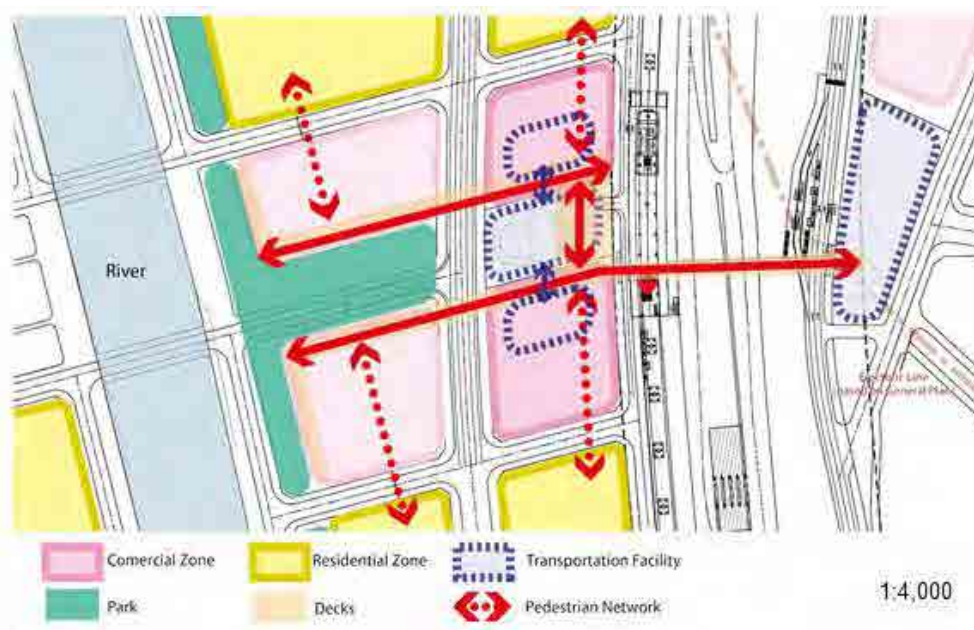


Source: Study Team

Urban Development Plan for Phuoc Long Station

96. On the western side of the Hanoi Highway, the current cement factory and container depot are planned to be converted to areas with urban and living functions. The following figure shows the concept plan of the area adjacent to the station, in which the station plaza and pedestrian decks accommodating a large-volume of pedestrians are planned. Together with the pedestrian decks, the parks and green spaces will be developed utilizing the waterfront amenity. In the buildings facing the station plaza, car and motorbike parking spaces will be developed through public private partnerships.

Figure ES.27 - Concept Plan of the Area Adjacent to Phuoc Long Station



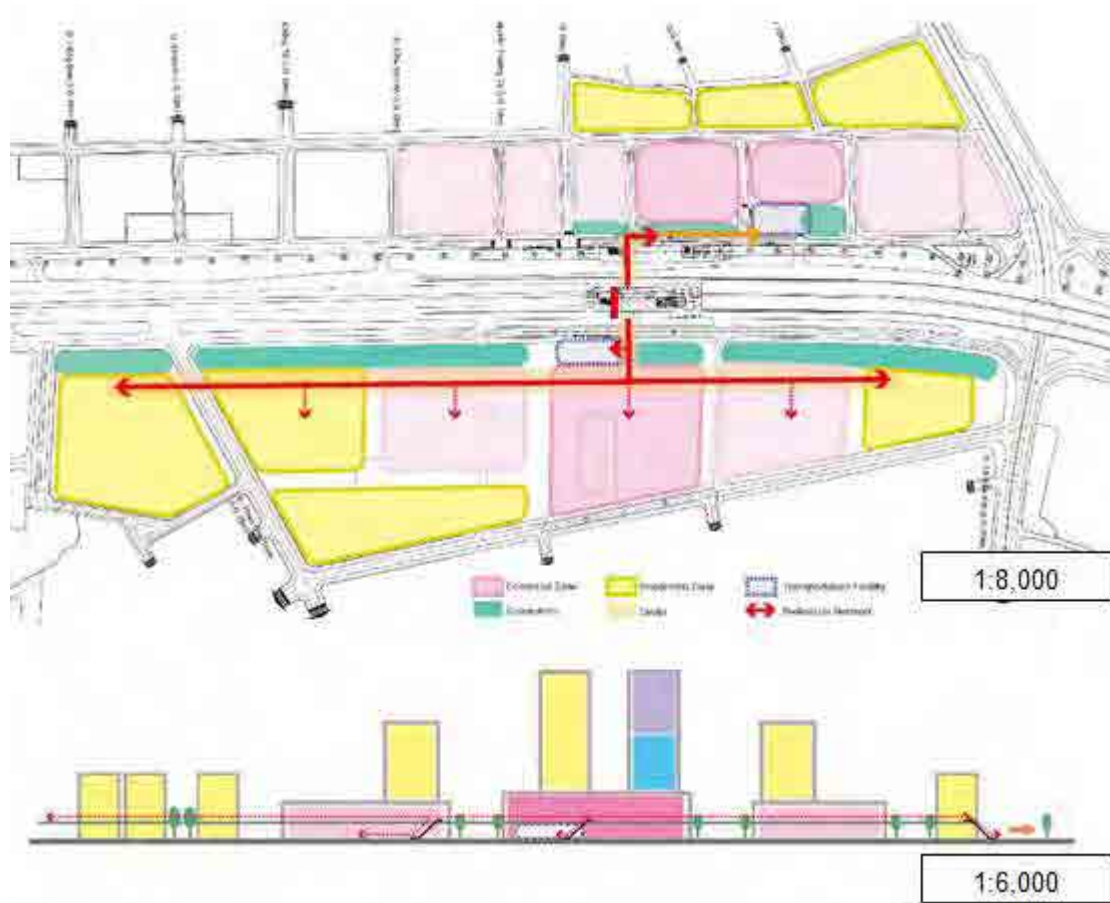
Source: Study Team

Urban Development Plan for Thu Duc Station

97. On the eastern side of the station, there are many large scale factories and high rise buildings and on the western side of the station, the area has been urbanized since the French colonial period and the district people's committee is located near the station.

98. The concept plan is for pedestrian decks to connect between the station and the buildings on the eastern side of the station and the residential blocks will be harmonized with the surrounding existing blocks in terms of size and type of housing. On the western side of the station, the pedestrian network is planned not at the deck level but at the ground level, respecting the historical context of the area. It would be a long-term project to develop the station plaza at the district PC office block.

Figure ES.28 - Concept Plan for Thu Duc Station

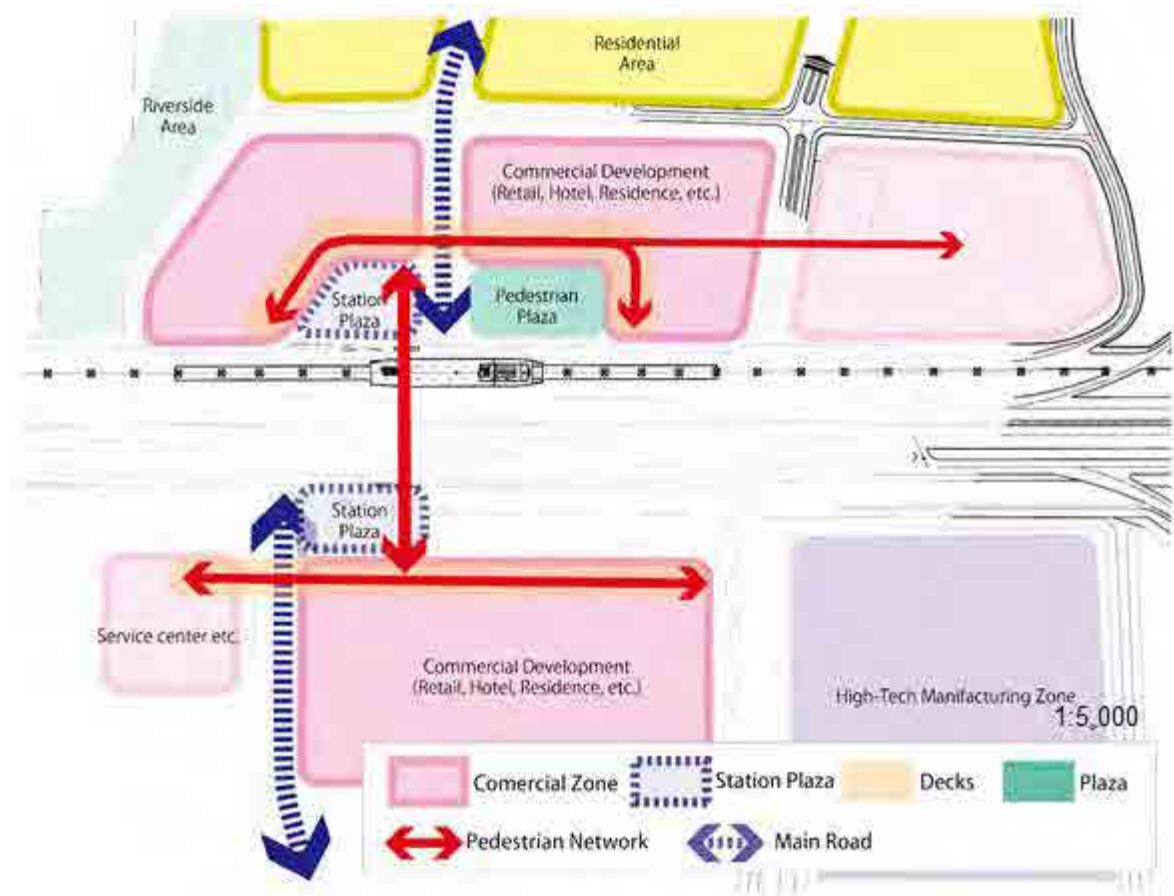


Source: Study Team

Urban Development Plan for High-Tech Park Station

99. On the southern side of the station, adjacent to the station in Saigon High-Tech Park, there is a 13 ha mixed used development that is planned by the Singaporean investor. On the northern side of the station, there is a small housing area but the zoning plan indicates that the area will become a high rise residential area. The concept is for station plazas to be developed on both sides of the station and these station plazas are connected to the main access roads to the surrounding areas. Also, the high density development areas surrounding the station and the station plazas will be integrated by the pedestrian deck networks.

Figure ES.29 - Concept Plan of the Area Adjacent to the High-Tech Park Station

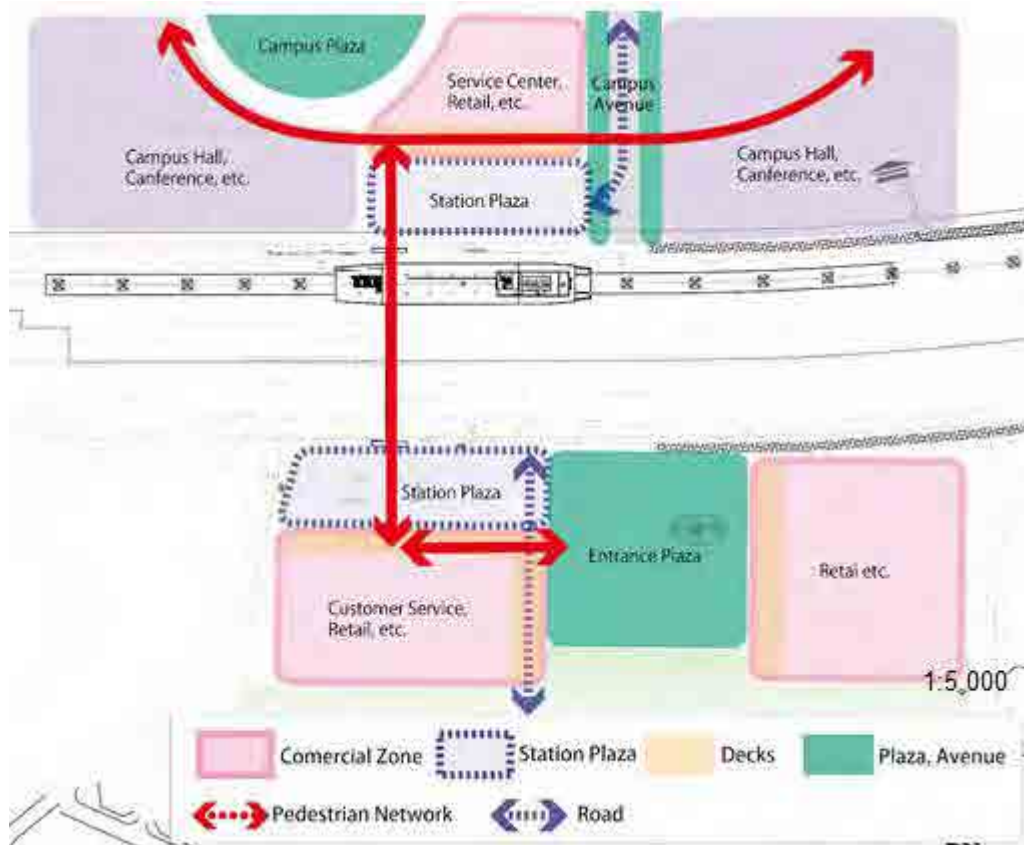


Source: Study Team

Urban Development Plan for Suoi Tien Station

100. On the southern side of Suoi Tien station, there is the Suoi Tien Water Park and the investor has a plan to expand the facility. On the northern side is the National University Area and several universities have already been relocated from the city center to here. The concept plan is for the southern station plaza to be located next to the entrance plaza of the Suoi Tien Water Park and for the southern station plaza to be connected to the station via a pedestrian deck. On the north side of the station, a northern station plaza is planned adjacent to the station and connected to the road which will be on the main avenue of the campus area. A service center and hall will be located in front of the station to serve as the gateway for the university area.

Figure ES.30 - Concept Plan of the Area Adjacent to Suoi Tien Station



Source: Study Area

Impacts to the HCMC UMRT Line 1 Ridership from the Proposed Station Area Development

101. With the development of TOD at the 6 station areas of An Phu, Rach Chiec, Phuoc Long, Thu Duc, High-Tech Park and Suoi Tien, the population density in the station areas is expected to reach 150-350 persons/ha.

102. The impact of TOD at these 6 station areas to the HCMC UMRT Line 1 ridership was evaluated and it was calculated that TOD at these 6 station areas would contribute to increase the ridership of the UMRT Line 1 by 2.7% in 2040 compared to the case without TOD.

Table ES.25 - Impact of TOD-based Integrated Development in 2040 on Ridership

| Station Name | Rate of Increase by TOD (%) | Proposed TOD Concept Plan | Scale of TOD (persons/ha) | | |
|--------------|-----------------------------|---------------------------|---------------------------|--------------|-------|
| | | | Station Area* | Traffic Zone | |
| 1 | Ben Thanh | - | - | | |
| 2 | Opera House | - | - | | |
| 3 | Ba Son | - | - | | |
| 4 | Van Thanh Park | - | - | | |
| 5 | Tan Cang | - | - | | |
| 6 | Thao Dien | - | - | | |
| 7 | An Phu | 10.6% | o | 200-350 | 167.6 |
| 8 | Rach Chiec | 3.7% | o | 200-350 | 184.2 |
| 9 | Phuoc Long | 14.2% | o | 150-250 | 160.5 |
| 10 | Binh Thai | - | - | | |
| 11 | Thu Duc | 3.3% | o | 175-300 | 186.3 |
| 12 | High Tech Park | 13.9% | o | 150-250 | 160.6 |
| 13 | Suoi Tien | 6.9% | o | 150-250 | 169.6 |
| 14 | Suoi Tien Terminal | - | - | | |
| | Total | 2.7% | | | |

*: The area within a 150-300 m radius from stations

Source: Study Team

Project Implementation Mechanisms and Measures on Station Area Development

103. For the implementation of the proposed concept plans for station area development, the legal urban planning scheme of a zoning plan and an architectural management guideline are needed. The following tables show the items which need to be prepared or amended in the zoning plan and architectural management guideline.

Table ES.26 - Items in the Zoning Plan to be Amended or Prepared

| Items | Principle of Amendment / Preparation |
|--|--|
| Road and road network | - Designation of roads and a road network with pedestrian and bicycle lanes into land use and transportation plans to ensure the accessibility to the station from surrounding areas and promote the utilization of public transportation. |
| Intermodal facilities in land use plan | - Designation of intermodal facilities, including a station plaza, into a land use plan to enhance the convenience of public transportation and transfer between different traffic modes. |
| Planning criteria | - Setting the planning criteria with medium or high-density (high FAR (floor area ratio), BCR (building coverage ratio) and height restriction) and with mixed-use land use to utilize the impact of station development. |

Source: Study Team

Table ES.27 - Items in the Architectural Management Guideline to be Amended or Prepared

| Items | Principle of Amendment / Preparation |
|---|---|
| Intermodal facilities | - Setting the functions and size of intermodal facilities (a station plaza, a parking facility, etc.). |
| Pedestrian facilities | - Location and size of the pedestrian deck, elevators and pedestrian pathways. |
| Other public facilities and open spaces | - Scale and specification of an open space and a park within private property. |
| Commercial functions | - Designation of commercial functions (retail, restaurant, etc.) in the rooms facing pedestrian malls to create an active atmosphere. |
| Other regulations | - Other regulations to control and promote urban development according to the TOD concept |

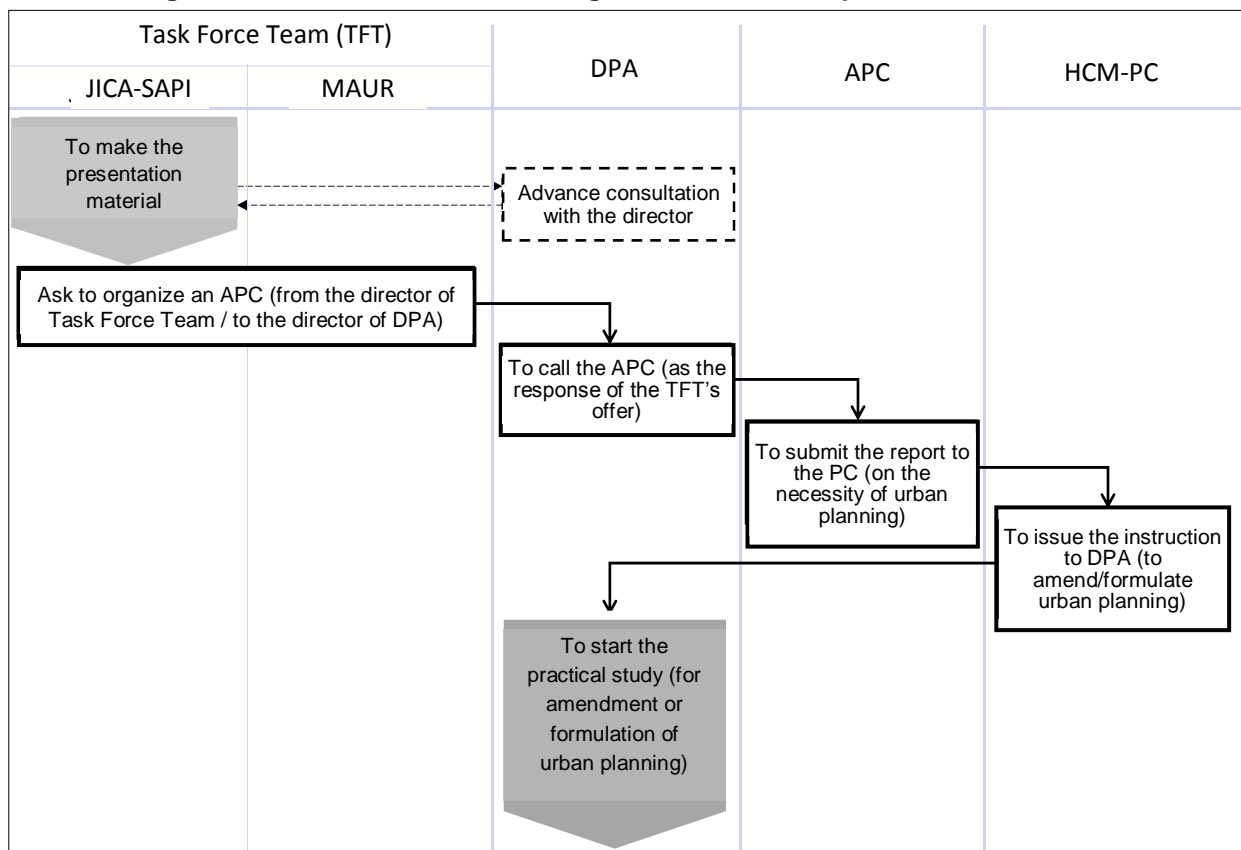
Source: Study Team

104. In order to practically utilize the items proposed to be amended or prepared in the zoning plans and architectural management guidelines for controlling and promoting urban development, they have to be legalized either by modification or formulation. However, legalizing these plans is not an easy task due to the regulatory environment in Vietnam.

105. Due to the difficulties in legalizing the urban plans, the Department of Planning and Architecture (DPA) suggested the procedure through an Architectural Planning Committee (APC) for the legalization of proposed urban plans for station area development.

106. The APC is a committee which examines a large-scale or an important architectural or urban development projects in Ho Chi Minh City, which is presided by the director of the DPA. The member of the committee include the city government authorities related to a project, such as the DPA, DOC, DOT and District leaders, and the experts of architecture and urban planning, such as university professors and members of the architecture association. The DPA's suggested procedure is shown in the following figure.

Figure ES.31 - Procedure for the Legalization of the Proposed Urban Plans



Source: Study Team

Conclusion

107. In order to maximize the project benefit of the HCMC UMRT Line 1, the Study Team proposed the following: (i) concept plan of Intermodal facility development for 10 stations and its basic design, (ii) 13 feeder bus routes and its operation plan and (iii) concept plan of transit oriented development (TOD) at 6 station areas. These developments are expected to lead to: (i) convenient, reliable and comfortable transit service, (ii) development of a hierarchical transport system and (iii) user-oriented urban development along the UMRT. These will generate the benefits such as less automobile use (mitigation of traffic congestion), affordable mobility, increased choices in transport and efficient and intensive land use along the Line 1 corridor.

108. HCMC UMRT Line 1 will be first trial of an urban railway in Vietnam, so the role sharing among relevant agencies for these developments is not clear. Therefore the demarcation of responsibilities also is proposed in order to smooth the implementation of them.

109. The next important steps include the following activities.

1. The feeder bus network development which should be ready when the HCMC UMRT Line 1 opens
2. Planning and implementation of the intermodal facility development
3. Encouragement of station area development
4. Establishment of an appropriate institutional framework

110. 1: “Feeder Bus Network Development”, 2: “Planning and Implementation of the Intermodal Facility Development” and 3: “Encouragement of Station Area Development” can be implemented under the present system and these should be started as soon as possible. 4: “Establishment of an Appropriate Institutional Framework” is a new legal and institutional mechanism to generate further project benefits for the HCMC UMRT Line 1. In order to establish the new framework, time is necessary; however, the study or necessary coordination with relevant agencies should be started as soon as possible.

111. The main agency should be responsible for each activity not only to implement it, but also to coordinate it with the other relevant agencies. Demarcation of responsibilities to implement the proposed activities is shown in the following table. It is recommended that the HCMC PC should make a decision to identify the implementing agency to implement these activities with the concerned agencies immediately.

Table ES.28 - Demarcation of Responsibilities for the Proposed Activities

| Activity (Action Program/Procedure) | Implementing Agency (Main Agency) | Related Agencies |
|--|---|--------------------------------------|
| 1. Feeder Bus Network Development | | |
| Modification of Existing Bus Routes | City Buses: MOCPT Inter-Provincial Buses: DOT | Bus Operators |
| Feeder Bus Development | DOT/MOCPT | Bus Operators |
| Coordination for the Intermodal Facility Development | MAUR/MOCPT | DOT, Traffic Police, Bus Operators |
| Fare and Ticket Integration | MAUR/DOT | MOCPT, Bus Operators, UMRT Operator |
| 2. Planning and Implementation of the Intermodal Facility Development | | |
| Procedure for Loan Agreement | HCMC PC, MAUR (DOT), JICA | MOF, MPI |
| Technical Design and Preparation of Tendering | MAUR (DOT), JICA, | NJPT, 3 rd Party Verifier |
| Tendering Contractor | MAUR (DOT), JICA, | NJPT, 3 rd Party Verifier |
| Approval Procedure on the Investment Report by the HCMC PC | HCMC PC, MAUR (DOT) | DPI, DOT (MAUR), DPA |
| Updating of Zoning Plan in the HCMC PC | HCMC PC, DPA | MAUR, DOT, District PC |
| Transfer of Land Use Rights | HCMC PC, District PC | MAUR, DOT, DPA |
| Construction Works | Contractor | MAUR (DOT), NJPT |
| 3. Encouragement of Station Area Development | | |
| Amendment of Urban Plans for the Proposed Concept Plan | DPA | Private Investor, District PC |
| Procedure on the Legalization of the Proposed Urban Plans | HCMC PC, DPA | APC, MAUR |
| 4. Establishment of an Appropriate Institutional Framework | | |
| Institutional Design and Business Model for the Feeder Bus Service | HCMC PC | MAUR, DOT, MOCPT |
| Institutional Mechanism of Role Sharing for the O&M of the Intermodal Facility | HCMC PC | MAUR, DOT |
| New Schemes for Station Area Development | HCMC PC | DPA |

Source: Study Team

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ABBREVIATIONS

| | |
|----------|--|
| BRT | Bus Rapid Transit |
| CBD | Central Business District |
| CII | Ho Chi Minh City Infrastructure Investment Joint Stock Company |
| CP | Contract package |
| DC | Direct current |
| DOC | Department of Construction |
| DOT | Department of Transport |
| DPA | Department of Planning and Architecture |
| DPI | Department of Planning and Investment |
| EIA | Environmental Impact Assessment |
| GIS | Geographical Information System |
| GMS | Greater Mekong Sub-region |
| HCMC | Ho Chi Minh City |
| HIS | Household Interview Survey |
| HOUTRANS | The Study on Urban Transport Master Plan and Feasibility Study in Ho Chi Minh Metropolitan Area |
| HW | Highway |
| IEE | Initial Environmental Examination |
| IP | Industrial Park |
| IRR | Internal Rate of Return |
| ITS | Intelligent Transport Systems |
| JICA | Japan International Cooperation Agency |
| MAUR | Management Authority for Urban Railways |
| LRT | Light Rapid Transit |
| M/P | Master Plan |
| MOC | Ministry of Construction |
| MOCPT | Management and Operation Center for Public Transportation |
| MONRE | Ministry of Natural Resources and Environment |
| NJPT | NJPT Association – General Consultants for the UMRT Line 1 Project |
| OD | Origin-Destination |
| ODA | Official Development Assistance |
| O&M | Operations & Maintenance |

| | |
|---------|---|
| PPP | Public Private Partnership |
| RAP | Resettlement Action Plan |
| SAPI | Special Assistance for Project Implementation |
| SAMCO | Saigon Transportation Mechanical Corporation |
| SEA | Strategic Environmental Assessment |
| STEP | Special Terms for Economic Partnership |
| STRASYA | Standard Urban Railway System for Asia. |
| TOD | Transit Oriented Development |
| UCCI | Urban – Civil Works Construction Investment Management Authority of HCMC |
| UMRT | Urban Mass Rapid Transit |
| VND | Vietnamese Dong |
| VNU-HCM | Vietnam National University - Ho Chi Minh City |

Part 1: General Issues

1 INTRODUCTION

1.1 Study Background, Objectives and Study Area

1) Background and Objectives

The Ho Chi Minh City (HCMC) metropolitan area serves as a socio-economic hub not only for the southern region of Vietnam but for the entire country as well. The significance of this area's role in the region requires an effective integration of its urban transport system with the regional transport system. It will become increasingly important to strengthen the transport network in this area for the city to become more competitive in the international market.

According to the official data of the General Statistical Office, the population of HCMC increased from 5.3 million in 2000 to more than 7.5 million in 2010, and is predicted to increase to 13 million in 2020 according to The Study on Urban Transport Master Plan and Feasibility Study in Ho Chi Minh Metropolitan Area (HOUTRANS). Together with economic growth, motorization has been rapidly increasing in the city. From 1996 to 2011, the number of registered motorcycles increased from 1.1 million to 6.5 million, and 4-wheel vehicles increased from 96,000 to 427,000 based on the data of Road and Rail Transport Division, Ministry of Public Security. The share of public transport has remained relatively low at only 5.4% in 2009 based on HOUTRANS, while motorcycle and private cars keep a large share which is the major cause of traffic congestion in the city. Accordingly, traffic situation has become worse. Average travel speed in HCMC is 23.8 km/h in 2002, and is predicted to worsen to 13.3 km/h in 2020, based on HOUTRANS.

Responding to these economic and social issues, Japanese ODA loans for the Ho Chi Minh City Urban Railway Project (Ben Thanh – Suoi Tien Section [Line 1]) or HCMC UMRT Line 1 was provided in March 2007 and March 2012, respectively. In order to maximize the effects of the Urban Railway Project, it is necessary that the level of service and environment of intermodal transfer functions should be considerably improved to facilitate more passengers' use of the railway systems. For this reason, the intermodal facilities such as station plazas, bus stops, pedestrian bridges, car/motor-cycle parking and development of a feeder bus network will be required to make the railway attractive, convenient and safe for passengers. This study is being carried out as a Special Assistance for Project Implementation (SAPI) for the HCMC UMRT Line 1 to ensure and maximize the project benefits.

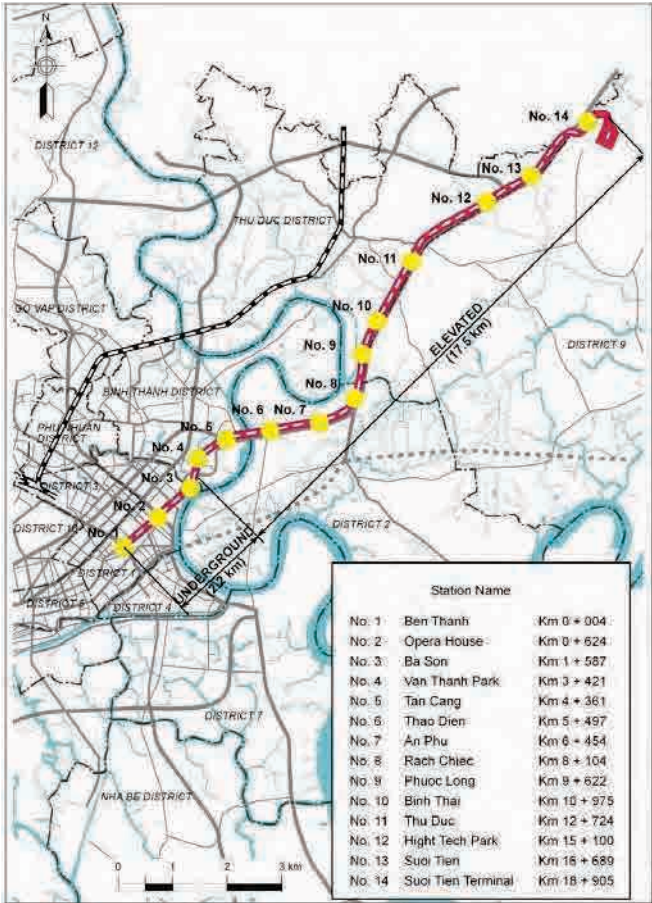
The objectives of the Study are:

- i) To develop an implementation plan of a feeder bus network along the HCMC UMRT Line 1
- ii) To conduct a feasibility study and basic design of intermodal facilities in station areas of the HCMC UMRT Line 1
- iii) To recommend policies and regulations for station area urban development

This Study is intended to promote intermodal transportation and transit oriented development (TOD) by improving accessibility and to create the added value of the HCMC UMRT Line 1 stations.

2) Study Area and Coverage

The study area is the area along HCMC UMRT Line 1 (Ben Thanh - Suoi Tien Section) is shown in Figure 1.1.1.



Source: Study Team

Figure 1.1.1 - Study Area

1.2 Work Flow and Study Approach

1) Study Schedule and Work Flow

As shown in Figure 1.2.1, the Study is being undertaken on the following three stages:

- i) Stage 1 (August 2013 - January 2014): Formulation of alternatives for the feeder bus network and conceptual design of each station based on the results of the review of the current study, surveys and access traffic demand forecast.
 - Study Mobilization and Discussion of Inception Report
 - Analysis of the Existing Conditions and Studies
 - Review of the Urban Development Master Plan
 - Traffic Demand Forecast
 - Examination of Feeder Bus Network Alternatives
 - Examination of the Concept Design of Station Area Development and Formulation of Alternatives of Intermodal Facility Planning for Access Improvement
 - Overall Evaluation of Alternatives
 - Preparation and Discussion on the Interim Report
- ii) Stage 2 (January – May 2014): Formulation of a development plan where various station planning works are done together with adequate project justification and an action plan.
 - Proposal on the Feeder Bus Route network
 - Proposal on the Implementation Plan for Intermodal Facility Development
 - Confirming the Project Impact of HCMC UMRT Line 1
 - Examination of the Implementation System and O&M System
 - Social / Environmental Consideration Study
 - Suggestions for Modification of the Urban Development Master Plan based on Result of this Study
 - Proposal on New Systems / Regulations for Station Area Development
 - Identification of Issues
 - Preparation and Discussion in the Draft Final Report
- iii) Stage 3 (June 2014): Finalization of this SAPI Study
 - Submission of the Final Report

SPECIAL ASSISTANCE FOR PROJECT IMPLEMENTATION (SAPI)
 FOR HO CHI MINH CITY URBAN RAILWAY PROJECT (BEN THANH – SUOI TIEN SECTION (LINE 1))
 Final Report

| Year | Month | Stage | Work Item | | | | Report | | | |
|--|---|---|---|---|---|---|----------------|---|--|--|
| | | | Traffic Demand Forecast / Evaluation | Feeder Bus Network Development | Intermodal Facility Development | Station Area Development | | | | |
| 2014 | 8 | Stage 1 | 1. Study Mobilization and Discussion on Inception Report | | | | IC/R (En·Vn) | | | |
| | | | 2. Analysis of the Existing Conditions and Studies | | | | | | | |
| | | | 2.1 Review of Existing Studies and Data | 2.2 Review of Urban Development Master Plan (Confirming of Necessity of Station Plaza Development and Feeder Bus Network) | | | | | | |
| | | | 4. Traffic Demand Forecast | 3. Review of Examples of Station Access Improvement in Foreign Countries | | | | | | |
| | | | | 4.1 Setting of Station Influential Area | 5. Examination of Feeder Bus Network Alternatives | 6. Examination of Concept Design of Station Area Development and Formulation of Alternatives of Intermodal Facility Planning for Access Improvement | | | | |
| | | | 4.2 Traffic Surveys | 5.1 Surveys for Existing Bus Operation and Usage in Study Area | 6.1 Review of Development Plans around the Stations and Survey on Ownership of Land Use and Development Rights | | | | | |
| | | | 4.3 Methodology of Demand Forecast | 5.2 Surveys for Urban Development Situation and Distribution of Public Facility in Study Area | 6.2 HIS targeting residents along Urban Railway Line 1 | | | | | |
| | | | | 5.3 Formulation of Feeder Bus Network Alternatives and Examination of Profitability of Bus Operation | 6.3 Basic Design for Intermodal Facility | 6.4 Formulation of Concept Design for Station Area Development | | | | |
| | | | 6 | 1 | 7. Overall Evaluation of Alternatives | | | | IT/R (En·Vn·Jp) | |
| | | | | | 8. Preparation and Discussion on Interim Report | | | | | |
| | | | 7 | 2 | 11. Confirming Project Effects of Urban Railway Line 1 (Review of Operation / Effect Indicators and IRR Estimation) | 9. Proposal of Feeder Bus Route | | 10. Proposal of Implementation Plan for Intermodal Facility Development | 14. Suggestion for Modification of Urban Development Master Plan based on Result of This Study | |
| 9.1 Feeder Bus Operational Plan and Proposal for a Bus Fare System | 10.1 Cost Estimation and Review of Cost Sharing | | | | | | | | | |
| 8 | 3 | 11. Confirming Project Effects of Urban Railway Line 1 (Review of Operation / Effect Indicators and IRR Estimation) | 9.2 Proposal of Bus Operator and its institutional system | 10.2 Examination of Implementation Schedule | 10.3 Examination of Required Consultation Service for Project Implementation | | | | | |
| | | | 9.3 Proposal of Further Support Projects | 12. Examination of Implementation System and O&M System | | | | | | |
| 9 | 4 | 11. Confirming Project Effects of Urban Railway Line 1 (Review of Operation / Effect Indicators and IRR Estimation) | 9.3 Proposal of Further Support Projects | 13. Social / Environmental Assessment (Formulation of Draft EIA / RAP Reports) | 15. Proposal of New Methods for Station Area Development | | | | | |
| | | | | 16. Identification of Issues | | | | | | |
| 10 | 5 | 11. Confirming Project Effects of Urban Railway Line 1 (Review of Operation / Effect Indicators and IRR Estimation) | 17. Preparation and Discussion on the Draft Final Report | | | DF/R (En·Vn·Jp) | | | | |
| | | | 18. Study Finalization (Submission of Final Report) | | | | | | | |
| 11 | 6 | Stage 3 | 18. Study Finalization (Submission of Final Report) | | | | F/R (En·Vn·Jp) | | | |

Source: Study Team

Figure 1.2.1 - Overall Work Flow

2) Study Approach

a) Station Catchment Area and Its Planning Components

HCMC UMRT Line 1 will be the first urban railway development in HCMC. And its impact will result in a big change in the social economy and land use along the HCMC UMRT Line 1 corridor. In order to have an enhanced integrated development that combines urban development and the HCMC UMRT Line 1 and to efficiently manage the planning process, the clear definition of the catchment area of the HCMC UMRT Line 1 is very vital. And depending on the purpose and scope of activities or related projects, the station catchment area of the HCMC UMRT Line 1 can be defined as follows:

- A) **Catchment Area (1): Station/Terminal Level** The railway station is not only a part of the transport facility but will also be a multi-functional facility which responds to various economic and commercial needs and public service. Accordingly, this area has a large potential to satisfy the various urban functions given its strategic location and potential socio-economic activities brought about by railway users. Basic design of intermodal facilities in station areas will be conducted in this study.
- B) **Catchment Area (2): Station/Terminal Surrounding Level** With regards to the perspective of railway use as a part of daily life, the catchment area can be regarded as a walking distance area. This will be within a 500-1,000 m radius of the station. An important consideration is the provision of a walkable urban environment to commercial, business and community facilities. Some other important considerations will be the development of intermodal facilities, feeder transport facilities and services, improvement of the urban environment for walking, its development method and roles of government agencies during the planning and development stages. Conceptual design of urban development and an implementation plan of a feeder bus service in this area will be formulated in this study.
- C) **Catchment Area (3): Urban/Corridor Level** The catchment area at the urban level is spread up to HCMC and Bien Hoa City of Dong Nai Province. The role of each urban transport systems should be clear to manage urban growth, and justification of related projects will also be required. The catchment area of the project at the corridor level refers to the areas along the HCMC UMRT Line 1 which will be directly affected: district 1, district 2, district 9, Binh Thanh district, Thu Duc district, Di Anh district, and Bien Hoa district. The provision of feeder bus services and the measures to encourage usage of public transport will be important. The implementation plan of the feeder bus service in this area will be formulated in this study.

The station catchment area along the HCMC UMRT Line 1 will be identified in this Study. Definition of the station catchment area can be summarized as shown in Table 1.2.1.

Table 1.2.1 - Definition of the Station Catchment Area

| Catchment Area | | Planning Component | Scope of Work in This Study |
|--|--|---|--|
| A. Catchment Area (1) | A1: Area within the legally defined property of the UMRT stations | <ul style="list-style-type: none"> • Station buildings • Underground space • Entrance/exit including direct access points/links | <ul style="list-style-type: none"> • Basic design of intermodal facilities at each station |
| | A2: Area directly adjoining the UMRT stations | <ul style="list-style-type: none"> • Intermodal facilities such as station plazas, bus bays, taxi stands, parking areas, etc. | |
| B. Catchment Area (2) | B1: Area directly surrounding A2 or area within a 100 m radius of the UMRT station | <ul style="list-style-type: none"> • Various commercial, business, community facilities • Supporting infrastructure • Feeder transport facilities and services | <ul style="list-style-type: none"> • Feeder bus network planning • Concept design of urban development |
| | B2: Area within 500-1,000 m radius of the UMRT station or within walking distance | | |
| C. Catchment Area (3) | Area that can be connected to the stations by feeder services | <ul style="list-style-type: none"> • Feeder transport facilities and services | <ul style="list-style-type: none"> • Feeder bus network planning |
| <p>Image of the Station Catchment Area</p> <p>The diagram illustrates the station catchment area for HCMC Line 1. It features a central station (A1) with a 100m radius (B1). Surrounding this is a 500-1,000m radius zone (B2). The next zone is A2, which is directly adjoining the station. The outermost zone is C, with a 1.0-5.0km radius. The diagram is centered on HCMC Line 1, which is shown as a dashed line passing through the station.</p> | | | |

Source: Study Team

b) Role and Functions of Intermodal Facilities

One of the most important advantages of the private transport mode is the provision of door-to-door travelling. Therefore, in order to realize the modal shift from the private to public transport mode, it is important to minimize the loss of intermodal transfer as much as possible. The loss of intermodal transfer can be classified into the following:

- 1) Physical: vertical and horizontal distance from one transport mode to another;
- 2) Psychological: psychological resistance from the difficulty in obtaining information of the other transport mode;
- 3) Monetary: annoyance from payment on each transfer and costly payment because of the base fare (starting fare);
- 4) Time: waiting time for the second transport mode.

Table 1.2.2 shows the distance in which pedestrians are willing to walk in foreign countries. It ranges by local characteristics but is no more than 500 m. Therefore, it is desirable that the impedance between modes is less than the equivalent of 500 m horizontal distance in order for the intermodal transfer point to function.

In foreign countries, there are many supplemental measures of intermodal transfer in order to reduce these types of loss and to enhance the public transport network.

Table 1.2.2 - Distance Pedestrians Are Willing to Walk or Wait, and Psychological Time Limit

| Items | | Distance or Time Willing to Walk or Wait | Source |
|--|------------------------|--|--|
| Cities in Europe | Ordinary city roads | 400 m | Sweden Runto Technology Institute |
| | Rainy and cold climate | 200 m | |
| | Comfortable roads | 30% to 50% increase | |
| | Congested roads | 150 m | UK Road & Transportation Research Institute |
| Tokyo | | 300 m | Transportation Economy Research Institute, Japan |
| Cities in Southeast Asia (in midsummer) | | 100 m to 200 m | |
| Interval of bus stops and car parks | | 200 m | Research in USA & Europe |
| Average walking distance by aged persons | | 100 m | Japan National Railway |

Source: Study Team

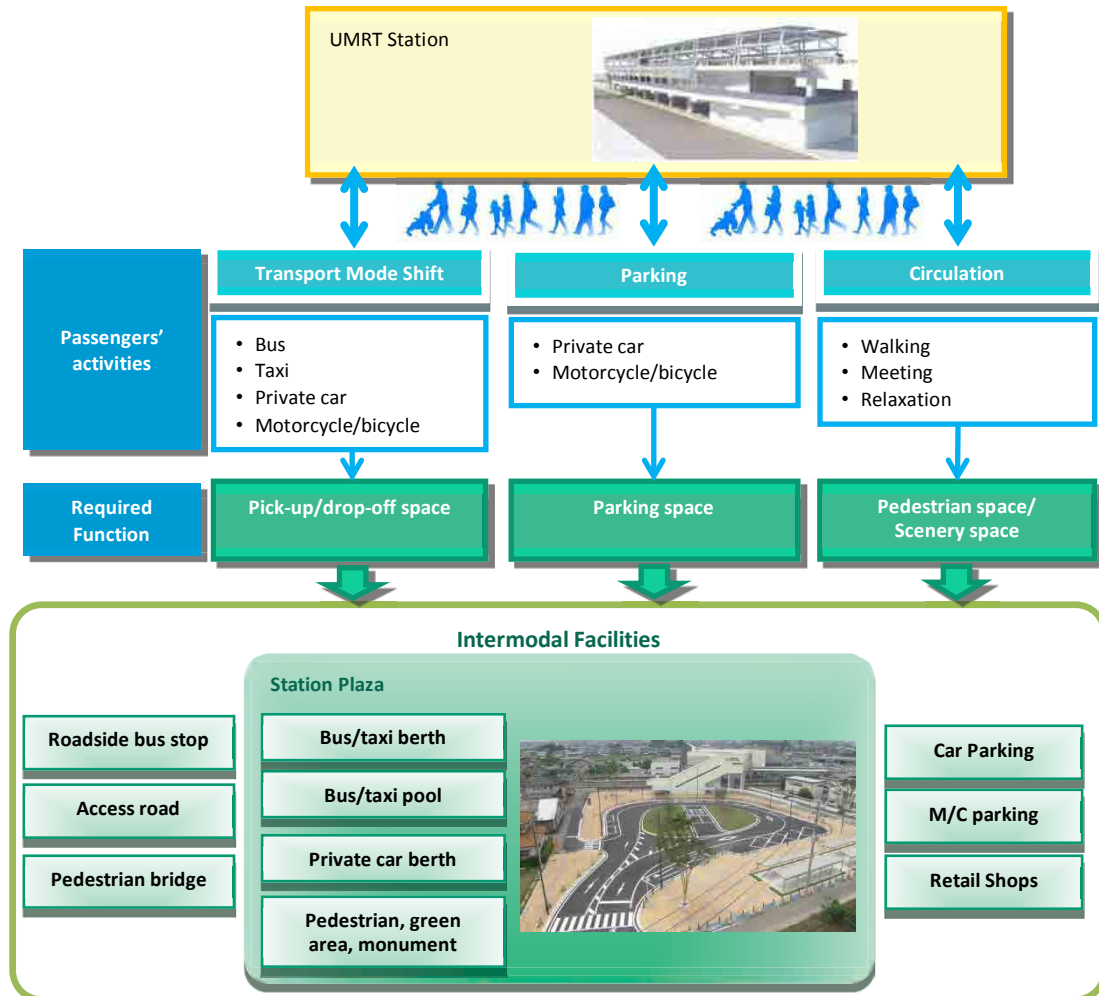
The role of intermodal facilities is to ensure convenience, safety and a pleasant experience for railway passengers' activities in the surroundings of the station. It is a strategy to promote railway use. The passengers activities consist of three major activities: i) modal shift between the railway and other modes of transport, ii) parking of private car, motor cycle and bicycle and iii) circulation for walking, meeting and relaxation. These roles are detailed as follows:

i) For Modal Shift: For the urban public transport system development in HCMC, connecting the UMRT station with bus service network is one of the most important strategies. To successfully realize this, it is necessary to ensure convenience and safety for the tens of thousands of daily transit passengers. It is therefore necessary that intermodal facilities such as bus stops and station plazas with bus berths be constructed near the stations. Likewise, transfers from or to private vehicles and taxi should be planned well to avoid congestion and accidents in the surrounding areas. The pick-up and drop-off points and the vehicle pool should be secured near the station. In addition, the access road and pedestrian bridge should provide smooth and safe access to each facility. Thus, intermodal facilities have the significant role to provide appropriate spaces for the modal shift between the railway and other transport modes.

ii) For Parking: Using private vehicles to access the railway station will result in a demand for parking spaces around the station. For the reduction of traffic congestion and accidents caused by roadside parking, adequate parking space should be allocated near the station. From the perspective of promoting railway use, convenient parking facilities near the station will promote Park and Ride behavior and will contribute in the increase in the number of railway passengers and will decrease the environmental load accordingly.

iii) For Circulation: In the station area, railway passengers create circulation activities such as walking, waiting and meeting. Thus, provision of convenience and amenities to these activities is also necessary to promote railway use. In particular, wide passage ways and open spaces are required for the convenience of pedestrians, and green scenery space, installation of a landmark and illumination in the station plaza will create a cityscape as an amenity for station visitors. In addition, retail shops such as supermarkets, kiosks and cafés will also add to the convenience of railway passengers.

Schematic image of role and function of intermodal facilities are shown in Figure 1.2.2.



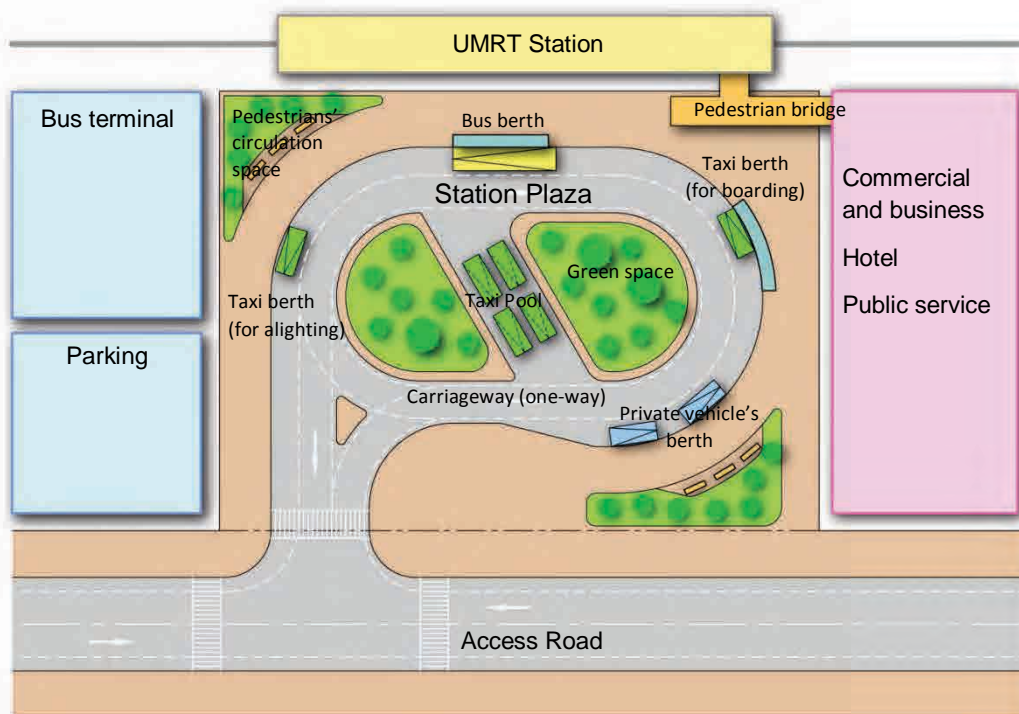
Source: Study Team

Figure 1.2.2 - Role and Function of Intermodal Facilities

Intermodal facilities consist of transport facilities such as station plazas, bus stops, pedestrian bridges, access roads, car parking and motor cycle parking, and other service facilities such as open space, green space and retail shops. Among these, the station plaza is the central facility with multiple functions as both a traffic square and a public open space. The components are (i) carriage way (one-way), (ii) bus berth and bus pool, (iii) taxi berths and taxi pool, (iv) berth for private vehicles, (v) pedestrian bridge, (vi) pedestrians' circulation space, and (vii) green space as shown in Figure 1.2.3.

In the planning of the station plaza, each component is laid out in consideration of connectivity, accessibility, efficiency and safety. Also, the capacities of traffic components such as the bus berth, taxi berth and taxi pool are estimated with future railway demand and modal share. As a traffic square, it is required to secure the users' accessibility between station gate and each transit berths and to reduce traffic congestion and accident.

In addition, as a public open space, it is required to have amenities and convenience for railway passengers and pedestrians through the provision of green area, installation of a landmark and illumination.



Source: Study Team

Figure 1.2.3 - Basic Layout of the Station Plaza

c) Feeder Bus Network Planning

One of major issues in the suburban stations is how to enhance the bus service level by providing an effective bus route and bus stops with increased frequency and punctuality to attract more urban railway users.

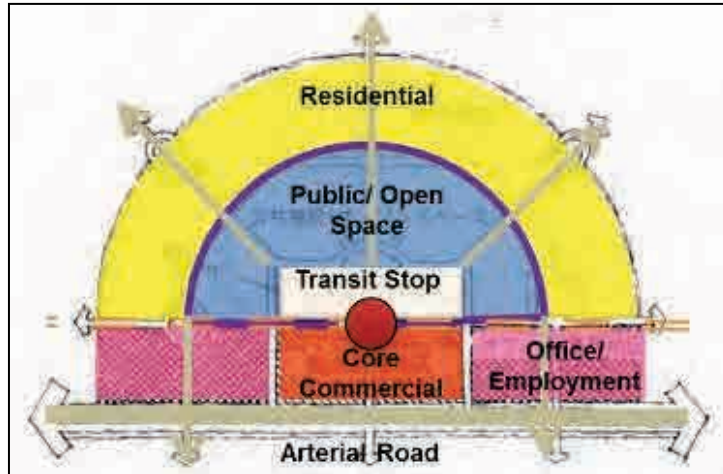
The following will be taken into consideration in the feeder bus network planning:

- i. **Rerouting (or Adjustment) of the Existing Bus Network along HCMC UMRT Line 1:** The existing bus network along the HCMC UMRT Line 1 is mainly operating on National Highway No. 1 and these bus routes will compete with the HCMC UMRT Line 1 when it becomes operational. This leads to concerns such as the decrease in the number of bus passengers and the decline in the profitability of the bus operation. Therefore, feeder bus network planning in this study will also cover the rerouting of the existing bus network along the HCMC UMRT Line 1.
- ii. **Coverage of Bus Service:** Feeder bus services should not only be useful for accessing UMRT stations but should also cover short distance trips in the surrounding area of a station. For that, the bus service will need to cover schools/universities, hospitals and supermarkets. This aims to increase bus users and to sustain the profitability of the bus operation.
- iii. **Shuttle Bus Service:** Industrial parks and universities are located along the HCMC UMRT Line 1 corridor which results in the expected high traffic demand between these areas and the stations. Hence, the provision of shuttle bus service seems to be necessary in these areas.
- iv. **Bus Operator, Fare Scheme and Fare Collection System:** There are various alternatives for the feeder bus operation such as by MAUR, existing bus operators, developers or new enterprises.

d) Measures and Direction for Station Area Development

In order to effectively use public transportation as a means to address urban traffic problems, improvement of the railway system may not be enough but necessary to ensure that the surrounding land is used to encourage the use of the urban railway system. Both land use and transport infrastructure should be integrated under a concept of "Transit Oriented Development (TOD)", and the promotion of high-density commercial land use for around urban railway stations (approximately 500-600 m to/from stations) will benefit both the urban economy and the business operation of the urban railway system as a whole.

Corridor areas which are served by the urban railway system will have great potential for urban development such as housing, industrial and commercial facilities, thereby bringing a significant impact on the urban structure. The area along the HCMC UMRT Line 1 has various opportunities for suburban development with new housing areas, shopping centers and industrial parks. The concept of TOD is shown in Figure 1.2.4.



Source: Study Team

Figure 1.2.4 - The Concept of Transit Oriented Development

1.3 Consultation with Stakeholders

This Study has been implemented by the JICA Study Team in cooperation with related agencies in Ho Chi Minh City People's Committee (HCMC-PC) such as the Management Authority for Urban Railways (MAUR), Department of Transport (DOT), Management and Operation Center of Public Transport (MOCPT) [under the DOT], Department of Planning and Investment (DPI) and Department of Planning Architecture (DPA). MAUR is the main counterpart of the Study, and HCMC-PC organizes the Task Team composed by MAUR, DOT, DPI and DPA. To identify issues and appropriate proposals, the Study Team has conducted the following Task Team meetings and various meetings with relevant agencies (see Table 1.3.1 and 1.3.2).

Table 1.3.1 - Task Team Meetings

| Meetings Conducted | Participated Agency | Key Agenda | Date |
|--|---|---|--------------------|
| Kick-off Meeting (1st Task Team Meeting) | MAUR, DOT, DPI, DPA, MOCPT, JICA Study Team, NJPT | Discussion on Inception Report | 29th August 2013 |
| 2nd Task Team Meeting | MAUR, DPI, MOCPT, JICA Study Team | Detailed Work Plan & Schedule of: 1.Transport Demand Forecast/ Survey and Feeder Bus Network Planning 2.Intermodal Facility Development 3.Station Area Development | 4th September 2013 |
| 3rd Task Team Meeting | MAUR, DPI, MOCPT, JICA Study Team | Reporting of Progress in: 1.Transport Demand Forecast/ Survey and Feeder Bus Network Planning 2.Intermodal Facility Development 3.Station Area Development 4. Social/Environmental Assessment. | 3rd October 2013 |
| 4th Task Team Meeting | MAUR, DPI, MOCPT, JICA Study Team | Reporting of Progress in: 1.Transport Demand Forecast/ Survey and Feeder Bus Network Planning 2.Intermodal Facility Development | 24th October 2013 |
| 5th Task Team Meeting | MAUR, DPI, DPA, MOCPT, JICA Study Team | Reporting of Progress in: 1.Concept Plan in District 2 Area 2.Concept Plan in Thu Duc and District 9 Area 3.Concept Plan in University and High-Tech Park Area 4.Discussion about Specific Issues | 7th November 2013 |
| 6th Task Team Meeting | MAUR, MOCPT, JICA Study Team | Reporting of Progress in: 1.Concept Plan of Feeder Bus Network and Intermodal Facility Development 2.Urban Planning and Development (Socio-Economic Framework and TOD) 3.Confirmation of Social / Environmental Impact in each station plaza | 3rd December 2013 |
| 7th Task Team Meeting | MAUR,DPI, DPA, MOCPT, JICA Study Team | Reporting of Progress in: 1.Measures (Engineering Solution) to Improve Accessibility to the Stations 2.Bus Network Planning along the HCMC UMRT Line 1 Corridor | 19th December 2013 |
| 8th Task Team Meeting | MAUR,DPI, DPA, MOCPT, JICA Study Team | Reporting of Progress in: 1.Initial Cost Estimation / Prioritization of the Station Plaza 2.Measures (Engineering Solution) to improve Accessibility to the Stations (Flyover bridge) | 9th January 2014 |
| Interim Report Meeting | MAUR, DOT, MOCPT, DPI, DPA, JICA, JICA Study Team | Discussion on Interim Report | 19th February 2014 |
| 9th Task Team Meeting | MAUR,DPI, MOCPT, JICA Study Team | Reporting of Progress in: 1.Confirmation of Required Procedure and Implementation Schedule on FS of Intermodal Facility Development | 6th March 2014 |

| Meetings Conducted | Participated Agency | Key Agenda | Date |
|------------------------|--|--|-----------------|
| | | 2.Procedure for Legalization of Proposed Concept Design on Station Area Urban Development 3.UMRT Feeder Routes and General Route Modifications | |
| 10th Task Team Meeting | MAUR, MOCPT, JICA Study Team | Reporting of Progress in: 1.Implementation Schedule for ITF Development and Role Sharing for Development and O&M of ITF 2.Report of Individual Meeting with MOCPT CP2 etc. | 20th March 2014 |
| 11th Task Team Meeting | MAUR,DPI, MOCPT, JICA Study Team | Reporting of Progress in: 1.Discussion on Alternatives of Implementation Scheme on ITF Development 2.Revision of Feeder Bus Planning and Operation Plan | 3rd April 2014 |
| 12th Task Team Meeting | MAUR, DOT, DPI, MOCPT, REFICO, JICA Study Team | 1.Discussion on Institutional Design of the Feeder Bus Routes for HCMC UMRT Line 1 and Level of Service and Cost Implications 2.Progress Reports Related to Intermodal Facility Development | 24th April 2014 |
| 13th Task Team Meeting | MAUR, DOT, DPI, DPA, MOCPT, JICA Study Team | 1.Progress Reports Related to Intermodal Facility Development and Social and Environmental Consideration 2.Overall schedule of SAPI Study including study tour in Japan | 15th May 2014 |

As of the end of May 2014

Source: Study Team

Table 1.3.2 - Individual Meetings with Relevant Agencies

| Organization | Key Contact Person | Key Agenda | Date |
|---|--|---|--------------------|
| DOT | Mr. Duong Hong Thanh – Deputy Director | • Cooperation mechanism for implementation of SAPI Study | 19th August 2013 |
| MOCPT | Mr. Van Cong Diem – Deputy Director | • Introduction about SAPI Study • Bus operation and management in HCMC | 27th August 2013 |
| Saigon Transportation Mechanical Corporation (SAMCO) | Mr. Le Van Pha Deputy General Director | • Discussion about New Mien Dong (Eastern) Bus Station Planning | 4th October 2013 |
| HCMC Infrastructure Investment Joint Stock Company (CII) | Mr. Nguyen Thanh Nam Hanoi Highway – BOT Project Director | • Discussion about ROW of HN Highway and land availability for intermodal facilities | 9th October 2013 |
| Suoi Tien Amusement Park | Mr. Dinh Van Vui – Chairman of the Board and CEO of Suoi Tien Group | • Information about 2 projects of Suoi Tien Group: (1) Suoi Tien Tourist Site expansion and (2) Tan Cang project | 23rd October 2013 |
| Vietnam National University - Ho Chi Minh City (VNU-HCM) | Do Dai Thang, Ph.D. | • Introduction of SAPI Study Project • The Master Plan of VNU-HCM Urban Area Development and construction progress. • Current status and development plan of the Shuttle Bus Service (to/ from city center and bus service inside the urban area) | 24th October 2013 |
| Sai Gon High Tech Park (HTP) | Mr. Hoang Nhu Phuong – Manager of Department of Planning, Construction and Environment | • Introduction of SAPI Study Project • Land possibility for Station Plaza in the HTP | 29th October 2013 |
| DOT | Mr. Duong Hong Thanh – Deputy Director | • Discussion about ROW of HN Highway and land availability | 31st October 2013 |
| UCCI (Urban – Civil Works Construction Investment Management Authority of | Ms. Nguyen Ngoc Tien – Deputy General Director Mr. Ha Quoc Linh – Deputy | • Discussion about BRT 1, especially the connectivity at Rach Chiec Station | 10th December 2013 |

SPECIAL ASSISTANCE FOR PROJECT IMPLEMENTATION (SAPI)
FOR HO CHI MINH CITY URBAN RAILWAY PROJECT (BEN THANH – SUOI TIEN SECTION (LINE 1))
Final Report

| Organization | Key Contact Person | Key Agenda | Date |
|---|--|--|--------------------|
| HCMC) | Manager of Project Development Division | | |
| DOT, MOCPT | Mr. Nguyen Duc Tri - Vice Head - Division of Road Transport Management. Mr. Van Cong Diem - Deputy Director of MOCPT. | <ul style="list-style-type: none"> Options of Rerouting of Competing Bus Routes Evaluation of Feeder Bus Network Alternatives | 23rd December 2013 |
| MOCPT | Mr. Van Cong Diem – Deputy Director | <ul style="list-style-type: none"> Discussion on bus planning | 25th February 2014 |
| Department of Culture, Sport & Tourism (DCST) | Mr. Nguyen Hung – Deputy Director of DCST and Director of Rach Chiec Sport Center | <ul style="list-style-type: none"> Development plan of Rach Chiec sports complex area | 26th February 2014 |
| HCMC Infrastructure Investment Joint Stock Company (CI) | Mr. Nguyen Thanh Nam Hanoi Highway – BOT Project Director | <ul style="list-style-type: none"> Widening construction project of HN Highway | 27th February 2014 |
| MOCPT | Mr. Van Cong Diem – Deputy Director | <ul style="list-style-type: none"> Discussion on future bus network | 13th March 2014 |
| VNU-HCM | Do Dai Thang, Ph.D. | <ul style="list-style-type: none"> Master Plan for VNU-HCM Discussion on the connectivity between Suoi Tien Station and National University area | 17th April 2014 |
| DOT, MOCPT | Mr. Nguyen Duc Tri - Vice Head - Division of Road Transport Management. Mr. Van Cong Diem - Deputy Director of MOCPT. | <ul style="list-style-type: none"> Discussion on the feeder bus operator and the implementation of bus rerouting | 29th April 2014 |

As of the end of May 2014

Source: Study Team

The Study Team also has conducted consultant discussions with relevant agencies on several special topics (see Table 1.3.3).

Table 1.3.3 - Consultation Discussions with Stakeholders

| Organization | Key Contact Person | Key Agenda | Note | Date |
|---------------------|---|--|---|---|
| DPA | Dr. Truong Trung Kien - Chief of City Center Planning Management Division | Necessary urban planning schemes and legalizing process for the TOD concept | It is confirmed that to amend or formulate urban planning based on a JICA's TOD proposal, Architecture Planning Committee has to be organized to relay the instruction from PC. | 30th August 2013 22nd February 2014 29th April 2014 |
| MOCPT | Mr. Van Cong Diem - Deputy Director | Future bus network and operation along HCMC Line 1 corridor | Bus planning of this SAPI Study has been designed and revised on the basis of MOCPT's feedback on the initial proposal. | 4th April 2014 (Official letter LTCP140404 from Study Team to MOCPT) 24th April 2014 (No. 1380 / TT-KHDH from MOCPT) |
| CP2 | Mr. Masuzawa Tatsuya - NJPT Project Director | Connection of station and intermodal facilities | It is confirmed that CP2 would harmonize the draft design of pedestrian deck and parking space under viaduct with the proposal of SAPI Team. | 16th April 2014 |
| Saigon Tourist | Mr. Tran Hung Viet - General Director | Availability of land in Van Thanh Park for station plaza and parking lots | It is confirmed that: + The road in the north of the station should not be hindered by the road accessing to the station plaza. + The water flow between Van Thanh Lake and Van Thanh Canal should not be affected. | 12th May 2014 |
| Binh Thanh District | Mr. Hoang Song Ha - Vice Chairman of District PC | Availability of land for ITF proposed at Van Thanh Park Station and Tan Cang Station | It is confirmed that: + Alternative plan for the use of the land lot in the south of the interchange at Tan Cang Station | 14th May 2014 |

| Organization | Key Contact Person | Key Agenda | Note | Date |
|--------------|------------------------------------|--|---|---------------|
| | | | should be made. + There is a plan to widen the road running in parallel with the railway around Van Thanh Park Station. This should be considered in the ITF development plan. | |
| MAUR | Mr.Hoang Nhu Cuong - Vice Chairman | Process for decision of the implementation scheme of ITF development | It is confirmed that the implementation scheme will be decided by HCMC-PC after the advantage of each option are clarified. | 22nd May 2014 |

As of the end of May 2014

Source: Study Team

The Advisory Board is established by JICA to take advantage of Japanese experience in the field of station area development. The meetings with the Advisory Board were held as shown in Table 1.3.4.

Table 1.3.4 - Meetings with Advisory Board

| Name of Meetings | Participants | Key Agenda | Date |
|--|---|--|---------------------|
| 1 st Advisory Board Meeting in Japan | JICA, Advisory Board Members, JICA Study Team | • Discussion on Inception Report | 5th August 2013 |
| Introduction of Japanese Experiences related to Station Area Urban Development | MAUR, DOT, DPI, DPA, MOCPT, Advisory Board Members, JICA Study Team, NJPT | • Introduction of station area development in Japan • Discussion with Advisory Board Members from Japan | 19th September 2013 |
| 2 nd Advisory Board Meeting in Japan | JICA, Advisory Board Members, NJPT, JICA Study Team | • Progress Report (Traffic Survey/Demand Forecast, Station Area Urban Development, Feeder Bus Planning and Station Plaza Layout) | 13th November, 2013 |
| 3 rd Advisory Board Meeting in Japan | JICA, Advisory Board Members, JICA Study Team | • Discussion on Interim Report | 22nd April 2014 |

As of the end of May 2014

Source: Study Team

1.4 Review of the Feasibility Study of the HCMC UMRT Line 1 Project

1) Overview of the HCMC UMRT Line 1 Project

The HCMC UMRT Line 1 project is a mass rapid transit construction project between Ben Thanh, the city center of HCMC and Suoi Tien along the Hanoi Highway. Currently, six UMRT lines are planned to be developed in HCMC and the Line 1 is the first urban railway project which came into the implementation stage. The outline of the HCMC UMRT Line 1 is as follows.

- The total route length is 19.7 km long which consists of a 2.2 km long underground section and a 17.5 km long elevated section.
- A double track and DC electrical system (Japanese standard of 1500 V DC) are applied for the whole line. Track gauge is 1,435mm (standard gauge).
- Regarding technical standards, two Japanese standards were approved by the HCMC-PC: (1) STRASYA and (2) Ministerial Ordinance to Provide Technical Standards on Railways by Ministry of Land, Infrastructure and Transport in Japan
- The Line 1 includes 14 stations. The first three stations (Ben Thanh, Opera House and Ba son) are underground stations and the rest of the 11 stations are elevated.
- Along the line, there are existing urban areas close to the station (around Ben Thanh and Opera House) and commercial districts (Ba Son and Tan Cang). In addition, high potential development areas such as the university town, the high-tech park and various new residential and commercial development areas are located along the Hanoi Highway. Table 1.4.1 shows the list of stations.

Table 1.4.1 - Stations of the HCMC UMRT Line 1

| | Name of Station | Distance from the Origin (km) | Distance between Stations (m) | Structure | Transfer to Other Transport Modes | |
|----|--------------------|-------------------------------|-------------------------------|-------------|-----------------------------------|-----|
| | | | | | UMRT | BRT |
| 1 | Ben Thanh | 0.000 | 0 | Underground | Line 2, Line 3, and Line 4 | |
| 2 | Opera House | 0.715 | 715 | Underground | | |
| 3 | Ba Son | 1.706 | 991 | Underground | | |
| 4 | Van Thanh Park | 3.520 | 1,814 | Elevated | | |
| 5 | Tan Cang | 4.438 | 918 | Elevated | Line 5 | |
| 6 | Thao Dien | 5.596 | 1,158 | Elevated | | |
| 7 | An Phu | 6.553 | 957 | Elevated | | |
| 8 | Rach Chiec | 8.207 | 1,654 | Elevated | | ◎ |
| 9 | Phuoc Long | 9.673 | 1,466 | Elevated | | |
| 10 | Binh Thai | 11.066 | 1,393 | Elevated | | |
| 11 | Thu Duc | 12.810 | 1,744 | Elevated | | |
| 12 | High-Tech Park | 15.190 | 2,380 | Elevated | | |
| 13 | Suoi Tien | 16.765 | 1,575 | Elevated | | |
| 14 | Suoi Tien Terminal | 18.821 | 2,056 | Elevated | | ◎ |

Source: Study Team

2) Implementation Structure and Schedule

The HCMC UMRT Line 1 Project is being implemented with funding from the Official Development Assistance (ODA) of the Japanese Government through the JICA Special Terms for Economic Partnership (STEP) Loan. The implementing agency is MAUR and the General Consultant (GC) is the NJPT Association which is a joint venture of five Japanese companies and two Vietnamese companies. The Project consists of four contract packages and Table 1.4.2 summarizes the contents and the current status of each package.

Table 1.4.2 - Contents and Progress of the Contract Packages

| Construction Package (CP) | Work Item | Commencement Date of Construction | Progress |
|----------------------------------|---|--|---|
| CP 1a | Civil and structural works at the underground section: <ul style="list-style-type: none"> • Ben Thanh station • Tunnel by the cut and cover method between Ben Thanh and Opera House stations | June 2015 | The detailed design work is conducted by the GC |
| CP 1b | Civil and structural works at the underground section: <ul style="list-style-type: none"> • Opera House and Ba Son stations • Bored tunnel between Opera House and Ba Son • Tunnel by cut and cover method between Ba Son station and elevated section | June 2014 | The construction contract with contractors is under negotiation |
| CP 2 | Civil and structural works at the elevated section and depot | 24 July 2012 | The detailed design and construction works are implemented by a JV of Sumitomo Corporation and CIENCO 6 |
| CP 3 | Procurement of rolling stock, railway track, electrical and mechanical systems (signals, power system etc.) and operations and maintenance for the first five years. | 5 August 2013 | The construction contract with Hitachi, Ltd. was signed in June 2013 and the procurement process is ongoing |

Source: Study Team

The Line 1 is scheduled to start operation between Tan Cang and Suoi Tien stations in 2018 (CP 2) followed by the extension to Ba Son in 2019 (CP 1b). The whole line is to be opened in 2020. The implementation schedule by package is shown in Figure 1.4.1.

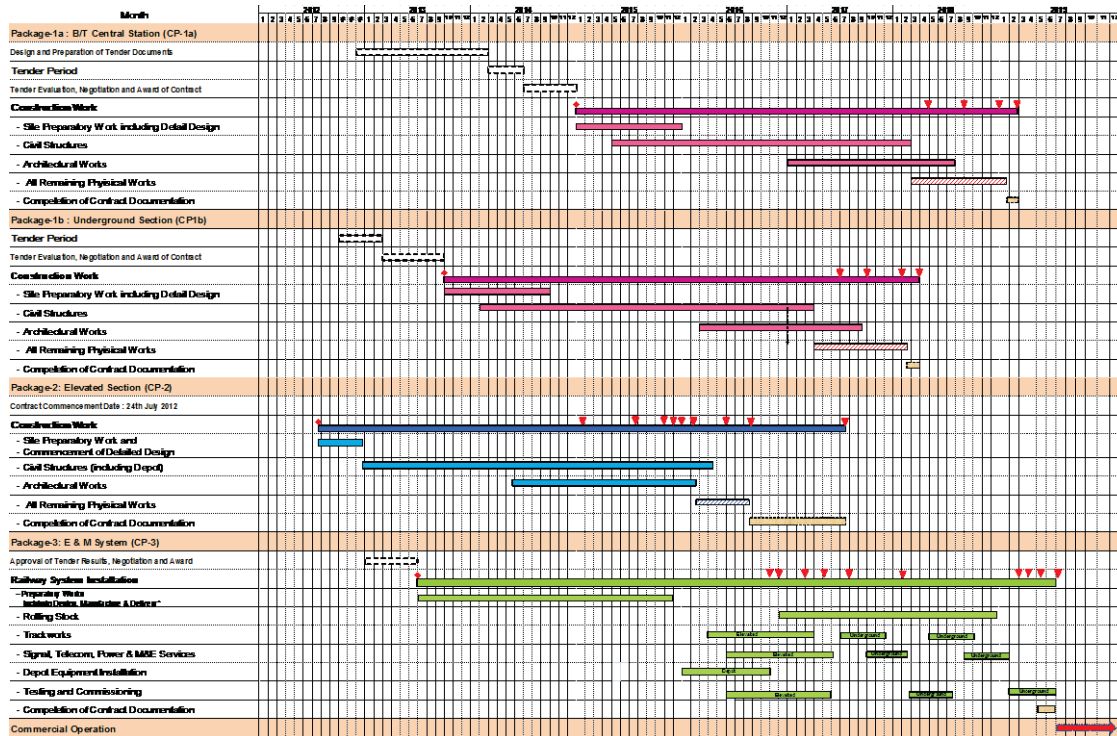


Figure 1.4.1 - Implementation Schedule

CP 3 includes the operations and maintenance (O&M) advisory service for the first five years after the start of business operation, where consultants will provide technical advice and instruction regarding the urban railway operation for the O&M company. The service is supported by the Transport Department of Osaka City. In addition, the contractor of CP 3 (Hitachi) is responsible for the maintenance of railway systems, including technical transfer to the Vietnamese side for the first five years. As discussed below, JICA conducted a technical assistance project for the setup of an O&M company along with the UMRT Line 1 construction project.

1.5 Relevant Projects and Studies

There are projects and studies related to the UMRT Line 1 project including this Study. The following is an outline of the relevant projects and studies.

- a) Support on the Setup of an Operation and Maintenance Company of Urban Railways in HCMC (JICA Technical Assistance Project)

The project aims to provide technical support to set up an O&M company for the UMRT Line 1 since MAUR does not have sufficient experience in establishing the operating company for urban railways. The project was implemented from March 2011 to March 2013 which included five components: (1) management, administration and safety, (2) personnel affairs, (3) financial issues, (4) marketing and sales promotion, and (5) human resource development. The phase 2 of the project is planned to commence soon.

- b) Preparatory Survey on Ben Thanh Station (JICA PPP-FS)

The vicinity of Ben Thanh Station has been a major urban hub in HCMC and is expected to attract more people after the urban railways are developed. Therefore, it is required to improve the traffic infrastructure and develop public spaces such as the station plaza as well as commercial facilities using private capital around Ben Thanh Station. The purpose of the survey was to examine the feasibility of a development project in the Ben Thanh Station area. The survey ended in 2012 and the efficiency of the project was confirmed. Currently, the detailed design of the underground station is in process and a further study to implement the entire development project is expected.

- c) Study on Urban Development with the TOD Concept and BRT Development in Binh Duong Province (JICA PPP-FS)

The survey consists of two components: (1) station area development of Suoi Tien Terminal station of UMRT Line 1 and (2) BRT development from Suoi Tien Terminal to the Binh Duong New Town. The survey is scheduled to be conducted from January to December 2014. In particular, the station area development is closely related to this Study and will be planned in close coordination with the Study.

2 URBAN DEVELOPMENT AND TRANSPORT CONTEXTS

2.1 Urban Development Orientation of Ho Chi Minh City

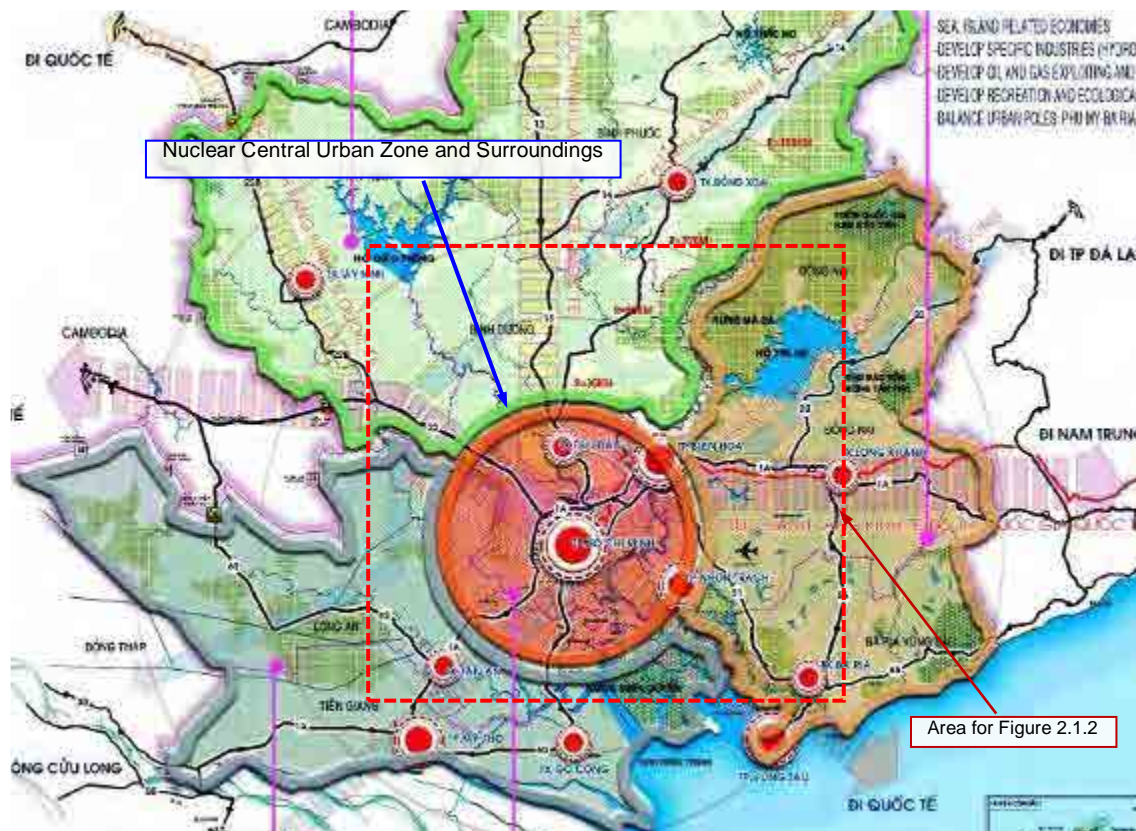
1) Formulated Urban Plans Related to the HCMC UMRT Line 1

In this section, the formulated urban plans related to the HCMC UMRT Line 1 are shown, which are categorized into the following four plans in a hierarchical order: (1) a regional plan, (2) a city (provincial) level general plan, (3) a district level general plan, and (4) a zoning plan and detailed plan. The plans of the above (1), (2) and (3) categories indicate the basic development direction, basic land use plan and location of large-scale infrastructure, while the plans of the above (4) category indicate a land use plan, infrastructure plans and urban planning criteria, including the floor area ratio (FAR), building coverage ratio (BCR) and height restriction.

The zoning plan was stipulated by the Urban Planning Law (Law No.30/2009/QH12) in 2009. Before that, the detailed plans in the scale of 1/2000 and 1/500 existed. But by this law the detailed plan in the scale of 1/2000 was replaced by the zoning plan in the scale of 1/5000 and 1/2000. By the Urban Planning Law the district level general plan has not been the obligatory one; however, the Ho Chi Minh City authorities continue to formulate general plans of this level to cover the areas in which the zoning and detailed plans are not formulated. In Ho Chi Minh City, the district level general plans exceptionally indicate the basic planning criteria for the area of several blocks, including average FAR, average building height and planned population.

2) Regional Planning of Ho Chi Minh Metropolitan Area Approved in 2008

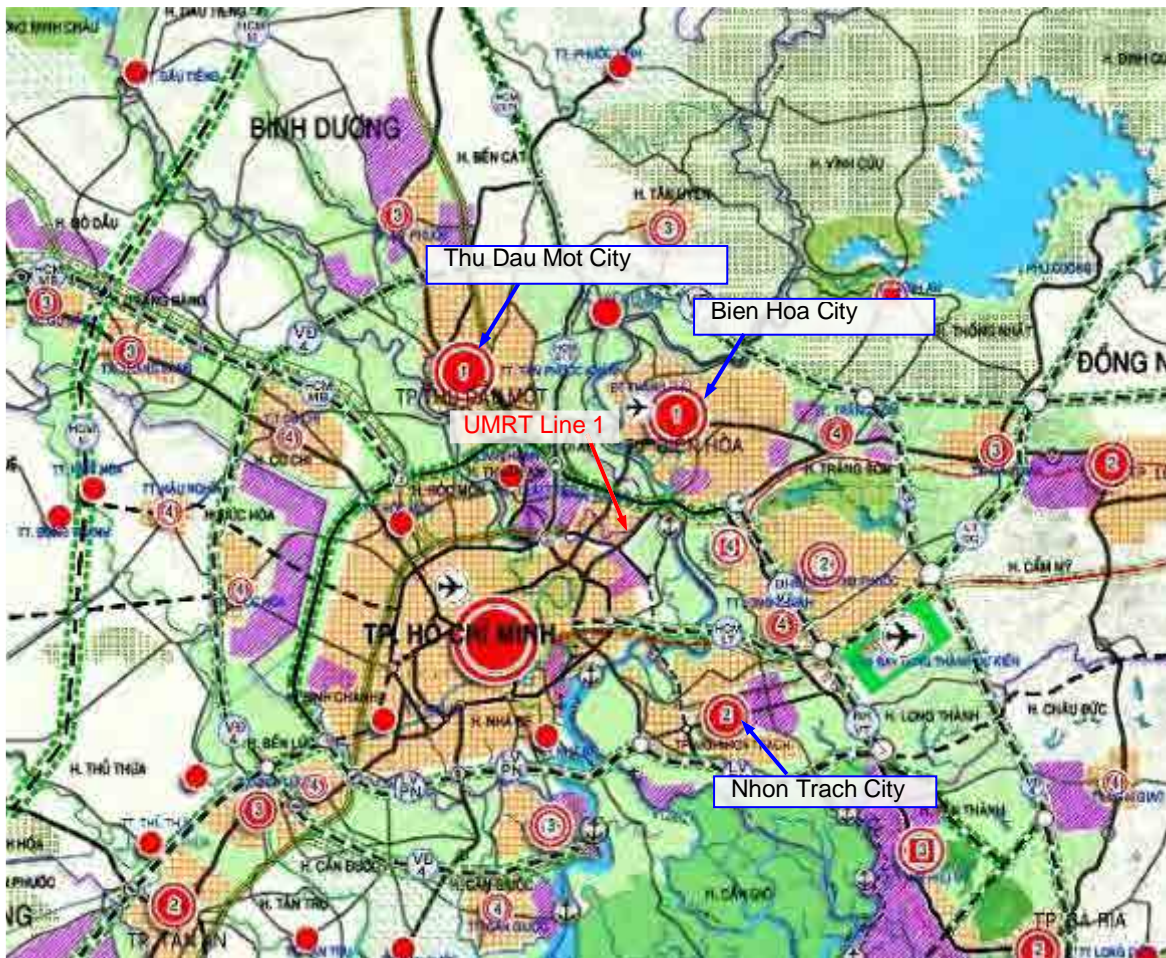
Basic urban development orientation of the Ho Chi Minh Metropolitan Area is provided by the Regional Planning of the Ho Chi Minh Metropolitan Area, Phase 2005-2020, Vision Up to 2050, which was prepared by the Ministry of Construction and approved by the Prime Minister in May 2008 (No.589/QĐ-TTg). This regional planning and vision shows the future urban structure, principal infrastructure arrangement plan, transport network, etc. for HCMC, Binh Duong Province, Dong Nai Province, Long An Province, and four other provinces.



Source: Regional Planning of Ho Chi Minh Metropolitan Area, Phase 2005-2020, Vision Up to 2050 (Ministry of Construction)

Figure 2.1.1 - Economic Development Plan in Regional Planning and Vision of Ho Chi Minh Metropolitan Area

In the basic urban development orientation, while the area within a 30 km radius of HCMC and its outskirts are positively urbanized as the Nuclear Central Urban Zone and Surroundings, Thu Dau Mot City, Bien Hoa City and Nhon Trach City located around the study area are referred to as Independent Satellite Urban Centers (Figure 2.1.1). For District 1, Binh Thanh District, District 2, District 9 and Thu Duc District of HCMC and Di An District of Binh Duong Province where the study area is located along UMRT Line 1, the Spatial Development Orientation provides that these districts should be more densely or intensively urbanized in the Nuclear Central Urban Zone.



Source: Regional Planning of Ho Chi Minh Metropolitan Area, Phase 2005-2020, Vision Up to 2050 (Ministry of Construction)

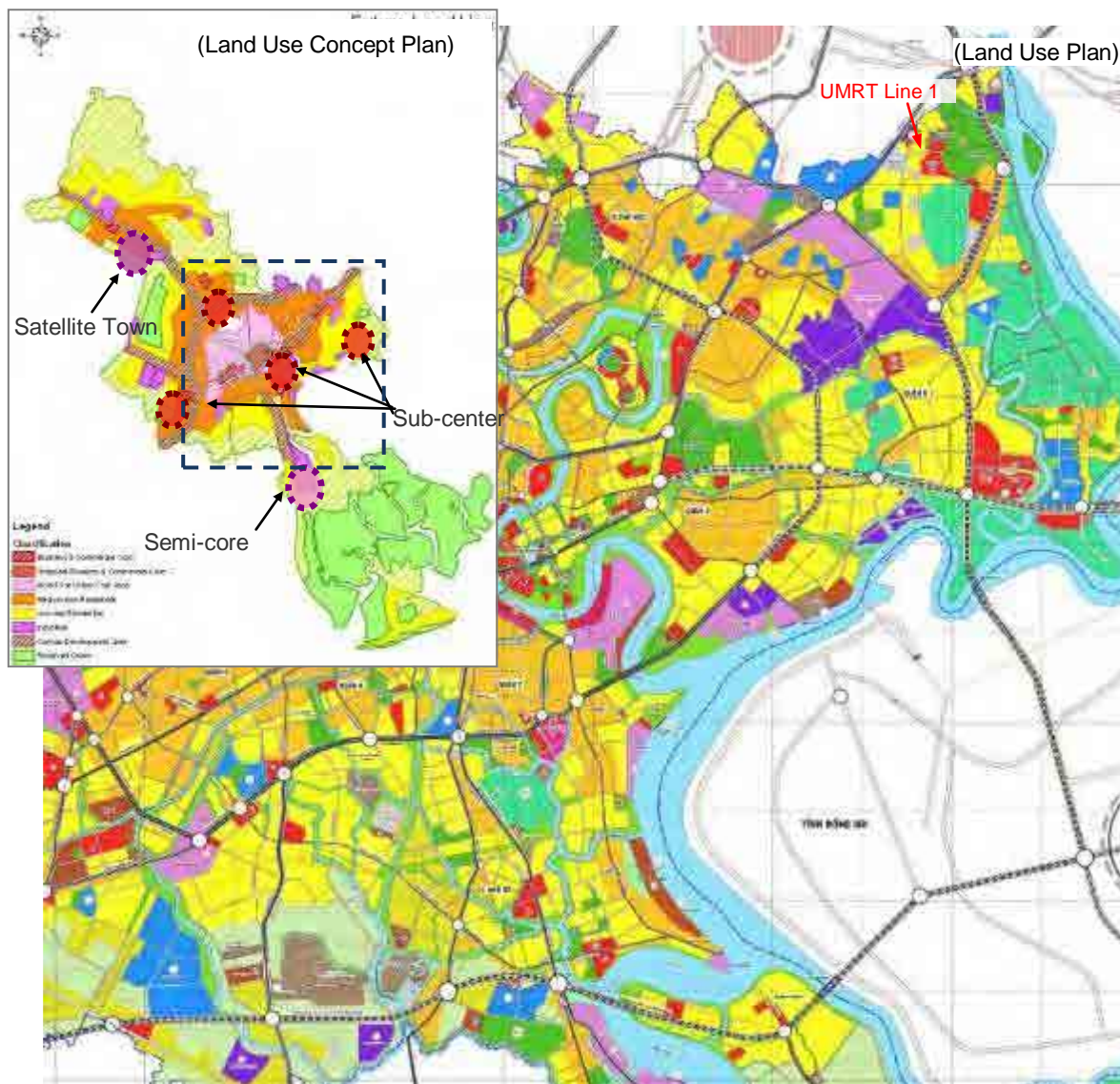
Figure 2.1.2 - Spatial Development Plan in Regional Planning and Vision of the Ho Chi Minh Metropolitan Area Zoning Plan of the Suoi Tien Terminal Station Area

3) General Construction Master Plan Approved in 2010

Urban development policies of HCMC itself are collectively given in the General Construction Master Plan up to 2025 as approved by the Prime Minister in 2010 (No.24/QĐ-TTg). As shown in Figure 2.1.3, this master plan provides that multi-core urban structure¹ should be formed by newly located satellite towns and sub-centers in the suburbs in order to mitigate the present overconcentration in the central area. It was also emphasized in the master plan that development in the suburbs should be triggered by constructing a railway. The area along the UMRT Line 1, which is dealt with by the present study, forms one of the strategic corridors to promote suburban development. The land

¹ As indicated in Figure 2.1.2, the general plan intends to convert the current mono-centric urban structure into a multi-core urban structure by allocating the satellite towns, sub-centers and semi-cores.

use plan aims for locating mixed land use of housing, High-Tech Park, education (university), etc. along the UMRT Line 1.



Source: Report on Adjustment Study on HCMC Urban Planning Master Plan up to 2025 (Urban Planning Institute, Nikken Sekkei Ltd.)

Figure 2.1.3 - Land Use Concept Plan and Land Use Plan

4) General Plan on the District Level

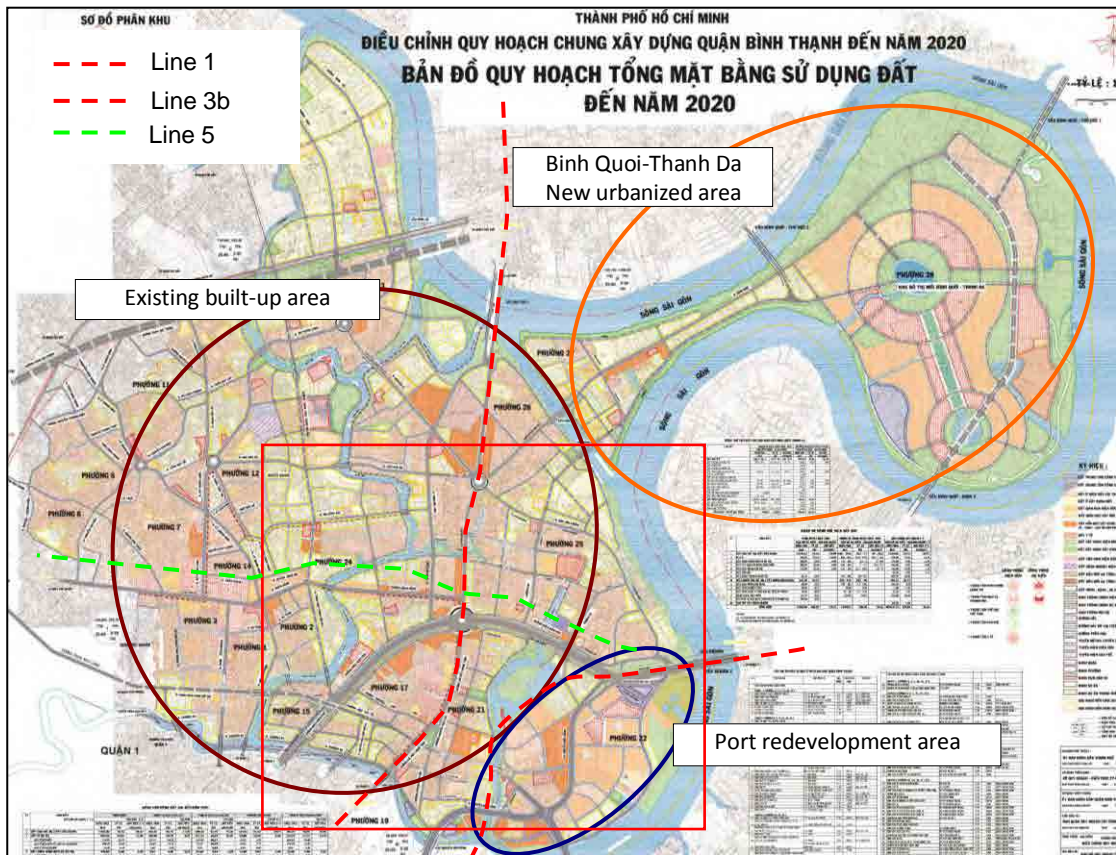
The Law on Urban Planning does not require general plans to be promulgated at the district level. In HCMC, however, general plans for all districts are available including those which are still being drafted so as to be used as reference and as a guide for promoting urban development and the construction of urban infrastructure. The general plan for each district covers the same items as that for the entire city, except that the former has drawings at a scale of 1/5,000 to 1/10,000 which is larger than the scale of 1/25,000 for the entire city. Compared to the general plan for the entire city, the general plan for a district

has more detailed information such as road arrangement, land use, future population frame, average floor area ratio, and average building height. Thus, in formulating for the demand forecast or development around a station, the general plans for relevant districts give substantial information.

All the general plans for districts covered by the study area are approved by the People's Committees of HCMC or Binh Duong Province, except for that of District 1 of HCMC². Necessary information from the general plans is described for every related district as follows.

1) Binh Thanh District

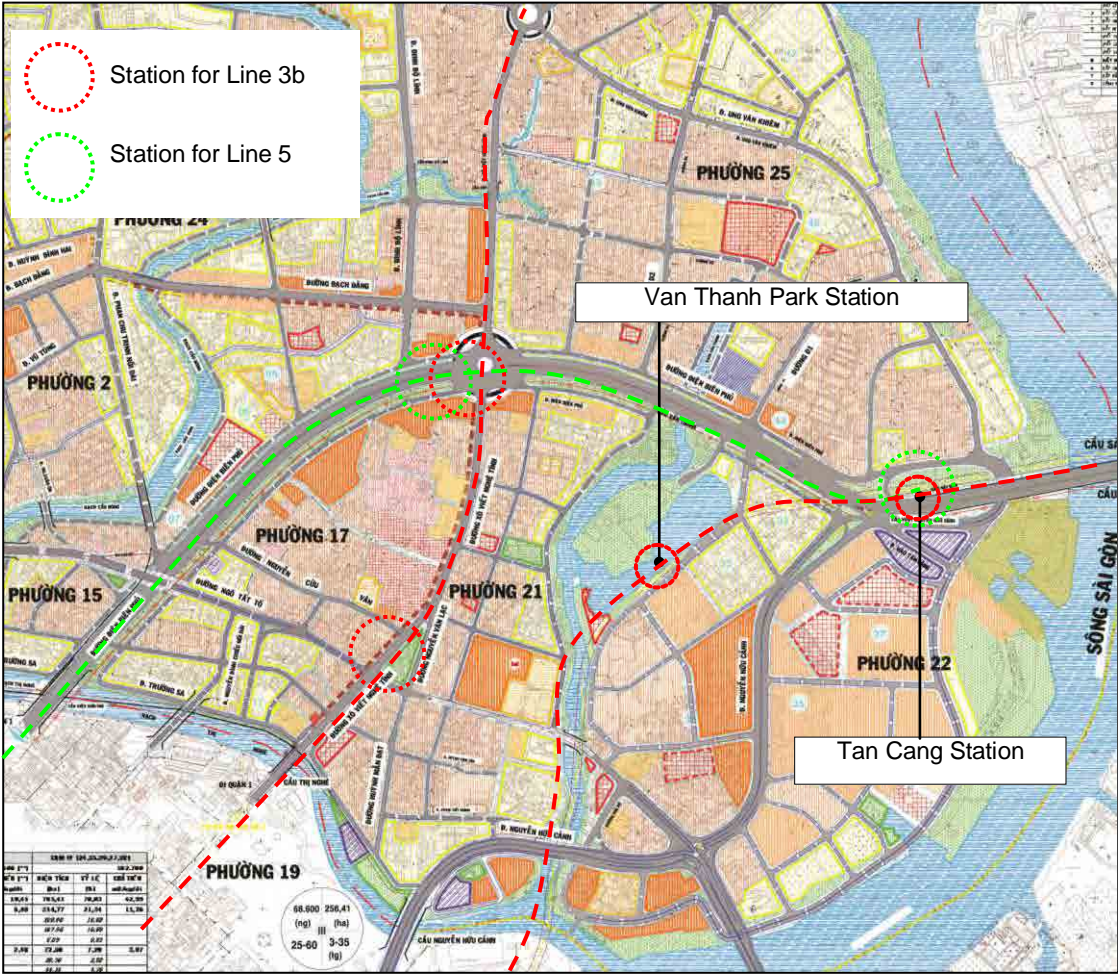
Binh Thanh District consists of three areas: the existing built-up area, port redevelopment area including Saigon New Port (Tan Cang Area) under relocation, and oxbow of Binh Quoi-Thanh Da.



Source: The Study Team, based on the General Plan of Binh Thanh District (Target year 2020, Decision No. 6014 /QD-UBND, Decision date 26/11/2012)

Figure 2.1.4 - General Plan of Binh Thanh District (1)

² In District 1, since the zoning plan which covers the entire area of the district was formulated in 2012, the authority is not planning to formulate the district level general plan.



Source: The Study Team, based on the General Plan of Binh Thanh District (Target year 2020, Decision No. 6014 /QD-UBND, Decision date 26/11/2012)

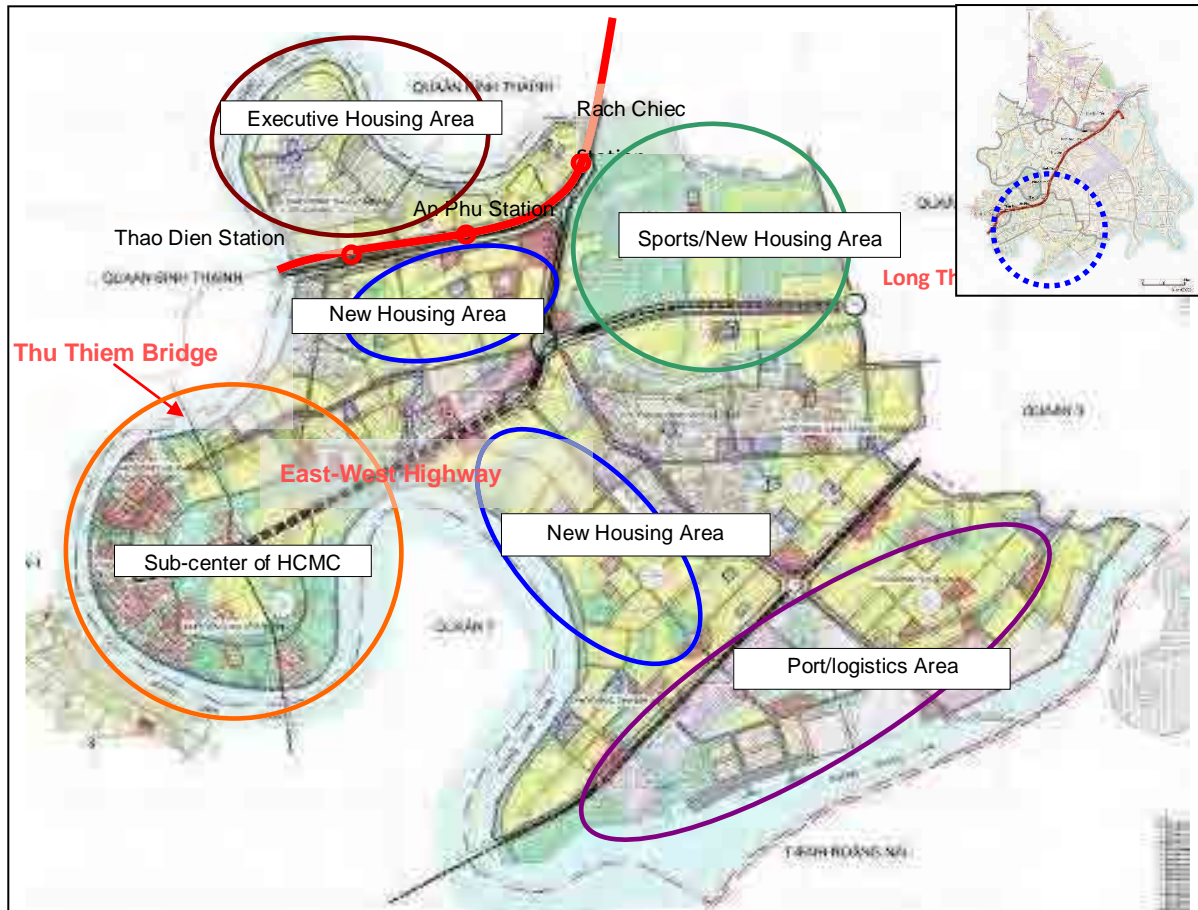
Figure 2.1.5 - General Plan of Binh Thanh District (2) (Area Surrounding UMRT Line 1)

Binh Thanh District will have two stations for UMRT Line 1: Van Thanh Park Station and Tan Cang Station. Tan Cang Station which is an interchange station with UMRT Line 5 is expected to be used by a high volume of residents, workers, etc. in the Port Redevelopment area (Tan Cang Area) where mixed urban functions will be densely provided as well as those from surrounding built-up area. Van Thanh Park Station will be used by residents in the southern Tan Cang Area and surrounding built-up area. In addition to UMRT Line 1, Binh Thanh District will also have Line 3b and Line 5. The development plan will have to be studied with due consideration regarding the competition with stations for other lines.

(2) District 2

District 2, most of which is occupied by humid lowland, has not been fully developed yet despite its strategic location close to the old urban center of HCMC across the Saigon River. By using the location to its advantage, the government considers District 2 to be an urban complex area in which commercial and business functions will center around the

Thu Thiem New Urban Area as one of the sub-centers of HCMC. In addition, District 2 has some areas where housing, port/logistics, etc. will be developed through public support. Along the UMRT Line 1 or Hanoi Highway will be Thao Dien Area, north of which is developed for executive housing, An Phu-An Khanh New Town Area under municipality-led development and the Sports City Area where stadiums will be constructed in the future (Figure 2.1.6).



Source: The Study Team, based on the General Plan of District 2 (Target year 2020, Decision No. 6707 /QĐ-UBND, Decision date 29/12/2012)

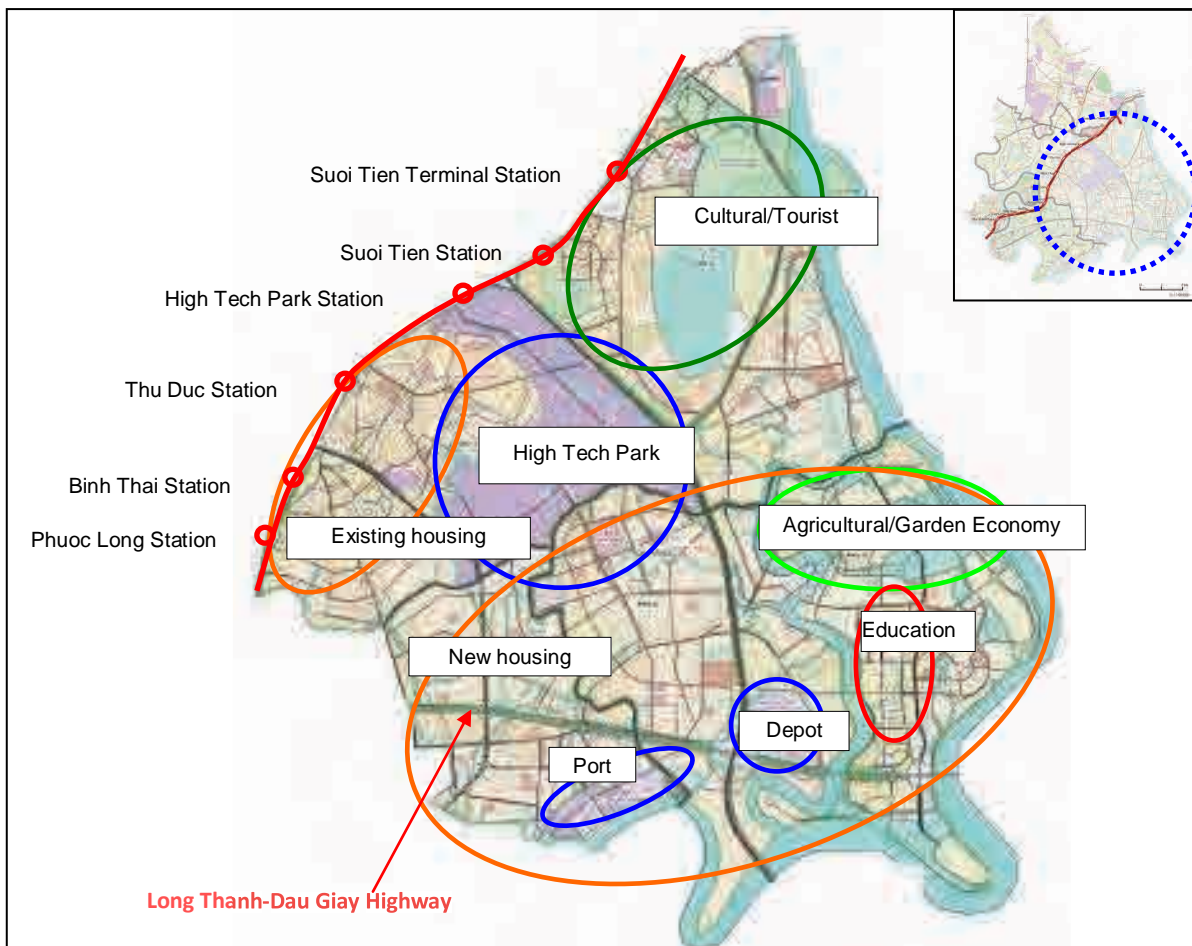
Figure 2.1.6 - General Plan of District 2

Since the northern Thao Dien Area is occupied by executive housing, residents are expected to use their privately-owned vehicles even after the completion of the UMRT Line 1. Therefore, the degree of public transport usage needs to be carefully studied. For An Phu-An Khanh New Town located south of An Phu Station, while some of the residents will use the UMRT Line 1, other residents will be able to use the roads connecting to the city center through Thu Thiem Tunnel (East-West Highway) or the Thu Thiem Bridge. This sort of modal share around An Phu Station has to be taken into account. Also, for the Sports City Area, although users of sports facilities and residents are expected to use the UMRT Line 1, road traffic through the Long Thanh-Dau Giay Highway and East-West Highway cannot be disregarded.

(3) District 9

The southern area of District 9 which is occupied by lowlands inappropriate for construction remains mostly undeveloped. In the General Plan of District 9, this area is regarded as the site for urban facilities such as housing, education, amusement and logistics. The area along the UMRT Line 1 in the northern part of the district which has better soil conditions is already provided with housing. In the General Plan, this area comprises of the High Tech Park and a cultural/tourist area around the existing golf course.

The southern area along the UMRT Line 1 from Phuoc Long Station to Thu Duc Station is occupied by existing and new housing plots. Its proximity to the UMRT Line 1 will make residents in this area use the UMRT. The southern area of Suoi Tien Station and Suoi Tien Terminal Station where cultural/tourist facilities and housing are planned is also expected to increase the UMRT Line 1 usage to some degree. The south of District 9 in which housing and educational facilities are planned will mostly use roads connecting to the city center through the Long Thanh-Dau Giay Highway and East-West Highway.



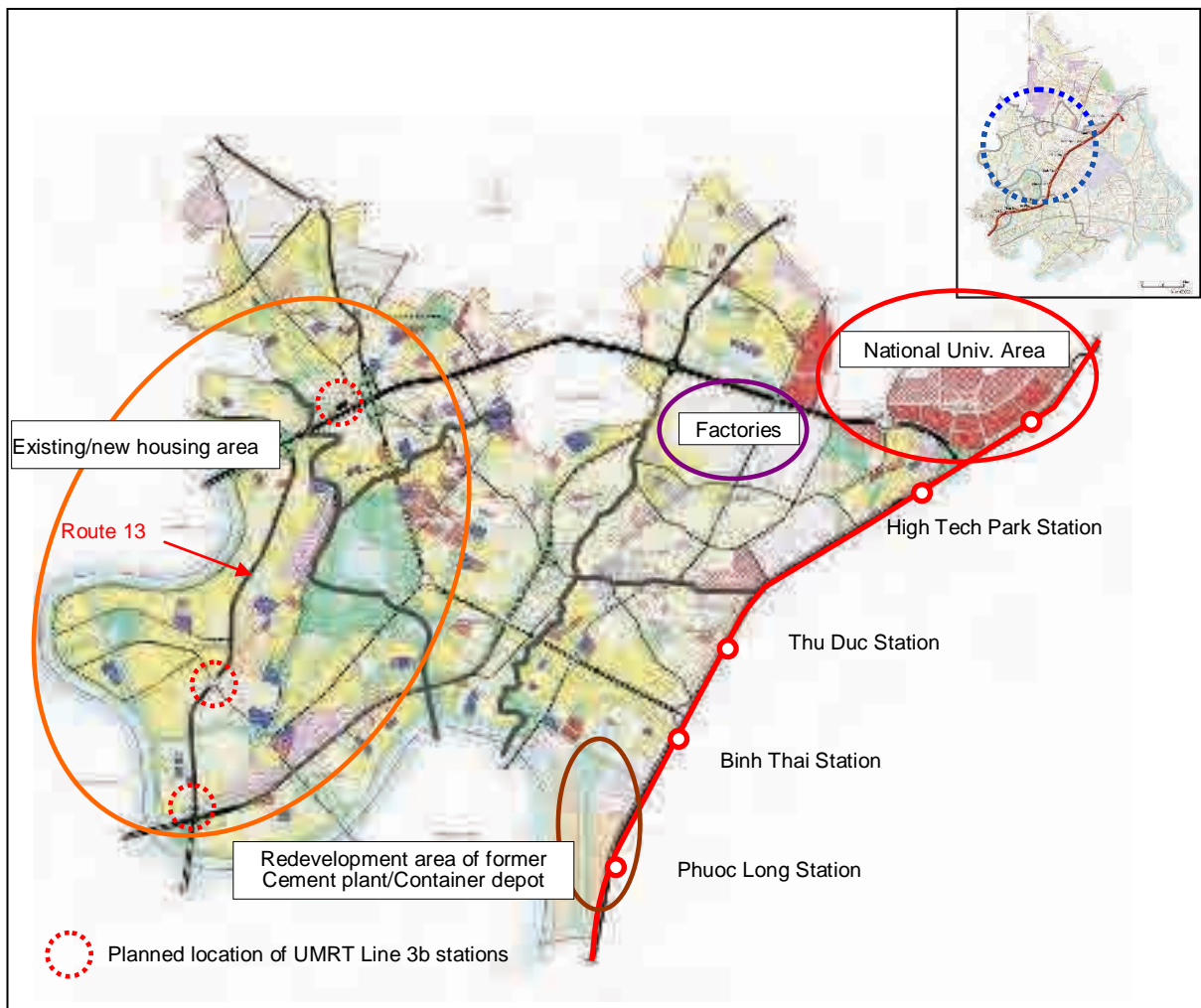
Source: The Study Team, based on the General Plan of District 9 (Target year 2020, Decision No. 5758 /QD-UBND, Decision date 12/11/2012)

Figure 2.1.7 - General Plan of District 9

(4) Thu Duc District

Thu Duc District is divided into the area along the Hanoi Highway which was built up during the French colonial period and the area along Route 13 where new housing development is in progress. For the area along the Hanoi Highway, the General Plan provides that the south of the built-up area and adjoining factories should be transformed from existing the cement plant and container depot to housing, commercial, business and other urban uses and that the north should be developed as part of the national university site which is under construction near the border of Binh Duong Province.

Phuoc Long Station will service the new urban area transformed from the cement plant and container depot. The area around Thu Duc Station will have the principal urban functions of Thu Duc District concentrated as one of major stations of the UMRT Line 1. For the southern area of Thu Duc District where new housing development is in progress, competition with Route 13 and the UMRT Line 3b connecting to the city center has to be taken into consideration.



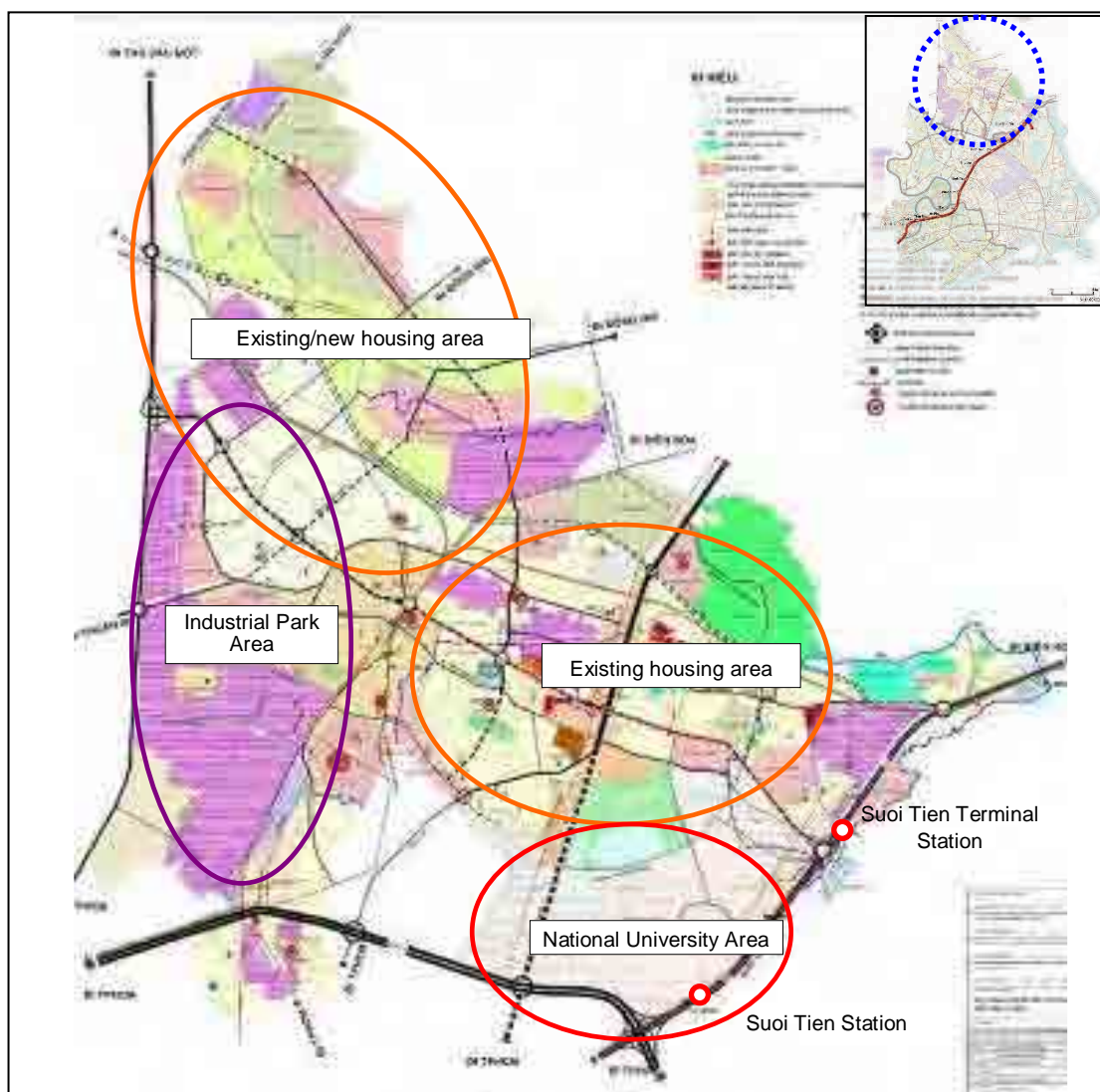
Source: The Study Team, based on the General Plan of Thu Duc District (Target year 2020, Decision No. 5759/2008 /QD-UBND, Decision date 12/01/2012)

Figure 2.1.8 - General Plan of Thu Duc District

(5) Di An District

Di An District of Binh Duong Province comprises the southern area in which large-sized industrial parks are concentrated, the northern area is where existing and new housing spreads out. Also the National University Area stretches over the district border and a new housing area is located next to the National University Area. Suoi Tien Station and Suoi Tien Terminal Station are located next to the National University Area and the new housing area respectively.

For Suoi Tien Station that is adjoining the National University Area, its plan has to be studied in accordance with the area development plan so as to function as the hub station for the area. Since housing development is planned around Suoi Tien Terminal Station, the station plan has to be studied taking into account integrated development with terminal functions.



Source: The Study Team, based on the General Plan of Di An District (Target year 2020 and 2030, Decision No. 2481 /QD-UBND, Decision date 23/06/2009)

Figure 2.1.9 - General Plan of Di An District

5) Area Zoning Plan

In Vietnam, the zoning plan at a scale of 1/2,000 or 1/5,000 has to be formulated for the implementation of urban development projects. The zoning plan indicates a planning framework that includes a future population frame, area or size of each land use and basic criteria of public facilities. The maps of the zoning plan show infrastructure plans (transportation, water supply, drainage and sewerage, electricity, etc.) and land use plan in which public facilities such as parks and green spaces, and detailed planning norms such as the floor area ratio (FAR), building coverage ratio (BCR) and maximum height (all of which are average norms in each block), are indicated. Therefore, the formulated zoning plans along the UMRT Line 1 will provide useful information to grasp the current urban development situation and to examine the possibility of developing station facilities and road networks.

Along the UMRT Line 1, many zoning plans have already been approved by the People's Committees of HCMC or Binh Duong Province. The outline of the relevant approved zoning plans is discussed below.

(A) Zoning Plan on the Expanded CBD Area

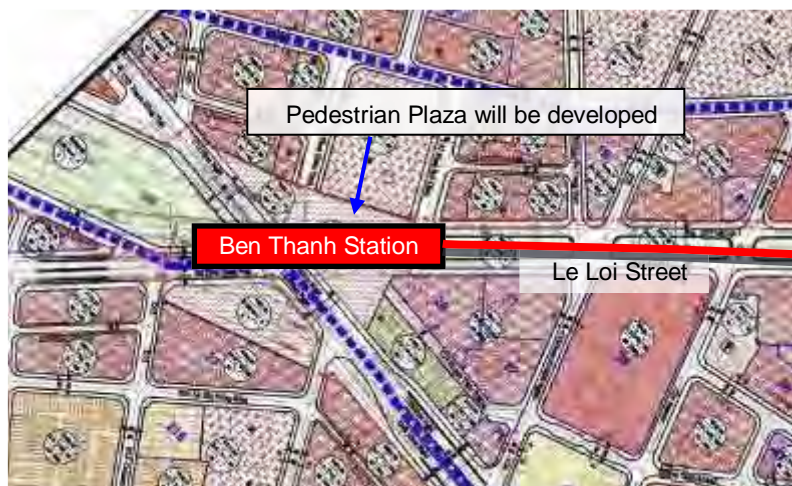
The zoning plan for the Expanded CBD Area with an area of 930 ha was approved in December 2012 (6708/QD-UBND) which covers the existing CBD area and the redevelopment areas of the port related facilities (the planned area belongs to District 1, District 3 and Binh Thanh District) (Figure 2.1.10). The four stations of UMRT Line 1 (Ben Thanh Station, Opera House Station, Van Thanh Park Station, and Ba Son Station) are included in the zoning plan.



Source: The Study Team based on the Zoning Plan on the Expanded CBD Area

Figure 2.1.10 - Image of Development for the Extended CBD Area

(A)-1 Ben Thanh Station Area



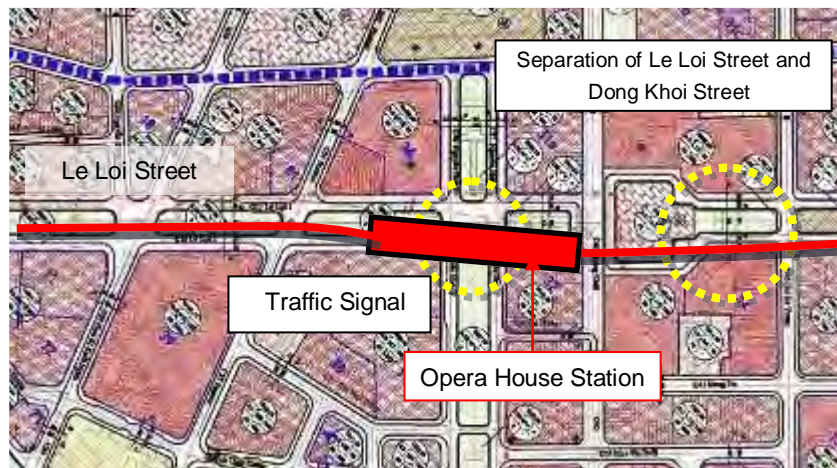
Source: The Study Team based on the Zoning Plan on the Expanded CBD Area

Figure 2.1.11 - Land Use Map of the Ben Thanh Station Area

The zoning plan indicates a drastic change of the streets near Ben Thanh Station. The existing roundabout in front of Ben Thanh Market will be abolished and will be transformed into a pedestrian plaza. Le Loi Street will be transformed into a pedestrian-oriented street (a transit mall). Underground bus terminals which connect between the UMRT lines and buses will be developed. The city authority is planning to formulate the detailed plan at a scale of 1/500 covering the area near Ben Thanh Station, since the facilities related to the underground station, such as ventilation towers and cooling towers, have become unpopular with the government.

(A)-2 Opera House Station Area

The zoning plan also indicates the drastic change of the streets near the Opera House Station. The roundabout at the intersection of Le Loi and Nguyen Hue Streets will be abolished, and these streets will be pedestrian-oriented streets (transit malls). The facilities related to the underground station have become serious landscape problems as well.

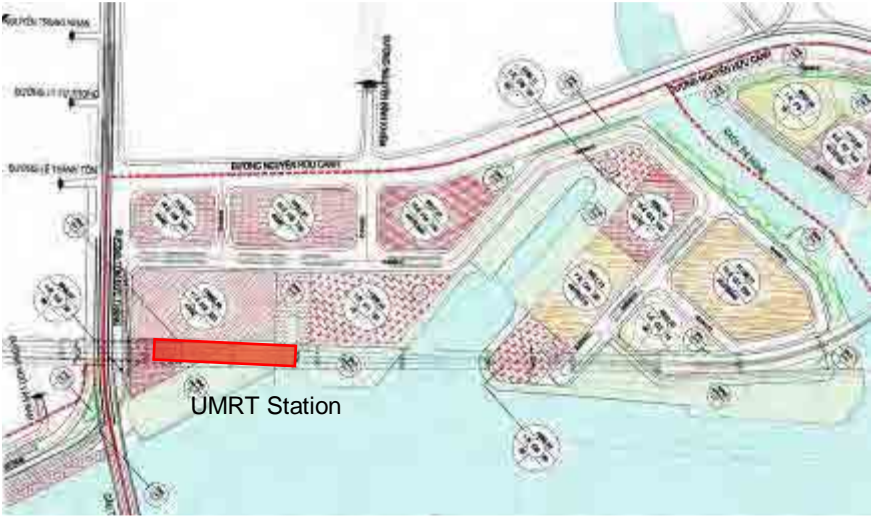


Source: The Study Team based on the Zoning Plan on the Expanded CBD Area

Figure 2.1.12 - Land Use Map of the Opera House Station Area

(A)-3 Ba Son Station Area

The zoning plan indicates that Ba Son Station will be integrated with the urban redevelopment project in Ba Son Area which is currently used for a navy shipyard, and the station will be a combined transportation terminal that will accommodate other transportation modes, including water bus, LRT or BRT, and buses. However, based on the approved zoning plan, the navy owns the land of the Ba Son Area so that the city authority does not fully control the area's development.

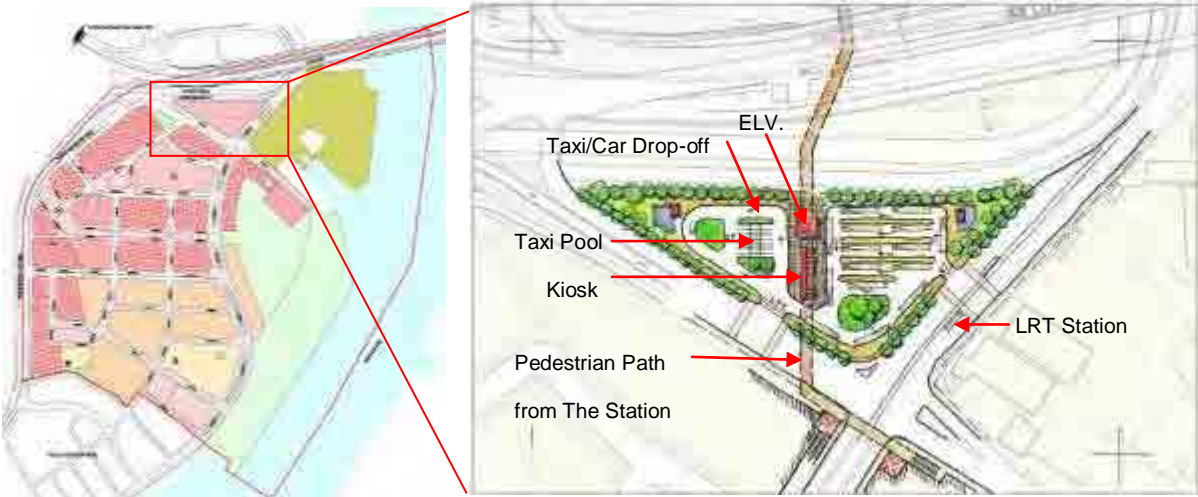


Source: The Study Team based on the Zoning Plan on the Expanded CBD Area

Figure 2.1.13 - Land Use Map of Ba Son Station Area

(A)-4 Tan Cang Station Area

The zoning plan indicates that the station plaza for a bus berth and a taxi pool will be developed at the northern corner of Tan Cang Area which is currently used as a navy container port. However, as in the case of the Ba Son Area, the navy owns the land in the Tan Cang Area so that the city authority does not fully control the area's development according to the approved zoning plan.

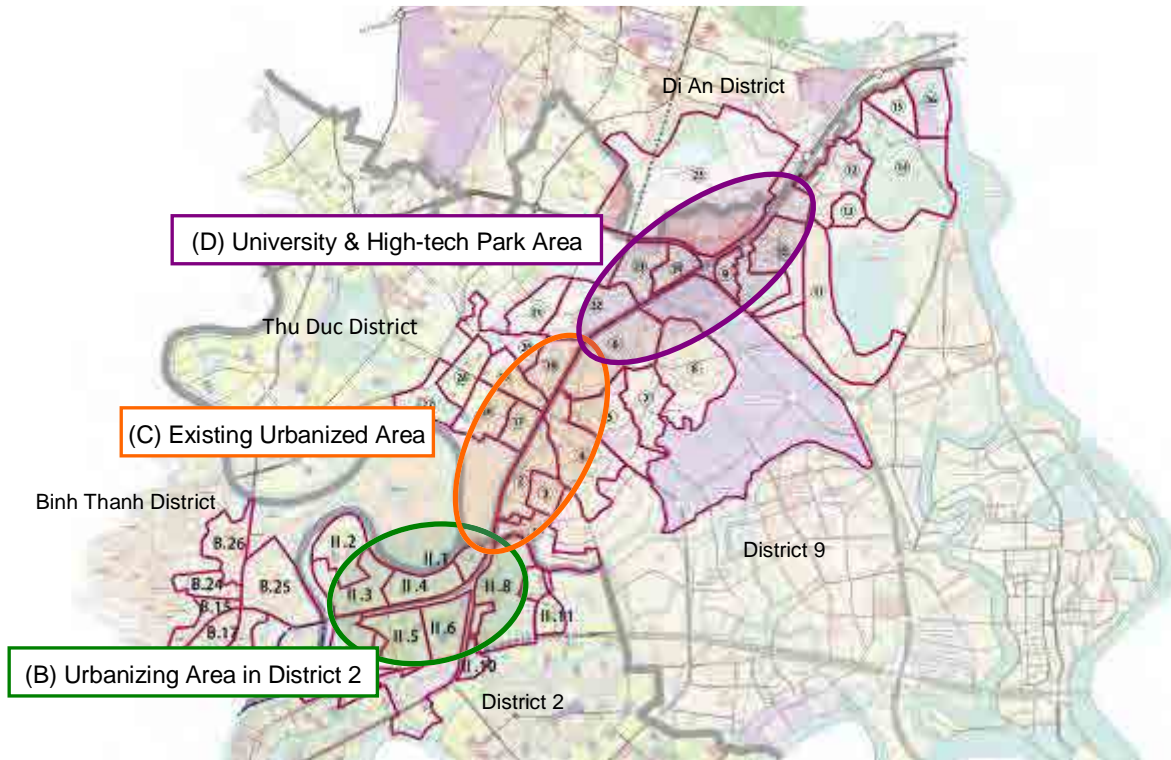


Source: The Study Team based on the Zoning Plan on the Expanded CBD Area

Figure 2.1.14 - Land Use Map and Station Plaza Image of the Tan Can Station Area

(B) Zoning Plans in the Urbanizing Area in District 2

The figure below shows the areas that the zoning plans have been formulated along the UMRT Line 1 on the east side of the Saigon River are divided into three zones: (B) Urbanizing Area in District 2, (C) Existing Urbanized Area and (D) University & High-Tech Park Area.



Source: The Study Team based on General Plans of districts

Figure 2.1.15 - Zoning Plans in the Eastern Side of the Saigon River

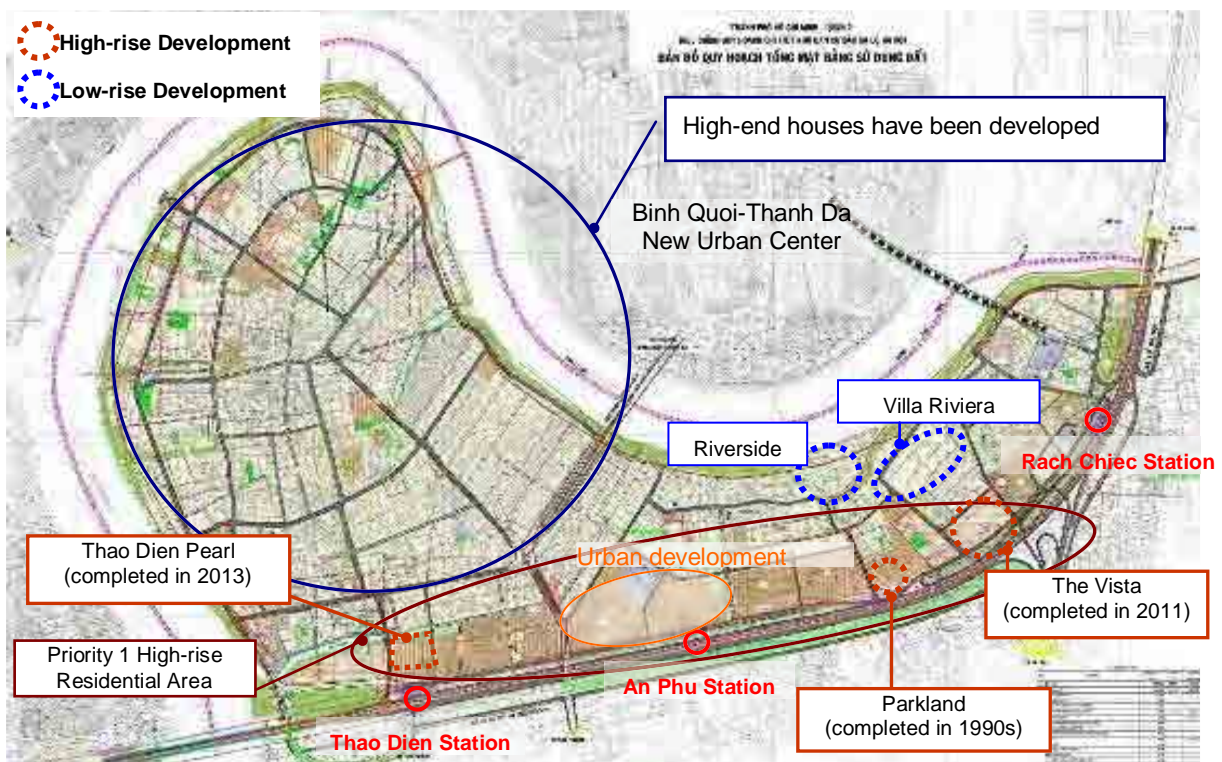
In (B) Urbanizing Area in District 2, several zoning plans (before 2010 the plan was called “detailed plan at a scale of 1/2000”) were formulated for the area surrounding Thao Dien and An Phu Stations in the 1990s and early 2000. While in the southern area of Rach Chiec Station, in which the land condition is not relatively good, the zoning plans have not proceeded to the approval stage (stopped during the planning framework stage). The following section indicates the zoning plans of the (B) zone.

(B)-1 Zoning Plans of the Thao Dien and An Phu Station Areas

In the Thao Dien Area which is located on the northern part of the Hanoi Highway, high-end houses have been developed since the 1970's, and there are three approved zoning plans during the 1990s and early 2000 and a comprehensive zoning plan covering these three zoning areas was formulated in 2008 although this is at a planning framework stage (Figure 2.1.16). In this planning framework, the area adjacent to the Hanoi Highway

is designated as a mixed-use, high-density residential zone based on the transit oriented development (TOD) concept.

In the Thao Dien Area, many high-rise apartment buildings have already been developed by local and foreign developers according to these plans. The development project called “Thao Dien Pearl” near Thao Dien Station, jointly implemented by the city authorities and the developer “SSG Group”, founded in 2003 at HCMC, will connect to the station by the pedestrian deck. According to the planning framework, the northern part of An Phu Station is designated as a prioritized high-rise residential zone which is needed to be developed by integrating with the station and relevant public facilities. In the area near Rach Chiec Station, the road connecting to the Binh Quoi-Thanh Da New Urban Development Area is planned to be developed.

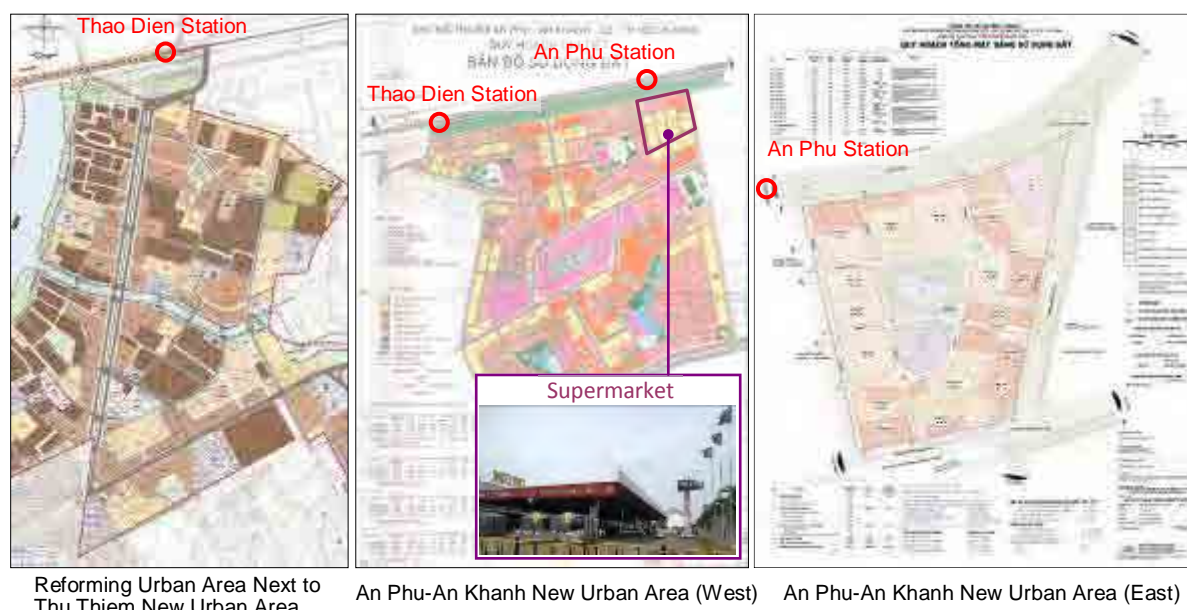


Source: The Study Team based on Zoning Plan of Residential Area on the Northern side of Hanoi Highway

Figure 2.1.16 - Zoning Plan (Planning Frame) and Location of the Major Urban Development Projects in the Thao Dien Area

In the southern part of Hanoi Highway, the area called the “An Phu-An Khanh New Urban Area” is being developed by the city government development corporation (SEJCO). The western part of the new urban area was planned as a detached housing area by the zoning plan formulated in 1999, while the eastern part was planned as a high-rise residential area by the zoning plan in 2009. On the western side of the new urban area, the zoning plan was approved in 2013 for the area called “Reforming Urban Area Next to Thu Thiem New Urban Area,” of which major parts have already been developed as a residential area. In these new urban areas and reforming urban areas, besides the space

for the right of way of the highway, the areas adjacent to the stations have already been occupied. Therefore, to develop the station-related facilities, coordination and negotiation with those land owners is needed.



Source: The Study Team based on the zoning plans of An Phu-An Khanh New Urban Area and Reforming Urban Area Next to Thu Thiem New Urban Area

Figure 2.1.17 - Zoning Plans in the Southern Part of Thao Dien and An Phu Stations

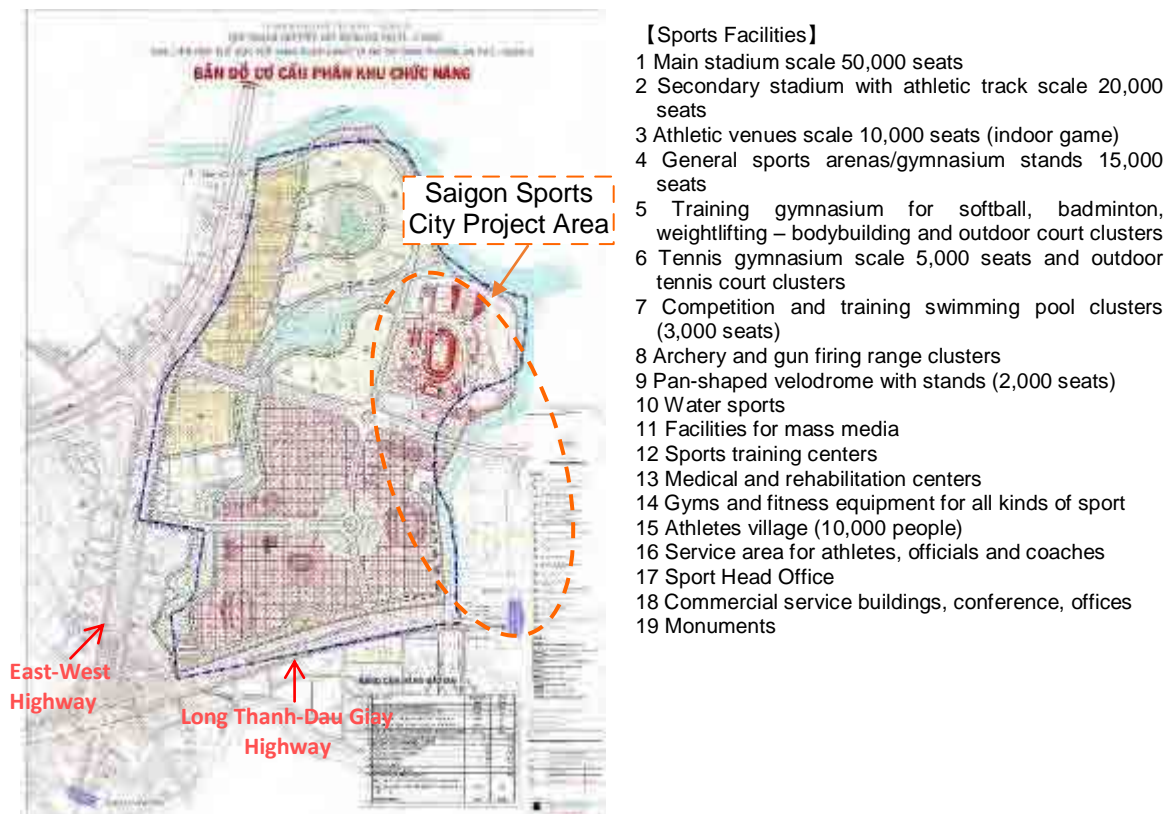
(B)-2 Zoning Plans of the Southeast Area of Rach Chiec Station

The zoning plan of the Rach Chiec National Sports Complex Area covers the southeast part of Rach Chiec Station with an area of 227 ha (only the planning framework was approved). In the sports complex area, various kinds of sports facilities will be developed, and the zone adjacent to the Hanoi Highway is designated as land for office, commercial and conference spaces in which the station plaza will be incorporated considering the land use. According to the city authority, however, the competition on the development plan and scheme for the sports complex area will be organized in 2014 based on the planning framework. Therefore, it will take a certain period of time for the area's actual development.

Table 2.1.1 - Land Use Framework of Rach Chiec National Sports Complex

| Project | Investor | Area (ha) |
|--|---|---------------|
| Rach Chiec National Sports Complex | Department of Culture, Sports and Tourism | 180.731 ha |
| Sports Service and Viet Nam Export Goods Exhibition Area (at Existing Golf Area) | Saigon Tourist | 5.003 ha |
| Sports Training Center and Service | Saigon Sports City | 26.12 ha |
| Golf-sport-housing Complex | Saigon Golf, Country Club and Residences | 3.224 ha |
| Residential Resettlement Project | Dai Tin Co., Ltd | 7.071 ha |
| Long Thanh – Dau Giay Highway | City Waterway Management and DOT | 4.851 ha |
| Total | | 227 ha |

Source: The Study Team based on the Zoning Plan of the Rach Chiec National Sports Complex Area



Source: The Study Team based on Rach Chiec Sports Complex Zoning Plan (Planning Framework)

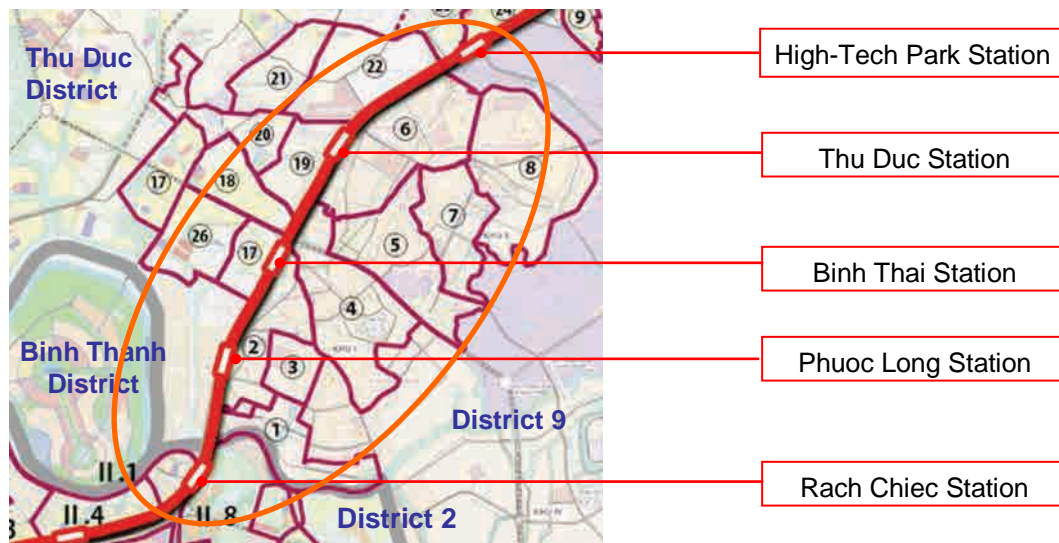
Figure 2.1.18 - Zoning Plan of the Rach Chiec Sports Complex (Planning Framework)

On the eastern part of the sports complex area, there are two zoning plans: Saigon Sports City, and Saigon Golf Country Club and Residences. The zoning plan of the Saigon Sports City covers the residential area for 12,000 people which includes the part of the sports facility area of the Rach Chiec National Sports Complex Area (Figure 2.1.18). The construction of Saigon Golf Country Club and Residences has already started; however, construction work is stopped at the present.

Although the development projects in the southeast part of Rach Chiec Station have not progressed at present, newly developed urbanized areas with a certain amount of population will emerge in the future. Considering the utilization of Rach Chiec Station, however, as mentioned in the district level general plan, the route through the Long Thanh-Dau Giay Highway and East-West Highway cannot be disregarded.

(C) Existing Urbanized Area

In the Existing Urbanized Area where Phuoc Long, Binh Thai and Thu Duc Stations will be located, urbanization has occurred and medium-density residences and industrial facilities such as factories, an electric power substation and container yards have been built along the Hanoi Highway. Aside from the west part of Phuoc Long Station where the cement plant will be transformed to a new urban area, the zoning plans were formulated based on the existing urbanized patterns. The section below shows the outline of these zoning plans.

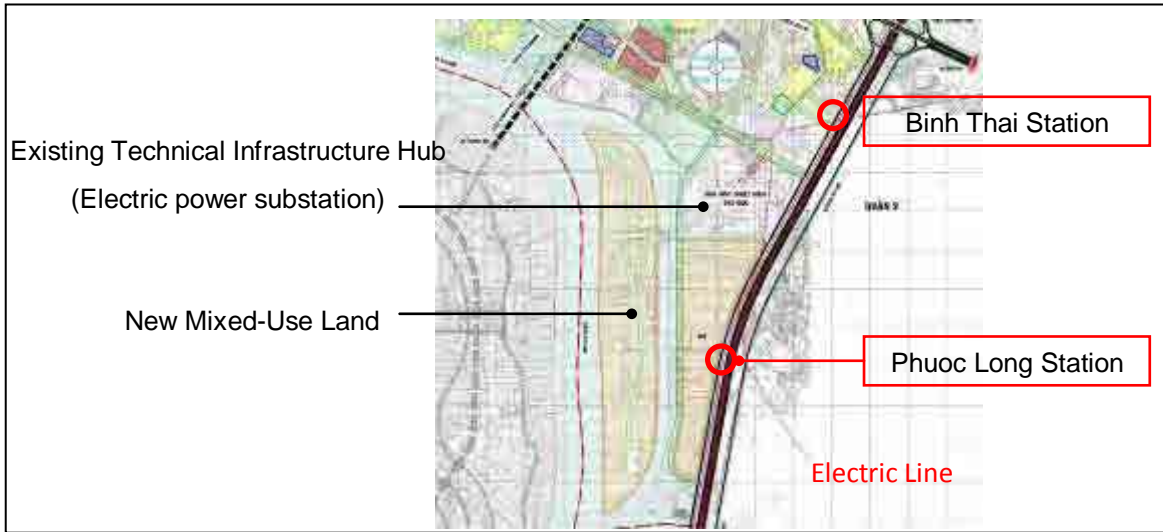


Source: The Study Team based on the General Plans of Thu Duc, Binh Thanh Districts and District

Figure 2.1.19 - Zoning Plans in Existing Urbanized Area

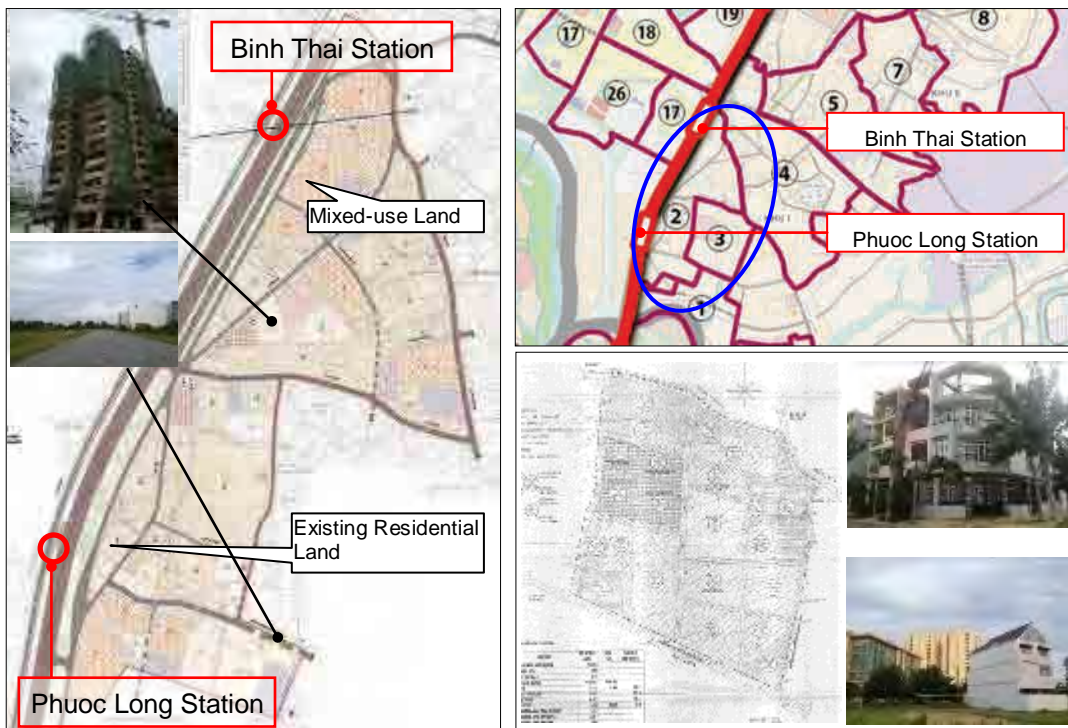
(C)-1 Zoning Plans Surrounding Phuoc Long Station

As mentioned above, according to the general plan of the Thu Duc District, the western part of Phuoc Long Station will transform into a new urban area with mixed-used urban functions. Although the zoning plan has not been formulated, the public facilities, including a station plaza, could be incorporated into this plan. For the examination of locations of such public facilities, the high-voltage electrical power lines running through the area have to be taken into account.



Source: The Study Team based on the General Plan of the Thu Duc District

Figure 2.1.20 - Western Area of Phuoc Long Station in the District Plan



Source: Left - The Study Team based on Planning Adjustment Residential Area of Block 1 to Block 4 (Phuoc Long A Ward)

Right - Resettlement Planning Residential Area of Block 4 of Phuoc Long A Ward

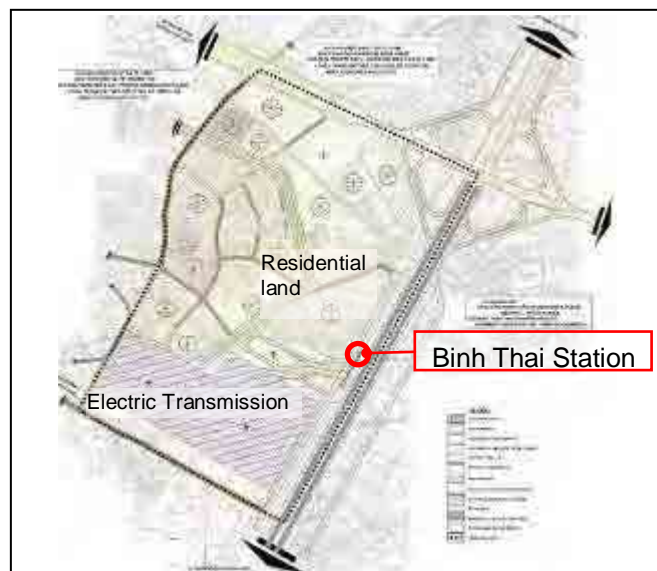
Figure 2.1.21 - Zoning Plans and Existing Situations of the Eastern Part of Phuoc Long Station

In the eastern part of Phuoc Long and Binh Thai Stations, several zoning plans were formulated (Figure 2.1.21). Since according to the plans, the area adjacent to these stations are designated as residential function areas based on the existing land use and urban patterns, the zoning plans have to be revised to allocate station-related facilities.

According to the zoning plans, the agricultural areas adjacent to the existing urbanized areas will be transformed into residential lands with new access roads. It is expected that the residents of these newly developed residential areas will utilize the UMRT Line 1 if the accessibility to the stations is ensured.

(C)-2 Zoning Plans surrounding Binh Thai Station

The zoning plans indicate that the area in the eastern part of Binh Thai Station is a mixed-use land use area based on the existing land use. As in the case of Phuoc Long Station, the zoning plans have to be revised to allocate station-related facilities. In the western part of the station, it is also expected that the residents of the newly developed residential areas will utilize the UMRT Line 1 if accessibility to the stations is ensured.



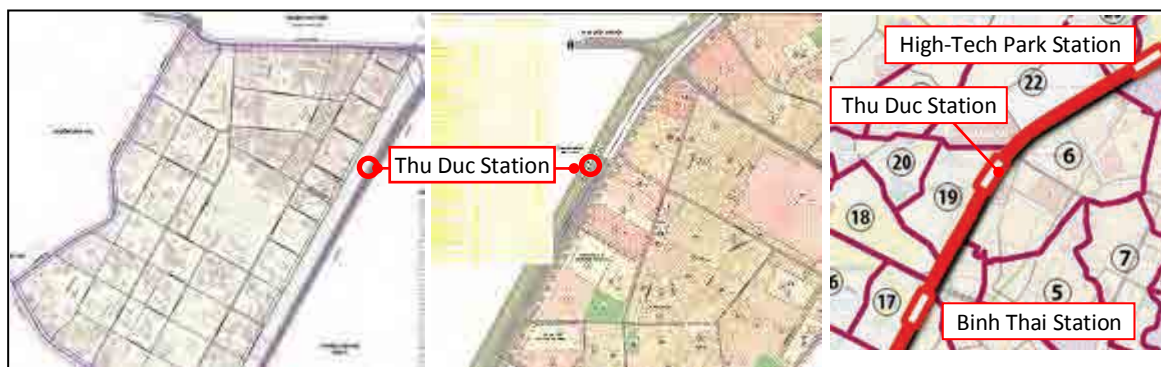
Source: The Study Team based on the Detailed Master Plan Residential Area on the Western side of the Hanoi Highway

Figure 2.1.22 - Zoning Plan of the Western Part of Binh Thai Station

(C)-3 Zoning Plans surrounding Thu Duc Station

The zoning plan of the western part of Thu Duc Station indicates the urban planning and design directions based on the existing urbanized patterns of small plots developed since the French colonial period. Although redevelopment of the existing urbanized area seems to be difficult, station-related facilities such as a station plaza has to be developed since the area will continue to be the center of the district where principal urban functions, including the government buildings for the district's People's Committee are concentrated.

The zoning plans in the eastern part of Thu Duc Station indicate mixed-use functions with public facilities such as a hospital and school will be developed adjacent to the station. The station-related facilities such as a station plaza could be included in such areas for the public facilities by revising the zoning plan.



Source: The Study Team based on Zoning Plans of the “Villa Area in the National University Urban Area”(left) and “Detailed Master Plan Residential Area of Block 2 to Block 6 of Hiep Phu Ward”(right)

Figure 2.1.23 - Zoning Plans Surrounding Thu Duc Station

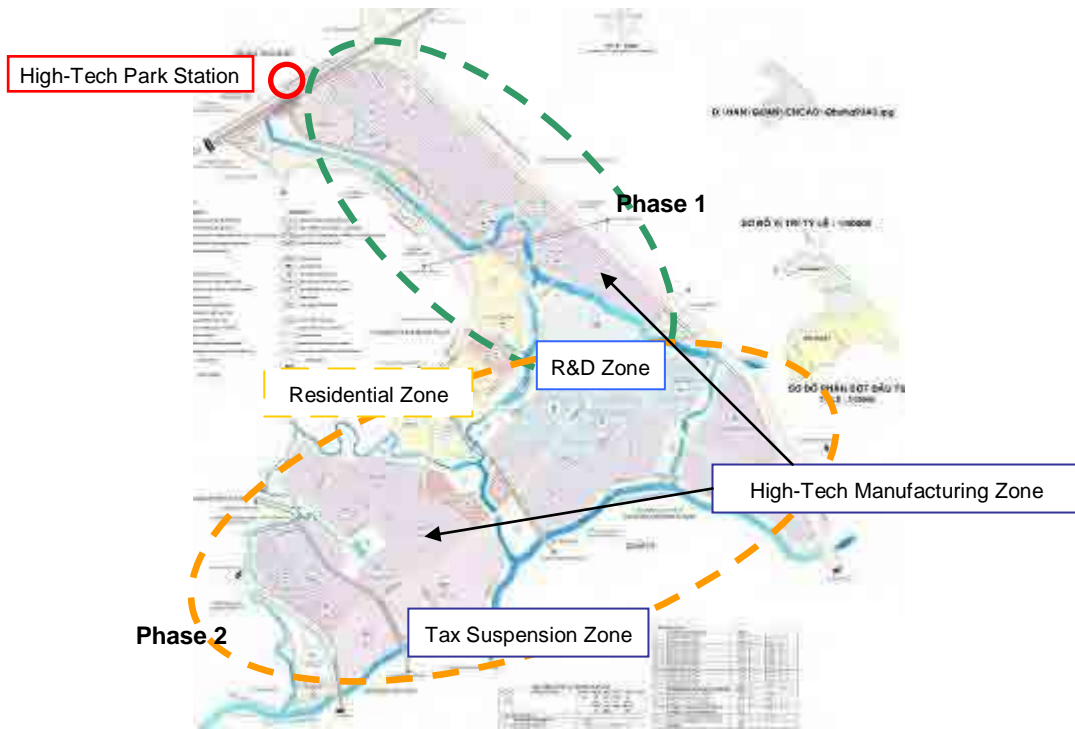
(D) University & High-Tech Park Area

In the University and High-Tech Park Area where the High-Tech Park, Suoi Tien and Suoi Tien Terminal Stations will be located, the national university area and the popular leisure facility the Suoi Tien Water Park are located. The Eastern Bus Terminal which is currently located in Binh Thanh District will be moved to this area. The following section shows the outline of the zoning plans and master plans of this area.

(D)-1 Master Plan and Zoning Plan surrounding High-Tech Park Station

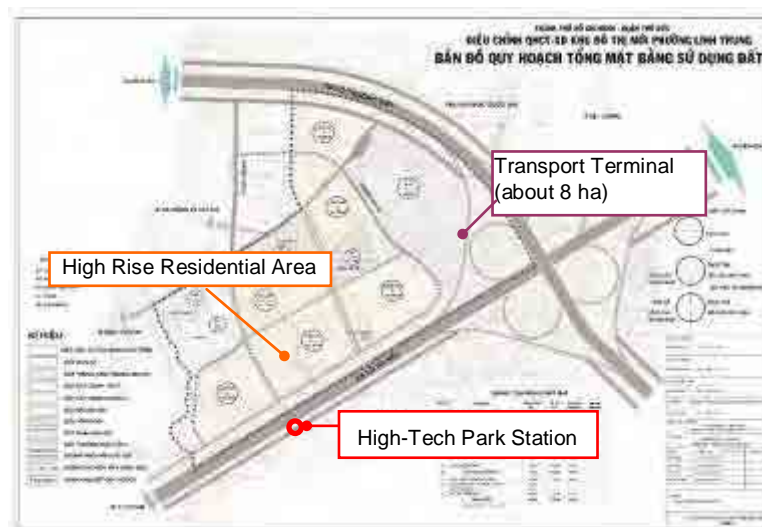
Adjacent to the High-Tech Park Station is the planned Saigon High-Tech Park with an area of 900 ha. According to the master plan, the high-tech park is divided into two areas: the area for the first stage with an area of 300 ha, and the area for the second stage with an area of 600 ha. In the first stage area, internally-owned production and research and development facilities for the high-tech industry have been located, including a factory of Intel Corporation.

In the High-Tech Park, the residential area with service functions for advanced technical experts are planned with a total area of 62 ha which will be developed step by step in each stage. However, since the majority of workers of the High-Tech Park will commute from outside of the park, it is expected that the commuting population will use the UMRT Line 1 if accessibility to/from the station to each of the facilities is ensured. Since a Singaporean developer is planning to develop the 16 ha area adjacent to the station, coordination with the developer is needed to develop the station plaza.



Source: The Study Team based on the Saigon High-Tech Park 1/5,000 Master Plan

Figure 2.1.24 - Master Plan of the Saigon High-Tech Park



Source: The Study Team based on the Zoning Plan of the New Urban Area of Linh Trung Ward

Figure 2.1.25 - Zoning Plan on the Northern Side of the High-Tech Park

On the opposite side of High-Tech Park Station, the zoning plan was formulated which indicates the high-rise residential area adjacent to the station and the transport terminal area with an area of 8 ha facing the intersection of the highway (Figure 2.1.25). However, since currently the area is occupied by small-scale residences, it will take a certain period of time to realize these plans.

(D)-2 Plans surrounding Suoi Tien Station

On the southern part of Suoi Tien Station is where the popular leisure facility Suoi Tien Water Park is located. The management company “Suoi Tien Group” is planning to expand the park from its current 55 ha to 100 ha to develop a new urban area with multi-urban functions (Figure 2.1.26). The station plaza could be incorporated in the expansion area near the station, the majority of which has already been acquired.



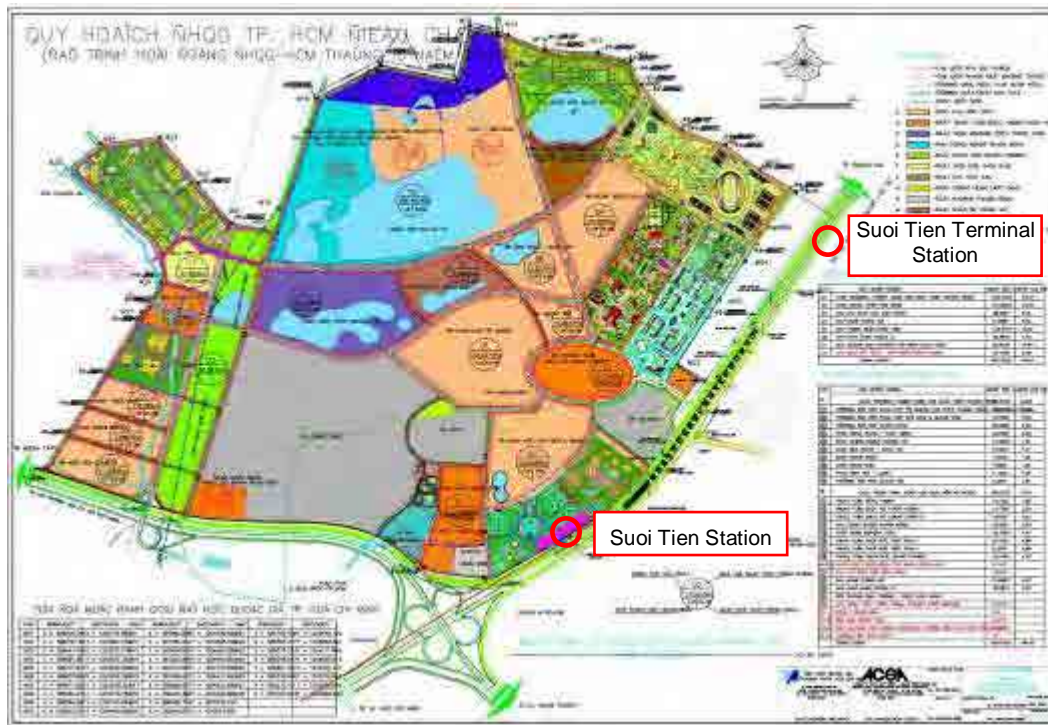
Source: The Study Team based on “Introduction of Suoi Tien Group”

Figure 2.1.26 - Expansion Image of Suoi Tien Water Park

In the northern part of Suoi Tien Station is the National University Area, which is being developed to relocate the universities concentrated in the city center of Ho Chi Minh City. The master plan of the area was formulated in 2003, revised in 2013 and approved by the Prime Minister in May 2014.

According to the revised master plan, the number of students of this university area is planned at 65,000. At present, approximately 80% of the students studying in this area live in the dormitories located inside of the area, and the dormitories for 60,000 students will be completed in 2015 as well. However, since these dormitories will also be used for the students outside of the area, a certain volume of students is expected to utilize the UMRT Line 1 for their school trips.

Since the revised master plan does not consider the connection to Suoi Tien Station, the coordination with the management authority of the National University Area is needed.



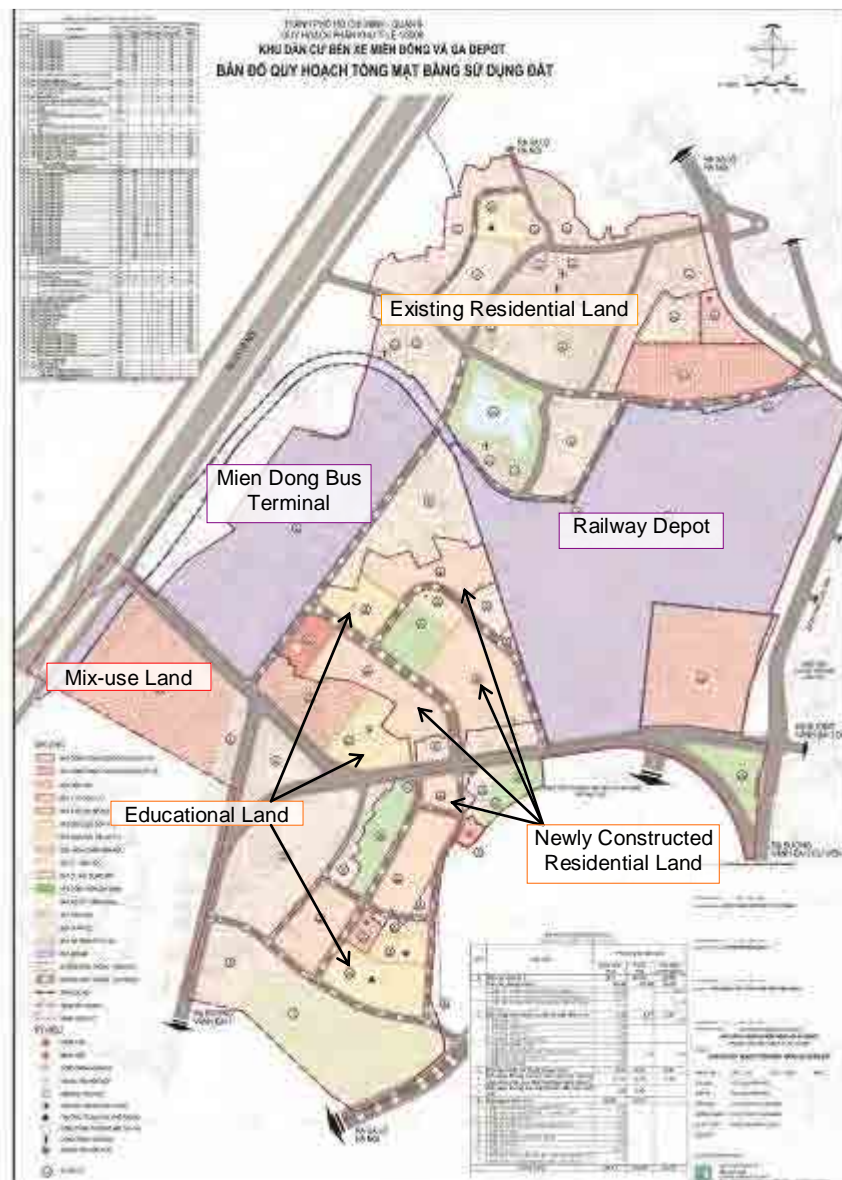
Source: The Study Team based on Master Plan of University Area (1/2,000)

Figure 2.1.27 - Master Plan of the University Area

(D)-3 Zoning Plans Surrounding the Suoi Tien Terminal Station

Since Suoi Tien Terminal Station is located near the boundary between Di An District of Binh Duong Province and District 9 of Ho Chi Minh City, for the development of the area near the station, coordination between the relevant authorities is needed.

The approved zoning plan for the area of Ho Chi Minh City indicates that the Mien Don (eastern) Bus Terminal, the depot of UMRT Line 1, and a lot of newly developed residential and educational areas will be located here. Since Suoi Tien Terminal Station will be the principal station for UMRT Line 1, the integrated development of the station and adjacent areas is expected.



Source: The Study Team based on Zoning Plan of Residential Area of Mien Dong Terminal (1/2,000)

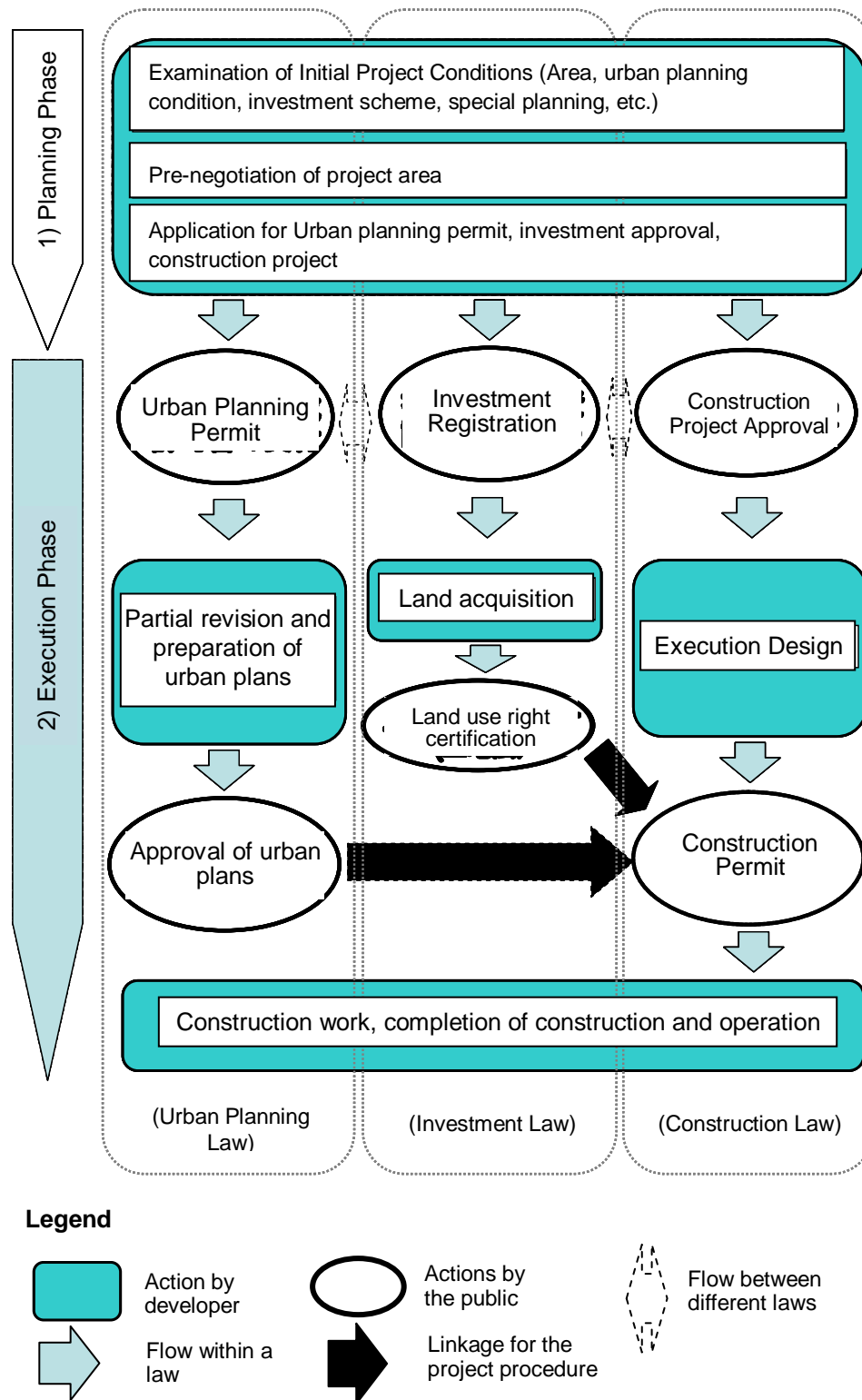
Figure 2.1.28 - Zoning Plan of the Suoi Tien Terminal Station Area

6) Existing Legal System on Urban Development

In Vietnam, the principal laws for urban development are composed of a) the Urban Planning Law, b) the Investment Law, and c) the Construction Law. The basic administrative procedure for urban development is implemented mainly through these three laws with the Land Law, which is related to the issuance of the land use right certificate. Figure 2.1.29 shows the general administrative procedure for urban development by these three laws, which is divided into the planning phase and the execution phase. In this figure, three certificates and permissions necessary for the administrative procedure for urban development, including urban planning permission, investment registration and construction project approval, are indicated in the same line; however, these procedures are not always conducted at the same period. As described later, the correlation of these three principal laws is not clearly stipulated in the current laws and regulations in Vietnam.

The planning phase is for a preparation and application stage to start the urban development project. If developers don't have a land use right certificate, they have to start the application procedure to be granted an urban planning permission. The application document needs to include not only spatial conditions but also investment schemes. In this stage, therefore, developers have to apply for the urban planning permission with preparation of applying investment registration and construction project approval and with a certain level of possibility of obtaining the land use right. In this way, the planning phase is for preparation and the application procedure to obtain basic certifications and permissions which are necessary to implement the urban development project.

In the execution stage, after being granted the urban planning permission, a zoning plan in a scale of 1/2000 or 1/5000 and a detailed plan in a scale of 1/500 are modified or prepared. When the detailed plan is approved, the urban planning procedure is completed. Then, after the construction project is approved, execution drawings for facilities in the project site are prepared. After completing the execution drawings and the investment registration, developers can start the administrative procedure for obtaining the land use right certificate. Then, developers apply the construction permit with the execution drawings, the copy of the land use right certificate and the detailed plan documents. After obtaining the construction permit, developers finally can start construction works for the urban development project.



Source: The Study Team based on the Urban Planning Law, Investment Law and Construction Law

Figure 2.1.29 - General Administrative Procedure for Urban Development by the Three Principal Laws

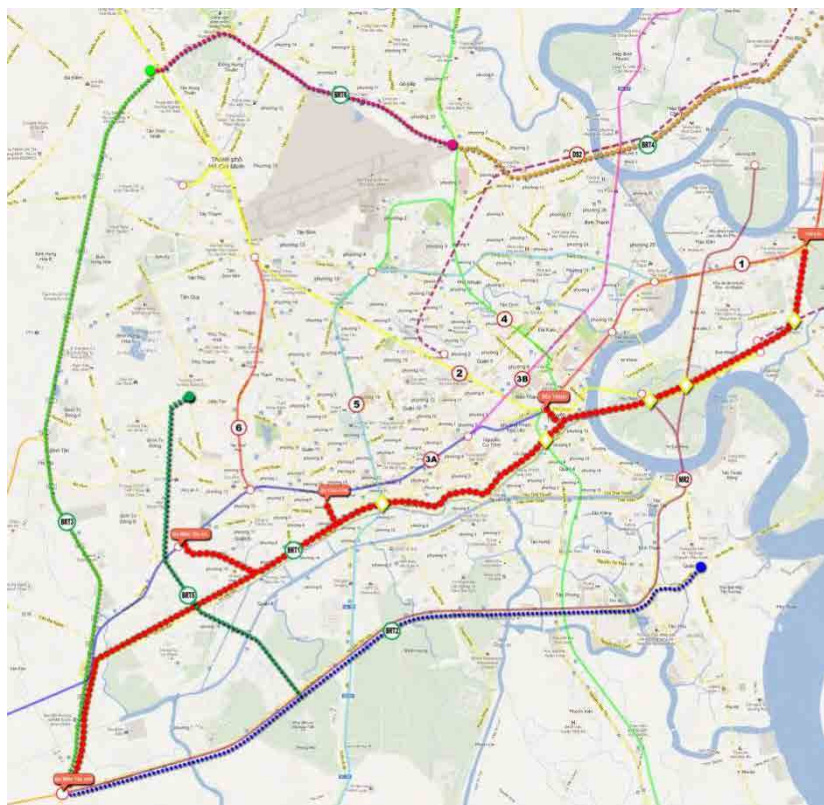
In the administrative procedure for urban development, there are the following characteristics and issues:

- Unclear correlation between relevant laws and regulations: the correlation and anteroposterior relation between the procedures and prerequisites are not clearly stipulated in the laws and regulations related to urban development. Consequently the administrative procedure is carried out at the discretion of the person in charge of this matter; therefore, each local government has a different system.
- Complicated and uncertain regulatory environment: the decrees, decision and circulars related to urban development are frequently enacted and modified, which is the situation that even local people would not be able to grasp properly. In particular, the situations of Hanoi City and Ho Chi Minh City are more complicated because various kinds of relevant local regulations are often enacted there.
- Insufficient business environment for foreign investors: The urban development project is not included in the business fields that are given preferential treatment for foreign investors by the investment law.

2.2 Related Transport Plans and Projects

1) Urban Transport Master Plan

The Master Plan for Urban Transport Development in HCMC until 2020 was approved by the Prime Minister through Decision 101/OD-TTg, dated 22/1/2007, based on the HOUTRANS study of 2004. For the urban railway network in HCMC, 7 UMRT lines which include Line 1 were planned through the Decision 5745/2009/QD-UBND in 2009. According to the latest government policy (Decision 568/QD-TTg, dated 08/08/2013, Approving the adjustment of Transportation Development Planning of Ho Chi Minh City by 2020 with a Vision after 2020), as shown in Figure 2.2.1, the targeted public transport modal share is 20-25% in 2020, 35-45% in 2030 and 50-60% in 2050 while achieving a reduction in the private transport modal share as per the policy direction. Meanwhile, a total of 8 lines of urban railways and 3 tramway/monorails are planned, in addition to the 6 BRT lines. Figure 2.2.1 shows these expanded public transportation network in Ho Chi Minh Metropolitan Area.

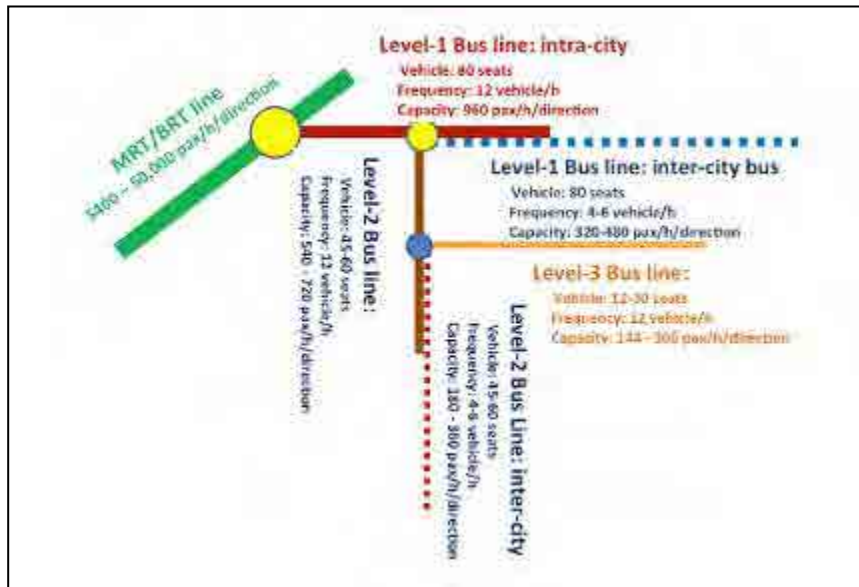


Source: Ho Chi Minh PC (Decision 568/QD-TTg)

Figure 2.2.1 - Public Transport Network in HCMC in 2020

2) Bus Transport Planning

The Master Plan for Public Transport Development in Ho Chi Minh City until 2025 was formulated to develop the plan of the public transport system until 2025 as the basis for the development of a sustainable urban transport system. In this plan, a concept of a hierarchical network of public transport and the idea of integration of railway stations and bus terminals with other modes (especially, motorcycle and bicycle) were proposed as shown in Figure 2.2.2.



Source: Master Plan for Public Transport Development in Ho Chi Minh City until 2025

Figure 2.2.2 - Hierarchical Public Transport Network Concept

Table 2.2.1 - Public Transport Network in HCMC

| No. | Section | Length (km) |
|---------------------------------------|--|-------------|
| Urban Railways (UMRT Lines) | | |
| Route No. 1 | Ben Thanh – Suoi Tien + Extending up to Bien Hoa city, Dong Nai province: From Suoi Tien station along national highway 1 to Sat market junction, Bien Hoa city. + Extending to Binh Duong: From Suoi Tien – My Phuoc – Tan Van – XT1 street – central station (Binh Duong industrial, urban and service complex) | 19.7 |
| Route No. 2 | West North urban center (Cu Chi district) – National highway 22 - Tay Ninh Bus Station - Truong Chinh - (branch into Tham Luong Depot) - Cach Mang Thang Tam - Pham Hong Thai - Le Lai - Ben Thanh – Thu Thiem | 48.0 |
| Route No. 3a | Ben Thanh – Pham Ngu Lao – Cong Hoa – Hung Vuong – Hong Bang – Kinh Duong Vuong – Tan Kien depot - Tan Kien station intersection + Extension of route No. 3a connecting Tan An city (Long An province) from Hung Nhon station moving along national highway 1 | 19.8 |
| Route No. 3b | Cong Hoa – Nguyen Thi Minh Khai – Xo Viet Nghe Tinh – national highway 13 – Hiep Binh Phuoc + Connection with Thu Dau Mot town (Binh Duong province) from Hiep Binh station and moving along national highway 13 connecting with the urban railway No. 1 of Binh Duong province | 12.1 |
| Route No. 4 | Thanh Xuan – Ha Huy Giap – Nguyen Oanh – Nguyen Kiem – Phan Dinh Phung – Hai Ba Trung – Ben Thanh - Nguyen Thai Hoc-Ton Dan - Nguyen Huu Tho - Hiep Phuoc urban Area | 36.2 |
| Route No. 4b | Gia Dinh Park station (Route No. 4) - Nguyen Thai Son - Hong Ha - Tan Son Nhat international airport - Truong Son - Hoang Van Thu Park - Lang Cha Ca station (Route 5) | 5.2 |
| Route No. 5 | New Giuoc bus station – National highway 50 - Tung Thien Vuong - Phu Dong Thien Vuong - Ly Thuong Kiet - Hoang Van Thu - Phan Dang Luu – Bach Dang - Dien Bien Phu - Saigon bridge | 26.0 |
| Route No. 6 | Ba Queo - Au Co – Luy Ban Bich - Tan Hoa Dong - Phu Lam roundabout | 5.6 |
| Tramway/Monorails¹⁾ | | |
| Tramway route No.1 | Ba Son - Ton Duc Thang - Me Linh square - Vo Van Kiet - Ly Chieu Hoang – existing West Bus station. It may be extended from Ba Son to Binh Quoi urban area (Thanh Da - Binh Thanh) | 12.8 |
| Monorail route No.2 | National highway No. 50 (district 8) - Nguyen Van Linh - Tran Nao - Xuan Thuy (District 2) - Binh Quoi urban area (Thanh Da - Binh Thanh). It may be connected with the railway Route No.3a | 27.2 |
| Monorail route No.3 | Intersection (Phan Van Tri – Nguyen Oanh)- Phan Van Tri – Quang Trung – Quang Trung software park – To Ky – Tan Chanh Hiep | 16.5 |
| BRT | | |
| No.1 | Along Vo Van Kiet – Mai Chi Tho boulevard | 20.5 |
| No.2 | Along Nguyen Van Linh street from the new West bus station to Phu My bridge | 24.0 |
| No.3 | Along the ring road 2 from An Suong intersection to the new West bus station | 19.0 |
| No.4 | Along Tan Son Nhat – Binh Loi road axis (after being put into operation), from Kha Van Can street to Chien Thang park | 14.5 |
| No.5 | Along Thoai Ngoc Hau – inner Belt road axis - extension to Nguyen Van Linh (after being expanded, completed and put into operation) from Bon xa intersection to Nguyen Van Linh street | 8.7 |
| No.6 | Along Quang Trung street (after being expanded, completed and put into operation), in the direction of the Monorail route No.3 | 8.5 |

Source: Study Team

1) Particularly, when the tramway routes No. 1, Monorail route No. 2 and 3 are completed and put into operation, they shall replace BRT route No. 1, 2 and 6.

According to “the Master Plan on Public Passenger Transport Development in HCMC by 2025”, integration of bus transport and HCMC UMRT Line 1 in the public transport network in HCMC will be implemented using the following three principles:

- i. **Removal of the overlapping section:** If a bus route is overlapping with that of HCMC UMRT Line 1 with the overlapping length being more than 5 km or more than 50% of the route (refer to Figure 2.2.3), the overlapping section should be converted to other routes. If the overlapping length will be less than 5 km or less than 50% of the route, this section should be maintained and bus stops should be integrated with the stations.



Figure 2.2.3 - Removal of the Overlapping Section

- ii. **Keeping the bus routes for backing up the UMRT:** Some of the bus routes should be kept as a backup plan for the UMRT (in case that there is incident or maintenance taking place for the UMRT).
- iii. **Adjustment of bus routes according to the stations:** In order to ensure the connectivity between the bus and the UMRT, there must be a connection between bus routes and stations when bus routes cross the UMRT. The distance between the UMRT and bus stops must not exceed the walking distance. If the crossing point to the nearest station will be more than 500 m, bus stop locations should be within 500 m.

Competing existing bus routes with the HCMC UMRT Line 1 will be adjusted in Chapter 6 of this Study.

As the output of this study, the strategy for bus public passenger transport development in Ho Chi Minh City is proposed and is described in Table 2.2.2.

Table 2.2.2 - Bus Service Development Orientation in HCMC

| Items | Short Term | Medium Term | Long Term |
|-----------------------------|--|---|---|
| Service provision structure | Meeting small cooperatives and consolidate state-owned enterprises | Consolidate the merged units in order to establish two big companies, consolidate the remaining cooperatives | 3 companies for primary market, 5-7 companies for secondary market |
| State Management | PPT Control Center | PPT Control Center | Public Transport Authority (PTA) |
| Purchase of vehicles | The government shoulders initial investments and transfer to major operators | Operators conduct purchase according to plans | Operators conduct purchase according to plans |
| Ticketing System | Issued by DOF, managed by PPT Control Center | Ticketing function is separated from operator, especially for subsidized routes | Apply smart cards, commonly used for all formal PPT services |
| Fare level | Continue low flat fare levels and monthly passes | Identified no-profit fare level as the basis for calculation of all fares | Identified no-profit fare level as the basis for calculation of all fares |
| Subsidies | Based on quota for routes by each type of vehicles | Based on categorized beneficiaries | Based on categorized beneficiaries. Reduced direct subsidy, increased indirect subsidy. |
| Market entry | License issued for operation via 1-year contract | Business permit issued for 5 years via bidding among enterprises | Business permit issued for 5 years via bidding among enterprises. |
| Route planning | Formulated by PPT Control Center | The Government formulates plan for primary market, interchange point; operators propose routes for secondary market | The Government formulates plan for primary market, interchange point; operators propose routes for secondary market |
| Service types and Itinerary | Assigned by PPT Control Center | Service standard prepared and applied on PPT network | Service standard prepared and applied on PPT network |
| Passenger information | Mostly provided by the Government | Coordination between the Government and operators | Mainly by operators |
| ITS application | Nearly none | Use of magnetic cards for payment and automatic trip control | Use of magnetic cards for payment and automatic trip control. Use GIS for service management on network. |

Source: Master Plan for Public Transport Development in Ho Chi Minh City until 2025

3) Bus Terminal Planning

There is at present 12 major bus terminals in HCMC as shown in Table 2.2.3. It should be noted that most of these terminals serve both inter-city and intra city buses – and to this extent, function also as transfer points.

Table 2.2.3 - Bus Terminals in HCMC

| Terminal Name | Dominant Service Orientation | Area (m ²) | No. of Bus Routes | | Transfer Station in the Future |
|-------------------------------|---|------------------------|-------------------|------------|---|
| | | | Inter-city | Intra-city | |
| Cho Lon | Routes to the West of HCMC | 10,196 | 5 | 27 | BRT Line 1 |
| Ben Thanh | NA | 10,000 | 3 | 20 | BRT Line 1 & UMRT Line 1, 2, 3a and 4 |
| Mien Dong Terminal | Routes to the Eastern Region (including Binh Duong, Binh Phuoc, Dac Nong, Dak Lak, Gia Lai and Kon Tum, and routes running along NH13 and 14) | 62,600 | 165 | 15 | UMRT Line 3 |
| Van Thanh | No operation (all routes relocated to Mien Dong) | 18,000 | | | |
| Mien Tay Terminal | Routes to the Western Region (including Long An and Tien Giang) | 47,400 | 114 | 17 | BRT Line 1 & UMRT Line 3a |
| District 8 | NA | 7,166 | 1 | 7 | No connection |
| An Suong | Routes to Quang Nam, Phan Rang, Tay Ninh and Hau Giang | 16,200 | 13 | 15 | BRT Line 3 & UMRT Line 2 |
| National University Dormitory | | 12,000 | | 8 | No connection |
| Nga tu Ga | Routes to the North and the Middle of Vietnam | 22,000 | 75 | 5 | No connection to UMRT Lines (this will be converted to city bus and freight terminal) |
| Hoc Mon | | 7,200 | | 4 | No connection |
| Cu Chi | | 7,000 | | 9 | No connection |
| Hung Temple Relic | | 6,000 | | 1 | No connection |

Source: Study Team

Mien Dong Bus Terminal Planning: According to the plan of HCMC, the existing Mien Dong Bus Terminal will be relocated to District 9. Therefore, the existing Mien Dong Bus terminal will be re-organized into the bus terminal for internal routes inside HCMC and inter-city bus routes along National Highway No. 14 in combination with the Trading Center, hotels and accommodation. The investment in the land after the existing Mien Dong Bus Terminal is relocated in Suoi Tien (District) should meet the main objective of serving intra-city and inter-city public passenger transport in accordance with the duties for transport development planning of HCMC to 2020 and the after-2020 vision as follows:

- Study about allocation and location identification of the stated above land in order to meet the necessary demand for a passenger transport hub which is convenient for the organization of transport functions with proper exits and entrances and auctioning the remaining land area in accordance with regulations to obtain funds for funding the new Mien Dong Bus Terminal.
- Half of the existing terminal (3.1 ha) will be used for city buses, intercity bus routes to Binh Duong (including Thu Dau Mot) and My Phuoc, and tourism bus services (projected total of 16 routes)

The existing Mien Dong Bus Terminal with a total area of 62,612m² includes 2 parts: one part for the construction of a new bus terminal (section A) and the remaining area will be for a mixed use development (Section B) inclusive of a Trading Center, hotels and accommodation.

Table 2.2.4 - Outline of the Mien Dong Bus Terminal Plan

| Area | Description | Layout |
|--|--|--------|
| Area A (New Bus Station) | Area: 31,475 m ² Construction area: 13,580m ² Construction density: 43.15% Total construction floor area: 53,700 m ² Floor-area ratio (FAR): 1.7 | |
| Area B (Mixed Use Complex ¹) | Total land area: 31,137m ² Construction density of the whole area: 20% Total floor area of the whole area: 152,571.3 m ² Floor-area ratio of the whole area: 4.9 Height restriction: 20 floors – 25 floors | |

Source: PRELIMINARY EXPLANATION Works: Detailed planning of 1/55 of Mien Dong Bus Terminal Location: 292 Dinh Bo Linh – Ward 26 – Binh Thanh District - HCMC

1) Including commercial & service areas, offices for lease, hotels and boarding houses

Suoi Tien Bus Terminal Planning: SAMCO is preparing a plan for a new bus terminal which has the function of part of the Mien Dong Bus Terminal in front of Suoi Tien Terminal Station of HCMC UMRT Line1. In addition, the JICA PPP-FS will be started from January 2014 for the station area urban development based on the concept of Transit Oriented Development (TOD) and Bus Rapid Transit (BRT) planning to Binh Duong New City.

Van Thanh Bus Terminal Planning: Based on discussions with the DOT and MOCPT on December 23, 2013, planning for the Van Thanh Bus Terminal has started. However, detailed information and the schedule for completion have yet to be confirmed.



Figure 2.2.4 - Current Land Usage around the Planned Van Thanh Bus Terminal

4) BRT Line 1 Plan

Bus Rapid Transit (BRT) Line 1 project consists of approximately 22.7 km of segregated bus lanes along Vo Van Kiet – Mai Chi Tho Boulevard (including 28 BRT stations and 4 interchange stations). At An Lac Roundabout Terminal, the BRT line will connect with city bus routes. At Cho Lon and Ben Thanh Bus Stations, it will connect with various city buses. At Rach Chiec Terminal, it will connect with UMRT Line 1 and city buses. A fleet of 46 BRT vehicles will be put into operation. The construction is set to begin in August 2015 and the operation is expected to commence in August 2018. The BRT line is shown in Figure 2.2.5. In the future, the city also plans to extend this line to connect to new Mien Tay Bus Terminal and interprovincial bus routes between HCMC and the southwestern provinces.



Source: Urban Civil Works Construction Investment Management Authority (UCCI) - HCMC

Figure 2.2.5 - Planned Routes of BRT Line 1

2.3 Current Bus Systems

1) Outline of Bus Transport in HCMC

Bus Network: The bus network in HCMC is formed in a fan-shape which includes radial routes (accounting for over 40%) and connect the terminal station at Ben Thanh Market to the western districts such as District 5, District 8, Phu Nhuan, Go Vap, etc. The remaining routes are the diametric routes (12%) and fish-bone collection routes and ring routes (over 30%). The fish-bone collection routes and ring routes, in addition to serving the travel demand of passengers traveling in the minor streets/corridors, serves an important function in collecting passengers for the main diametric and radial routes. Also due to the distribution of the diametric and radial routes, the bus network is at present densely concentrated in the center of city such as the Ben Thanh Market area, Cho Lon, Le Lai, Ham Nghi, etc.

Regarding connective characteristics, it can be said that the bus network is basically formed to connect the downtown areas to the suburban areas, and the city with the adjacent provinces. The principle of the bus network organization is based on the "Major route - branch line" concept. This means that the passengers can fully make their trips with 1 or 2 routes.

An important feature that makes buses in Ho Chi Minh City increasingly attractive to the people is the usage of a variety of services, such as ordinary bus, rapid bus, bus routes running at night, and serving pupils/students has created very a favorable situation for passengers.

Along with the expansion of the network is an increase in the number of subsidized bus routes. Now the whole Ho Chi Minh City has 110 subsidized bus routes, accounting for 75.8%, among 145 routes of the entire city (Figure 2.3.1).

Table 2.3.1 - The Number of Bus Routes

| Route Type | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Subsidized Route | 45 | 66 | 89 | 98 | 118 | 117 | 116 | 112 | 112 | 108 | 110 | 110 |
| Unsubsidized Route | 52 | 38 | 31 | 45 | 28 | 34 | 37 | 36 | 36 | 38 | 40 | 35 |
| Total | 97 | 104 | 120 | 143 | 146 | 151 | 153 | 148 | 148 | 146 | 150 | 145 |

Source: HCMC DOT, MOCPT

However, the disadvantage of the existing route network is that it has no hierarchy between the routes, with most of the routes built to connect to the city center or to directly connect between two large travel demand areas. This reduces the possibility of linked trips in the route network and increases the concentration of routes especially at the gateway to the city.

Bus Fare: Bus fares are flat and are not based on distance travelled. Basically, the fare system includes the following: (1) Single trip fare from 5,000 VND (for routes shorter than

18 km) to 6,000 VND (for routes longer than 18 km); (2) Discounted single trip fare of 2,000 VND (for pupils and students); and (3) Multi-ticket fare from 112,500 VND (for routes < 18 km and for students regardless of distance) to 135,000 VND (for routes > 18 km). There are several rapid routes with higher fares such as Route No. 13 and 94 (7,000 VND) and Route No. 96-Night Bus (10,000 VND).

Bus Stops: The bus stop is the most common and basic infrastructure of bus public transport and are located along the bus route. The bus stops were built on the sidewalk or on separators. The bus stop has information on transport services such as maps, routes, fares, schedules, etc. Some bus stops have been renovated to serve people with disabilities.

As of 2013, the city has 4,174 bus stops. In particular, 497 stops have shelters while other stops have installed poles or sign boards and 4,066 bus stops are painted with bus stop markings. The sizes of the current shelters are 6.6 m x 1.5 m and 4.3 m x 1.5 m.

Currently, the city has 72 start/end stations for the bus network. On September 1, 2008, the HCMC DOT issued the official letter No.030/SGTCC-VTCN regarding the use of the sidewalk and roadway for bus parking. Currently 45 bus terminals are temporarily using roads and sidewalks for bus operations, of which, 31 bus terminals were approved by the DOT. For the 14 remaining ones, MOCPT is working with the localities to review and adjust to submit to the DOT for approval.

Bus Depots: The major bus depots in Ho Chi Minh City are summarized in Table 2.3.2.

Table 2.3.2 - Bus Depots in HCMC

| No. | Name of Depot | Position | Management Unit | Area (m ²) | Function |
|-----|---------------|-------------------|--------------------------|------------------------|--------------------------------------|
| 1 | Bac Viet | Tan Binh District | Saigon Bus | 27,000 | Night parking + maintenance + repair |
| 2 | Lac Long Quan | Tan Phu District | Saigon Bus | 30,000 | Night parking + maintenance + repair |
| 3 | Cong Hoa | Tan Binh District | Saigon Bus | 7,000 | Night parking |
| 4 | Phan Van Tri | Go Vap District | Saigon Bus | 7,000 | Night parking |
| 5 | Lac Long Quan | Tan Binh District | Quyet Thang co-operative | 8,000 | Night parking |
| 6 | Hoc Mon | Hoc Mon District | 19/5co-operative | 10,000 | Night parking |

Source: HCMC DOT

2) Current Bus Operation and Usage along the HCMC UMRT Line 1 Corridor

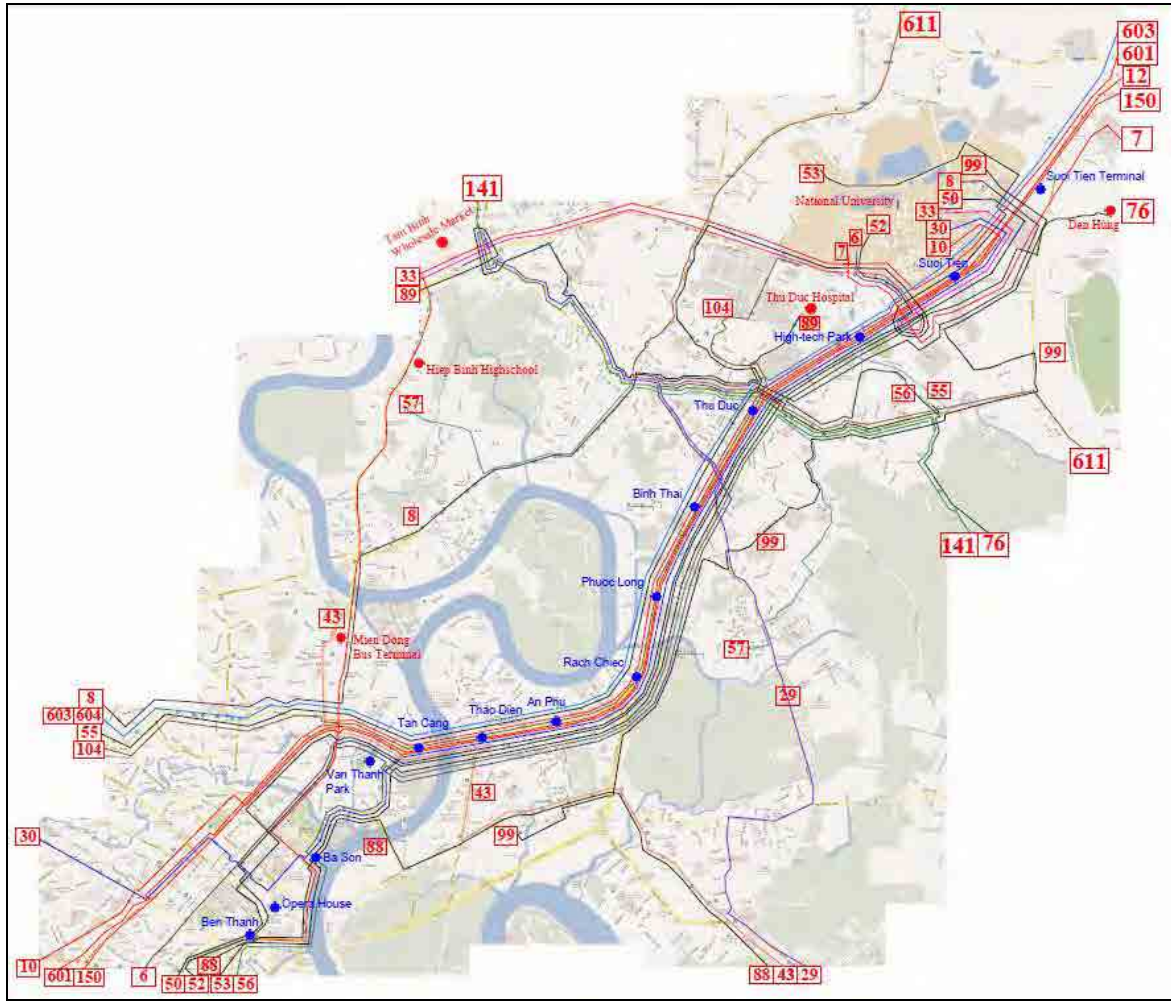
After the discussion during the Task Team meetings, Table 2.3.3 lists the selected set of bus routes that are likely to be affected most by the HCMC UMRT Line 1. Re-structuring of the bus routes are required targeting these routes.

Table 2.3.3 - Bus Routes Competing with the UMRT Line 1

| No. | Bus Route No. | Route | UMRT Line 1 Stations near the Bus Route |
|-----|---------------|---|---|
| 1 | 6 | Cho Lon Bus Terminal - Dai Hoc Nong Lam (Agricultural University) | (4) Van Thanh Park - (13) Suoi Tien |
| 2 | 10 | Dai Hoc Quoc Gia (National University) - Mien Tay Bus Terminal | (4) Van Thanh Park - (14) Suoi Tien Terminal |
| 3 | 19 | Ben Thanh - Dai Hoc Quoc Gia (National University) | (1) Ben Thanh - (2) Opera House, (4) Van Thanh Park, (13) Suoi Tien - (14) Suoi Tien Terminal |
| 4 | 30 | Cho Tan Huong - Dai Hoc Quoc Te (International University) | (2) Opera House - (14) Suoi Tien Terminal |
| 5 | 50 | Dai Hoc Bach Khoa (University of Technology) - Dai Hoc Quoc Gia (National University) | (1) Ben Thanh - (2) Opera House, (4) Van Thanh Park - (14) Suoi Tien Terminal |
| 6 | 52 | Ben Thanh - Dai Hoc Quoc Te (International University) | (1) Ben Thanh - (2) Opera House, (4) Van Thanh Park - (14) Suoi Tien Terminal |
| 7 | 53 | Le Hong Phong - Dai Hoc Quoc Gia (National University) | (1) Ben Thanh - (14) Suoi Tien Terminal |
| 8 | 55 | Cong Vien Phan Mem Quang Trung (Quang Trung Software Park) - Khu Cong Nghe Cao (High-tech Park) | (4) Van Thanh Park - (12) Suoi Tien Terminal |
| 9 | 56 | Cho Lon Bus Terminal - Dai Hoc Giao Thong Van Tai (University of Transport and Communication) | (1) Ben Thanh - (12) High-tech Park |
| 10 | 99 | Cho Binh Khanh - Dai Hoc Quoc Gia (National University) | (8) Rach Chiec - (9) Phuoc Long, (13) Suoi Tien- (14) Suoi Tien Terminal |
| 11 | 104 | An Suong Bus Terminal - Dai Hoc Nong Lam (Agricultural University) | (4) Van Thanh Park - (11) Thu Duc, (13) Suoi Tien |
| 12 | 150 | Cho Lon Bus Terminal - Nga 3 Tan Van | (4) Van Thanh Park - (14) Suoi Tien Terminal |

Source: Study Team

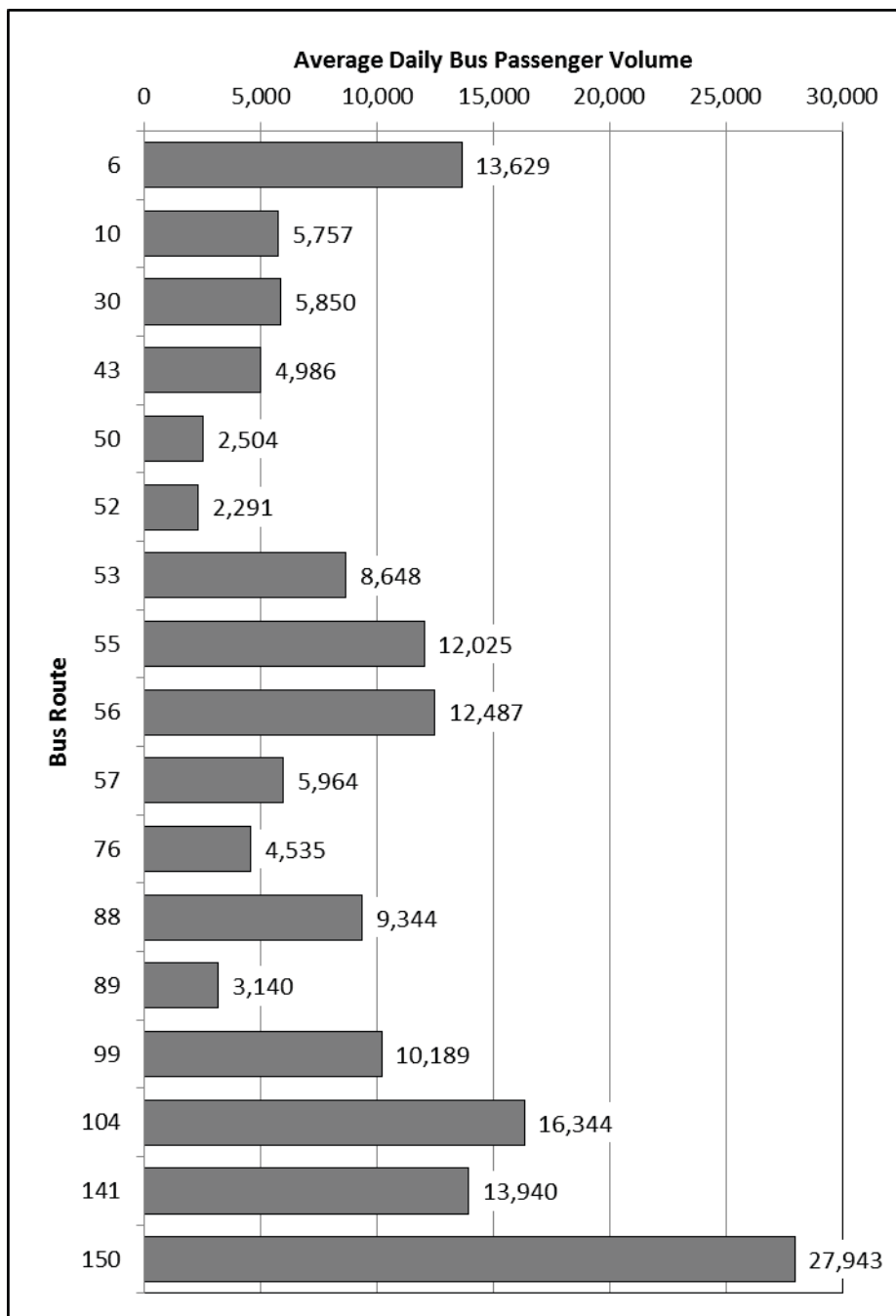
Figure 2.3.1 shows the existing bus network along the HCMC UMRT Line 1 corridor. In planning the future bus network, these bus routes are taken into consideration.



Source: Study Team

Figure 2.3.1 - Current Bus Network along the HCMC UMRT Line 1

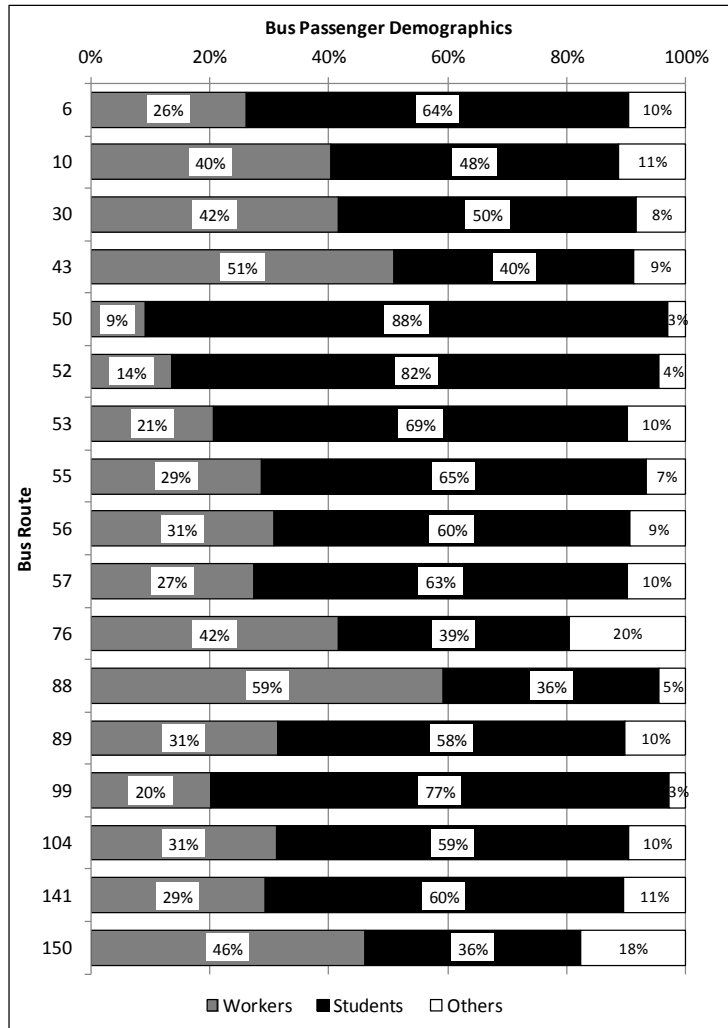
Figure 2.3.2 shows the average daily bus passenger volume in 2013 along the HCMC UMRT Line 1 corridor. Route 150 has the largest number of passengers of these routes at around 28,000 passengers daily while Route 52 has the smallest number of passengers per day at around 2,300.



Source: MOCPT

Figure 2.3.2 - Average Daily Bus Passenger Volume by Bus Route in 2013

Figure 2.3.3 shows the demographics of bus passengers along the HCMC UMRT Line 1 corridor. The ratio of students among all passengers is highest in Route 50 at 88%. This may be because this route connects two university areas (University of Technology - National University). On Routes 76, 88 and 150, on the other hand, students constitute less than 40% of the bus passenger demographics.

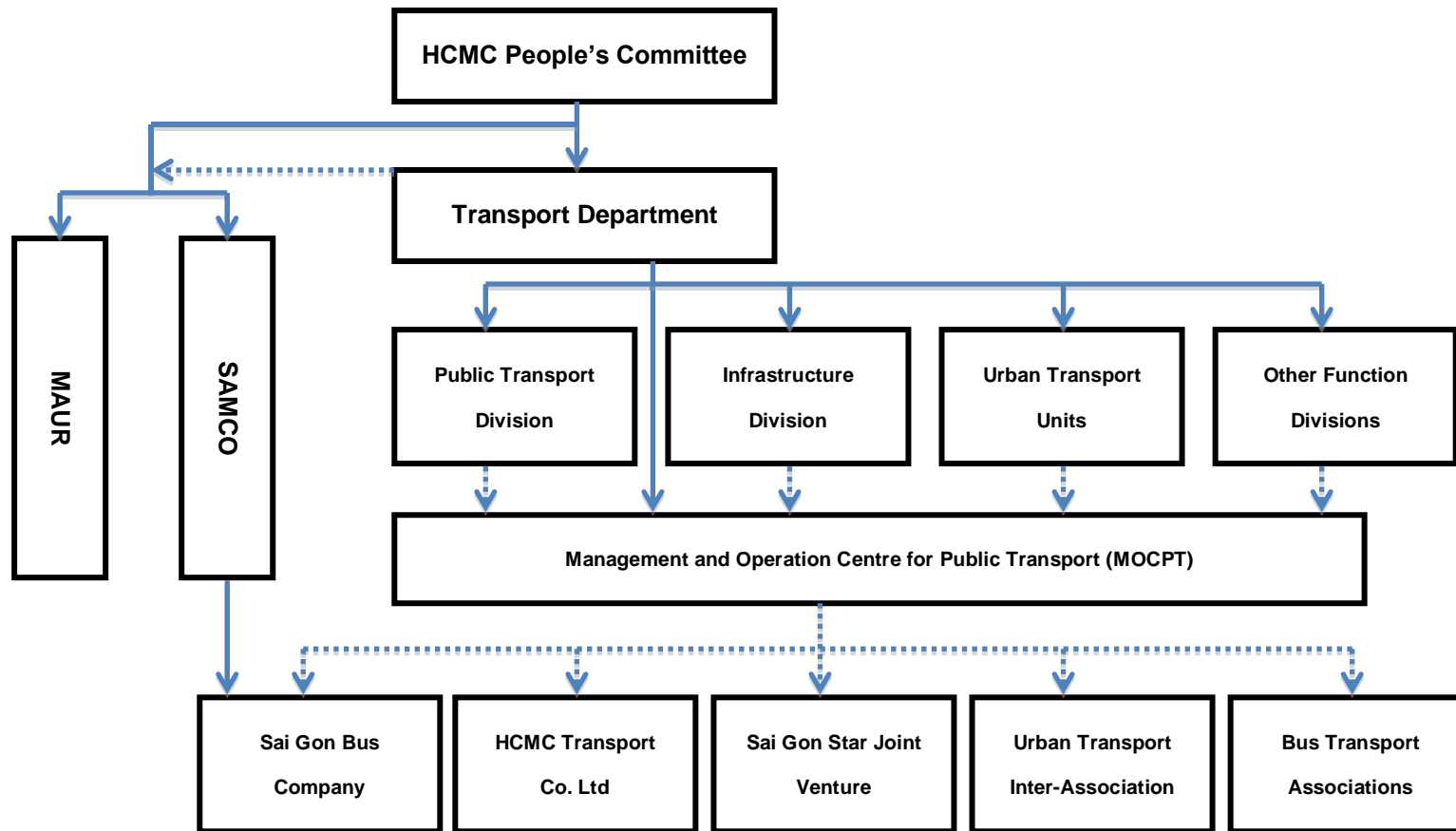


Source: MOCPT

Figure 2.3.3 - Demographics of Bus Passengers by Route in 2013

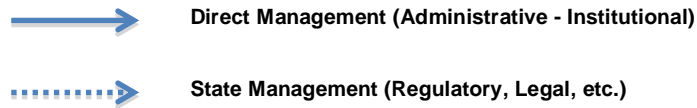
3) Current Bus Institutions

Decision No. 321/2003/QĐ-UB (dated 20/12/2003 by HCMC PC) has defined the organizational structure and operational management for public bus services in the city. The governance model for public transport system operation is illustrated in Figure 2.3.4 below.



Source: HCMC PC

Figure 2.3.4 -



Institutional Structure of HCMC's Public Transport

Systems

The **HCMC People's Committee** has the following authority:

- Approval of bus infrastructure and network planning
- Making decisions on bus investment and results of bus route bidding
- Promulgating technical standards, technical-economic specifications for bus services; deciding fare levels and subsidies for bus operations
- Promulgating and modifying decisions and regulations on bus management
- Determining bus priority
- Issuing state-budget investment and investment incentives for the bus industry

HCMC's Department of Transport (DOT) is an agency to support the HCMC PC in governing bus services and has the following authority:

- Determine and modifying bus routes, the number of and type of buses per route; Infrastructure and facilities per bus route and prototype designs of bus stops and terminals
- Stating the bus priority on a specific road; deciding the plan, form, and estimated cost for bus public relations and information
- Studying and proposing state incentives and priority policies for bus operations (such as tax exemption, subsidy, deficit and fees)
- Reviewing and deciding bus related investment project of 1 billion VND or below, technical design and estimated cost of bus related bidding or procurement as assigned
- Managing and issuing bus tickets to operators
- Deciding to pause or fully stop bus operations of the operators who violate the bus operation regulations
- Capacity building plan for bus drivers, conductors, and service staff
- Managing the public transport development fund of the city

MOCPT has the following authority:

- Deciding the bus routing and scheduling per bus route
- Organizing bidding for selecting successful bus operators for the route that has been approved by the HCMC DOT; signing the operational contract with the successful operator
- Checking operational conditions of an operator when supplying bus services; check technical standards for bus vehicles
- Managing, coordinating, guiding and checking bus routes to ensure that all routes operate according to the approved schedules

- Conducting surveys and demand forecast of the whole network, proposing route modification when necessary
- Receiving, checking and paying subsidies to the operators
- Printing, issuing and checking dispatch commands to bus operators
- Planning and implementing capacity building training for bus drivers and conductors
- Playing the role of client to investments in constructing, maintaining, and rehabilitating infrastructure and facilities for bus operation
- Organizing information channels for public relations and campaign for bus usage, providing information and responding to bus passengers' inquires

The results of reviewing the management of bus services and fares and the calculation of bus subsidies in the HCMC area are as follows:

1. Appraisal and licensing procedures for new operators of mass transit services

- a. Organize the bidding for most of the routes according to the bidding law for the construction, operation and payment according to the following documents:
 - i. Law No. 43/2013/QH13 promulgating the Law on bidding (replacing Law No. 61/2005/QH11)
 - ii. Decree No. 85/2009/ND-CP dated 15/10/2009 guiding the Bidding Law and the selection of construction contractors under the Construction Law.
 - iii. Circular No. 27/2007/BTC dated 03/4/2007 and Circular No. 130/2007/BTC dated 02/11/2007 of the Ministry of Finance guiding the management and payment of investment capital and non-business capital of investment nature belonging to the state budget capital source.
 - iv. Decision No. 34/2006/QD-BGTVT dated 26/10/2006 of the Ministry of Transportation promulgating the regulation on the management of mass transit by bus.
 - v. Decision No. 62/2009/QD-TTg dated 20/4/2009 on the exemption from land rents for building maintenance and repair stations and car parks of mass transit enterprises
- b. Except for some routes which will not be put out to tender but the contractor will be nominated, the DOT will propose and the PC will decide. They are typically routes for political, social and defense security purposes.

2. The method for determining bus fares, based on the following criteria (even without an official document)

- a. Calculated according to the income of the low-income group, the total cost of travelling by bus does not exceed 10 % of the income of this group.
- b. Balanced with the subsidy rate: Every year the Department of Finance will balance the city budget to determine the total subsidy for the bus system.
 - i. In the previous period, the subsidy rate is 50% - 55%
 - ii. In the recent period, the PC's policy is to ensure that:
 1. The subsidy rate must be lower than the revenue from ticket rate
 2. The subsidy rate of the current year must be lower than that of the previous year (Decision No. 2184/QD-UBND).
- c. The preferential group who don't have to pay for fares includes primary and secondary pupils, invalids, the disabled and the elderly (currently identified as over 80 years old and is expected to fall to 70 years old). The percentage of passengers in this group is estimated at 10% of the total number of passengers.
- d. The frame of bus fares is determined according to:
 - i. Joint Circular No. 129/2010/TTLT-BTC-BGTVT guiding implementation of road transport freight rates and road transport support service charge rates)
 - ii. In HCMC, the bus fare threshold (with subsidies) is from 4,000 – 10,000 VND/pax. HCMC applied the bus fare at 6,000 VND/pax (Decision No.2184/QD-UBND of the HCMC's PC dated 29/4/2011).
 - iii. HCMC: Decision No. 4059/QD-UBND (dated 09/8/2005) promulgating the subsidized bus fare is from 2,000 to 5,000 VND/pax. The un-subsidized bus routes will be authorized to be reviewed by the Director of DOT to issue the fare based on the proposals of the enterprises to ensure the profit but not to exceed 2 times of the subsidized bus fare with equivalent distance.

3. Regulations and the formula for calculating subsidies

- a. Regulations to be referred to TRANCENCO 's report
- b. The formula for calculating subsidies (refer to Trancenco's report)
- c. Spreadsheet of bus transportation costs (Decision No. 23/2012/QD-UBND, English and Vietnamese versions)

4. The protection policies of the state (city) for mass transit enterprises

- a. No government policies issued.
- b. If any enterprise has to terminate one or more routes, the city will consider allocating these buses to strengthen other routes operated by the same enterprise or other enterprises who have the demand for increasing the frequency.
- c. For enterprises who invest in purchasing new vehicles to operate the new routes, the city can consider extending the contract period from 3 years to 5 years to minimize the impact of closing risks due to without winning the new contract after the end of the previous contract.

3 REVIEW OF THE INTERNATIONAL EXPERIENCE IN INTERMODAL TRANSFER IMPROVEMENT

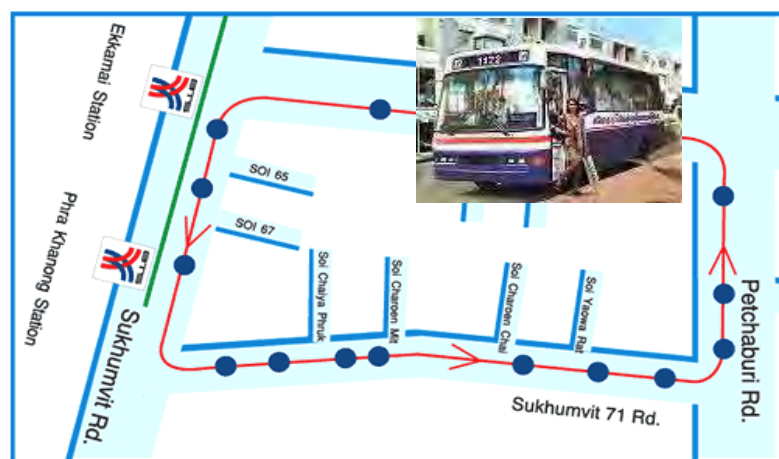
3.1 Integration of the Urban Railway and Bus Network

1) Feeder Bus Planning

Integration of the urban railway and bus network is critical in order to maximize the convenience of and ridership on the urban railway.

For terminal stations, or stations serving a bedroom community or an industrial park, some cities have introduced bus shuttle services for residents and workers using the urban railway. Because of the pattern of demand, the service is non-existent between peak hours, with the morning traffic in the reverse flow of the evening traffic. Such a service would naturally require subsidies. The fares are set at a level below parking charges. Passengers can buy rail-bus through service daily or seasonal tickets at station offices or at ticket vending machines in the station concourse. This kind of "rail-bus integration" is complemented by a series of direction signs, high quality display boards, and electronic boards providing real-time travel information about the rail and local bus services.

What may preclude the complete integration of the bus and urban railway is the question of which organization picks up the tab. The incentive is for the other service providers to get a "free-ride", i.e., benefit from the joint service without contributing his share of the cost. In the case of Bangkok's Skytrain, in order to attract more passengers, the train operator introduced a free shuttle bus service to its stations with seven routes. In some other cities, a free shuttle bus is provided by private companies for special promotional events, or for commuters going to/from their shopping malls or offices.



Source: Study Team

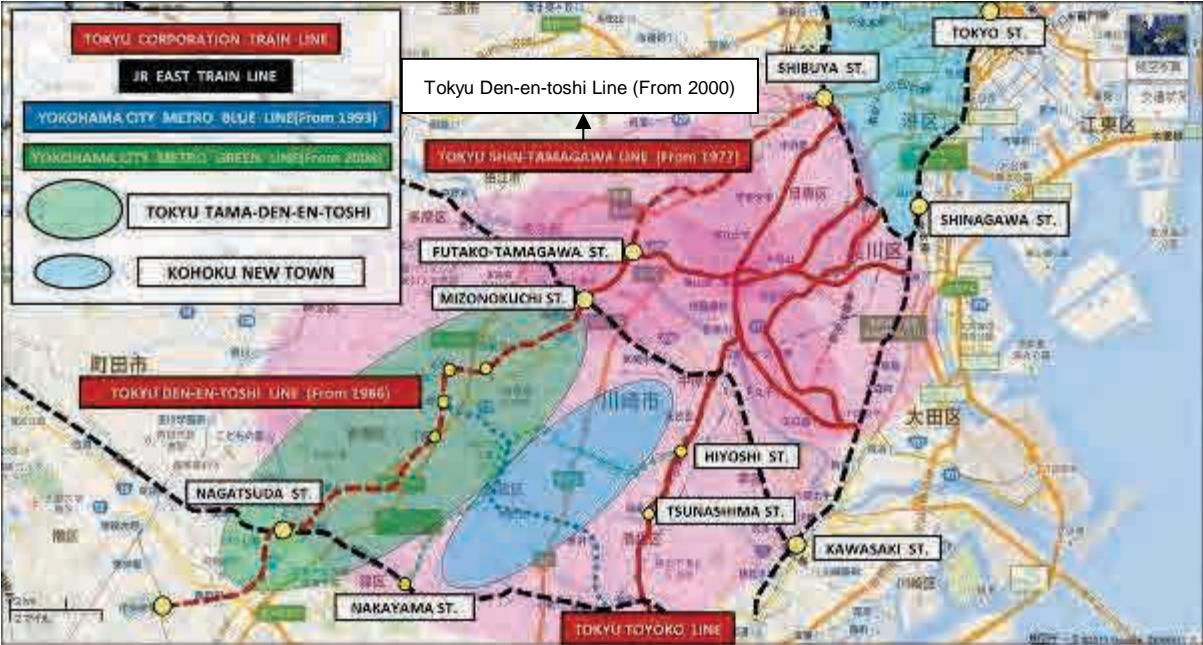
Figure 3.1.1 - Shuttle Bus Route to Two BTS (Skytrain) Stations, Bangkok

Existing bus routes will have to be rearranged once the HCMC UMRT Line 1 is operational to make it complementary rather than competing substitutes. Feeder bus routes, however, will be necessary in several stations. These routes can be entirely new, or modified routes of existing bus routes. The latter is more preferable, because stand-alone feeder routes will not be viable. The former is recommended in areas not currently served by buses.

Tokyu Corporation (Japan) has experience in rerouting pre-existing bus routes and feeder bus planning accompanying the provision of new urban railway lines.

Tokyu Den-en-toshi Line - Tokyu Bus

Tokyu Den-en-toshi Line (Shibuya - Chuo-rinkan, 31.5 km), along which the Tama Den-en Toshi Residential Area has developed, has been extended step by step. Tokyu carried out the rerouting or the supply and demand adjustment of pre-existing bus routes along the line in accordance with the extension.



Source: Tokyu Corporation

Figure 3.1.2 - Tokyu Railway Network

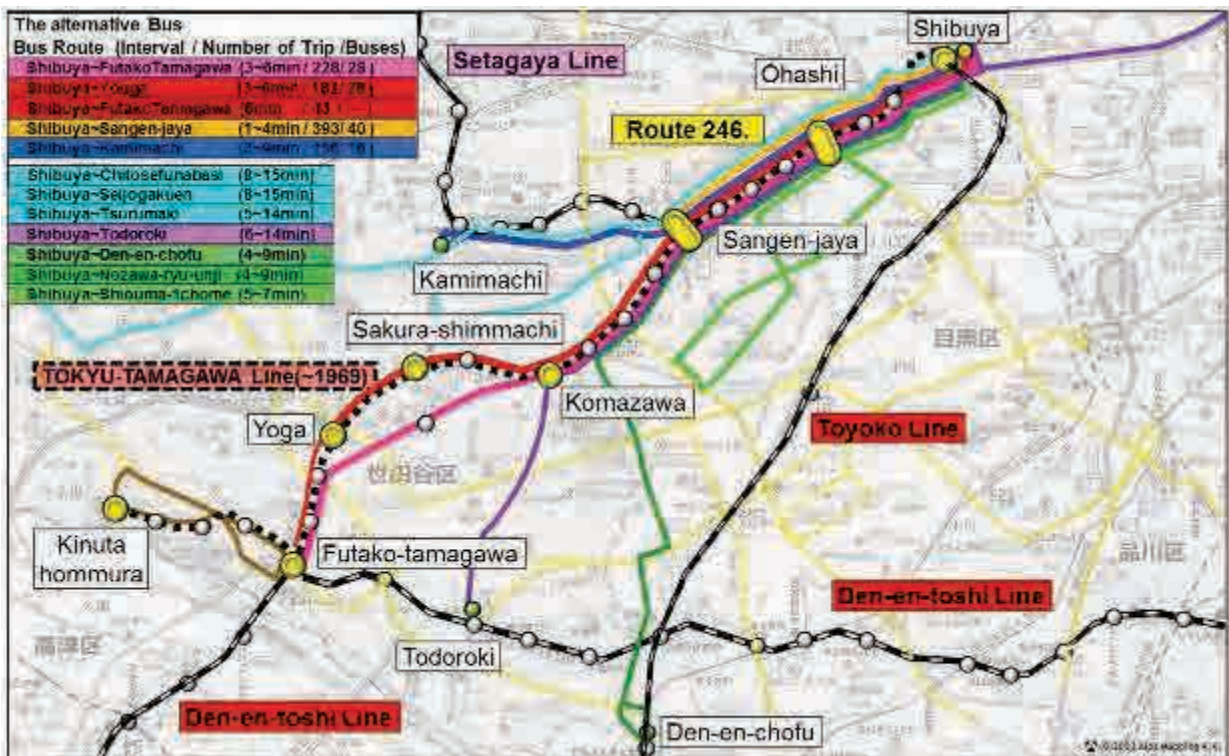
Shibuya - Futako-tamagawa (9.4 km)

This is the underground section located beneath the National Route 246 and the Metropolitan Expressway No. 3. Formerly there was the Tokyu Tamagawa Line (tram line) in this section. The Tamagawa Line was discontinued in 1969 because of the construction of the Tokyu Shin-tamagawa Line (subway line) and the Metropolitan Expressway No. 3. Then a large-scale alternative bus transport service started.

When the Tokyu Shin-tamagawa Line opened in 1977, the alternative bus transport service ended. The number of bus fleet was reduced by 85 in four routes in the

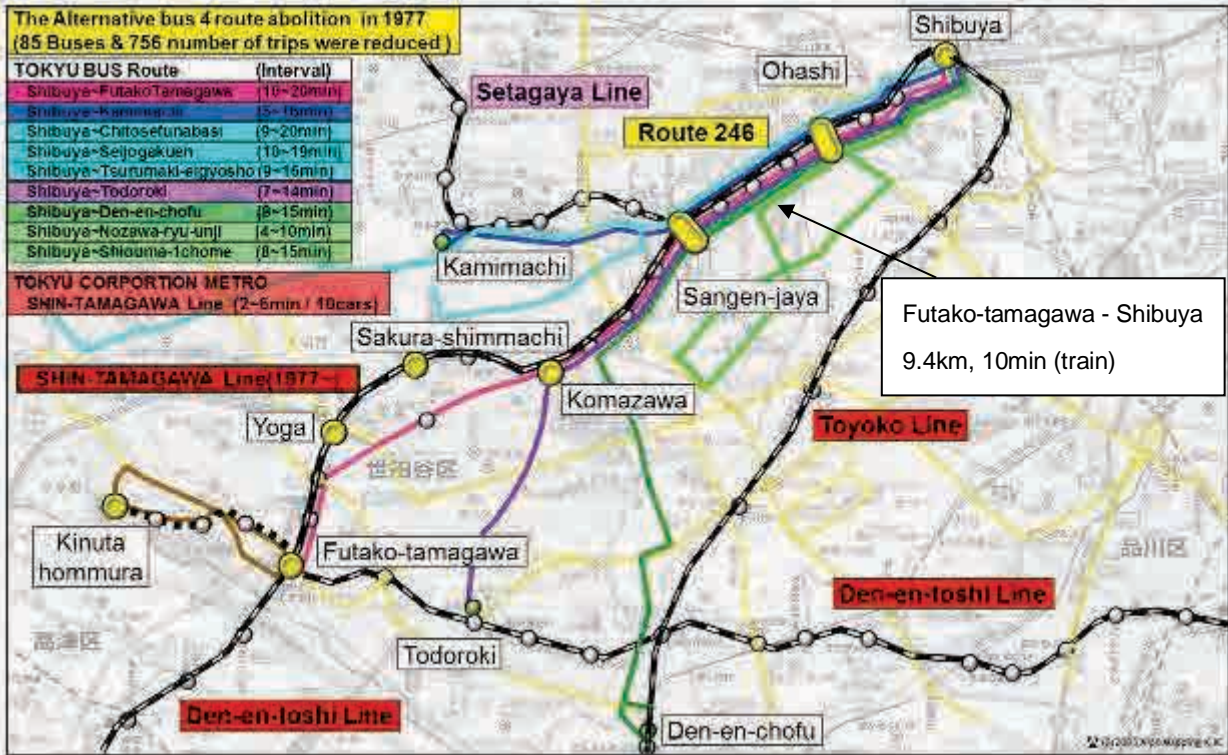
reorganization of the bus route. After that, this section was merged into the Den-en-toshi Line in 2000.

In the area between the Toyoko Line and Den-en-toshi Line, there are many densely-populated areas located more than 1 km from the nearest station. There are 9 bus lines directly connecting these areas and Shibuya Station via an intermediate station of the Den-en-toshi Line. These bus routes have existed from the period of the Tamagawa Line and they still remain even after the opening of the Den-en-toshi Line. Most of the passengers on these routes ride up to the Shibuya station terminal instead of transferring to a train at an intermediate station. This is because the travel distance by train to the destination is short.



Source: Tokyu Corporation

Figure 3.1.3 - The Alternative Bus Routes of Tokyu Tamagawa Line (1969-1977)



Source: Tokyu Corporation

Figure 3.1.4 - Current Bus Route

Futako tamagawa – Chuo rinkan (22.1 km)

Before the Tokyu Den-en-toshi Line was extended, there was no railway in the Tama Den-En-Toshi residential area. Bus transport to existing station 5-10 km away from the area was the main public transport means.

After Tokyu Den-en-toshi Line was extended to Nagatsuta Station in 1966, railway transport took the role of the "main transport" and the role of bus transport changed into "feeder transport from a railway station". The role of feeder bus network has become more important in accordance with the growth of the population.

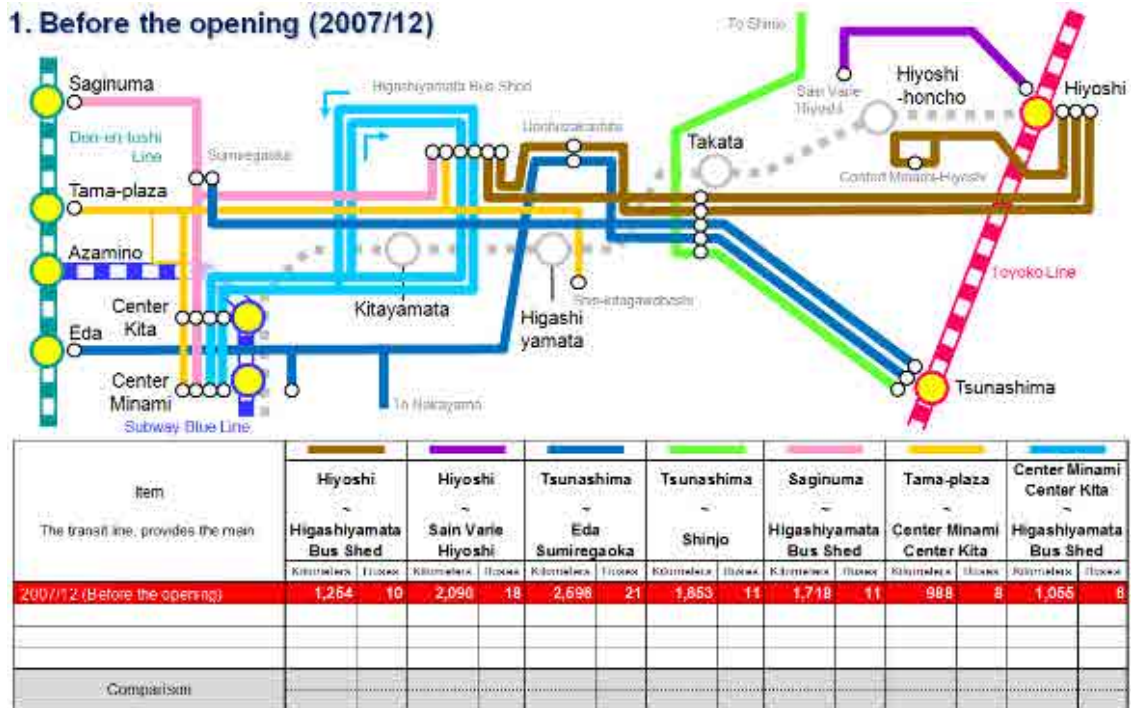
Yokohama Municipal Subway Green Line - Tokyu Bus

The Yokohama Municipal Subway Green Line (Nakayama - Hiyoshi, 13.1 km), along which the population of Kohoku New Town was increasing, was opened in 2008. Tokyu Bus carried out the supply and demand adjustment in seven bus routes along the Green Line in accordance with the opening.

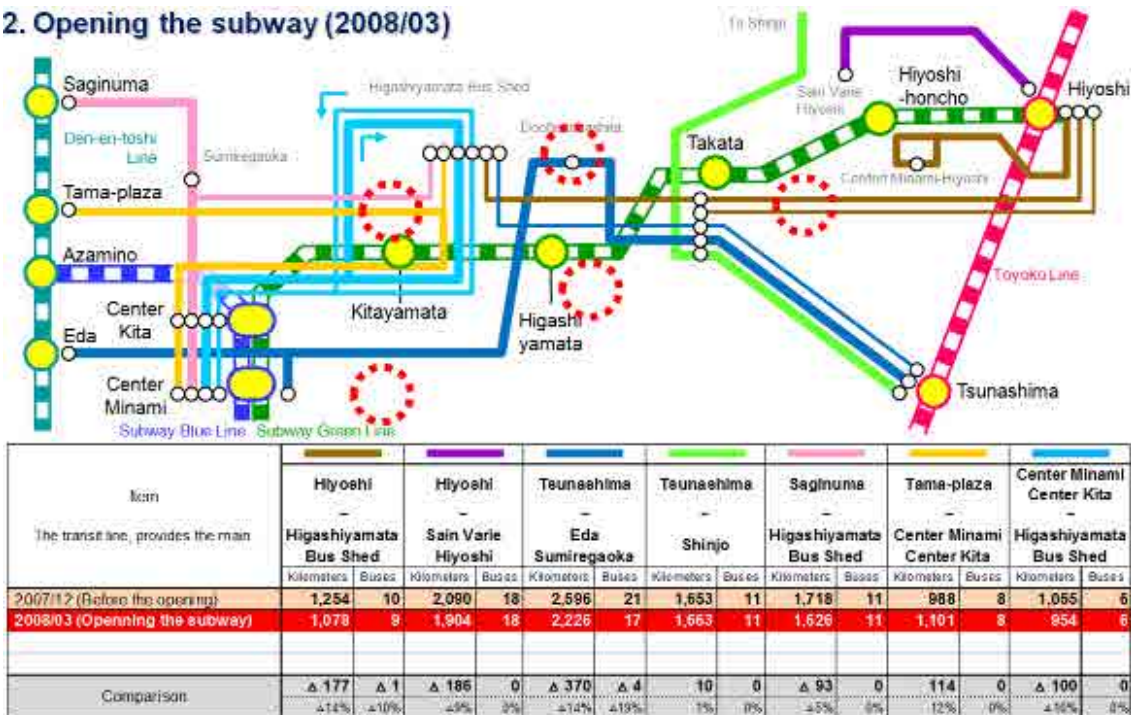
In formulation of the implementation plan of supply and demand adjustment, a bus passenger survey was carried out on the target bus routes. Even after the opening of the Green Line, bus passenger surveys were continuously conducted and additional supply and demand adjustments were carried out in accordance with the change in the number of bus passengers. After all the adjustments were carried out three times in two years, the number of operating bus fleets gradually decreased from 85 to 63. It is important to carry

out continuous bus passenger surveys and supply demand adjustments when the HCMC UMRT Line 1 will start its operation.

1. Before the opening (2007/12)



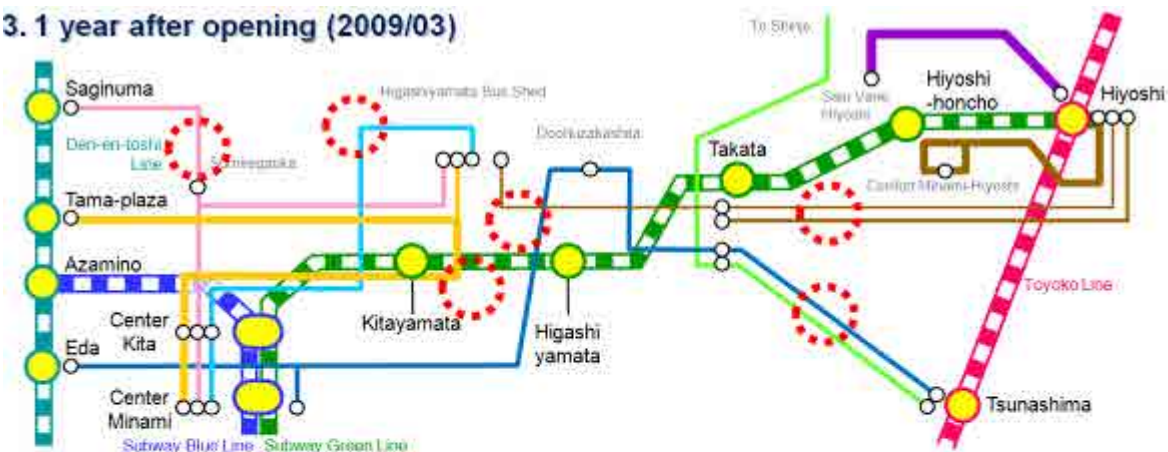
2. Opening the subway (2008/03)



Source: Tokyu Corporation

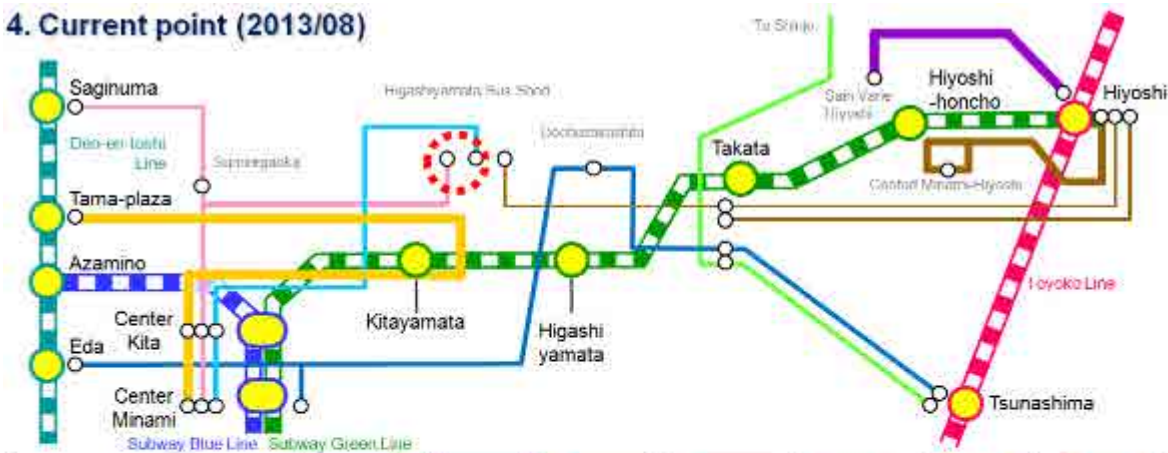
Figure 3.1.5 - Rerouting and Supply and Demand Adjustment of Pre-existing Bus Routes along the Yokohama Municipal Subway Green Line (1)

3. 1 year after opening (2009/03)



| Item | Higashiyamata Bus Shed | | Sain Varie Hiyoshi | | Eda Sumiregaoka | | Shinjo | | Higashiyamata Bus Shed | | Center Minami Center Kita | | Higashiyamata Bus Shed | |
|--------------------------------|------------------------------|-------|--------------------|-------|-----------------|-------|------------|-------|------------------------|-------|---------------------------|-------|------------------------|-------|
| | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses |
| | 2007/12 (Before the opening) | 1,254 | 10 | 2,090 | 18 | 2,596 | 21 | 1,653 | 11 | 1,718 | 11 | 988 | 8 | 1,055 |
| 2008/03 (Opening the subway) | 1,078 | 9 | 1,904 | 18 | 2,226 | 17 | 1,663 | 11 | 1,626 | 11 | 1,101 | 8 | 954 | 6 |
| 2009/03 (1 year after opening) | 704 | 6 | 1,901 | 16 | 1,726 | 12 | 1,551 | 11 | 1,570 | 9 | 1,101 | 8 | 466 | 3 |
| Comparison | Δ 551 | Δ 4 | Δ 189 | 0 | Δ 870 | Δ 9 | Δ 102 | 0 | Δ 148 | Δ 2 | 114 | 0 | Δ 588 | Δ 3 |
| | -44% | -40% | -9% | 0% | -34% | -13% | -8% | 0% | -9% | -18% | 12% | 0% | -55% | -50% |

4. Current point (2013/08)



| Item | Higashiyamata Bus Shed | | Sain Varie Hiyoshi | | Eda Sumiregaoka | | Shinjo | | Higashiyamata Bus Shed | | Center Minami Center Kita | | Higashiyamata Bus Shed | |
|--------------------------------|------------------------------|-------|--------------------|-------|-----------------|-------|------------|-------|------------------------|-------|---------------------------|-------|------------------------|-------|
| | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses | Kilometers | Buses |
| | 2007/12 (Before the opening) | 1,254 | 10 | 2,090 | 18 | 2,596 | 21 | 1,653 | 11 | 1,718 | 11 | 988 | 8 | 1,055 |
| 2008/03 (Opening the subway) | 1,078 | 9 | 1,904 | 18 | 2,226 | 17 | 1,663 | 11 | 1,626 | 11 | 1,101 | 8 | 954 | 6 |
| 2009/03 (1 year after opening) | 704 | 6 | 1,901 | 18 | 1,726 | 12 | 1,551 | 11 | 1,570 | 9 | 1,101 | 8 | 466 | 3 |
| Current point | 704 | 6 | 1,917 | 17 | 1,660 | 10 | 1,467 | 10 | 1,600 | 9 | 1,317 | 8 | 466 | 3 |
| Comparison | Δ 551 | Δ 4 | Δ 173 | Δ 1 | Δ 946 | Δ 11 | Δ 196 | Δ 1 | Δ 119 | Δ 2 | 330 | 0 | Δ 588 | Δ 3 |
| | -44% | -40% | -8% | -6% | -36% | -52% | -12% | -9% | -4% | -18% | 33% | 0% | -55% | -50% |

Source: Tokyu Corporation

Figure 3.1.6 - Rerouting and Supply and Demand Adjustment of Pre-existing Bus Routes along the Yokohama Municipal Subway Green Line (2)

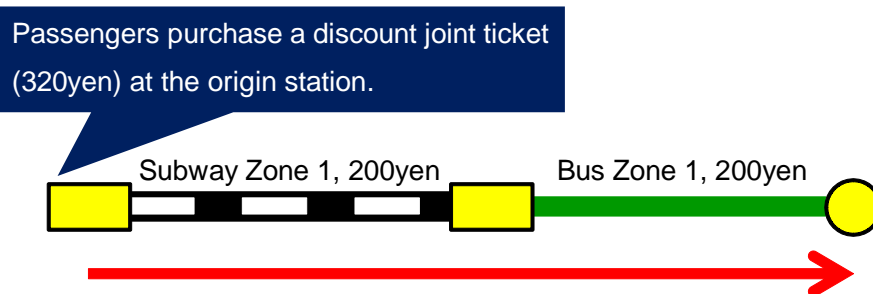
2) Discount Joint Fare between Train and Bus/Tram

Many cities in developed countries have through ticketing between public transport modes in order to encourage more ridership. The concept is simple: a joint ticket purchased on a bus can be used or be accepted on the rail, and vice versa. The cost of the joint ticket is cheaper than buying bus and train tickets separately. Besides it saves time for queuing and buying another ticket at the station or transfer point.

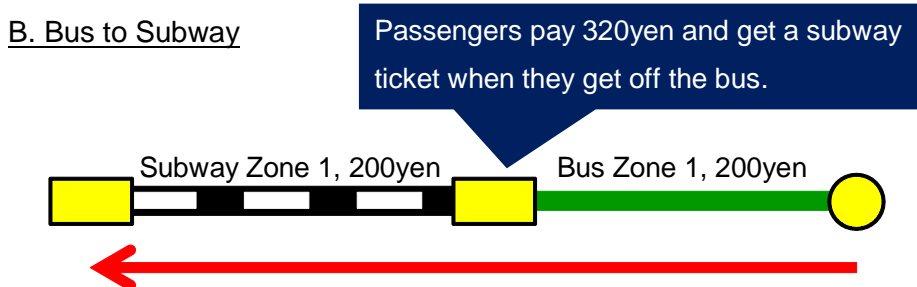
Sapporo City, Japan

In this fare system, if the passengers transfer between the City Subway train and bus or City Tram, they obtain an 80yen (around 0.8 USD) discount. This system reduces the psychological loss and the monetary loss of intermodal transfer.

A. Subway to Bus



B. Bus to Subway



Source: Study Team

Figure 3.1.7 - Joint Discount Fare between Subway and Bus in Sapporo City

3) Smartcard Ticketing System

Smartcard ticketing systems has been introduced to public transport in many cities in the world.

Figure 3.1.8 shows the FeliCa smartcard, which is used in the public transport system in Japan. It contributes to smoother intermodal transfers as well.

Furthermore, many types of fare systems can be introduced with the smartcard system. For example, Toyama Light Rail, in Japan, offers special joint discount fares to passengers using smartcards who transfer between tram and feeder bus. In Istanbul in Turkey, the smartcard (known as 'Akbil', see Figure 3.1.9) is used for all intra-city traffic modes as bus, tram, cable car, subway, and ferry. It is a stored-value card that can be acquired with a small refundable deposit, and can be reloaded at ticket kiosks. When a user transfers to another mode within 90 minutes, the next fare is discounted by 50% (the ratio sometimes varies).

This system reduces the monetary loss of intermodal transfer. If joint discount fare system for smartcard users is introduced, further loss can be reduced.



Source: FeliCa Business Division,
Professional Solutions Group, IP&S,
Sony Corporation

**Figure 3.1.8 - FeliCa
Smartcard**



Figure 3.1.9 - Akbil

4) Integrated Time Schedule between Trains and Buses

Keisei Railway Shizu Station Bus Terminal, Japan

In this bus terminal, feeder buses adjust their departure time to the arrival time of trains in order for the passengers to transfer between two modes smoothly. Feeder bus drivers know the train arrivals by the sign on the bus stop pole (see Figure 3.1.10). This system reduces the time loss of intermodal transfer.



Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan

Figure 3.1.10 - Train Arrival Sign

5) Integrated Real-time Information of Train and Bus Operation

Odakyu Railway, Odakyu Bus and Kanagawa Chuo Bus (Odakyu Group), Japan

Odakyu Railway, Odakyu Bus and Kanagawa Chuo Bus jointly provide the Integrated Real-Time Information of Train and Bus Operation. When the passengers input their origin (bus stop or railway station) and destination, they can find the train and bus which they can catch and transfer to from the real-time information of operation. This system reduces the psychological loss of intermodal transfer.

The screenshot shows the Odakyu Bus Navi website interface. At the top, there is a navigation bar with 'TOP', '利用区間 を指定して検索', '停留所 を指定して検索', and 'バスと鉄道の乗継検索'. Below this, there is a search bar with '13:06現在' and 'Departure Time'. The search results are displayed in a table with three columns: '候補1', '候補2', and '候補3'. The results show a route from '生田高校前(バス)' to '町田駅(電車)'. The search results are summarized in a box on the right:

| 候補 | 出発 | 乗継 | 到着 |
|----|-------------|-------------|---------|
| 1 | 生田高校前(バス) | 新百合ヶ丘駅(電車) | 町田駅(電車) |
| 2 | 13:10 発(予測) | 13:17 着(予測) | |
| 3 | 13:38 発 | 13:47 着 | |

Search Results of Route and Time Schedule from the Origin (Bus Stop) to the Destination (Train Station)

- Bus Stop (Origin)
- Bus
- Railway Station (Transfer)
- Train
- Train Station (Destination)

Source: Odakyu Bus Navi Web Site: <http://www.odakyubus-navi.com/blsys/loca>

Figure 3.1.11 - Search Results of Route and Time Schedule from the Origin to the Destination

3.2 Intermodal Facility Planning

1) Summary of Intermodal Facility Planning in Foreign Countries

As a reference for Intermodal Facility Planning of the HCMC UMRT Line 1, Table 3.2.1 lists relevant examples of Intermodal Facilities in foreign countries.

Table 3.2.1 - Summary of Intermodal Facility Planning in Foreign Countries

| Type of Intermodal Facility | | Example |
|-------------------------------------|---|---|
| Station Plaza | Two-side station plazas connecting by pedestrian bridge | <ul style="list-style-type: none"> • JR Inazawa Station, Japan • JR Biwajima Station, Japan |
| | Station plaza under viaduct | <ul style="list-style-type: none"> • JR Niigata Station, Japan • Shakujii-Kouen Station of Seibu Railway, Japan |
| Bus Stop | Column bus stop along arterial road | <ul style="list-style-type: none"> • Busan Station, Korea |
| Pedestrian Bridge | Attractive walk space | <ul style="list-style-type: none"> • JR Kawasaki Station, Japan |
| | Escalator and Elevator | <ul style="list-style-type: none"> • JR Sendai Station, Japan • JR Takasaki Station, Japan |
| | Moving walkway | <ul style="list-style-type: none"> • Sakuragi-cho Station, Japan |
| | Solar panel and illumination | <ul style="list-style-type: none"> • JR Kokura Station, Japan |
| Parking | Car parking under elevated station | <ul style="list-style-type: none"> • Sendai Airport Station, Japan • JR Shin-tosu Station, Japan |
| | Bicycle parking under viaduct | <ul style="list-style-type: none"> • Otagawa Station of Nagoya Railway, Japan |
| Access Road | U-turn bridge | <ul style="list-style-type: none"> • U-turn bridge on Motor way No.7, Bangkok |
| Other effective use of railway area | Retail store under viaduct | <ul style="list-style-type: none"> • Tokyu Store, Takatsu Station of Tokyu Railway, Japan |

Source: Study Team

2) Examples of Issues Due to the Lack of Intermodal Facilities in the Station Area

Figure 3.2.1 illustrates some cases of traffic issues in the station areas due to the lack of intermodal facilities. In these examples, traffic congestion and obstruction to pedestrians are caused due to shortage of adequate intermodal facilities such as station plaza, access road and parking.



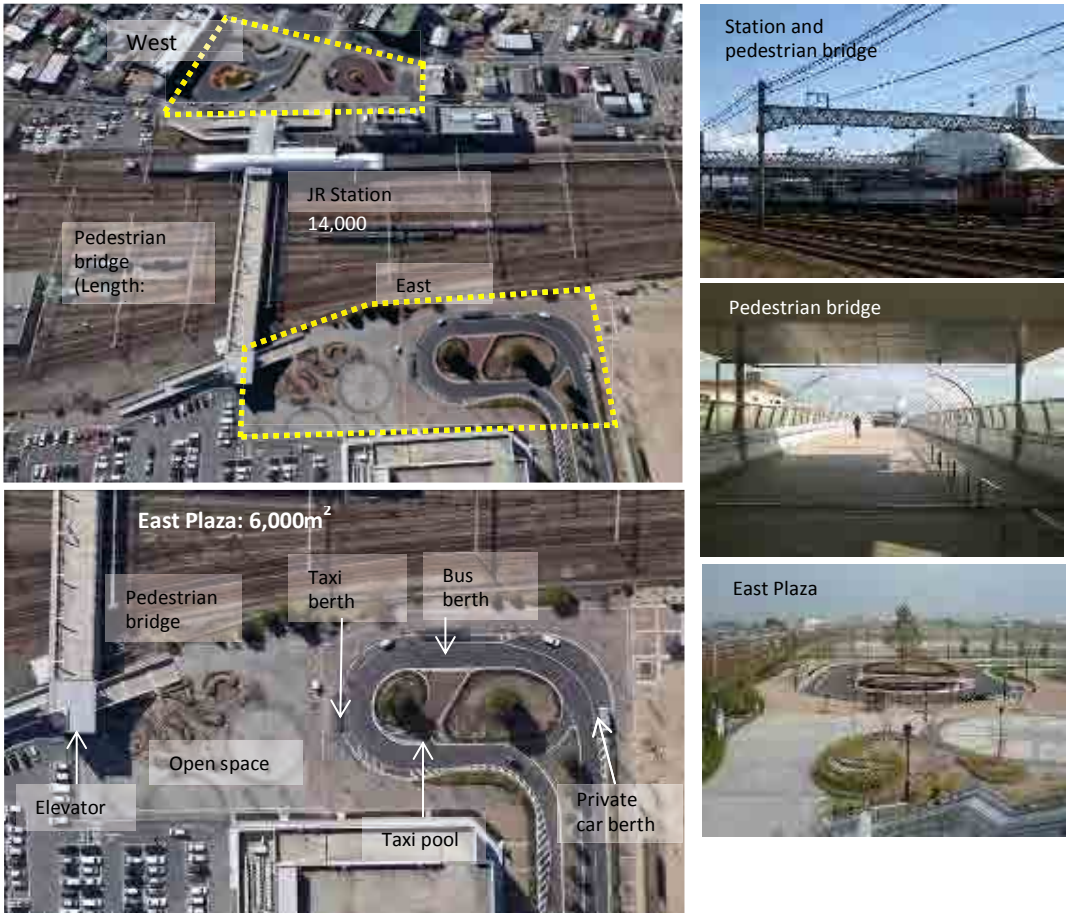
Source: Study Team

Figure 3.2.1 - Issues of Station Areas without Intermodal Facilities

3) Station Plaza

(1) Two-Side Station Plaza Connected by a Pedestrian Bridge (JR Inazawa Station, Aichi Prefecture, Japan)

Station plazas in Inazawa station is shown as an example of a two-side station plaza connected by a pedestrian bridge (Figure 3.2.2). Inazawa station is an elevated station with platforms on ground and is used by an average of approximately 14,000 passengers daily. Since the urban areas surrounding the station are divided by railway tracks 100 meters wide, station plazas were developed at both the east and west side of the station. The pedestrian bridge, which is 110 meters in length and 8.0 meters wide, was also constructed to connect urban areas on both sides to secure the accessibility not only of railway users but also of general pedestrians. The bridge was also installed with an elevator and escalator at both sides for the convenience of persons with disabilities. East plaza with an area of 6,000 square meters consists of intermodal space and scenery designed open space. The intermodal space has a one-way carriageway and transit spaces for bus, taxi and private car located with enough distance from each other and pedestrian space of 6.0 meters wide or more. The open space is located between the pedestrian bridge and intermodal space, and is supplied with seasonal plants to create a natural ambience.



Source: Study Team

Figure 3.2.2 - Two-Sided Station Plaza connected by Pedestrian Bridge (JR Inazawa Station)

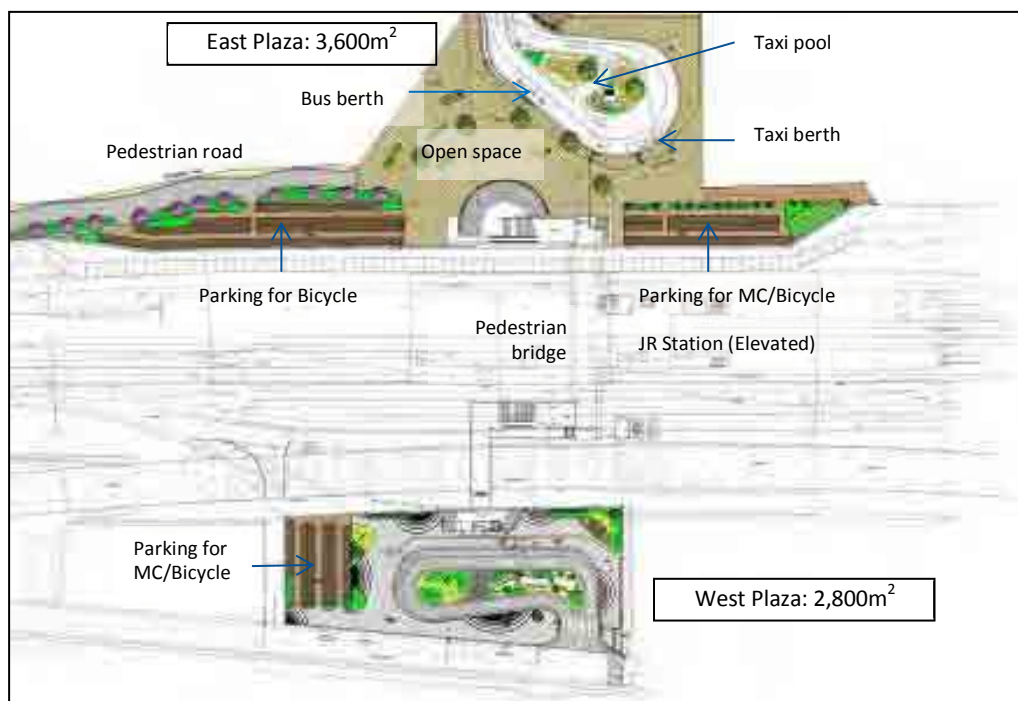
(2) Two-Side Station Plaza Connected by Pedestrian Bridge (JR Biwajima Station, Aichi Prefecture, Japan)

Station plazas in Biwajima station is also shown as an example of two-side station plaza connected by pedestrian bridge (Figure 3.2.3, 3.2.4). Biwajima station is an elevated station with platforms on ground and is used by an average of approximately 7,000 passengers daily. Although the station building is on-ground and facing only the west urban area, the station was elevated in 2008 and the pedestrian bridge 100 meters in length and 5 meters wide was constructed by the municipality. The pedestrian bridge has an escalator and elevator at both sides to secure access for railway users. What used to be a factory area located on the east side of the station was re-developed into a residential and commercial area by the land readjustment project from 2001 to 2007. The station plazas were developed on the west side on a portion of the railway area and on the east side in the land readjustment project area. West plaza with an area of 2,800 square meters consists of intermodal space for taxis and private cars but not for buses because there is no bus service in the west urban area. East plaza with an area of 3,600 square meters consists of intermodal space and open space. The intermodal space has one-way carriageway and transit spaces for buses, taxis and private cars located with enough distance from each other and pedestrian space of 6.0 meters wide or more. In addition, a total of 2,014 free parking spaces (586 in the west and 1,428 in the east) for bicycle and motor cycle are located at both sides for the convenience of railway users.



Source: Kiyosu City

Figure 3.2.3 - Two-side Station Plaza connecting with a Pedestrian Bridge (JR Biwajima Station)



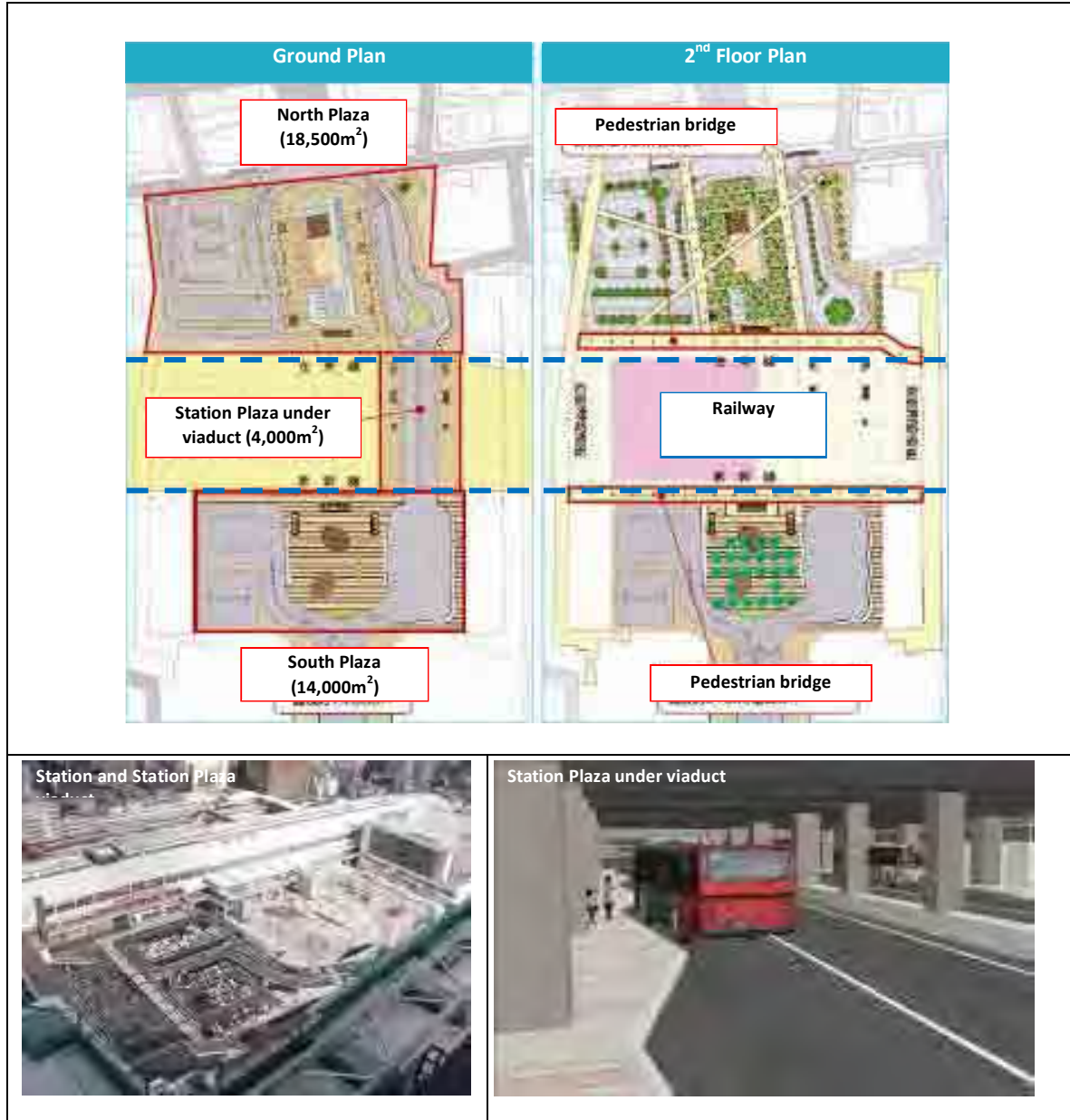
Source: Kiyosu City

Figure 3.2.4 - Two-side Station Plaza connecting with a Pedestrian Bridge (JR Biwajima Station)

(3) Station Plaza under the Viaduct (JR Niigata Station, Niigata Prefecture, Japan)

The station plaza in Niigata station is shown as an example of station plaza under a viaduct (Figure 3.2.5). Niigata station is a terminal station connected to the local railway and high-speed railway and is used by an average of approximately 37,000 passengers daily. Since 2007, renovation of the station area has been ongoing. The renovation project includes the railway elevation, renovation of the station building and redevelopment of the station plaza. The new south plaza and the pedestrian bridge were already completed in 2009 and railway elevation will be completed by 2021. After the elevation, the station plaza under the viaduct will open in 2022.

The station plaza under the viaduct with an area of 4,000 square meters is aimed towards the effective use of right of way of the railway to create a pedestrian passing between both sides of the station and provide convenience of bus services. For the railway passengers, it will result in a shorter distance between the ticket gates and the bus berths, and provide for a comfortable waiting space that will shield passengers from the rain and heat of the sun.



Source: Niigata City

Figure 3.2.5 - Station Plaza under the Viaduct (JR Niigata Station)

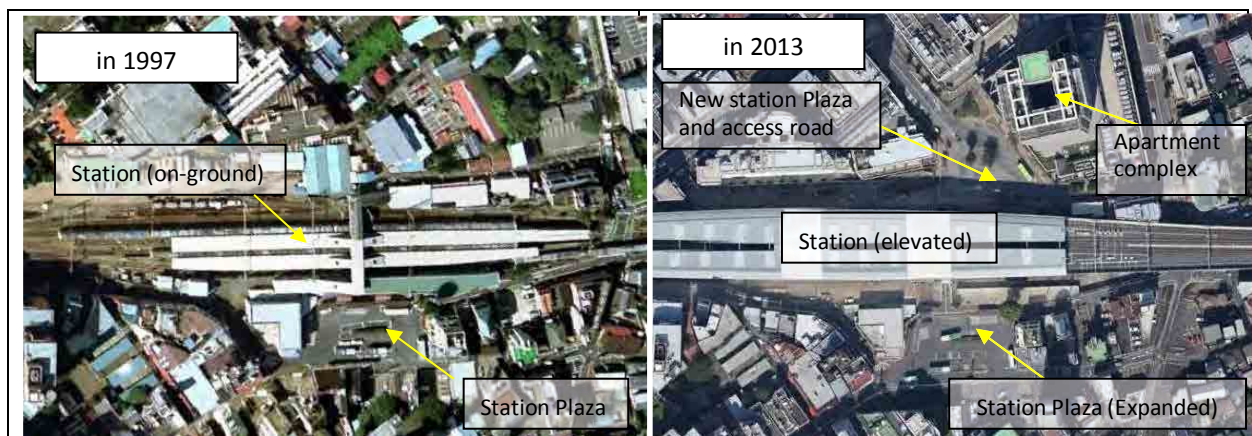
(4) Station Plaza under the Viaduct (Seibu Railway, Shakuji-kouen Station, Tokyo, Japan)

The station plaza in Shakuji-kouen station is shown as an example of a station plaza under a viaduct (Figure 3.2.6, 3.2.7). Shakuji-kouen station is a station of private railway of Seibu Railway and is used by an average of approximately 71,000 passengers daily. The railway elevation project was completed in 2013. At present, the intermodal facilities renovation project is on-going in the surrounding of the station and will finish in 2014. The new station plaza with an area of 4,399 square meters is planned to be located under the viaduct due to the shortage of available land. Usually, a station plaza in Japan is developed on land owned by the municipality and not on the railway right of way but the location of the new station plaza will provide a convenient and comfortable space for railway passengers. The passenger can easily access between the station and the transit space for the bus because of the short distance and pedestrian corridor is shielded from rain and heat of the sun.



Source: Seibu Railway

Figure 3.2.6 - Station Plaza under the Viaduct (Shakuji-Kouen Station of Seibu Railway)



Source: Study Team

Figure 3.2.7 - The Changing of the Shakuji-kouen Station Area

4) Bus Stops

(1) Column Bus Stops along the Arterial Road (Busan Station, Busan, Korea)

Bus stop in Busan station is shown as an example of column bus stops along arterial road (Figure 3.2.8). Busan station is a terminal station connecting to local railways and high-speed railway. It is used by an average of approximately 41,000 passengers daily. There is a huge station plaza with an area of 20,000 square meters or more in front of the station, most of which is a shared public open space. Bus stops and taxi berth are located at the edge of the station plaza and along the arterial road. Although it is quite inconvenient for railway passengers due to the long distance from the station gate, the column bus stops along the arterial road which is a major bus route is reasonable from an efficient bus service operation perspective.



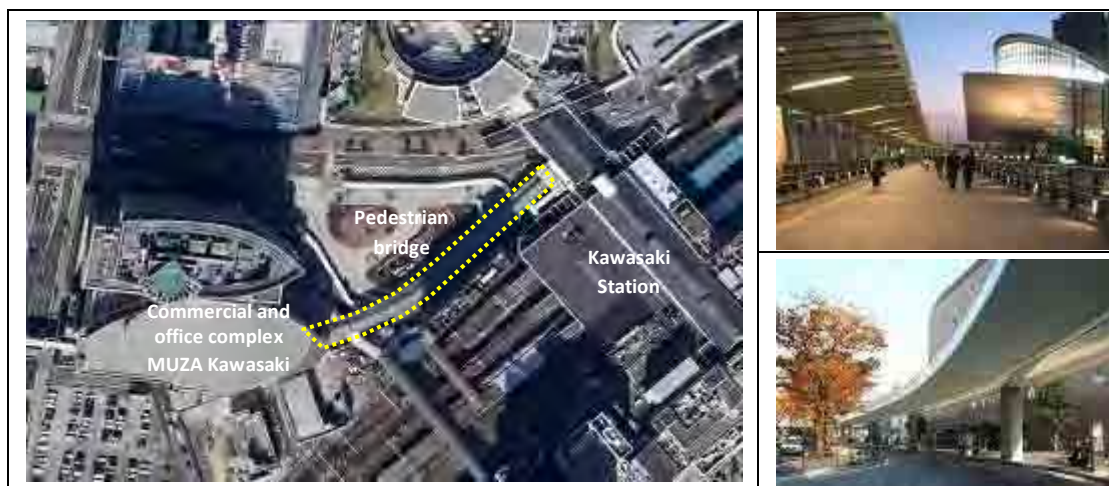
Source: Study Team

Figure 3.2.8 - Column Bus Stop at Roadside (Busan Station, Korea)

5) Pedestrian Bridge

(1) Pedestrian Bridge with an Attractive Walk Space ("Kawasaki MUZA Deck" at JR Kawasaki Station, Kanagawa Prefecture, Japan)

The pedestrian bridge "Kawasaki Muza" in JR Kawasaki station is shown as an example of a pedestrian bridge that has an attractive walk space (Figure 3.2.9). Kawasaki station is elevated on JR line and is used by an average of approximately 188,000 passengers daily. The pedestrian bridge is 125 meters in length and 7.5 meters wide and was developed to access between west gate of Kawasaki station and the commercial and office complex "Muza Kawasaki" in 2003. The bridge was awarded the Civil Engineering Prize 2010 by the Japan Society of Civil Engineers. The bridge is shaped as a gentle curve with translucent glass roof on one side of the edges. The lighting installed on both the roof beam and the underfoot of the pillar very well create a visual effect. The structure of the bridge serves as shelter for bus stops on ground as well and is installed ceiling lights to illuminate the bus terminal. Thus, the bridge has both functions of pedestrian access and attractive space for the railway users.



Source: Study Team

Figure 3.2.9 - Pedestrian Bridge with an Attractive Walk Space (Kawasaki Station)

(2) Pedestrian Bridge with Escalators and Elevators (JR Sendai Station, Miyagi Prefecture, Japan)

The pedestrian bridge in east gate of JR Sendai station is shown as an example of a pedestrian bridge installed with escalators and elevators (Figure 3.2.10). Sendai station is a terminal station connecting to local railways, high-speed railway and metro line. It is used by an average of approximately 118,000 passengers daily. The station building is a four-story building that includes a two-story concourse for local railway on the 2nd floor and for high-speed railway on the 3rd floor.

East station plaza has 9 bus berths which serve 18 bus routes including feeder buses and long-distance buses. A pedestrian deck is established for the connection between the concourse on the 2nd floor and the bus berths on the plaza. For easy access, the deck is installed with two elevators and has three stairs with two-way escalators in consideration of the traffic capacity and for the use of persons with disabilities. The stairs is 22 meters in length and 4.0-5.0 meters wide and has glass roofing for the escalator.

Since March 2013, the east-gate area renovation project is ongoing. The project consists of three sub-components: (i) east-west pedestrian corridor, (ii) station upgrading, (iii) commercial and hotel complex development on right of way of railways. The project is expected to be completed in 2016.



Source: Study Team

Figure 3.2.10 - Pedestrian Bridge with Escalators and Elevators (JR Sendai Station)

(3) Pedestrian Bridge with Elevators (JR Takasaki Station, Gunma Prefecture, Japan)

Pedestrian bridges in JR Takasaki station is shown as an example of a pedestrian bridge with elevator (Figure 3.2.11). The station is a terminal station connecting to local railways, high-speed railways and is used by an average of approximately 31,000 passengers daily. The station is structured with local railway on-ground and elevated high-speed railway line.

The east station plaza was upgraded in 2012. The plaza with an area of 10,000 square meters includes the bus terminal with 18 berths for feeder and long-trips, 4 berths for taxi, taxi pool of 30 lots, private car dropping space of 14 berths and 2 berths for people with disability. For the connection between the station and those transit spaces, a pedestrian network improvement project is being implemented since 2007 (Table 3.2.2). Each bridge was installed one or two elevators to access to main pedestrian space on the station plaza and arterial road nearby commercial complexes. It will provide short access for the railway passenger compared with on-ground moving with interruption by the carriageway in station plaza. In addition, the size of elevator cages was designed in consideration for users on wheelchair.

Table 3.2.2 - Pedestrian Bridge with Elevators (JR Takasaki Station)

| | Station Bridge | Bridge A | Bridge C | North Bridge |
|-------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------------|
| Date of Operation | Dec 2010 | Dec 2008 | Mar 2010 | Dec 2011 |
| Length | 90.4m | 97.4m | 40.0m | 41.4m |
| Width | 12.0m | 6.0m | 4.0m | 4.0m |
| Area | 1,100.0m ² | 823.5m ² | 160.0m ² | 198.7m ² |
| Facility | Elevator: 1 Stair: 1 Lighting | Elevator: 1 Stair: 1 Lighting | Elevator: 2 Stair: 2 Lighting | Lighting |

Source: Takasaki City



Source: Takasaki City

Figure 3.2.11 - Pedestrian Bridge with Elevators (JR Takasaki Station)

(4) Pedestrian Bridge with Moving Walkways (Sakuragi-cho Station, Yokohama, Japan)

Pedestrian bridge in Sakuragi-cho station is shown as an example of pedestrian bridge installed with moving walkway (Figure 3.2.12). Sakuragi station is a nodal station connecting to JR line and subway line. It is used by an average of approximately 77,000 passengers daily. The concourse of JR station is elevated on the 2nd floor.

The pedestrian bridge is 230 meters in length and 12 meters wide and was established in 1989 to provide access from the station towards the direction of the Yokohama Landmark Tower in the city center. It is installed with moving walkway for pedestrian access convenience. In addition, a solar panel was installed on the rooftop in 2009. The solar panel of 1,773 square meters generates electric power to a maximum of 75,000kWh/year for the moving walkway and the lighting fixtures, and supplies 20% of the electric power required by the moving walkway.



Source: Study Team

Figure 3.2.12 - Pedestrian Bridge with Moving Walkway (Sakuragi-cho Station, Yokohama)

- (5) Pedestrian Bridge with a Solar Panel Roof and Illumination (JR Kokura Station, Kitakyushu city, Japan)

Pedestrian bridge in JR Kokura station is shown as an example of pedestrian bridge with solar panel and illumination (Figure 3.2.13). The station is a terminal station connecting to JR line, high-speed railway and urban railway (monorail). It is used by an average of approximately 54,000 passengers daily. The station building is elevated with local railway platform on the 2nd floor and high-speed railway and monorail on the 4th floor.

The pedestrian bridge is 5-11 meters wide and was established in 1997 to provide access between the south gate of the station and the surrounding commercial area. Although it was an open-air bridge, a solar panel roof that is 210 meters in length and LED illuminations were installed to the main bridge in 2012 to provide access to a commercial complex. The roof provides comfortable walk space avoiding rain and the heat of the sun and the solar panel generates electric power for illumination, escalator and elevators. The LED illumination was installed with 83 units to secure the intensity of illumination and 42 units to create a visual effect. The lighting decoration according to the season and events contributes to improve the revitalization of the station area.



Source: Study Team

**Figure 3.2.13 - Pedestrian Bridge with Solar Panel and Illumination
(Kokura Station, Kitakyushu City)**

6) Parking

(1) Car Parking under an Elevated Station (Sendai Airport Station, Miyagi Prefecture, Japan)

Car parking in Sendai Airport station is shown as an example of car parking under an elevated station (Figure 3.2.14). The elevated station is connecting to Sendai Airport Access line and is located close to the Sendai Airport. It is used by an average of approximately 3,700 passengers daily. The ground floor of the station is utilized for car parking. It contributes to a part of car parking with total capacity of 1,162 parking spaces.



Source: Study Team

Figure 3.2.14 - Car Parking under the Elevated Station (Sendai Airport Station, Sendai City)

(2) Car Parking under an Elevated Station (Kyushu-shinkansen, Shin-tosu Station, Saga Prefecture, Japan)

Car parking in Sendai Airport station is shown as an example of car parking under an elevated station (see Figure 3.2.15). The station is connecting to local line and high-speed railway and is used by an average of approximately 836 passengers daily. The ground floor of the station is utilized for car parking with an area of 2,519 square meters and capacity of 63 parking spaces. Railway users with season ticket get a discounted rate on parking.



Source: Study Team

Figure 3.2.15 - Car Parking under the Elevated Station (Shin-tosu Station, Tosu City)

(3) Bicycle Parking under the Viaduct (Nagoya Railway, Otagawa Station, Tokai City, Japan)

Bicycle parking in Otagawa station is shown as an example of bicycle parking under the viaduct (Table 3.2.3 and Figure 3.2.16). Otagawa station is a station of private railway of Nagoya Railway and is used by an average of approximately 13,000 passengers daily. The station area redevelopment project is implemented since 2003. The project includes elevating of railway and station, redevelopment of station plaza and land readjustment project of the station surroundings. At present, the project is almost complete and is expected to be fully completed by 2015.

After completion of railway elevation and the station plaza, two bicycle parking areas were built under the viaduct in 2012 with a total capacity of 1,928 parking spaces for bicycles and motorcycles. Parking is free for the first three hours and for students and season-ticket holders.

Table 3.2.3 - Bicycle Parking of Otagawa Station

| | North | South |
|-------------------|---------------------------------|--------------------|
| Date of Operation | Oct 2012 | Nov 2012 |
| Capacity | Bicycle: 765 Motorcycle: 142 | Bicycle: 1,021 |
| Building Area | 130 m ² | 847 m ² |
| Structure | 1-storey | 2-storey |

Source: Tokai City



Source: Study Team

Figure 3.2.16 - Bicycle Parking under the Viaduct (Otagawa Station, Tokai City)

7) Access Road

- U-turn bridge on Highway (Bangkok, Thailand)

U-turn bridge on Motorway No. 7 in Bangkok is shown as an example of U-turn bridge on Highway (Figure 3.2.17). Motorway No. 7 is a highway road connecting between Suvarnabhumi International Airport and the city center of Bangkok. It is an on-ground carriageway with eight lanes and 70 meters in width. For the improvement of connectivity on the highway network, U-turn bridges with one-way were developed above the carriageway. This development has a reduced project cost since there is no need for land acquisition.



Source: Study Team

Figure 3.2.17 - U-turn Bridge on Highway (Bangkok)

8) Other Effective Utilization of the Railway Area

- Retail Store Under the Viaduct (Tokyu Store, Takatsu Station of Tokyu Railway, Kawasaki city, Japan)

Tokyu Store in Takatsu station is shown as an example of a retail store under the viaduct as an effective utilization of railway area (Figure 3.2.18). The surrounding area of Takatsu station is a residential area where many young families live in. However, there was no supermarket and the residents demanded for one. So in Oct. 2013, Tokyu Railway established the supermarket "Tokyu Store" under the viaduct that has been created by the quadruple-track project. The store with a sales area of 672 square meters sells perishables and foodstuff, and the exterior is finished with a light-earth color and is decorated with various plants to provide a peaceful and comfortable surrounding for the residents.



Source: Tokyu Railway

Figure 3.2.18 - Retail Store Under the Viaduct (Tokyu Store, Takatsu Station of Tokyu Railway)

9) Inputs for Intermodal Facilities on the HCMC UMRT Line 1

Table 3.2.4 shows some of the practical inputs for intermodal facilities of the HCMC UMRT Line 1 from examples in foreign countries.

Table 3.2.4 - Inputs for Intermodal Facilities on the HCMC UMRT Line 1

| Intermodal Facility | Inputs | Target Station |
|-------------------------------------|--|----------------------------------|
| Station Plaza | <ul style="list-style-type: none"> • Functional layout of transit spaces for bus, taxi and private car • Adequate pedestrian space and open space • Scenery space with monument and planting | All station |
| | <ul style="list-style-type: none"> • Provide modal shift space at both sides of station | Stations along the Hanoi Highway |
| | <ul style="list-style-type: none"> • Effective use under station building and viaduct | Elevated stations |
| Bus Stop | <ul style="list-style-type: none"> • Utilize road side for bus stops to save facility space | Stations along the Hanoi Highway |
| Pedestrian Bridge | <ul style="list-style-type: none"> • Secure adequate width • Elevator and escalator for persons with disability • Moving walkway to secure the traffic capacity • LED illumination for visual attractiveness • Solar panel to generate electric power for the optional facilities | Elevated stations |
| | <ul style="list-style-type: none"> • Pedestrian bridge network to connect surrounding facilities | Tan Cang station |
| Parking | <ul style="list-style-type: none"> • Parking under station and viaduct • Discount rate for railway user with season ticket | Elevated stations |
| Access Road | <ul style="list-style-type: none"> • U-turn bridge for improvement of accessibility | Stations along the Hanoi Highway |
| Other effective use of railway area | <ul style="list-style-type: none"> • Retail store under station and viaduct | Elevated stations |

Source: Study Team

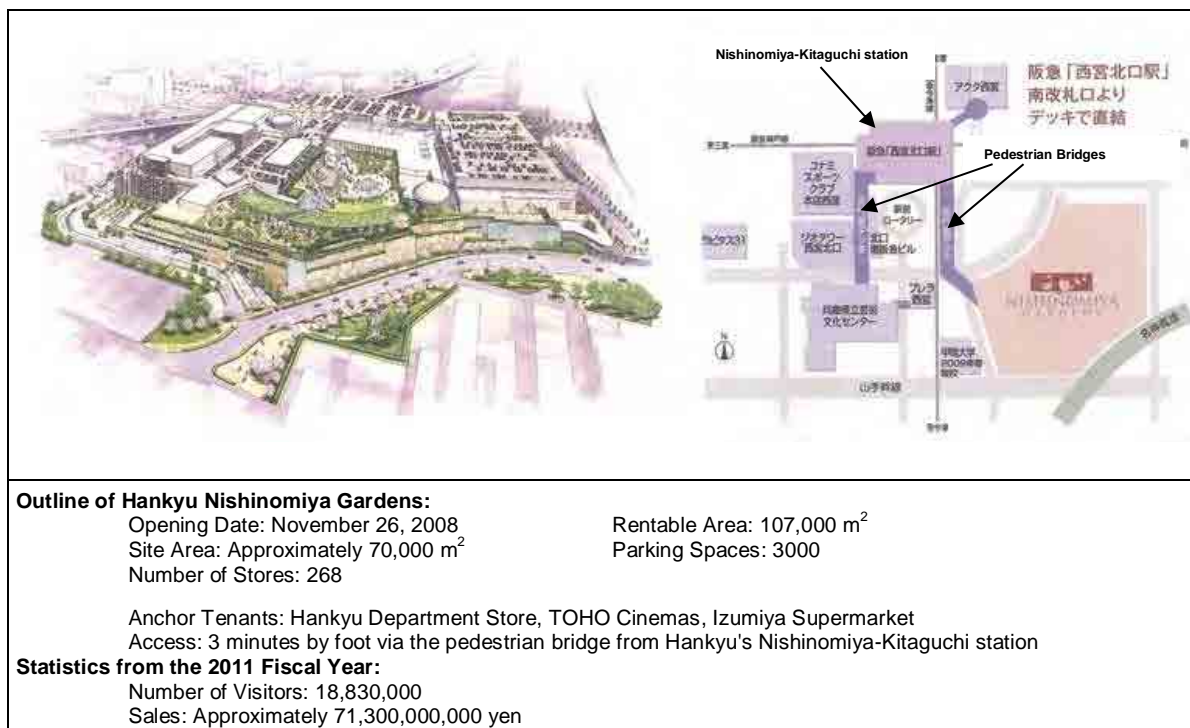
3.3 Station Area Development

1) Urban Development along Private Railway Lines in Japan

(1) Urban Development by Hankyu Corporation in Hyogo Prefecture, Japan

Hankyu Corporation (Hankyu) located in the Kansai area of western Japan is the pioneer in Japan of the business model of integrating urban development along with the construction of railway lines. One of the representative projects of this business model was the construction of the Hankyu Takarazuka Line in a greenfield area in Hyogo Prefecture in the first half of the 20th century. In order to increase the ridership and to maintain this ridership, during and after the construction of the line, Hankyu also developed commercial and leisure facilities along the line in addition to developing residential real estate. This project has been very successful and today, the area along the Hankyu Takarazuka Line is fully urbanized due to the efforts of Hankyu.

Recently, in 2008, Hankyu developed the "Hankyu Nishinomiya Gardens", a large scale commercial complex that includes a department store, shops and restaurants, a multiplex theater, etc. adjacent to Nishinomiya-Kitaguchi station, one of the main interchange stations between Hankyu's Kobe Line and Imazu Line. The large scale commercial complex is connected with the station with elevated pedestrian bridges to create a pedestrian priority space in the area surrounding the station.



Source: Hankyu Hanshin Holdings, Inc.

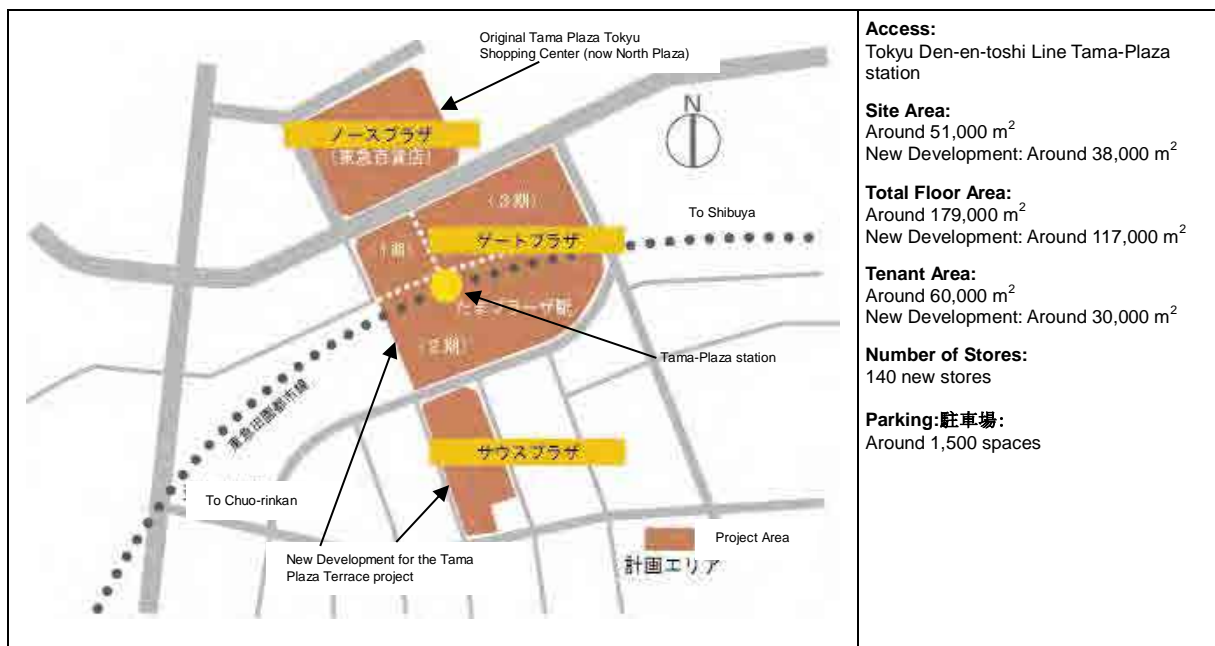
Figure 3.3.1 - Hankyu Nishinomiya Gardens

(2) Urban Development by Tokyu Corporation in Kanagawa Prefecture, Japan

Tokyu Corporation (Tokyu), which was established in 1922, has developed the residential areas integrated with railway networks extending to the southwest suburban area of the Tokyo Metropolitan Area. Besides operating the railway and developing real estate, Tokyu is also involved in various other types of businesses such as the hospitality and retail businesses and others.

The "Tama Denen Toshi" (Tama Garden City) along Tokyu's Den-en-toshi Line is one of the success examples of Tokyu's efforts in integrated rail and property development. The 490 km² area along the railway line has a population of about 5 million and is one of the successful high-end suburban residential areas in the Tokyo Metropolitan Area. There are bus networks operated by Tokyu that acts as feeders to connect the farther suburban development to the Den-en-toshi Line.

There is a good example of Tokyu's efforts at integrated commercial development with railway stations at Tama-Plaza station on the Den-en-toshi Line. In 1982, Tokyu first opened the Tama Plaza Tokyu Shopping Center on the northern side of the railway station. To meet the needs of the 21st century and based on the concept of "attracting young people while serving an increasingly aging population in order to maintain the vitality of the surrounding area", the existing Tama Plaza Tokyu Shopping Center was completely renovated and expanded and Tama Plaza station was completely rebuilt to be fully integrated into this commercial facility to provide greater convenience for passengers and to attract new customers. In addition, multimodal transport facilities were also improved at this station such as the construction of an underground enclosed bus terminal located directly under the commercial facility. This commercial facility was renamed Tama Plaza Terrace and was fully opened in 2010. Compared to the previous facility, the Tama Plaza Terrace was built based on the concept of total integration with the existing railway station. An outline of the Tama Plaza Terrace commercial facility is shown below.



Source: Tokyu Corporation

Figure 3.3.2 - Outline of the Tama Plaza Terrace Commercial Facility



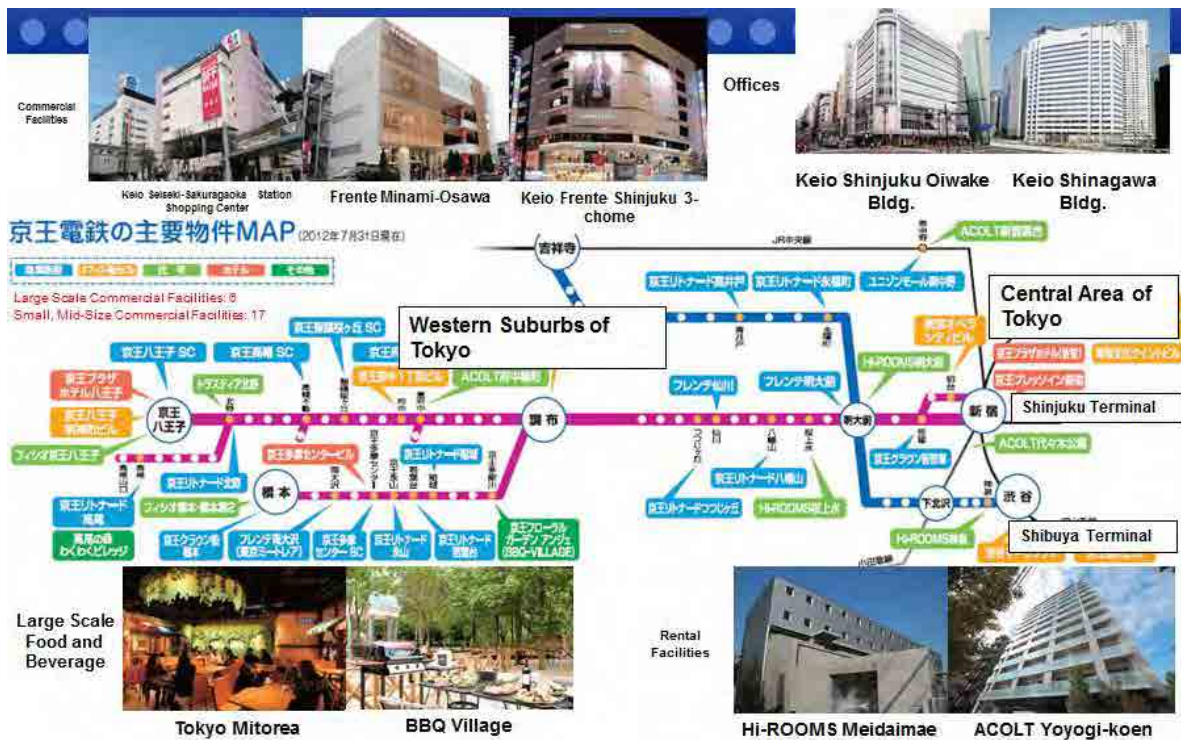
Source: Tokyu Corporation

Figure 3.3.3 - Image of the Tama Plaza Terrace Commercial Facility

(3) Urban Development by Keio Corporation in Tokyo, Japan

The railway lines of Keio Corporation (Keio) extending from the center of Tokyo to the western suburbs boast of the largest incoming and outgoing passengers in the world.

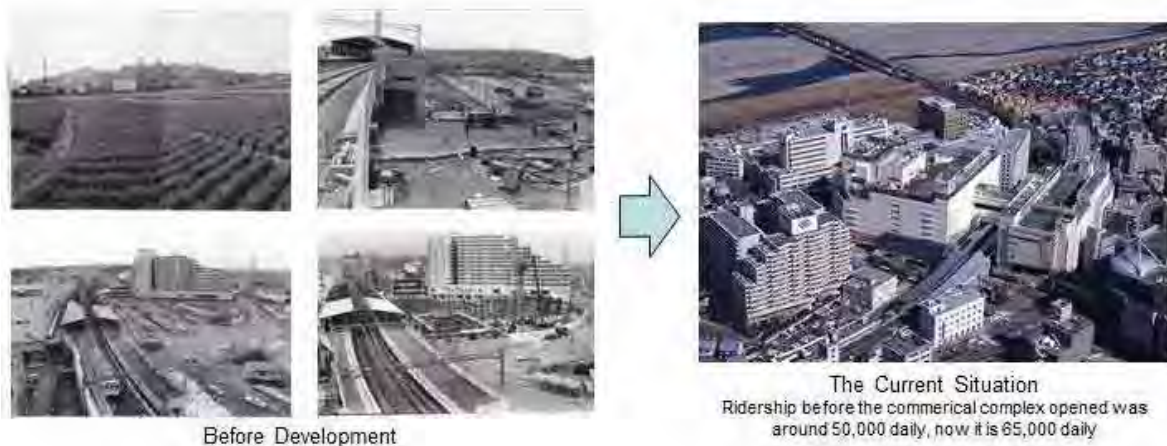
Keio has had more than 50 years of experience in undertaking urban development along its railway lines. The urban development that Keio has carried out are at its Shinjuku and Shibuya terminal stations as well as many stations along its two lines that connect the central area of Tokyo to the suburbs, the Keio Main Line and the Inokashira Line. The various urban development projects from Keio are shown in the following figure.



Source: Keio Corporation

Figure 3.3.4 - Urban Development along Keio's Railway Lines

The Seiseki-Sakuragaoka Shopping Center at Seiseki-Sakuragaoka station is one of the examples of Keio's efforts in developing a large scale commercial complex at its railway station. Based on the "Tama City Station Area Basic Plan", in 1981, Keio planned a new town based on the concept of suburban style comprehensive development. 5 years after the original plan, Seiseki-Sakuragaoka Shopping Center with a total floor area of 80,000 m² was opened. Currently, as the largest scale commercial complex in the western suburban area of Tokyo, it is very popular among the residents of the area.



Source: Keio Corporation

Figure 3.3.5 - Keio Corporation's Seseki-Sakuragaoka Urban Development

(4) Urban Development by Nishi-Nippon Railroad in Fukuoka, Japan

Aside from the railway service, Nishi-Nippon Railroad Co. (Nishitetsu) conducts various businesses that includes taxi and bus operations (short and long-distance), real-estate, hotel and leisure businesses, distribution services, etc., in Fukuoka City, the primary city in southern Japan and surrounding areas. It has developed large-scale multi-function facilities (e.g., Solaria Terminal Building, Solaria Stage Building, Solaria Plaza Building) integrated with the central railway terminal, the Nishitetsu Fukuoka Station, which is also an intercity bus terminal.

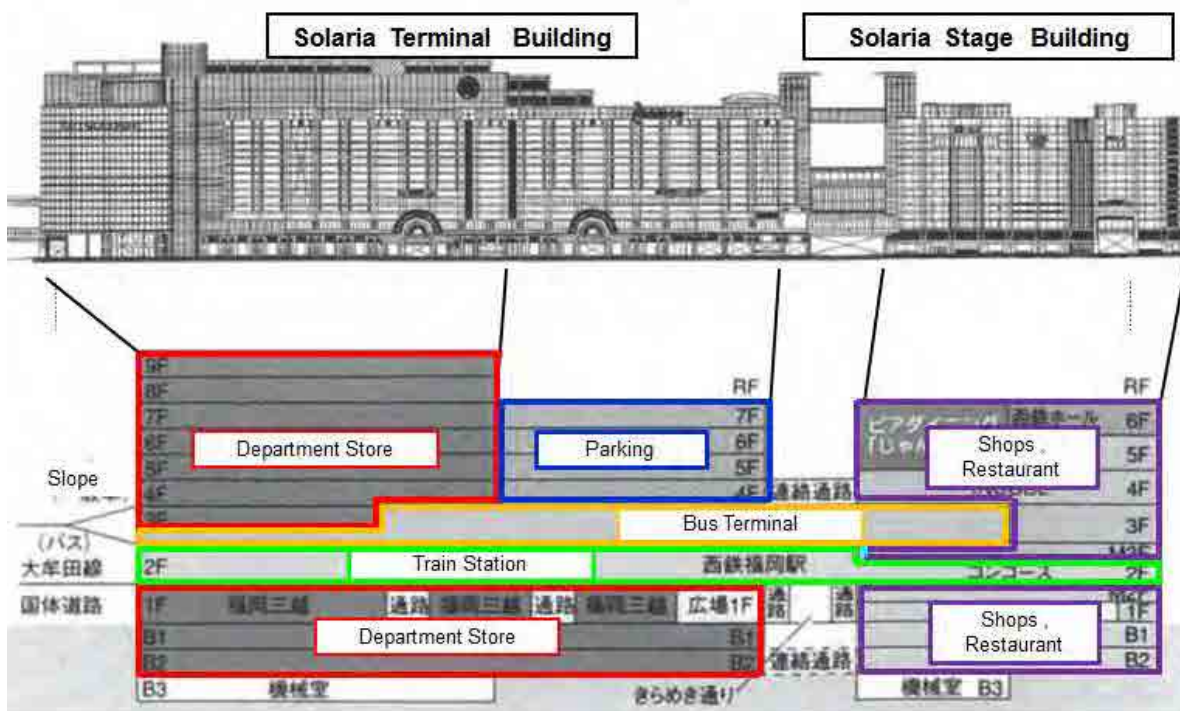


Source: Nishi-Nippon Railroad Co. Ltd.

Figure 3.3.6 - Bird's Eye View of Nishitetsu's Urban Development in Fukuoka

Nishitetsu's Fukuoka Station has various functions including commercial and hotel facilities. This has maximized the convenience to people who use the railway and bus services of the station.

In addition, the bus terminal at Nishitetsu's Fukuoka Station serves many different types of services (e.g., express, rapid), for mid-to-long distance routes. It is the busiest bus terminal in Japan in terms of the annual number of long distance bus users. In the bus terminal, there is a glass wall that separates the waiting area for the buses and the boarding and alighting platforms for the buses so that passengers waiting for buses are shielded from the emissions and exhaust from running buses. At Nishitetsu's Fukuoka Station, there are an average of 128,500 railway users and 20,000 bus users per day.



Source: Nishi-Nippon Railroad Co. Ltd.

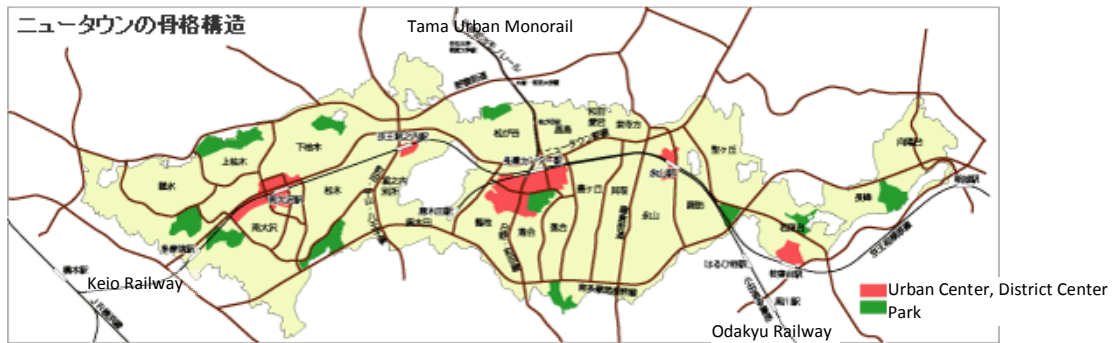
Figure 3.3.7 - Cross Section of Nishitetsu's Fukuoka Station

2) Urban Development along Railway Lines Led by the Public Sector in Japan

(1) Urban Development by the Public Sector in Tama New Town in Tokyo, Japan

Tama New Town is a large residential development, straddling the four municipalities of Tokyo (Hachioji, Tama, Inagi and Machida Cities), with an area of about 28,000 ha. It was designed as a new town in 1965 by the metropolitan government. It is approximately 14 kilometers stretching east-west direction 1-3 kilometers wide and located in an expanse of hills known as the Tama Hills about 20 kilometers west of the

center of Tokyo. The area’s development has been conducted mainly by the public sector with only some small areas in which the residents who wanted to stay applied the land readjustment method. In contrast, the railway lines are covered by the private railway companies, Keio Railway Corporation and Odakyu Corporation, with two lines and more than 10 stations, which connect with the sub-center of Tokyo, Shinjuku.



Source: Study Team based on Urban Renaissance Agency website

Figure 3.3.8 - Urban Structure of the Tama New Town

(2) Urban Development by the Urban Renaissance Agency along the Tsukuba Express Line in the Tokyo Metropolitan Area, Japan

The urban railway line extending eastward of Tokyo (Chiba, Saitama and Ibaraki Prefectures), Tsukuba Express (TX), has been in operation since 2005 with a total length of 58.3 km (38 minutes is the shortest operational time with a maximum speed of 130 km/h) and 20 stations in total. To develop suburban areas along the TX, “Integrated Land Readjustment (LR) Projects” were carried out by the public Urban Renaissance Agency (UR) by integrating the development of the railway line, infrastructure and urban facilities.

Regarding urban development along the TX, the UR was in charge of urban development in 6 development zones these 6 zones made up of 1/3 of all the development zones along the line. When adding up the land area in the zones that the UR was in charge of, the UR was in charge of 1,400 ha, which is roughly half of the entire land area for urban development along the TX. The following table shows the details of UR’s urban development efforts along the TX.

Table 3.3.1 - Outline of the UR's Urban Development Efforts along the Tsukuba Express

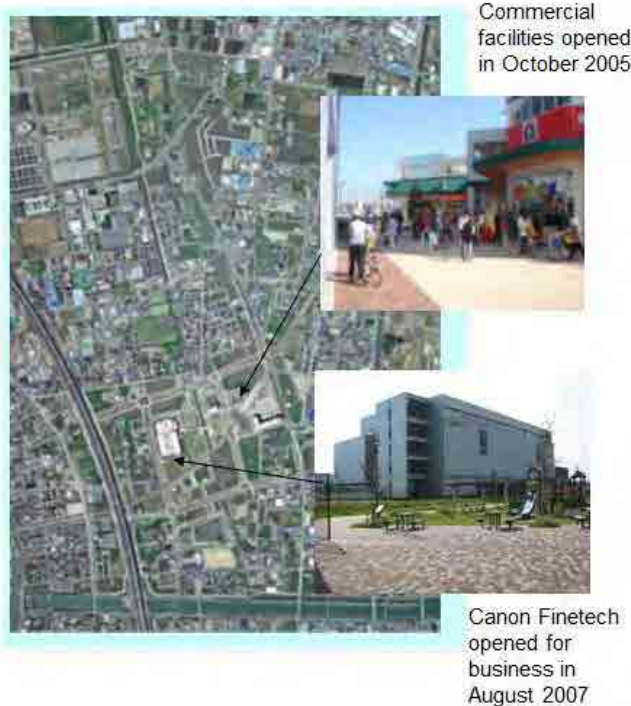
| Administrative Area | Number of Zones | Area of Urban Development (ha) | Planned Population (people) | Outline |
|---|-----------------|--------------------------------|-----------------------------|---|
| Tokyo Metropolitan Area | 2 | 78 | 9,300 | |
| Saitama Prefecture (Zones undertaken by UR) | 4 (2) | 374 (187) | 39,900 (20,400) | Misato-chuo (115 ha): Misato-chuo Station Yashio-nanbu-chuo (72 ha): Yashio Station |
| Chiba Prefecture (Zones undertaken by UR) | 6 (2) | 1,081 (456) | 104,900 (45,600) | Kashiwa-hokubu-higashi (170 ha): Kashiwa-Tanaka Station Shin-shigaichi (286 ha): Nagareyama-otakanomori Station |
| Ibaraki Prefecture (Zones undertaken by UR) | 6 (2) | 1,375 (778) | 83,200 (46,000) | Katsuragi (485 ha): Kenkyu-gakuen Station Kayamaru (293 ha): Midorino Station |
| Total (Total zones undertaken by UR) | 18 (6) | 2,908 (1421) | 237,300 (112,000) | The 7 zones including Nakane-kondadai has a total land area of around 1,611 ha The 20 zones including Nakane-kondadai, Kami-kawarazaki and Naka-nishi has a total land area of around 3,264 ha |

Source: Urban Renaissance Agency

Before Land Readjustment



The Current Conditions



Source: Urban Renaissance Agency

Figure 3.3.9 - Urban Development in the Misato-chuo Area along the Tsukuba Express

One of the primary development areas along the TX is the area surrounding Kashiwanoha-campus station. The UR together with the private sector, citizens and universities, conducted various activities including formulating the urban development vision and establishing the urban design center for urban development at this station. In addition, a private developer has been leading the next generation of urban development at the station area by introducing mixed-use urban functions that includes residences, commercial facilities, medical and welfare facilities, and an incubation facility for high technology.



Source: Study Team based on the brochure of “Urban Design Center Kashiwanoha”

Figure 3.3.10 - Kashiwanoha-campus Station

3) Urban Area Renewal Integrated with New Transportation System

(1) BRT System and Integrated Master Plan - Curitiba, Brazil

Curitiba has a unique transportation system which was developed locally but is attracting worldwide interest. The popularity of Curitiba's BRT has affected a modal shift from automobile travel to bus travel, resulting in 28 percent of BRT riders who previously had traveled by car. Curitiba's Master Plan, in which land use planning is integrated with transportation planning, has called for a cultural, social, and economic transformation of the city. The plan limits the growth of the city center, while it encourages the growth along the transport arteries radiating out from the city center.



Source: The Report of "The Project on Integrated UMRT and Urban Development for Hanoi in Vietnam"

Figure 3.3.11 - BRT of Curitiba

(2) Downtown Redevelopment Projects with Introduction of LRT and Improvement of Pedestrian Spaces - Bilbao, Spain

Bilbao, which once flourished due to the mining and manufacturing industries, had been suffering from the economic downturn since the 1970's. However, the downtown redevelopment projects with the slogan "Creative City" have been implemented from the late 1990's, including the opening of Guggenheim Museum Bilbao designed by the famous American architect in 1997. And now, the redevelopment projects have successfully received international accolade. The redevelopment projects included the introduction of the LRT system in 2002, which connects the museum and the international exhibition hall, and the improvement of pedestrian spaces including the pedestrian bridges crossing the river running through the central area of the city. Those projects have enhanced the convenience and the amenities for the people walking along the river.



Source: The Study Team

Figure 3.3.12 - LRT of Bilbao

(3) Toyama, Japan

Toyama City is one of the local cities in Japan which are suffering from decreasing population due to a lowered population growth rate and an ageing population. The city's principal urban planning issue is how to rearrange the spreading urban areas to compact ones. To address this urban planning issue, the city has taken over the existing railway line from the national railway company and converted that line to the LRT equipped with barrier-free facilities to increase ridership of elderly citizens. The LRT line is expected to support the urban rearrangement with a compact structure, which in turn will revitalize the urban center.



Source: Visit Toyama, Toyama City Global Site

Figure 3.3.13 - LRT of Toyama

4) Development of Transportation Facilities by Utilizing Development Benefit

(1) Development of Transportation Facilities by Land Readjustment Project – Shiodome, Tokyo, Japan

The project, for which “Land Readjustment Method” is applied, develops or improves public facilities such as roads, parks, and rivers to reorganize land boundaries, in order to establish a sound city structure in an existing urbanized area where urban infrastructures are not sufficiently developed. The land owners in the project area offer part of their land either as a donation or for sale for public use such as for roads or parks. The funds generated from the sale of the land and the funds from the public sector are then used for developing public facilities (see Figure 3.3.10).

The land readjustment method is often applied for residential development in farm land or the area close to railway stations where the urban development potential is the greatest. The Shiodome Business District, located in the central area of Tokyo, is an example where the land readjustment method was applied for the former freight station site (see Figure 3.3.11). In this case, the land readjustment method was utilized with reset of FAR for raising development benefit, and the public facilities such as roads, underground passages, etc. were developed.

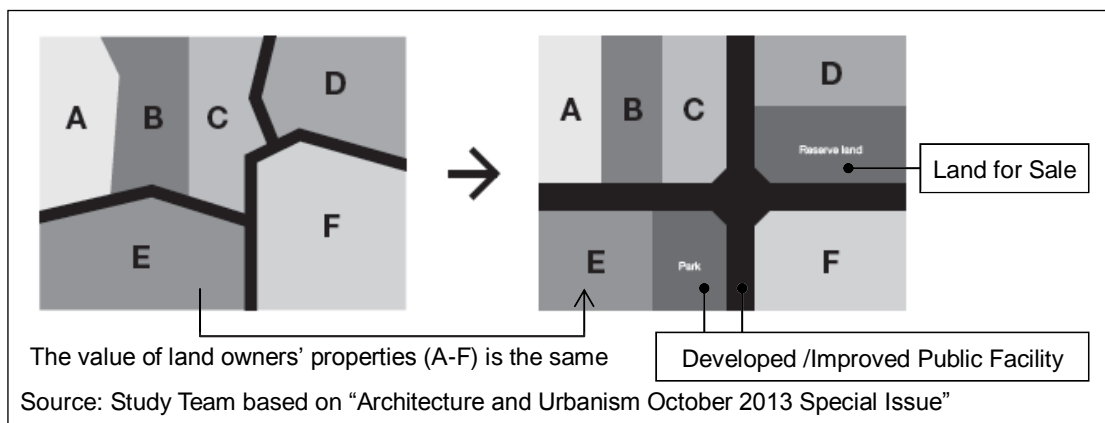
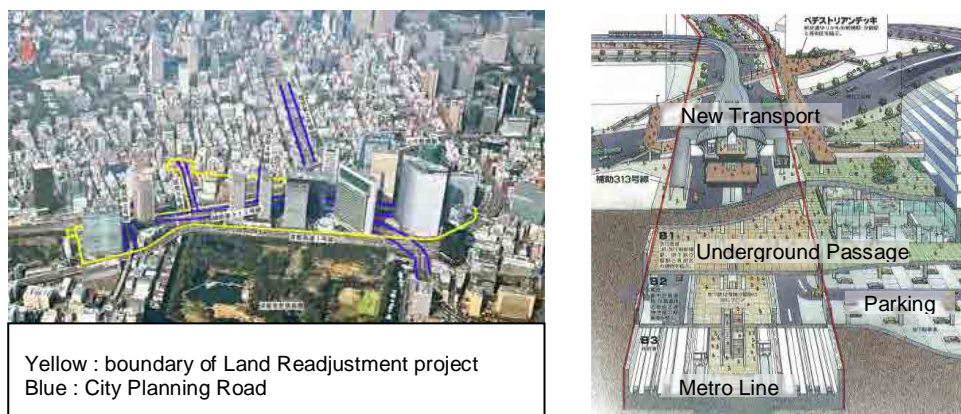


Figure 3.3.14 - Scheme of the Land Readjustment Method



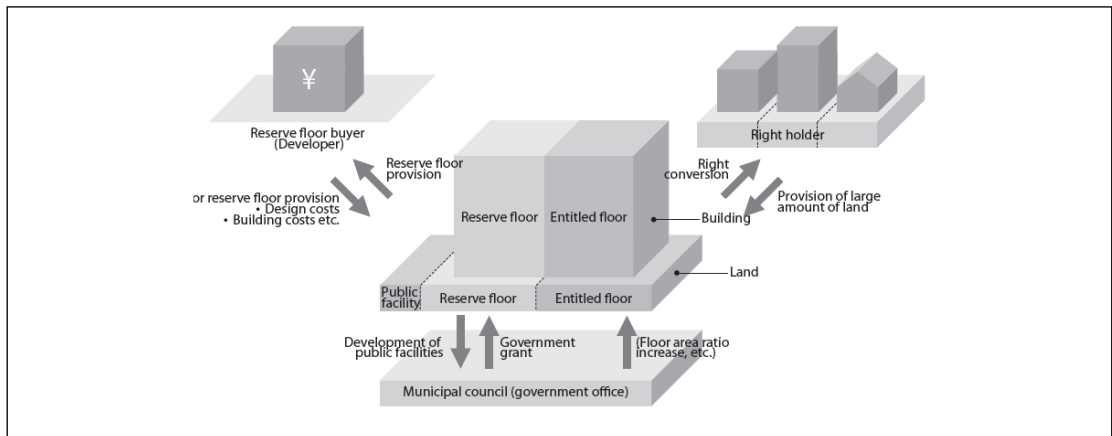
Source: (Left) Study Team based on the website of the Tokyo Metropolitan Government/(Right) Pamphlet of the Project

Figure 3.3.15 - Project Applied Land Readjustment Methods - Shiodome, Tokyo

(2) Development of Station Plaza by Urban Redevelopment Method – Yurakucho, Tokyo, Japan

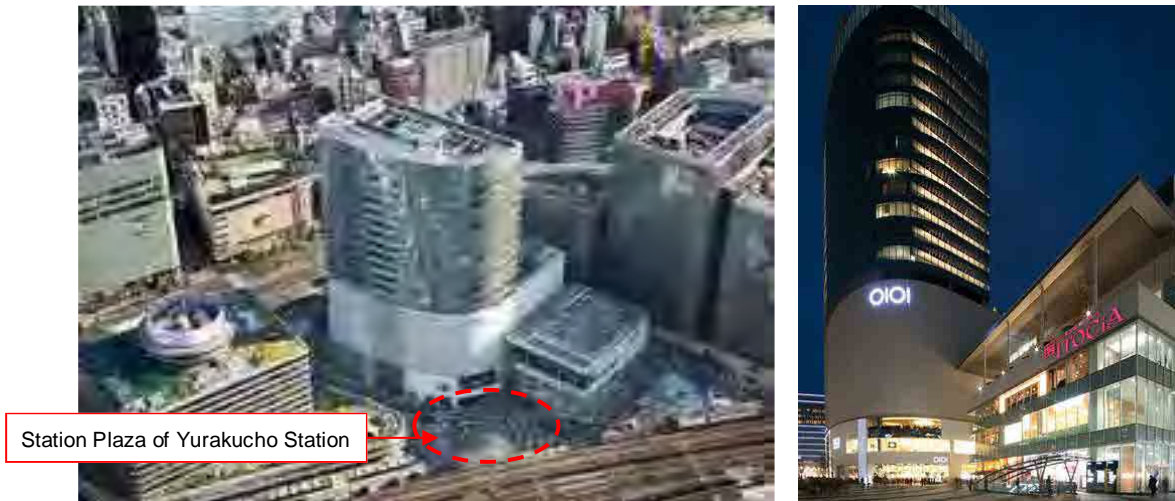
The “Urban Redevelopment Method” is often regarded as the “spatial” land readjustment method. In a project which applies the urban redevelopment method, the right holder of the post-project could own a floor in the new building and the development cost is covered by selling the floor areas in the newly developed building. This is different from a land adjustment project where the project cost is covered mainly by selling the readjusted lands (see Figure 3.3.12).

The urban redevelopment method was applied to the Yurakucho Station Area located in the central area of Tokyo, which was composed of small lots and old buildings (see Figure 3.3.13). The project applied this method and the public facilities such as the station plaza, roads designated by the urban plans, etc. were developed by integration into the newly developed commercial buildings. In this case, the business operator of the department store bought the rights of the building floor areas in front of the station plaza and operates retail facilities that target passengers who use the station.



Source: Study Team based on “Architecture and Urbanism October 2013 Special Issue”

Figure 3.3.16 - Scheme of Urban Redevelopment Method



Source: Study Team based on HP of Tokyo Metropolitan Government

Figure 3.3.17 - Project Applied Urban Redevelopment Method - Yurakucho, Tokyo

4 PLANNING DIRECTION ON THE HCMC UMRT LINE 1 TRANSIT CORRIDOR

4.1 Planning Issues on the HCMC UMRT Line 1 Transit Corridor

The HCMC UMRT Line 1 has been set in HCMC where the line covers various urban land uses from the CBD to suburban area. Different land use at station areas requires an adequate development approach to fit the appropriate socio-economic activities and for peoples' mobility, while the line is expected to encourage the development and formation of the "UMRT Transit Corridor" in an integrated manner. The formation of urban transport nodes in conjunction with station area development is illustrated in Figure 4.1.1.

Ben Thanh, Tan Cang, Rach Chiec and Suoi Tien Terminal will be major interchange stations connecting with other UMRT and BRT lines. The development of seamless transfer facilities and good connections with bus services in these stations will be required to promote usage on the UMRT. There are also station area urban developments along the HCMC UMRT Line 1 transit corridor, such as the Ba Son shipyard, the Tan Cang port area and the Sports City. The stations of the HCMC UMRT Line 1 provide opportunities for integration with urban activities in these areas in the form of transit-oriented development (TOD). Table 4.1.1 summarizes desirable development of station areas as a strategy in order to achieve the desired usage levels on the HCMC UMRT Line 1.

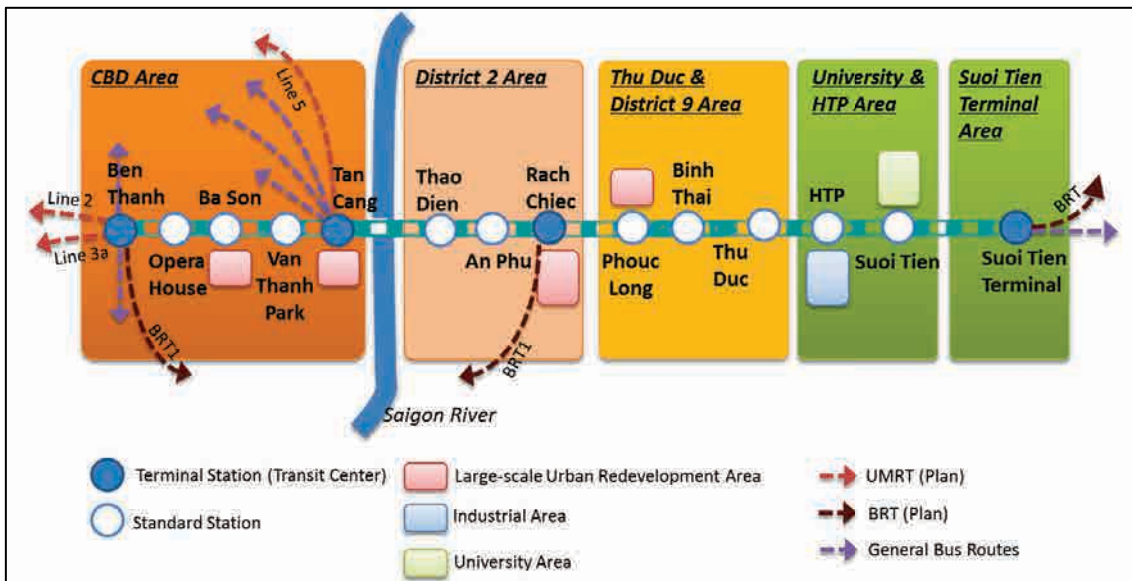


Figure 4.1.1 - HCMC UMRT Line 1 Transit Corridor

Table 4.1.1 - Urban/Transport Development Aspects by Area on the HCMC UMRT Line 1 Corridor

| Area | Urban Development Aspect | Urban Transport Aspect |
|------------------------------------|--|---|
| CBD Area | - Promote station area development such as the Ba Son shipyard or Tan Cang port area | - Provide adequate feeder bus services by the rerouting of existing bus routes - Promote seamless transfers at Tan Cang station to buses |
| District 2 Area | - Promote the Sports City Development | - Provide adequate feeder bus services - Rerouting of existing bus routes on the overlapping section with the HCMC UMRT Line 1 - Develop station plazas - Provide parking facilities - Promote the seamless transfer at Rach Chiec Station to BRT 1 - Promote the seamless transfer at Suoi Tien Terminal Station to BRT/buses |
| Thu Duc and District 9 Area | - Promote and lead station area development by using the concept of TOD - Provide organized urban lands ahead of urbanization to prevent sprawl | |
| University and High-Tech Park Area | - Promote the master plan of national university and High-Tech Park | |
| Suoi Tien Terminal Area | - Promote and lead station area development by using the concept of TOD | |

Source: Study Team

1) Summary of Planning Issues

Based on the analysis of various plans elaborated in Chapter 2, planning issues to facilitate the increased usage of the HCMC UMRT Line 1 are explained and summarized as follows.

Accessibility to the Station: Areas along the HCMC UMRT Line 1 corridor will be directly affected by the provision of modern and high quality public transport services. The impact will be significant and mostly positive. However, unless proper measures to secure the accessibility to stations are taken such as the development of a feeder bus system or station plaza development, benefits from the operation of the HCMC UMRT Line 1 may not be fully maximized. Smooth, safe, and comfortable service must be provided through well-planned feeder bus systems and intermodal transfer facilities in the station plazas.

Conditions in the Station Area: In order to develop intermodal facilities in the station area, the present conditions of each station area should be evaluated in terms of land availability and the presence of major public utilities along the Hanoi Highway.

Location and Alignment of Stations: Locations of the stations on the east side of the Saigon River are along the Hanoi Highway. In intermodal facility planning, accessibility from the other side of the station has to be taken into consideration after the analysis of the characteristics of the highway.

2) Planning Issues Regarding the Accessibility to the Stations

Planning issues from the view point of accessibility to stations is summarized by the grouping of station areas as follows:

CBD Area:

- i) **Ben Thanh Station:** This station will be the central station for HCMC. The existing roundabout in front of Ben Thanh Market will be abolished and will be transformed into a pedestrian plaza. Le Loi Street will be transformed into a pedestrian-oriented street (a transit mall). Underground, bus terminals which connect between the UMRT lines and other buses also will be developed.
- ii) **Opera House Station:** The roundabout at the intersection of Le Loi and Nguyen Hue Streets will be abolished and these streets will be pedestrian-oriented streets (transit malls) according to the zoning plan.
- iii) **Ba Son Station:** The zoning plan indicates that Ba Son Station will be integrated with the urban redevelopment project in the Ba Son Area which is currently used for a navy shipyard, and the station will be a combined transportation terminal accommodating other transportation modes, including water bus, LRT or BRT, and buses. However, the navy owns the land in the Ba Son Area so the city authority does not fully control the area's development according to the approved zoning plan.
- iv) **Van Thanh Park Station:** Van Thanh Park Station will be used by residents in the southern Tan Cang Area and surrounding built-up area. Walking conditions to access the station will be required to ensure the usage of the HCMC UMRT Line 1. Access road to the station is connected from urban roads of Dien Bien Phu Street and Nguyen Huu Canh Street. However, the streets are currently narrow and congested with vehicles, motorbikes, roadside stands, etc.
- v) **Tan Cang Station:** The zoning plan indicates that the station plaza for a bus berth and a taxi pool will be developed at the northern corner of the Tan Cang Area which is currently used for a navy container port. However, as in the case of the Ba Son Area, the army owns the land in the Tan Cang Area so that the city authority does not control the area's development according to the approved zoning plan. This station will be required for smooth transfers between the HCMC UMRT Line 1 and buses to/from the city center and western part of HCMC from the first stage of the opening of the UMRT in 2018. Especially, the bus berths and taxi pools located in front of the station will be indispensable for providing seamless transfers between the HCMC UMRT Line 1 and buses and taxis. The station is located inside the junction and the existing urban area is spread out on the north side. Accessibility to the station, which is possible from District 2, Nguyen Huu Canh Street and Dien Bien Phu Street, is high. However, this junction is complicated and drivers need correct traffic information so that they can access the station without losing their way.



Figure 4.1.2 - Accessibility to Van Thanh Park Station and Tan Cang Station

District 2 Area:

- i) **Thao Dien Station:** This station will be a core station of the area covering the exclusive housing quarters in the Thao Dien Area and the existing and newly developing residential areas in the south. However, proper consideration should be given for the residents of the southern residential areas to utilize routes to the city center through the East-West Highway (Thu Thiem Tunnel) and the Thu Thiem Bridge. Therefore, feeder bus and parking facilities will be required to improve accessibility to the station.
- ii) **An Phu Station:** Considering the accessibility to the station and the size of the covered area, besides the apartment buildings within a walking distance, the volume of passengers utilizing this station from the northern area would not be so high. The residents in the southern area (the An Khanh-An Phu New Town) could be counted as passengers to some extent; however, similar to Thao Dien Station, feeder bus and parking facilities will be required to improve accessibility to the station.
- iii) **Rach Chiec Station:** In the same manner as An Phu Station, the volume of passengers utilizing this station from the northern area would not be so high. However, considering the many existing and planned high-rise apartment buildings along the Hanoi Highway and the newly planned access road from the Binh Quoi-Thanh Da Area (a new urban center situated on the opposite side of the Saigon River), a certain volume of passengers can be anticipated in the future. The residents in the southern area (the Saigon Sports City, etc.) could also be counted as passengers to some extent. Feeder bus and parking facilities will be required to improve accessibility to the station. BRT Line 1 is also planned to connect to this station so it is necessary to ensure the seamless transfer between the HCMC UMRT Line 1 and BRT Line 1.

Thu Duc and District 9 Area:

- i) **Phuoc Long Station:** Since the land use of the cement factory and container depot in the western part of the station has been converted to residential and commercial functions, a large-scale urban redevelopment will happen in the near future where station facilities are expected to be developed. In the eastern part of the station, there are the existing and newly planned residential areas. Therefore, if the station plaza, feeder bus and access routes to the station are secured, a certain volume of passengers can be anticipated. Currently, majority of the residents work or study in the vicinity.
- ii) **Binh Thai Station:** Binh Thai and Thu Duc Stations will cover the residents living in the newly developing areas in the western part of the Hanoi Highway if the access roads are properly developed. However, consideration is needed for the residents of the western part of Thu Duc District to utilize the routes to the city center through the National Highway No. 13 and the UMRT Line 3b in the future. In the eastern part of the station, as indicated in Phuoc Long Station, there are the existing and newly planned residential areas. Therefore, if the station plaza and feeder bus to the station are secured, a certain volume of passengers can be anticipated.
- iii) **Thu Duc Station:** The western part of the station has been the central area of Thu Duc District since the French Colonial Period where historical buildings including the People's Committee office are located in the small blocks and therefore, redevelopment of the area seems to be difficult. In the eastern area, as indicated in Phuoc Long and Binh Thai Stations, if the access routes to the station are secured, a certain volume of passengers can be anticipated. This station will be a core terminal of the area covering the existing residential areas in Thu Duc District. Thus, coordination with existing bus services and new feeder bus routes which are connected to the station will be required.

University and High-Tech Park Area:

- i) **High Tech Park Station:** In the northern part of the station are the industrial parks including Linh Trung Industrial Park and the National University Area which have become the commuting and schooling destinations for many people. Currently, many of these commuters and students live in the neighboring areas. In the future, however, it should be considered that these commuting and schooling patterns will change as the lifestyle changes as a result of the development of the urban railway. In the southern part of the station since there are the Saigon High-Tech Park and existing residential areas, the workers and residents of these areas could be counted as passengers to some extent. Feeder bus services will be required to connect between the station and these potential areas.
- ii) **Suoi Tien Station:** In the current master plan of the National University Area, the bus routes and bus terminals are not properly connected with Suoi Tien Station. Therefore, the Study Team has to continuously work with the university for the revision of their bus-related plans. Since the Suoi Tien Water Park in the southern part of the station has an expansion plan of the park to be a mixed-use urban area

with residential, business and commercial functions, residents and workers of this new development area could be counted as passengers in the future. Feeder bus and parking facilities will be required to improve accessibility to the station.

Suoi Tien Terminal Area:

- i) **Suoi Tien Terminal Station:** Since Suoi Tien Terminal Station will be the principal station for the HCMC UMRT Line 1, the integrated development of the station and adjacent areas and the functions of this core interchange station and seamless transfer between modes are expected. The station will be located on the southern side of the Hanoi Highway and there is no plan to construct a pedestrian bridge to access the northern side of the station. The Study Team recommends the public sector to develop the pedestrian bridge before commercial operations of the HCMC UMRT Line 1.

3) **Planning Issues Regarding the Condition of the Station Areas**

In this section, the present conditions of the station areas are evaluated in terms of land availability for intermodal facilities including station plazas and public utilities, and issues related to the development of intermodal facilities should be clarified. The present conditions of the station area are summarized in Table 4.1.2.

Table 4.1.2 - Planning Issues on Intermodal Facility Development

| | Station | Land Availability for Station Plazas | Major Public Utilities to be Considered |
|----|--------------------|---|--|
| 1 | Ben Thanh | Not available due to CBD | - |
| 2 | Opera House | Not available due to CBD | - |
| 3 | Ba Son | Not available due to land owned by the military | - |
| 4 | Van Thanh Park | Available in the wetland owned by state owned company | None |
| 5 | Tan Cang | Available in the inside ramp way and some space outside ramp way owned by the public | None |
| 6 | Thao Dien | Available triangular lots on both sides owned by the public and in the safety corridors | Water pipe, electric line |
| 7 | An Phu | Available in the north side urban development area, safety corridors | Water pipe, electric line |
| 8 | Rach Chiec | Available in the south side urban development area, safety corridors and inside ramp ways | Water pipe, electric line |
| 9 | Phuoc Long | Available in the north side urban development area, safety corridors | Water pipe, electric line |
| 10 | Binh Thai | Safety corridors | Water pipe, electric line |
| 11 | Thu Duc | Available in the south side development area, safety corridors | Water pipe |
| 12 | High-Tech Park | Available in the south side development area, safety corridors | Water pipe |
| 13 | Suoi Tien | Available in the south side development area, safety corridors | Water pipe |
| 14 | Suoi Tien Terminal | Available in both the north and south development areas, safety corridors | Water pipe |

Source: Study Team

Details on each item are discussed below:

(1) Land Availability for Intermodal Facilities:

Ben Thanh Station, Opera House Station

No land available in the expanded CBD area.

Ba Son Station:

Ba Son Station will be integrated with the urban redevelopment project with a transportation terminal according to the approved zoning plan. However, land for intermodal facilities for the HCMC UMRT Line 1 is difficult for HCMC PC to acquire because the military owns the land of the Ba Son Area.

Van Thanh Park Station:

The wetland inside the Van Thanh Park is owned by the Saigon Tourist Company (state-owned enterprise with headquarters located in HCMC) and there is a possibility to acquire some land for intermodal facilities in the wetland.

Vacant land exists at the south side of the UMRT station. Since access to this area is difficult because the area is surrounded by small existing houses, development of intermodal facilities is not suitable.



Source: Study Team using Google Maps

Figure 4.1.3 - Land Availability at Van Thanh Park Station

Tan Cang Station:

Both land inside the ramp way of Saigon Bridge and land in front of the Tan Cang Restaurant belong to the public. These areas are available for the development of intermodal facilities.



Source: Study Team using Google Maps

Figure 4.1.4 - Land Availability at Tan Cang Station

Thao Dien Station:

Both the triangular lots beside the station and on the opposite side of the station are public land. The safety corridors of the Hanoi Highway are also available because land was already acquired by the Hanoi Highway Widening Project.



Source: Study Team using Google Maps

Figure 4.1.5 - Land Availability Thao Dien

An Phu Station:

On the north side of the station, there is an urban development plan by a private enterprise. It has the possibility of being developed into an intermodal facility inside the urban development area subject to negotiation with the investor. However, in the south side of the station, a commercial facility (METRO Supermarket) and a residential area are developed and there is no land available.

Safety corridors of the Hanoi Highway are available but land is limited.



Source: Study Team using Google Maps

Figure 4.1.6 - Land Availability at An Phu Station

Rach Chiec Station:

On the north side of the station, land is not available due to existing residential area. On the south side, public land is available inside the ramp ways. There is an urban development plan (Saigon Sports City) by a private enterprise which has the possibility of being developed into intermodal facilities inside the urban development area subject to negotiation with the investor.



Source: Study Team using Google Maps

Figure 4.1.7 - Land Availability at Rach Chiec Station

Phuoc Long Station:

On the north side, there is an urban development plan by private enterprises (owner of the cement factory and a Japanese real estate developer) at the unused land where a cement factory previously operated. There is the possibility of the land being developed into intermodal facilities inside the urban development area subject to negotiation with the investor.

Safety corridors of the Hanoi Highway are available but land is limited.



Source: Study Team using Google Maps

Figure 4.1.8 - Land Availability at Phuoc Long Station

Binh Thai Station:

The existing residential area is developed at the north side of the station while an electric construction company is located at the south side. In both cases, it is difficult to acquire the land. Public land is available only inside the safety corridor of Hanoi Highway.



Source: Study Team using Google Maps

Figure 4.1.9 - Land Availability at Binh Thai Station

Thu Duc Station:

Existing residential area is developed at the north side of the station and no land is available for intermodal facilities. On the south side, there is a hospital/school development plan beside existing factories. It is possible to utilize some portion of the land for intermodal facilities. Also, safety corridors of Hanoi Highway are available but land is limited.

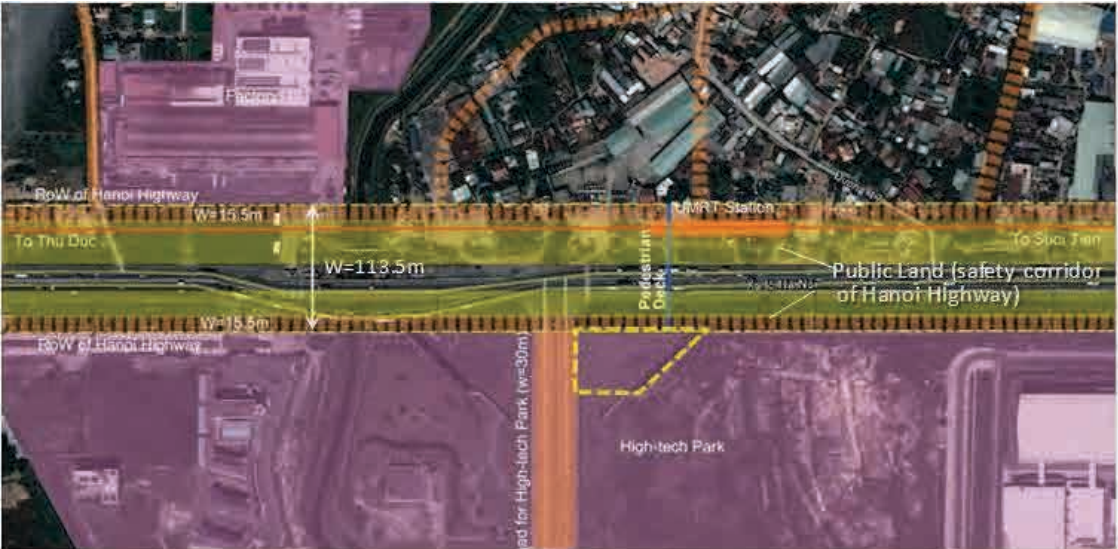


Source: Study Team using Google Maps

Figure 4.1.10 - Land Availability at Thu Duc Station

High-Tech Park Station:

Existing residential area is developed at the north side of the station and no land is available for intermodal facilities. On the south side, open space exists at the gate of the High-Tech Park which might be available for intermodal facilities, subject to negotiation with High-Tech Park. Also, safety corridors of the Hanoi Highway are available but land is limited.



Source: Study Team using Google Maps

Figure 4.1.11 - Land Availability at High-Tech Park Station

Suoi Tien Station:

Existing residential area is developed at the north side of the station and no land is available for intermodal facilities. On the south side, the developer who owns Suoi Tien Park has an urban development plan where there are possible areas that may be utilized for intermodal facilities, subject to negotiation with the developer of Suoi Tien Park. Also, safety corridors of the Hanoi Highway are available but land is limited.



Source: Study Team using Google Map

Figure 4.1.12 - Land Availability at Suoi Tien Station

Suoi Tien Terminal Station:

On the north side, urban development is being planned by Becamex IDC at Binh Duong Province. At the south side, SAMCO is planning for a bus terminal (new Mien Dong). Intermodal facilities with a station plaza will be developed inside these development areas and respective plans will be studied under the JICA PPP FS.

(2) Public Utilities to be Considered

In the safety corridors of the Hanoi Highway, there are water pipes (largest one has a diameter of 2.0 m) and 65 kV power lines, which are managed by SAWACO (Saigon Water Supply Corporation) and EVN (Electricity Vietnam), respectively.

For developing intermodal facilities, the utilization of some area within the safety corridors of the Hanoi Highway is ideal but the space is limited, with the development plan for facilities restricted by public utilities managed by different authorities.

4) Planning Issues Regarding the Location and Alignment of Stations

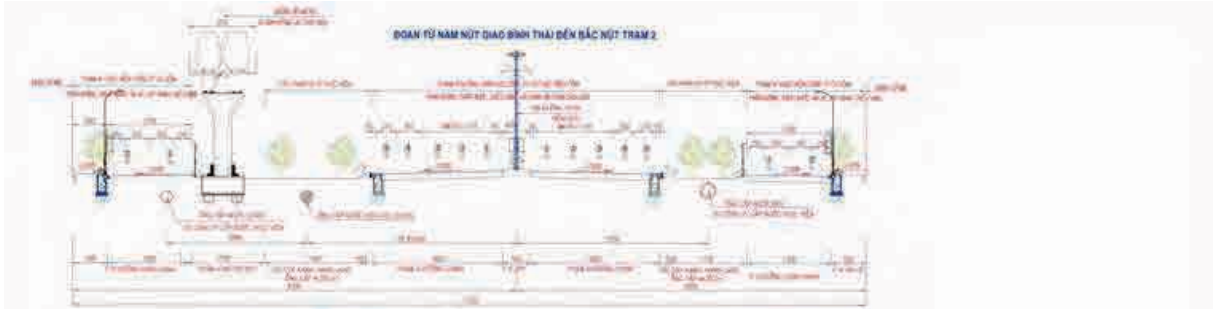
The viaduct of UMRT Line 1 on the east side of the Saigon River passes along the Hanoi Highway (NH1A) which is a trunk road connecting HCMC with Bien Hoa City of Dong Nai Province. At present, the widening project of Hanoi Highway is being implemented by the BOT scheme and the work is delayed due to land acquisition issues. The whole section will be completed before 2018. The typical cross section of the Hanoi Highway is shown in Figure 4.1.4.

Section 1: From Saigon Bridge to Binh Thai Intersection: ROW is 153.5 m.



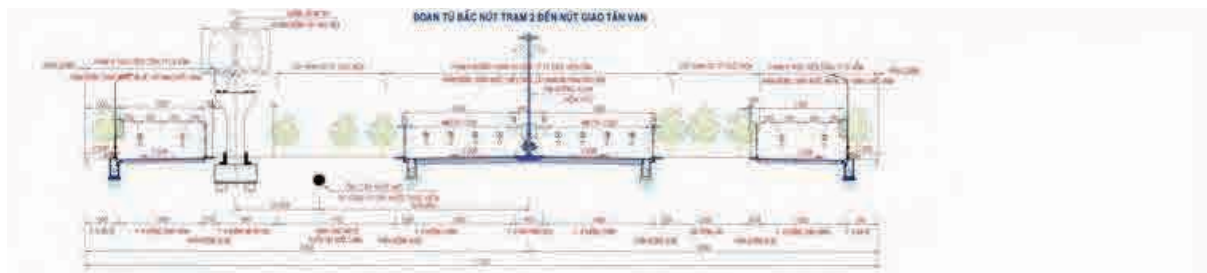
- Sidewalks on the two sides: $2 \times 5.0 \text{ m} = 10.0 \text{ m}$
- Service roads: $2 \times 12.0 \text{ m} = 24.0 \text{ m}$
- Urban railway corridor (the railway corridor is 12 m wide. However, the service roads shall encroach from 1.5 – 4 m in the corridor on the ground). $8.0 - 10.5 \text{ m}$
- Main carriageway: there are 10 lanes for automobiles and 2 lanes for emergency stopping. $2 \times 22.0 \text{ m} = 44.0 \text{ m}$
- Middle Separator $1 \times 4.0 \text{ m} = 4.0 \text{ m}$
- Safety corridor for water pipes (left side of the central line) $1 \times 12.0 \text{ m} = 12.0 \text{ m}$
- Green tree area and safety corridor for power grids (right side of the central line) $= (51.5 - 49.0) \text{ m}$

Section 2: Binh Thai Intersection – Tram 2 Intersection: ROW is 113.5 m.



- Sidewalks on the two sides: $2 \times 5.0 \text{ m} = 10.0 \text{ m}$
- Service roads: $2 \times 12.0 \text{ m} = 24.0 \text{ m}$
- Urban railway corridor (the railway corridor is 12 m wide. However the service roads shall encroach from 1.5 – 4 m in the corridor on the ground) $1 \times 10.5 \text{ m} = 10.5 \text{ m}$
- Main carriageway: there are 8 lanes for automobiles and 2 lanes for emergency stopping $2 \times 18.5 \text{ m} = 37.0 \text{ m}$
- Middle Separator $1 \times 4.0 \text{ m} = 4.0 \text{ m}$
- Safety corridor for water pipes (left side of the central line) $1 \times 15.5 \text{ m} = 15.5 \text{ m}$
- Green tree area and safety corridor for power grids (right hand of the central line) $1 \times 12.5 \text{ m} = 12.5 \text{ m}$

Section 3: Tram 2 Intersection – Tan Van Intersection: ROW is 113.5 m.



- Sidewalks on the two sides: $2 \times 5.0\text{m} = 10.0 \text{ m}$
- Service roads: $2 \times 12.0\text{m} = 24.0\text{m}$
- Urban railway corridor (the railway corridor is 12m wide. However the service roads shall encroach 1.5 m of the corridor on the ground) $1 \times 10.5\text{m} = 10.5\text{m}$
- Main carriageway: there are 8 lanes for automobiles $2 \times 16.0\text{m} = 32.0\text{m}$
- Middle Separator $1 \times 4.0\text{m} = 4.0\text{m}$
- Safety corridor for water pipes (left side of the central line) $1 \times 18.0\text{m} = 18.0\text{m}$
- Green tree area and safety corridor for power grids (right side of the central line) $1 \times 15.0\text{m} = 15.0\text{m}$

Source: HCMC Infrastructure Investment Joint Stock Company (CII)

Figure 4.1.13 - Typical Cross Section of the Hanoi Highway

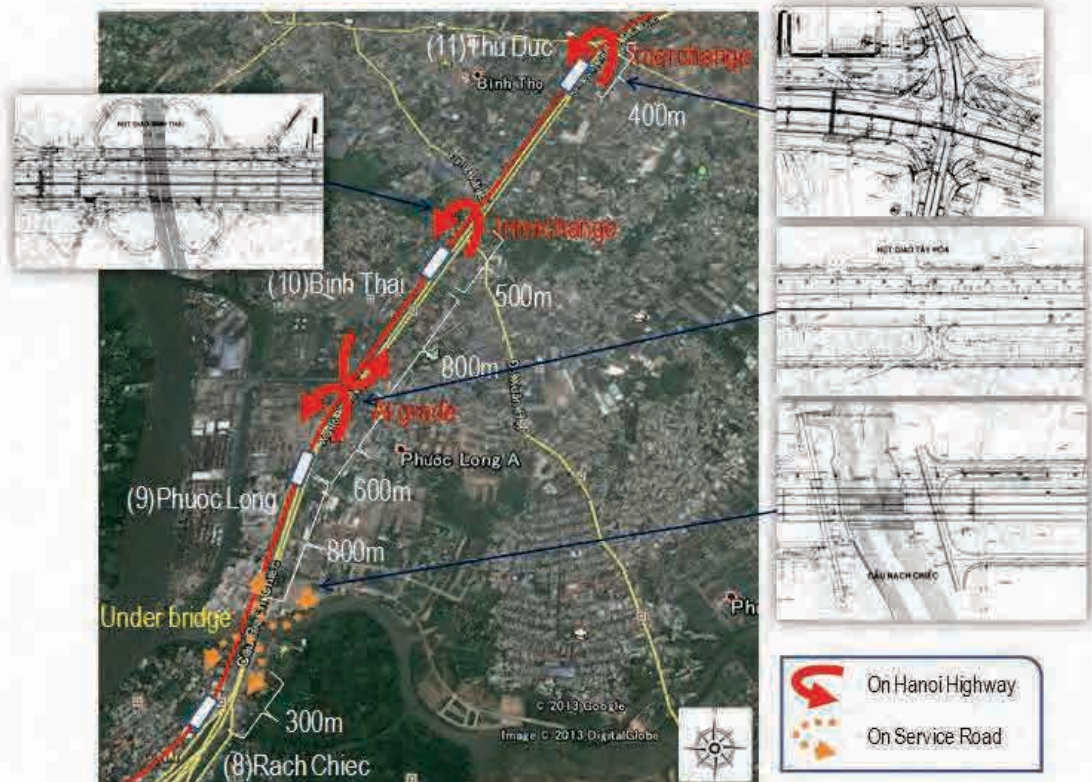
As shown in Figure 4.1.4, the area is divided by the Hanoi Highway and both sides is approximately 113 m – 153 m wide. When accessed from either side of the Hanoi Highway, access by the underpass of a bridge, at-grade intersection and interchange with a major trunk road such as the East-West Highway (Mai Chi Tho Highway) and Ring Road No. 2 are required but it is limited according to the existing plan of the Hanoi Highway Widening Project as shown in Figure 4.1.5.

For example, in the case where you are on the opposite side of An Phu Station, you must drive about 2,800 m to reach the station through the underpass of the Saigon Bridge.

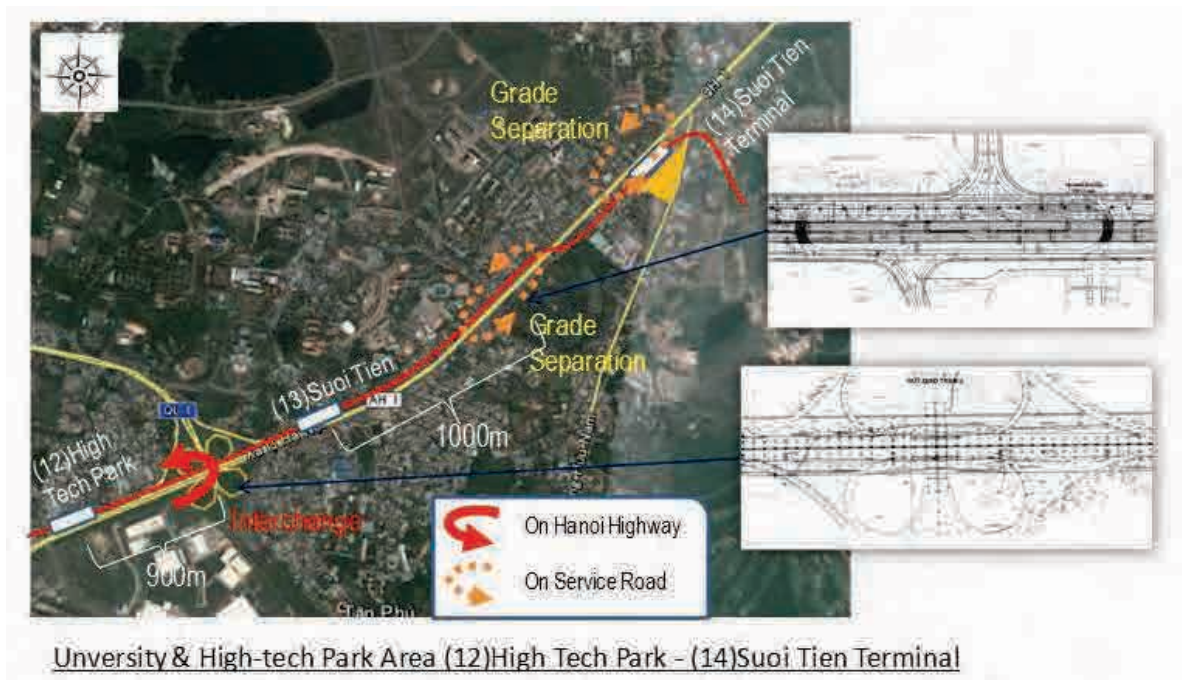
And as described above, Hanoi Highway is one of the trunk roads in the HCMC Metropolitan Area and has a large traffic volume of approximately 48,000 vehicles/day and 234,000 motorcycles/day near Tao Dien Station; 50,402 vehicles/day and 196,492 motorcycle/day near Rach Chiec Bridge; and 45,560 vehicles/day and 86,981 motorcycle/day near Suoi Tien Station according to the traffic count survey conducted in this Study. Therefore, crossing the Hanoi Highway at grade will not be applicable because traffic congestion and traffic accidents might occur due to the large traffic volume and wide cross section of the highway.



Developing Area in District 2 (6)Thao Dien Station – (7) An Phu Station



Tu Duc & Distict 9 Area (8)Rach Chiec- (11)Thu Duc



Source: Study Team based on the Google Maps

Figure 4.1.14 - Accessibility to the Stations according to the Plan of the Hanoi Highway

4.2 Present Trip Characteristics and Future Expectation of the UMRT Line 1 Catchment Area

1) Overview of Surveys

Data collection on road traffic/bus usage along the Hanoi Highway and National Road No. 1 and the stated preference of potential users of the HCMC UMRT Line 1 along these roads are required to understand the characteristics of travel behavior and to update the demand forecast model. The JICA Study Team conducted a traffic survey and travel behavior interview survey with a local consultant as shown in Table 4.2.1.

Table 4.2.1 - Overview of Surveys

| Type of Survey | Items |
|----------------------------------|---|
| Traffic Survey | <p><u>Traffic Count Survey</u></p> <ul style="list-style-type: none"> • Traffic volume and vehicle occupancy by vehicle type at survey stations • Survey locations: 9 cross-sections along the Hanoi Highway |
| | <p><u>Bus Transport Survey</u></p> <ul style="list-style-type: none"> • Passenger counts and OD Interviews at the main bus stops • Survey locations: 49 bus stops • Number of samples: 507 |
| | <p><u>Travel Speed Survey</u></p> <ul style="list-style-type: none"> • Travel speed of cars, motorcycles and public buses • Recorded sections: <ul style="list-style-type: none"> ○ Ben Thanh - Suoi Tien Terminal [by car and motorcycle] ○ Between the terminals of each route [by public bus] • Number of target public bus routes: 11 • Survey hours: morning peak, off-peak and evening peak |
| Travel Behavior Interview Survey | <ul style="list-style-type: none"> • Interview surveys in households, schools, factories and malls around each planned station of the HCMC UMRT Line 1 • Contents of questionnaire: <ol style="list-style-type: none"> 1) Personal and household information 2) Characteristics of daily trips made by each member 3) Stated choice scenarios 4) Opinions and perceptions on general transport conditions in the city and along the HCMC UMRT Line 1 <p>Number of Samples: 3,691</p> |

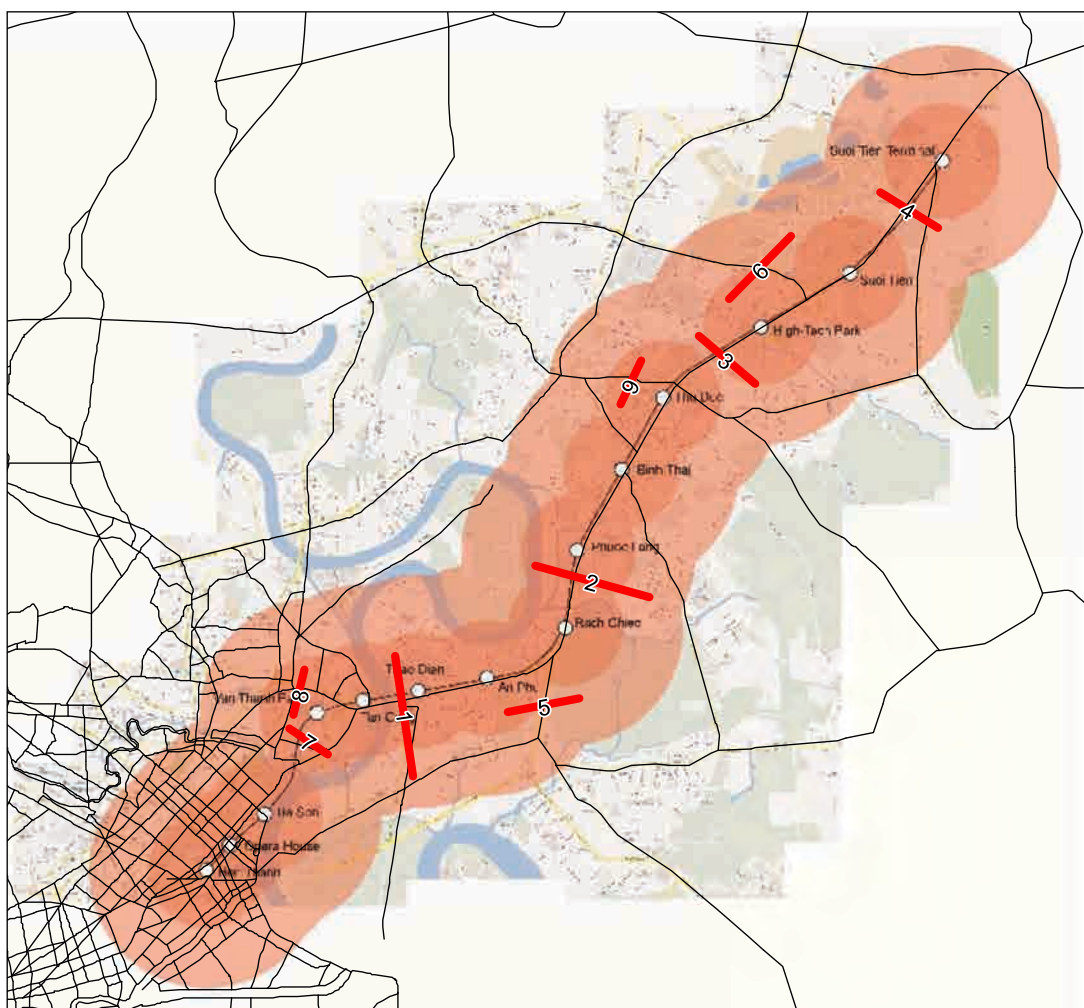
Source: Study Team

2) Major Findings from the Traffic Surveys

Major findings from the traffic surveys are as follows.

Traffic Volume

The traffic volume was counted at 9 sections along the Hanoi Highway as shown in Figure 4.2.1. It is found that the total all-day traffic volume on Sections 1-4 on the Hanoi Highway range from between 127,000 to 283,000 vehicles (Table 4.2.2). Regarding the composition of vehicles, motorcycles account for 60-90% of the total number of vehicles per day (Table 4.2.3).



Note: Traffic volume at 16h-counting sections (Section 1, 3, 5, 6, 8 and 9) has been converted into 24h traffic volume by the 24h/16h ratio observed at 24h-counting sections (Section 2, 4 and 7).

Source: Study Team

Figure 4.2.1 - Location of Survey Sections for the Traffic Counts

Table 4.2.2 - Traffic Volume by Vehicle Type for Both Directions

| | Bicycle | MC | Cyclo | Car | Taxi | Minibus | St. Bus | Truck | Other | Total |
|---|---------|---------|-------|--------|-------|---------|---------|--------|-------|---------|
| 1 | 879 | 233,738 | 8 | 26,767 | 7,800 | 3,634 | 2,823 | 7,306 | 519 | 283,474 |
| 2 | 512 | 196,492 | 5 | 20,661 | 3,545 | 4,013 | 2,824 | 19,359 | 434 | 247,846 |
| 3 | 590 | 84,515 | 0 | 12,838 | 2,049 | 3,255 | 2,499 | 20,708 | 272 | 126,725 |
| 4 | 509 | 86,981 | 7 | 13,348 | 1,775 | 4,342 | 3,972 | 22,123 | 401 | 133,459 |
| 5 | 273 | 77,438 | 2 | 9,421 | 1,489 | 2,087 | 268 | 18,831 | 180 | 109,990 |
| 6 | 957 | 53,740 | 0 | 3,266 | 432 | 1,894 | 2,243 | 22,838 | 338 | 85,708 |
| 7 | 820 | 99,974 | 10 | 15,656 | 5,722 | 1,629 | 627 | 3,367 | 340 | 128,145 |
| 8 | 3,225 | 288,536 | 34 | 24,789 | 8,475 | 3,932 | 2,639 | 7,015 | 747 | 339,391 |
| 9 | 5,124 | 116,687 | 2 | 3,504 | 886 | 962 | 1,305 | 1,817 | 249 | 130,536 |

Source: Study Team

Table 4.2.3 - Vehicle Composition for Both Directions

| | Bicycle | MC | Cyclo | Car | Taxi | Minibus | St. Bus | Truck | Other | Total |
|---|---------|-----|-------|-----|------|---------|---------|-------|-------|-------|
| 1 | 0% | 82% | 0% | 9% | 3% | 1% | 1% | 3% | 0% | 100% |
| 2 | 0% | 79% | 0% | 8% | 1% | 2% | 1% | 8% | 0% | 100% |
| 3 | 0% | 67% | 0% | 10% | 2% | 3% | 2% | 16% | 0% | 100% |
| 4 | 0% | 65% | 0% | 10% | 1% | 3% | 3% | 17% | 0% | 100% |
| 5 | 0% | 70% | 0% | 9% | 1% | 2% | 0% | 17% | 0% | 100% |
| 6 | 1% | 63% | 0% | 4% | 1% | 2% | 3% | 27% | 0% | 100% |
| 7 | 1% | 78% | 0% | 12% | 4% | 1% | 0% | 3% | 0% | 100% |
| 8 | 1% | 85% | 0% | 7% | 2% | 1% | 1% | 2% | 0% | 100% |
| 9 | 4% | 89% | 0% | 3% | 1% | 1% | 1% | 1% | 0% | 100% |

Source: Study Team

Table 4.2.4 shows the comparison of observed traffic volumes at the survey station near the Saigon Bridge in this study and in HOUTRANS, 2003. Total traffic volume increased by 23% in 10 years. The number of motorcycles increased by 30% and that of cars almost doubled.

Table 4.2.4 - Comparison of Traffic Volume in the SAPI Study and in HOUTRANS

| | Number of Vehicles (24 hours, both directions) | | | | | | |
|------------------|---|---------|--------|-------|--------|--------|---------|
| | Bicycle | M/C | Car | Bus | Truck | Others | TOTAL |
| HCMC-Line1-SAPI* | 879 | 233,738 | 34,567 | 6,457 | 7,306 | 527 | 283,474 |
| HOUTRANS** | 6,184 | 179,826 | 17,500 | 6,832 | 18,503 | 976 | 229,821 |
| SAPI / HOUTRANS | 14% | 130% | 198% | 95% | 39% | 54% | 123% |
| | Vehicle Composition (24 hours, both directions) | | | | | | |
| | Bicycle | M/C | Car | Bus | Truck | Others | TOTAL |
| HCMC-Line1-SAPI* | 0% | 82% | 12% | 2% | 3% | 0% | 100% |
| HOUTRANS** | 3% | 78% | 8% | 3% | 8% | 0% | 100% |

Note: *At Survey Station No. 1, **At Traffic Count Survey Station No. 14

Source: Study Team

- Stated Modal Choice (Shift) to HCMC UMRT Line 1

The travel behavior interview survey was conducted targeting people along the HCMC UMRT Line 1 corridor, and a total of 3,691 samples were collected during this time. 68% of the total samples were collected at households and 32% were collected at offices, factories, schools, hospitals and shops. 55% of the total respondents were male. 33% of the respondents were from the ages of 18 to 24 and 32% were from the ages of 25 to 35. About 19% of the respondents were government officers and office workers, 11% were workers, 28% were doing small businesses or engaged in self-employment and 23% were university students. 46% of all respondents have an income ranging from 3 to 6 million VND/month.

It is found that 50.3% of all interviewees might consider shifting to the UMRT while 49.7% might continue on using existing modes (10.5% uses buses and 39.2% uses motorcycles/cars).

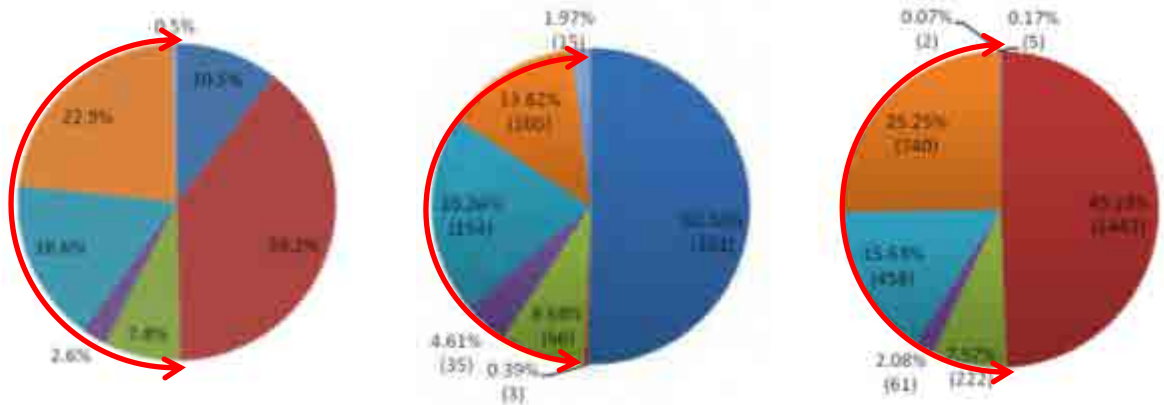
Once respondents decided on the UMRT choice, the respondents choose one option among the 5 available access mode choices: (1) walking, (2) bicycle, (3) feeder bus, (4) motorcycle, and (5) xe om (motorcycle taxi). The most preferable option is the motorcycle

(22.9%), followed by feeder buses (16.6%) and walking (7.8%). Bicycles (2.6%) and xe om (motorcycle taxi) (0.5%) are the two options that very few people opted to choose.

Among 760 bus passengers interviewed, 382 people still opted to continue using the bus for their trips, accounting for 50.3% while 375 people (49.3%) said they might consider switching to the UMRT.

Among the 2,931 motorcycle/car passengers interviewed, 1,443 people still opted to continue using the motorcycle/car for their trips, accounting for 49.2%, while 1,483 people (50.6%) said they might consider switching to the UMRT.

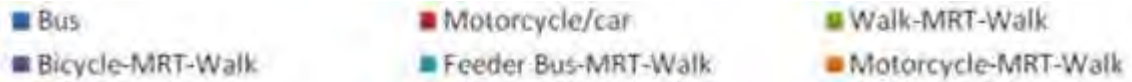
Shift to the UMRT (50.3%) Shift to the UMRT (49.3%) Shift to the UMRT (50.6%)



All Respondents (N = 3,691)

Bus Users (N = 760)

Motorcycle/Car Users (N = 2,931)



Note: This is the result in the scenario that the respondents walk to their final destination.

Source: Study Team

Figure 4.2.2 - Distribution of the Combined Mode Choices

- Stated Access Mode Choice by Access Distance to the Station

Most of the respondents whose access distance to the station is 500 m or less chose walking as the access mode. On the other hand, most of the respondents whose access distance to the station is more than 800 m chose bus or motorcycle as the access mode. This result suggests that it is important to improve the road infrastructure for pedestrians such as sidewalks within a 500 m radius from stations and to providing feeder bus services to the areas that are more than an 800 m radius from stations in order to maximize the ridership of HCMC UMRT Line 1.

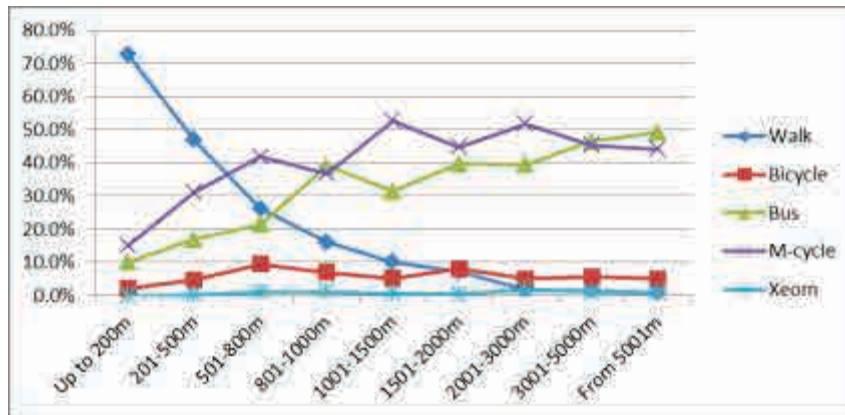


Figure 4.2.3 - Stated Access Mode Choice by Access Distance

- Respondents' Opinion on the Importance of Proposed Complementary Measures to Attract More Ridership on the UMRT

In order to understand peoples' opinion on complementary measures to encourage the usage of the UMRT, 12 question items as shown in Figure 4.2.4 were asked during the travel behavior interview survey.

From the perspective of the respondents, the three most important measures to attract more passengers to the UMRT would be:

- Providing facilities for people with disabilities in the station area
- Providing parking spaces for motorcycles and bicycles at every UMRT station
- Reducing the fares of the UMRT

Providing facilities for people with disabilities in the station area received strong support from the respondents, with 90% of respondents considering it as a strong measure to attract ridership on the HCMC UMRT Line 1. A total of 80% of respondents considered the provision of parking spaces for motorcycles and bicycles as very important while more than 75% said that reducing the UMRT fare was the most important measure to attract ridership.

Three unpopular measures based on the survey conducted are as follows:

- Increasing taxes and fees on motorcycle and car use

- Restricting motorcycle use on the Hanoi Highway
- Restricting car and motorcycle use in designated areas (e.g., Ben Thanh Market and Opera House, etc.)

Increasing taxes and fees on motorcycle and car use did not get the support of the interviewees. Many of them (43%) disagreed on the adoption of this measure as it may affect their private vehicle usage. It would therefore be very challenging to introduce such a measure to encourage the modal shift to the HCMC UMRT Line 1 in the future. In addition, many of the respondents did not agree on measures to restrict motorcycle usage on the Hanoi Highway since as many as 57% of the respondents believed that this was either unimportant or just so-so. Restricting car and motorcycle usage in designated areas likewise did not get support from the respondents as shown by more than 50% of respondents ranking it as an unimportant measure or just so-so.

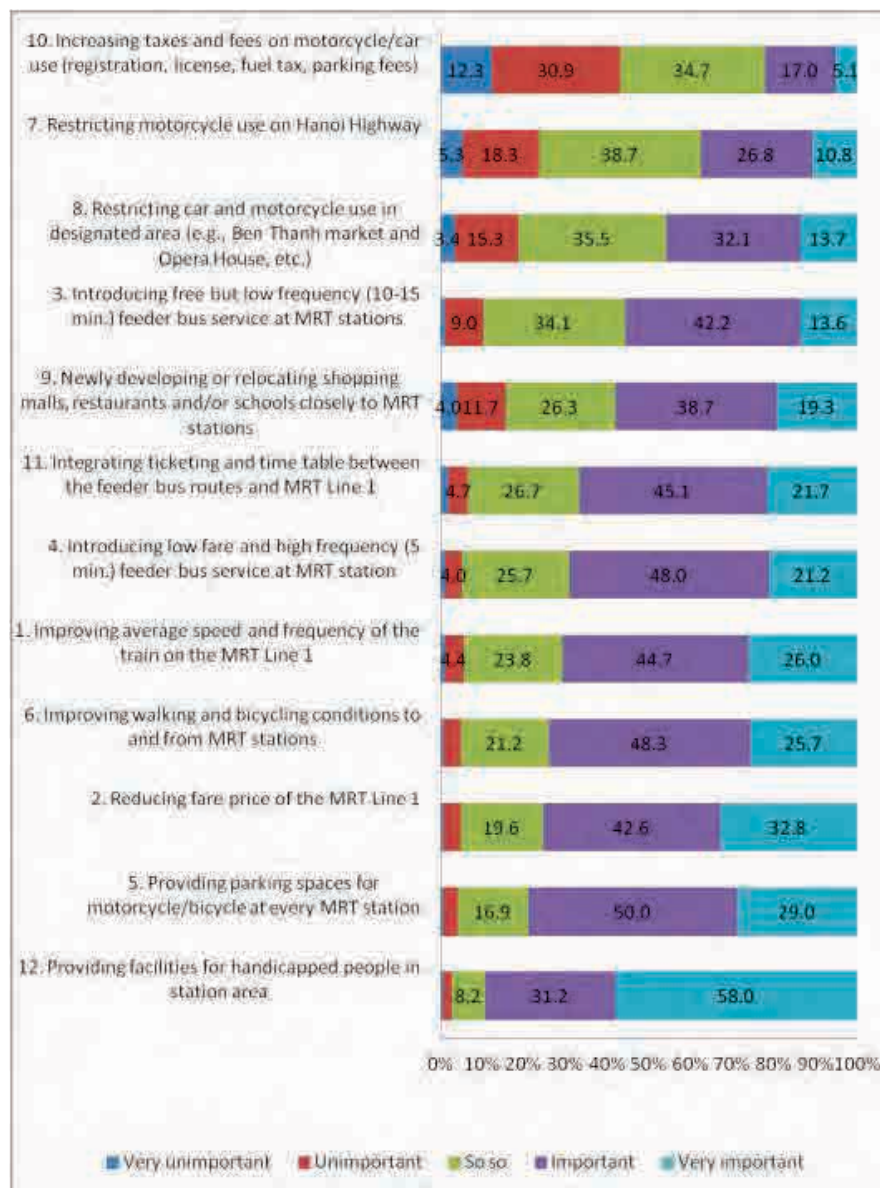


Figure 4.2.4 - Respondents' Opinion on the Importance of Proposed Complementary Measures to Attract More Ridership on the UMRT

- Willingness to Pay for Railway Station Parking/Feeder Buses and Willingness to Wait for Feeder Buses

About 61% of respondents said that they are willing to pay a 3,000 VND parking fee for their motorcycle at a UMRT station, whereas 33% answered that they would be willing to pay a 5,000 VND parking fee which is the same rate as the existing parking fee for motorcycles in the city.

More than half (51%) of the respondents are willing to pay 2,000 VND or more for bicycle parking while nearly half (49%) are only willing to pay up to 1,000 VND.

About 42% of interviewees are willing to pay for feeder bus fare of 5,000 VND. A total of 27% of the respondents said that 3,000 VND is a more acceptable fare while only 15% said that they can afford a feeder bus fee higher than 5,000 VND which is the average fare for existing city buses (18 km in travel length or less).

It was found from 47% of the interviewees that a suitable waiting time for feeder buses is 5 minutes. A total of 18% said that they might wait for feeder buses up to 8 minutes, while only 23% might wait for the bus of up to 10 minutes. Only 6% accepted a waiting time for feeder buses within 15 minutes.

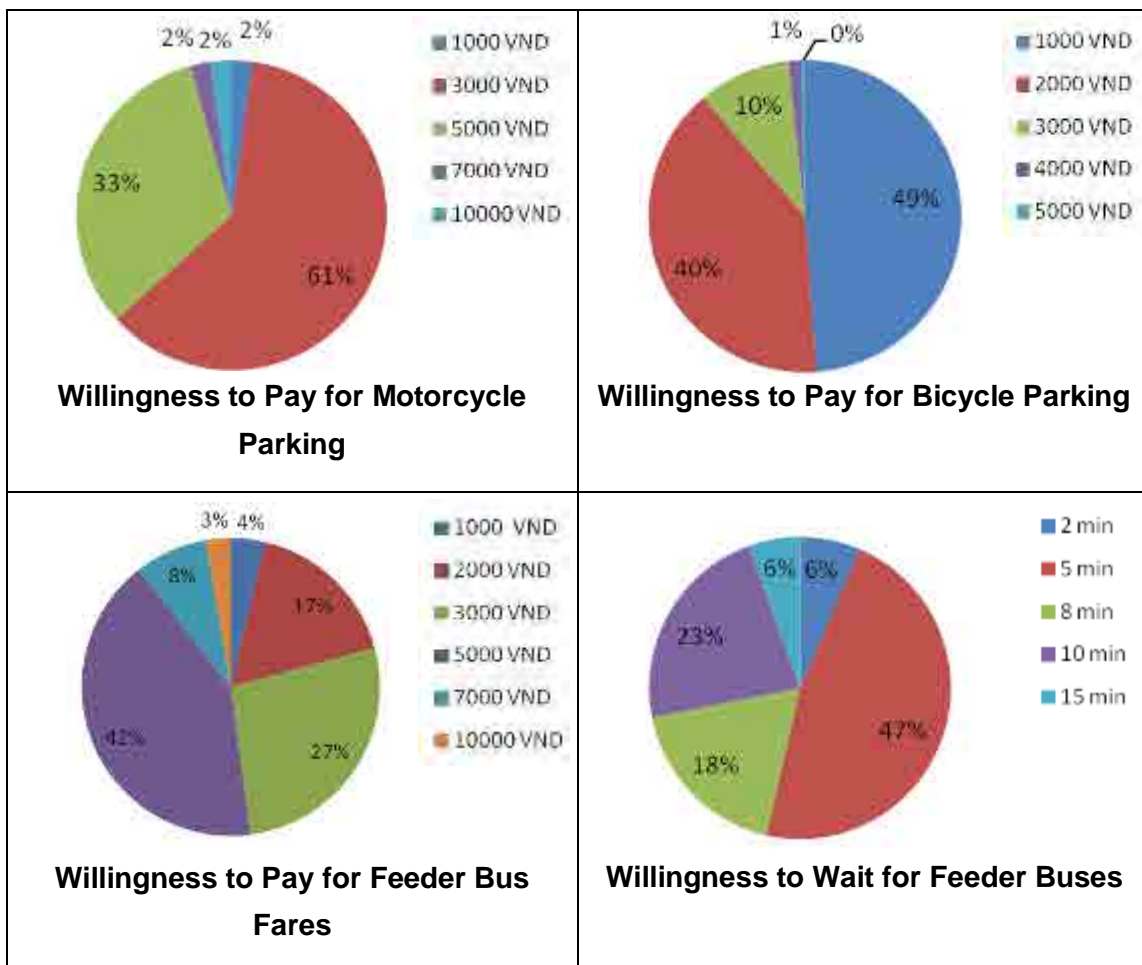
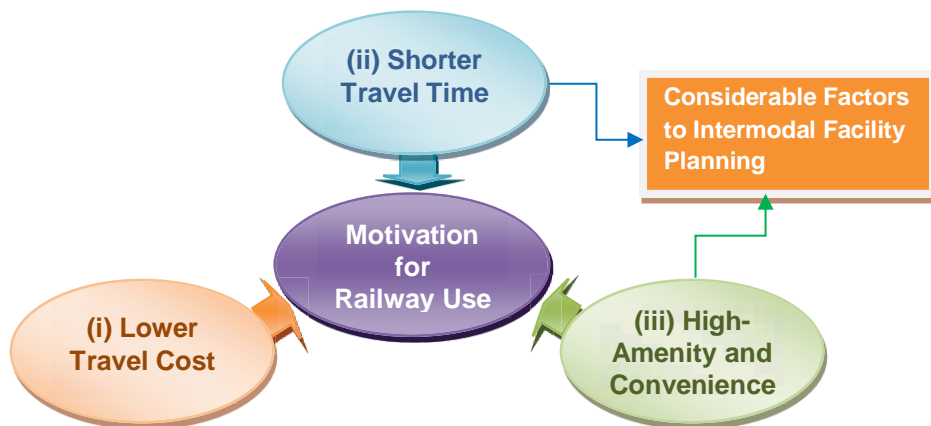


Figure 4.2.5 - Willingness to Pay for Railway Station Parking Fees/Feeder Buses and Willingness to Wait for Feeder Buses

4.3 Development Strategies to Promote UMRT Usage

1) Motivation Factors for Railway Usage

From the viewpoint of the railway user, motivation to choose public transport including railway comes up under a well put together judgment of three motivation factors: (i) lower travel cost, (ii) shorter travel time, and (iii) high level of amenity and convenience, as compared with private transport such as the car and motorcycle. Travel cost is a factor to be considered in the operation planning of the UMRT and the feeder bus service. In intermodal facility planning, it is necessary to study how to provide shorter travel time and a high level of amenity and convenience to the user (Figure 4.3.1).



Source: Study Team

Figure 4.3.1 - Motivation Factors for Railway Usage

Basic concept of motivation factors and promotion measures are explained below.

a) Lower Travel Cost: Travel cost is the fare for public transport and the running cost for private transport. The running cost of private transport consists of fuel and parking fees as well as the purchase cost, tax and insurance. As a counter measure in operation planning, the reduction of the travel cost of public transport such as setting an appropriate fare and special discounts for season tickets and students is suitable. In intermodal facility planning, reduction of travel cost is not considerable; however, periodic free parking campaigns will motivate the cost-conscious park and ride user.

b) Shorter Travel Time: Travel time consists of access time to bus stops, trip time of feeder buses, transit time in the station area as well as the trip time of the UMRT. For the shortening of these trip times, several measures such as the improvement of the access road for the smooth operation of feeder buses, layout of an appropriate number of transit berths in the station plaza, and an appropriate layout of the transit berth with shorter distance to ticket gate are applicable to intermodal facility planning. Besides, the fare payment system by a smartcard is efficient to shorten the time of ticketing and passing through fare gates.

c) High-Amenity and Convenience: Upgraded measures for amenity and convenience are largely categorized into two types of measures, common and regional. Common measures are applicable measure for all stations. At the station, the installation of a roof

and shelter for weather-proof pedestrian walkways, elevators for barrier-free facilities, open space and illumination for users' amenity, digital information displays and a website for transport information and the usage of smartcards for shopping are applicable. In addition, in accessing the station, the creation of safe road spaces for pedestrians and bicycle users enhances comfort in commuting.

As a regional measure, formulation of the core area with commercial facilities, service facilities inside/outside of the station such as retail shops, restaurants, cafés and public service facilities, parking and park and ride and bicycle facilities is necessary to promote a new environmentally friendly and healthy lifestyle with the UMRT.

2) Development Strategy to Promote UMRT Usage

Considering the basic concept for the promotion of UMRT usage as mentioned above, the development strategy is shown in Table 4.3.1. The strategy is split into the two categories of common and regional.

Table 4.3.1 - Development Strategies to Promote UMRT Usage

| Common Strategy | | |
|---|---|--|
| Motivate Factor | UMRT and Feeder Bus | Intermodal Facility |
| Travel Cost | <ul style="list-style-type: none"> • Appropriate fare considering the people's motivation to use the railway • Special discounts for commuter tickets, student tickets for the UMRT and bus (institutional measure) • Company subsidy for commuting expenses of commuter passes • Restriction of private car into the CBD | <ul style="list-style-type: none"> • Free parking campaign for the UMRT user |
| Travel Time | <ul style="list-style-type: none"> • Appropriate layout of station-related facilities in considering shorter distances for pedestrian movement • Smartcard system to shorten the time of ticketing and passing through fare gates | <ul style="list-style-type: none"> • Improvement of access roads and installation of appropriate number of berths for the smooth operation of feeder buses • Appropriate layout of transit facilities considering short distances to ticket gates |
| Amenity and Convenience | <ul style="list-style-type: none"> • Barrier-free facilities such as the installation of elevators • Shops within the station building (Kiosk, café) • Digital information displays showing transit timetables • Information service of the route guide and time table by website and smart phone application • Smartcard payment for shopping • Public Wi-Fi service inside the train • Service facilities to meet the users and regional character | <ul style="list-style-type: none"> • Weatherproof pedestrian walkways • Barrier-free facility such as elevators • Amenity space by open space and illumination • Safe access space for pedestrians and bicycles • Service facilities to meet the users and regional character |
| Regional Vision and Strategy | | |
| Zone (Station) | Character of Region and User | Vision and Strategy |
| A. CBD Zone (Ben Thanh to Tan Cang) | Region: The greatest urban center for commercial, business, tourism and amusement, and the transport core of HCMC. This area is | Vision: Renovation for an attractive pedestrian space and cityscape to suite the core of HCMC |

| | | |
|--|---|--|
| | <p>packed with historic buildings, tourism facilities and large-scale commercial and business facilities.</p> <p>User: Multiple visitors such as shoppers, businessmen, tourists, and foreigners. Most visitors do not have their own private vehicles to reach their destination</p> | <p>Strategy:</p> <ul style="list-style-type: none"> • Renovation of major streets as attractive and comfortable pedestrian corridors • Create cityscape and green space considering the historical and cultural facilities • Formulate an underground pedestrian network to connect the UMRT stations with commercial buildings nearby • Establish an eco-friendly transport institution (restriction of private vehicles, rental electric bicycle network, etc.) |
| <p>B. Development Zone in District 2 (Thao Dien to Rach Chiec)</p> | <p>Region: This area has a high-end residential area on the north side and there is an existing built-up area in the south side and is relatively close to the city center. Further south, the East-West highway is already developed. For this, the UMRT and private vehicle might be competitive. Large-scale commercial developments are ongoing in the nearby station area</p> <p>User: High-end residents with private cars as well as environmentally and health conscious people</p> | <p>Vision: Propose new environmentally and health conscious lifestyle like in other developed cities</p> <p>Strategy:</p> <ul style="list-style-type: none"> • Create safe and comfort road space to promote new transport style by public transport and bicycle • Create attractive space at the connection and integration between commercial development and the UMRT stations |
| <p>C. Existing Urbanized Zone (Phuoc Long to Thu Duc)</p> | <p>Region: This area has a large buildup area and has several large-scale industries. Land use changes along this corridor will be caused by the UMRT. Then, the commuting destination for the residents will shift from the surrounding area to the city center of HCMC. Changing of the commuting pattern can be expected.</p> <p>User: Middle-class residents (they are expected to be major UMRT user for commuting)</p> | <p>Vision: Create residential areas with high convenience for commuting residents</p> <p>Strategy:</p> <ul style="list-style-type: none"> • Development of station plazas for the smooth operation of feeder buses • Promotion of urban development in the nearby stations • Public service facilities (day-care facilities for children, administrative window service) • Create amenities and event space with open space and parks and greenery • Provide park and ride facilities |
| <p>D. University and High-Tech Park Zone (High-tech Park to Suoi Tien Terminal)</p> | <p>Region: This area is packed with universities, the High-Tech Park and an amusement park. The area is expected to attract the younger generation. But there are not many services and commercial facilities</p> <p>User: Students, workers, visitors to the amusement park</p> | <p>Vision: Create an integrated new urban space for academic and industry linkage, youth activities and tourism</p> <p>Strategy:</p> <ul style="list-style-type: none"> • Create exclusive public transport/ bicycle network for university students and workers in the High-Tech Park • Set public services in station to promote academic and industry linkage activities (display space, employment information center, etc.) • Set convenience facilities for students and workers (restaurants, cafés and convenience stores) • Upgrade amusement area to secure weekend passengers |

Source: Study Team

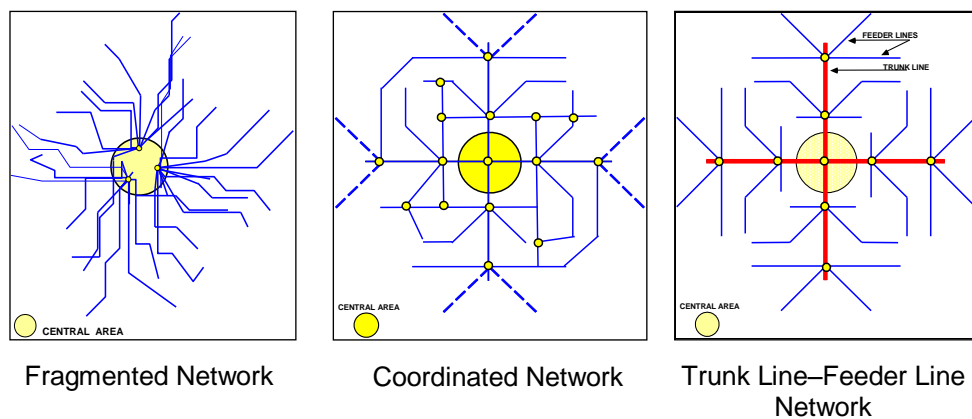
4.4 Technical Orientation in this Study

1) Technical Orientation of the Feeder Bus Planning

(1) Public Transport Network Development Direction

By the end of 2013, public buses are operated on more than 10 routes, covering the Hanoi Highway corridor. These buses have a function as the main public transport mode in this corridor now.

Basically, there are three types of public transportation network options (See Figure 4.4.1). The types of uncoordinated network and fragmented route network are commonly observed in some developing countries. Instead, an evolutionary concept is recommended for the development of the present public transport network into a trunk line-feeder line network of the type that exists in many modern, well-planned cities with efficient UMRT systems.



Source: Study Team

Figure 4.4.1 - Public Transport Network Options

The HCMC UMRT Line 1 will be the trunk-line after the opening. Effective transferability between the bus network and stations of the HCMC UMRT Line 1 will be required from the viewpoint of both efficient public transport operations and for the convenience of users. The following points have to be taken into consideration in the bus network planning along the HCMC UMRT Line 1:

- On the eastern side of the Saigon River, the connection of UMRT stations and the residential areas via the feeder bus network will be indispensable in order to promote usage of the HCMC UMRT Line 1 because of the distance between the residential area and stations. According to the traffic survey results, the people in the residential area prefer the motorcycle or feeder bus as the access mode to the UMRT stations if the distance to the UMRT stations is more than 800 m away.
- It is necessary to consider the public transport network to/from the UMRT stations, such as Ben Thanh, Tan Cang, Rach Chiec and Suoi Tien Terminal. Especially, Tan Cang Station will be the transport hub to connect the bus network from the western side of the Saigon River with the HCMC UMRT Line 1.

(2) Planning Orientation of the Feeder Bus Development

Orientation of the feeder bus system to meet the UMRT service level is shown in Table 4.4.1.

Table 4.4.1 - Technical Orientation for Feeder Bus Development

| Item | General Orientation |
|---------------------------------|---|
| Coverage Area | <ul style="list-style-type: none"> Catchment area of the HCMC UMRT Line 1 (5 km from the UMRT stations) and links between the development clusters within the catchment area and the stations |
| Feeder Bus Frequency & Schedule | <ul style="list-style-type: none"> Feeder bus frequency and time schedule should be adjusted based on the operation schedule of the HCMC UMRT Line 1 and demand volume of feeder bus routes |
| Bus Fleet Size | <ul style="list-style-type: none"> Bus fleet size also should be selected by considering the scale of the UMRT and feeder bus demand. HCMC UMRT Line 1 plans to assign 3-car trainsets at the opening stage and 6-car trainsets in the future |
| Interval of Bus Stops | <ul style="list-style-type: none"> Interval of bus stops is often shorter than that of regular buses The interval of the feeder bus stops should be keep to 400 m. According to the survey from the SAPI Study, people are willing to walk for a maximum distance of 200 m to the feeder bus stops. |
| Operation Plan | <ul style="list-style-type: none"> Bus parking space at the proposed station plaza will be included in the plan for intermodal facility development Bus turnaround plan also is included in the feeder bus operation plan |
| Ticketing and Fare Integration | <ul style="list-style-type: none"> For the ease of transferring between feeder bus and the HCMC UMRT Line 1, there is often a need to integrate two systems in terms of ticketing and fares |
| Others | <ul style="list-style-type: none"> Necessity of required coordination and activities among relevant agencies will be identified with the implementation schedule |

Source: Study Team

2) Technical Orientation of Intermodal Facilities Planning

(1) General Orientation

Considering the findings from foreign countries, development issues and development strategies as mentioned in the previous chapter and sections, the general technical orientation for intermodal facility planning is organized as shown in Table 4.4.2.

Table 4.4.2 - Technical Orientation for Intermodal Facility Planning

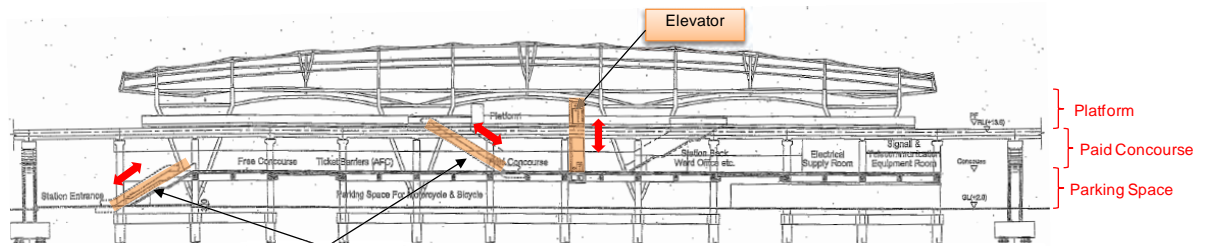
| Item | General Orientation |
|----------------------------|---|
| Land Acquisition | <ul style="list-style-type: none"> • Basically, use existing public lands such as the railway area, green zone and service road of highway to reduce development cost and time • Not require new land acquisition toward existing built up area as much as possible • In the area where urban development projects are planned, propose station plaza for future development |
| Station Plaza/ Bus Stop | <ul style="list-style-type: none"> • Secure accessibility for pedestrians and vehicles to/from multiple directions • Consider the connectivity with the feeder bus network and accessibility to cross the Hanoi Highway • Station plazas along the Hanoi Highway will be proposed based on 3 types: (i) station plaza, (ii) separated bus stops or (iii) roadside bus stops in consideration of land availability, feeder bus route and accessibility • Avoid or protect existing infrastructure such as water pipeline and high-voltage power lines • Estimate the facility demand based on future passenger demand in 2040 |
| Parking | <ul style="list-style-type: none"> • Secure parking space for private cars, motorcycles and bicycles • Estimate the capacity based on future passenger demand in 2020 • Effectively use available space under the UMRT station and viaduct in the elevated section of the UMRT |
| Access Road | <ul style="list-style-type: none"> • Layout road facilities to improve accessibility in crossing the Hanoi Highway |
| Pedestrian Bridge | <ul style="list-style-type: none"> • Upgrade in terms of providing accessibility and convenience • Install escalators, elevators and solar panels for barrier-free facilities and alternative power generation |
| Others | <ul style="list-style-type: none"> • Consider phased development to meet the UMRT opening • Effective use of space under the stations and viaduct for retail shops and etc. |

Source: Study Team

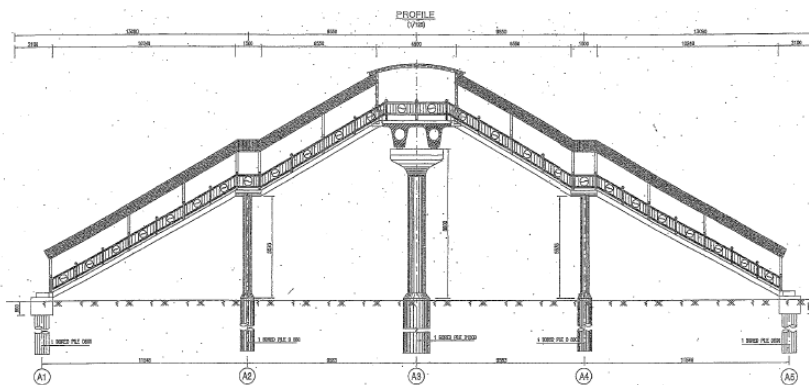
(2) Desired Improvement around Stations

According to respondents' opinion on the importance of proposed complementary measures to attract more people to use the UMRT, providing facilities for physically challenged people in the station area and improving walking and bicycling conditions to and from UMRT stations are regarded as important measures to attract people to use the UMRT.

However, in the concept design of the station and pedestrian bridge of the elevated section of the HCMC UMRT Line 1, elevators and escalators are considered only in the stations but not in the pedestrian bridges as shown in Figure 4.4.2. This is deemed insufficient in terms of the barrier free concept.



Side View of the Station (Stairs, Escalators, Elevators)



Stairs of Pedestrian Bridge

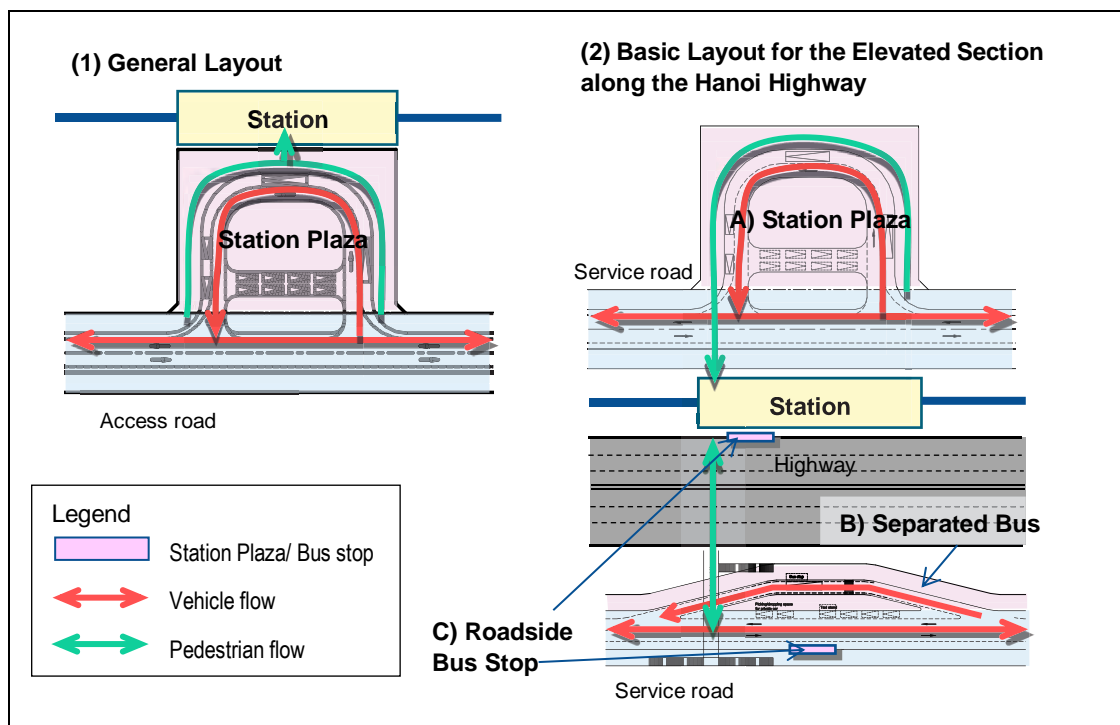
Source: Investment Project Report of HCMC UMRT Line 1 prepared by NJPT (June 2010)

Figure 4.4.2 - Existing Plan of Access/Egress at Elevated Stations

As for the walking/bicycling conditions to and from UMRT stations, sidewalks are not installed along most of the main streets around stations. And for those with installed sidewalks, walking space is encroached by motorcycle parking, roadside stands and electric light poles.

(3) Planning Orientation of Station Plazas and Bus Stops

In general, a station plaza is laid out at the station nearby as shown in Figure 4.4.3 (1). This layout secures the smooth transfer between the UMRT and other transport modes and provides a safe space for pedestrians. On the other hand, the northern elevated section from Thao Dien station of the HCMC UMRT Line 1 is located along the Hanoi Highway so the UMRT stations and the surrounding area are interloped by the roadway and service road of the Hanoi Highway making it impossible to layout a station plaza according to the general layout. For this issue, the station plaza for the northern elevated section is planned based on the basic layout as shown in Figure 4.4.3 (2).



Source: Study Team

Figure 4.4.3 - Types of Layout of the Station Plazas and Bus Stops

In the orientation for the station plaza development, feeder bus plan and accessibility improvement for crossing the Hanoi Highway were considered for the necessity of the bus berth or bus stop. Development orientations of intermodal facilities of each station are organized as shown in Table 4.4.3.

In addition, although land availability on the west side of the Thu Duc station area indicates that land is not available, the development of a station plaza is recommended from the viewpoint of smooth operations of the feeder bus.

Table 4.4.3 - Orientation of Station Plaza Planning

| | Station | Location | Land Availability for Station Plaza (*1) | Feeder Bus Plan | Improve Accessibility to cross the Hanoi Highway (*2) | Proposed Type of Station Plaza/Bus stop | | |
|----|--------------------|----------|--|-----------------|---|---|--------------------|--------------------------|
| | | | | | | Station Plaza (○: Future plan) | Separated Bus stop | Roadside Stop (bus/taxi) |
| 1 | Ben Thanh | - | C | - | - | Bus terminal | - | - |
| 2 | Opera House | - | C | - | - | - | - | ● (for taxi) |
| 3 | Ba Son | - | C | - | - | - | - | ● (for taxi) |
| 4 | Van Thanh Park | - | A2 | - | - | ● General layout | - | - |
| 5 | Tan Cang | - | A1 | ● | - | ● General layout | - | - |
| 6 | Thao Dien | North | A1 | ● | - | ● | - | ● |
| | | South | A1 | ● | | ● General layout | - | - |
| 7 | An Phu | North | A2 | - | ● | - | - | ● |
| | | South | B | ● | | - | ● | - |
| 8 | Rach Chiec | West | C | - | - | - | - | ● |
| | | East | A2, B | - | | ○ | ● | - |
| 9 | Phuoc Long | West | A2 | ● | ● | ● | - | ● |
| | | East | B | - | | - | ● | - |
| 10 | Binh Thai | West | C | ● | - | - | - | ● |
| | | East | C | - | | - | - | ● |
| 11 | Thu Duc | West | C | ● | - | ○ | - | ● |
| | | East | A2 | - | | ○ | - | ● |
| 12 | High-tech Park | West | C | - | - | - | - | ● |
| | | East | A2 | ● | | ● | - | - |
| 13 | Suoi Tien | West | C | ● | - | ○ | - | ● |
| | | East | A2 | ● | | ● | - | ● |
| 14 | Suoi Tien Terminal | - | A2 | ● | - | ● General layout | - | - |

*1 A1: Available on existing public land, A2: Possible on private land, B: Limited size on public land, C: Not available

*2 Result of supplemental study for U-turn bridge

Source: Study Team

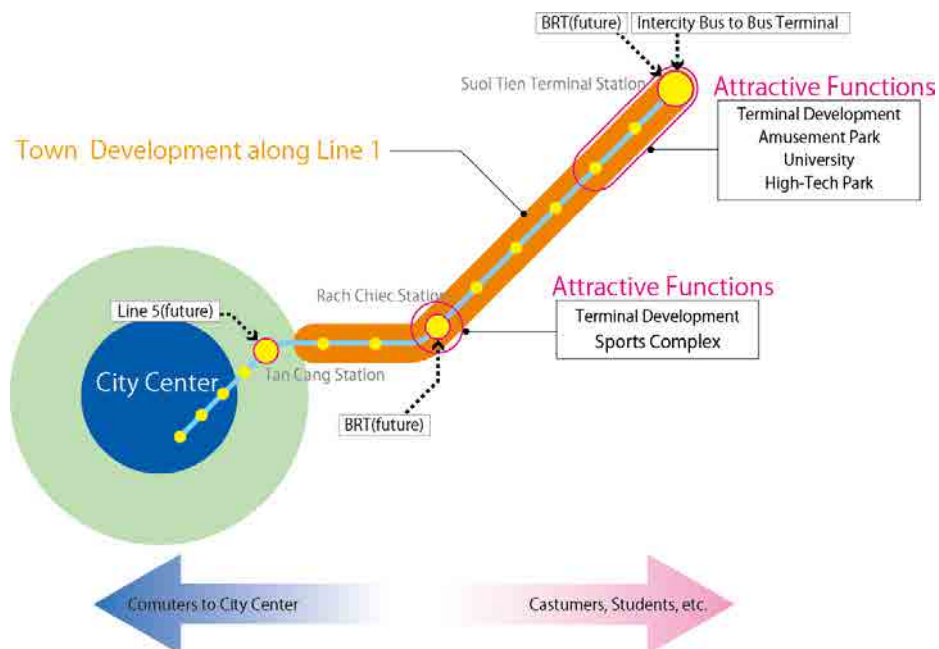
3) Orientation of Urban Area Development Planning

(1) Station Area Development Direction Addressing HCMC Urban Issues

To promote urban development along the area of the HCMC UMRT Line 1 based on the TOD concept, the following points have to be taken into consideration.

- As indicated in Chapter 2, the zoning plan was formulated for the area in the western side of the Saigon River, in which the TOD concept is adopted. However, in the area in the eastern side of the Saigon River, there are not enough urban plans following the TOD concept.
- To increase the ridership of the railway, the urban plans along the HCMC UMRT Line 1 on the eastern side of the Saigon River have to be formulated or amended. In particular, accessibility to the existing and planned facilities near the railway stations has to be improved by the urban plans, which include the sports facilities in the southeastern part of Rach Chiec Station, the Suoi Tien Water Park and the educational facilities near the Suoi Tien Station, and the Saigon High-Tech Park adjacent to the High-Tech Park Station.
- In addition, Suoi Tien Terminal and Rach Chiec Stations have to be planned as hub stations for the eastern area of UMRT Line 1.

Figure 4.4.4 shows the image of urban development along the UMRT Line 1 based on the TOD concept.



Source: Study Team

Figure 4.4.4 - Image of Urban Development for the Area along the UMRT Line 1 Based on the TOD Concept

(2) Required Urban Development Scheme

Necessary Urban Planning Schemes

a) Planning Scheme of the Zoning Plan

While a general plan in Vietnam indicates the basic development direction of the planned area, including the basic land use concept, urban structure and location of major infrastructure, a zoning plan stipulates concrete planning criteria in each urban block such as the floor area ratio (FAR), building coverage ratio (BCR), and planned population and height restriction. Therefore, to control urban development for the areas near the stations, the appropriate zoning plan which is formulated based on the TOD concept is needed.

b) Planning Scheme of Architectural Management Guidelines

The planning scheme of the zoning plan is necessary, but does not provide enough conditions to control urban development with the TOD concept. Hence, the Study Team recommends that in addition to the zoning plan, an architectural management guideline should be formulated which can stipulate the additional regulations under the flexible regulatory framework.

Necessary Implementation Framework for Developing Intermodal Facilities

The intermodal facilities at the stations of the UMRT Line 1 will be developed by the following three patterns: i) utilizing lands for public facilities (road, green spaces, etc.), ii) included in large-scale urban development projects by the private sector, iii) developing as a part of redevelopment of existing urbanized areas (Table 4.4.4 shows the outline and evaluation of these development schemes).

Table 4.4.4 - Alternative Implementation Schemes for Intermodal Facility Development

| Case | | Scheme | Expected Schedule | | Features and Issues |
|------|---|------------------------------------|---|--|--|
| i | Utilizing public facility lands | Public project | Fast | No need to purchase lands | - Can easily secure lands - ODA funds could be utilized |
| ii | Included in large-scale development projects | (A) Public project | Decided by the progress of development projects | | - Lands will be purchased or transferred - Could utilize the ODA funds |
| | | (B) Public and private partnership | | | - Could be integrated into development projects - BT, BOT and PPP schemes could be utilized |
| iii | Developing as a part of the redevelopment of existing urbanized areas | (A) Public project | Slow | Negotiation and coordination with plural land owners will take a long period | - Need to purchase lands - ODA fund could be utilized |
| | | (B) Public and private partnership | | | - Promoting redevelopment of existing urbanized area and ensuring an equal distribution of development benefit is difficult under the current Vietnamese laws and regulations - Need to establish new regulations |

Source: Study Team

To develop the intermodal facilities in accordance with the inauguration of the UMRT Line 1, the pattern i) (utilizing lands for public facilities) will be the most appropriate scheme to

be examined. However, this pattern is not sufficient enough to promote urban development with the TOD concept for the areas near the stations.

In the pattern ii) (included in large-scale urban development projects by the private sector), the schedule of intermodal facility development will be decided by the progress of urban development projects. Therefore, if some urban development projects start in the near future, the intermodal facilities will also be developed in the early period. In addition, since the intermodal facilities will be developed as part of the urban development projects by integration with urban and development plans, the TOD concept could be materialized through its inclusion in those plans.

The pattern iii) (developing as a part of the redevelopment of existing urbanized areas) will require a long period of time and a considerable amount of compensation money is necessary for securing the land. In addition, the present legal system in Vietnam cannot appropriately promote facility development. Therefore, this pattern will only be applied to the case that the urbanized area near the station needs to be thoroughly restructured with the necessary infrastructure including the intermodal facilities for a long period of time.

(3) Orientation for Station Area Urban Development

The urban development situation for the station areas of the UMRT Line 1 are shown in the table below. Although in most of the station areas urban development projects would not start immediately (Phase 1), in several station areas, including the western part of Phuoc Long Station, the southern parts of Hi-Tech Park and Suoi Tien Stations, and the surrounding area of Suoi Tien Terminal Station, urban development projects are expected to start in the near future (Phase 2). In several remaining station areas, large-scale urban development projects will be implemented in the long run (Phase 3).

Table 4.4.5 - Urban Development Situations for the Station Areas

| No. | Name of Station | Urban Development Situations for Station Areas | | |
|-----|--------------------|--|---|--|
| | | Phase 1 | Phase 2 | Phase 3 |
| 1 | Ben Thanh | - | - | - |
| 2 | Opera House | - | - | - |
| 3 | Ba Son | - | - | Redevelopment of shipyard |
| 4 | Van Thanh Park | - | - | Redevelopment of the area near the station |
| 5 | Tan Cang | - | - | Redevelopment of the container port |
| 6 | Thao Dien | - | - | - |
| 7 | An Phu | - | - | Development of the northern area |
| 8 | Rach Chiec | - | - | Sports area development |
| 9 | Phuoc Long | - | Urban Development by the Vietnamese developer with access roads | - |
| 10 | Binh Thai | - | - | - |
| 11 | Thu Duc | - | - | Relocation of the District PC |
| 12 | High-Tech Park | - | Development of area near the station by the Singaporean developer | - |
| 13 | Suoi Tien | - | Redevelopment of the Suoi Tien Expansion Area | - |
| 14 | Suoi Tien Terminal | - | JICA PPP-FS | - |

Source: Study Team

In the areas near the stations in which urban development projects are planned or expected, the intermodal facilities have to be integrated with urban development by planning and coordination of implementation. In particular, in the Phase 2 period, integration with the UMRT project is expected which could promote urban development with the TOD concept.

5 TRAVEL DEMAND FORECAST

5.1 Methodology of the Transport Demand Forecast

The demand forecast was conducted using the model based on the conventional four-step method which is the same as that used in the previous HOUTRANS study. The steps are: (1) Trip Generation and Attraction Model – to estimate the number of trips generated by and attracted to each traffic zone; (2) Trip Distribution Model – to estimate the number of trips traveling between the traffic zones; (3) Modal Share Model – to estimate the number of trips made using different transport modes; and (4) Traffic Assignment Model – to estimate the number of trips on the transport network by the different transport modes. The traffic demands on the HCMC UMRT Line 1 project were forecasted based on the HOUTRANS model with target years 2020 and 2040. The traffic demands in this study will also be forecasted with target years 2020 and 2040. In the model building and application, considerations were given to the following:

Traffic zones along HCMC UMRT Line 1: Traffic zones were divided into the Phong/Xa (commune) level in order to forecast access/egress traffic demand for feeder bus planning, based on the station catchment area (Figure 5.1.1).

Road network and bus route network data: The road network and bus route network data was developed considering existing conditions and plans. The road network for traffic assignment is shown in Figure 5.1.2.

Generation & Attraction Trips: The number of residents and workers in each traffic zone was set considering the latest urban development plans/projects along the HCMC UMRT Line 1 (Refer to Section 5.2 – Socio-Economic Framework for the Transport Demand Forecast). Generated and attracted traffic volume was calculated by the model used in HOUTRANS.

Modal Split: The modal split model of HOUTRANS was adopted to estimate the traffic volume of HCMC UMRT Line 1 and the total number of trips of each mode was adjusted by the actual modal share from the results of the passenger volume from the traffic survey. In addition, another model for access/egress trip to/from stations of HCMC UMRT Line 1 was built based on the result of the traffic surveys mentioned in Figure 4.2.3 Stated Access Mode Choice by Access Distance.

Traffic Assignment: The demand of cars, motorcycles, passengers from the HCMC UMRT Line 1 and buses were calculated. The numbers of passengers using the bus as the main mode of transport as well as for access/egress of the HCMC UMRT Line 1 were calculated. The modal share of the bus will depend on the future network of bus routes competing with HCMC UMRT Line 1 and the intermodal facilities of each station. Therefore, several cases of the bus route network was set considering several patterns of the rerouting of these competing routes and the modal split calculation was implemented by applying each pattern of the rerouted bus network.

Present Calibration: Present calibration of the demand forecast was done to adjust OD matrices by comparing between the 2013 traffic assignment result and passenger movements from the traffic survey result.

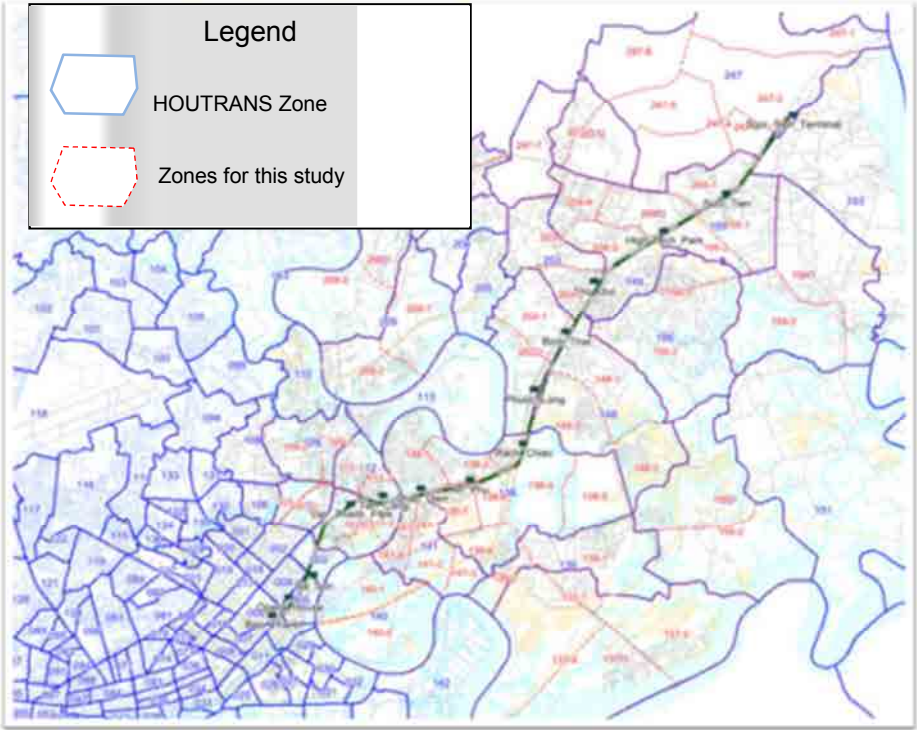


Figure 5.1.1 - Setting of Traffic Zones



Figure 5.1.2 - The Future Road Network for Traffic Assignment

5.2 Socio-Economic Framework for the Transport Demand Forecast

1) Population Trends and Plans

The Actual Population of Districts 2 and 9 and Thu Duc and Di An Districts: Districts 2 and 9 as well as the Thu Duc District of HCMC and Di An District of Binh Dung Province are located east of the Saigon River. The actual population of these four districts was recorded for 2007 and 2013 as shown in Table 5.2.1. It was found that any one of the four districts showed a high increase in population considering the fact that the entire HCMC had an annual population growth rate of around 2.5%.

Table 5.2.1 - The Actual Population of Districts 2 and 9 and Thu Duc District

| | District 2 | District 9 | Thu Duc District | Di An District |
|-------------------------------|------------|------------|------------------|----------------|
| In 2007 | 133,257 | 221,314 | 368,032 | 233,907 |
| In 2013 | 177,913 | 309,386 | 533,389 | 375,239 |
| Annual Population Growth Rate | 4.9% | 5.7% | 6.4% | 8.2% |

Comparison of Estimated Population Trends with the Planned Population:

Population trends estimated on the basis of the aforesaid actual population are compared with the planned population given in the Master Plan of HCMC and the Master Plans of each district. As shown in Table 5.2.2 below, while District 9 has little difference between the estimated trends and the planned population, the estimated population of District 2 for 2020 is remarkably lower than the planned population. The target population of District 2 for 2020 is therefore over planned. In contrast, the estimated population of Thu Duc and Di An Districts for 2015 and 2020 exceeds their respective target population.

Table 5.2.2 - Comparison of Estimated Population Trends with the Planned Population

| | District 2 | District 9 | Thu Duc District | Di An District |
|----------------------------------|------------|------------|------------------|----------------|
| Planned for 2015 ¹⁾ | 220,000 | 310,000 | 470,000 | 290,000 |
| Estimated for 2015 ²⁾ | 195,906 | 345,938 | 603,620 | 417,072 |
| Planned for 2020 ¹⁾ | 650,000 | 500,000 | 550,000 | 335,000 |
| Estimated for 2020 ²⁾ | 209,637 | 536,339 | 574,049 | 406,743 |

1) The planned population for 2015 is from the Master Plans of HCMC and Di An District and the planned population for 2020 is from the Master Plans of Districts 2 and 9 and Thu Duc and Di An Districts.

2) The estimated population was obtained by multiplying the actual population of 2013 by the annual increase ratio from 2007 to 2013 given in 1. above.

Source: Study Team

2) Estimated Population Distribution for 2020 and 2040

In the study, the population distribution for 2020 and 2040 is estimated as follows:

District 9: Since District 9 has a resemblance between the estimated population and the planned one, the population for 2020 is distributed as set out in the Master Plan of District 9, except for Blocks 1 and 2 which are already exceeding the 2020 planned population. For Blocks 1 and 2, the current (2013) population is applied as the population for 2020 considering that even if the population there will probably decrease due to such non-residential development as the development of the high tech park in 2040, eviction of dwellers will not have been completed by 2020. The increase of the planned population of Blocks 1 and 2 for 2020 is offset by decreasing the planned population of other blocks in the proportion given in the district master plan. For 2040, the population is distributed as set out in the Master Plan of District 9.



Figure 5.2.1 - The 6 Blocks of District 9



Figure 5.2.2 - The 5 Blocks of Thu Duc District

Thu Duc District: All blocks, except for Block 2 where a cement plant and container port is located, exceed the planned population of the Master Plan of Thu Duc District. For 2020, since it is not expected that the district population will decrease in the near future, the population of Block 2 is as drawn out in the Master Plan and that of other blocks is as recorded in 2013. In the distant future as well, judging that land use will not be drastically changed to non-residential use, it is expected that the present population will not change in a downward trend. Thus, also for 2040, the population of Block 2 is as given as in the Master Plan and that of other blocks is maintained as recorded in 2013. For both 2020 and 2040, the excess of the estimated population is reduced from the total population provided in the Master Plan of HCMC in the proportion shown in the same Master Plan so that the population balance can be kept entirely in the city.

District 2: Since all blocks of District 2 undoubtedly reveal an over planned population for 2020, the 2020 population is collected for each block in such a manner that the estimated population trend will continue until 2020. The resulting decrease of population is offset by increasing the other districts' planned population of the Master Plan of HCMC in the proportion given in the Master Plan. If the estimated population trends continue, it is expected to reach the level of the planned population in 2040. Thus, for 2040, the planned population is used as drawn from the Master Plan of District 2 relying on the municipal policies.

Di An District: The district is divided into (1) the zone which covers the national university area and (2) the zone for the residential area. Zone 1 shows almost the same increase ratio as that of the planned one, but Zone 2 shows a much higher increase ratio than the planned one. Since it is not expected that the population of Zone 2 will decrease in the near future, the current (2013) population of Zone 2 is applied as the population for 2020. As for Zone 1, the planned population is used for 2020. For 2040, since the aforesaid district population used for 2020 is almost the same as the planned population for 2040, the population for 2020 is used for 2040 as well.

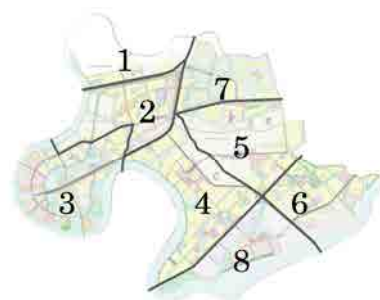


Figure 5.2.3 - The 8 Blocks of District 2

Table 5.2.3 - The Applied Population for 2020 and 2040

| | District 2 | District 9 | Thu Duc District | Di An District |
|---------|---|---|---|---|
| 2020 | Estimated population trends are used for all blocks | The current (2013) population is used for those of Block 1 and Block 2, while the planned population is used for other blocks. | For Block 2, the planned population is used, while for other blocks the current (2013) population is used. | For zone (1), the planned population is used, while for zone (2) the current (2013) population is used. |
| 2040 | Planned population for 2020 is used for all blocks | The planned population is used for all blocks. | For Block 2, the planned population is used, while for other blocks the current (2013) population is used. | For zone (1), the planned population is used, while for zone (2) the current (2013) population is used. |
| Remarks | The decrease of the planned population in all blocks for 2020 is offset by increasing the other districts' planned population of the Master Plan of HCMC in the proportion given in that Master Plan. | The increase of the planned population of Blocks 1 and 2 for 2020 is offset by decreasing the planned population of the remaining blocks in the proportion given in the district master plan. | The increase of the planned population of the blocks except Block 2 for 2020 and 2040 is offset by decreasing the population of other districts of the Master Plan of HCMC in the proportion given in that Master Plan. | |

Source: Study Team

The population as the socio-economic framework used in the demand forecast process is shown in Table 5.2.4. In the case of trend estimation, the population of District 2 of HCMC is lower than the master plan. On the other hand, the population of District 9, Thu Duc District of HCMC and Di An District of Binh Duong Province are higher than the master plan.

Table 5.2.4 - Socio-Economic Framework for 2020 and 2040

| Population | District 2, HCMC | District 9, HCMC | Thu Duc District, HCMC | Di An District, Binh Duong Province |
|---------------------------|-----------------------------|-----------------------------|-----------------------------------|--|
| Trend Estimation for 2013 | 177,913 | 309,386 | 533,389 | 375,239 |
| Trend Estimation for 2020 | 209,637 | 536,339 | 574,049 | 406,743 |
| Master Plan for Plan 2040 | 650,000 | 507,500 | 550,000 | 335,000 |
| Estimated for 2040 | 650,000 | 536,339 | 574,049 | 512,800 |

Note: District 9 and Thu Duc District are already urbanized residential areas so it is assumed that for the purposes of the travel demand forecast, the estimated population for 2020 and 2040 will be around the same

Source: Study Team

5.3 Result of the Transport Demand Forecast

1) Public Transport Mode Trip Generation and Attraction along the HCMC UMRT Line 1

Trip generation and attraction of the public transport mode along the HCMC UMRT Line 1 is shown in Figure 5.3.1. Higher trip growth during 2020 to 2040 is from high socio-economic growth at HCMC District 1, District 2 and District 9. On the other hand, trip growth at HCMC Binh Thanh District, Thu Duc District and the Binh Duong Province Di An District located in the northern area of HCMC UMRT Line 1 is lower than the southern area.

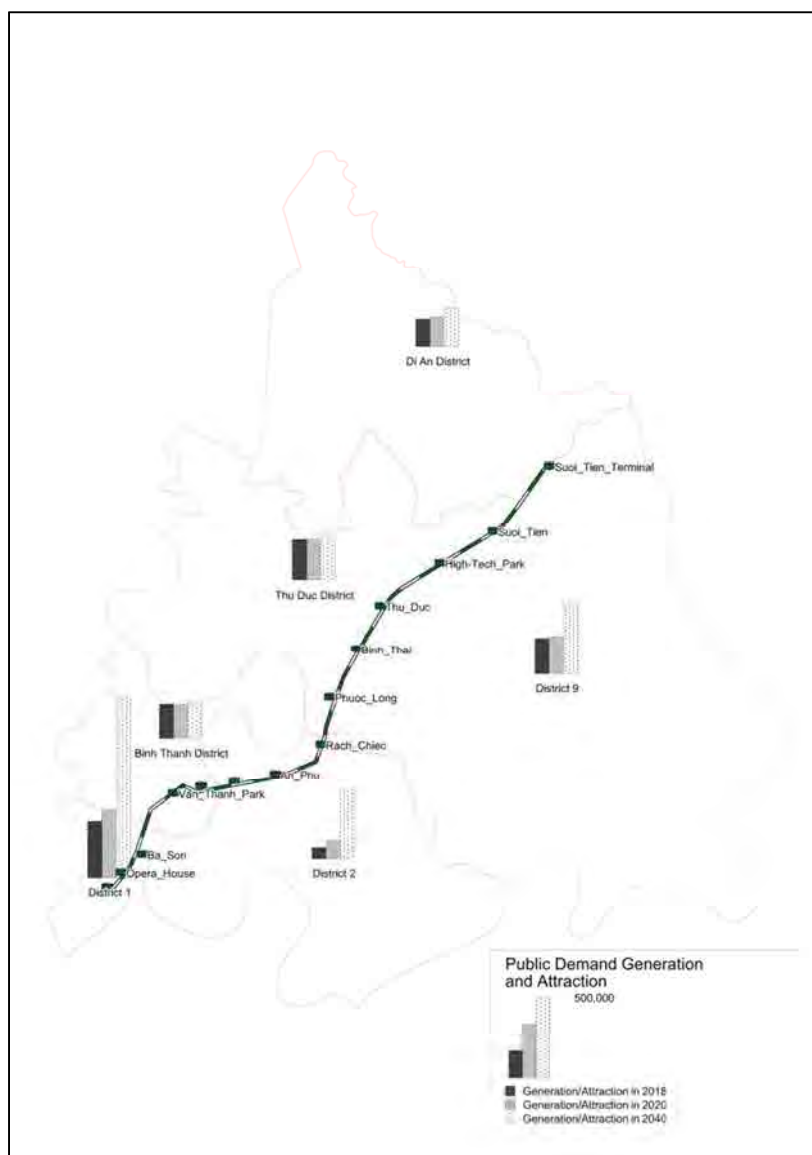


Figure 5.3.1 - Comparison of Transport Demand along the HCMC UMRT Line 1

2) Trip Distribution and Modal Share along the HCMC UMRT Line 1

The pattern of trip distribution in this study is using same model as that of HOUTRANS. Modal shares in this study, which was adjusted by the actual modal share of the passenger volume from the results of the traffic survey are shown in Table 5.3.1. The modal share of public transport in 2018, 2020 and 2040 will be estimated as 17.8%, 17.7% and 16.9% respectively.

Table 5.3.1 - Modal Share in the SAPI Study

| Year | Motorcycle | Car* | Public Transport | Total |
|-------------|-------------------|-------------|-------------------------|--------------|
| 2018 | 74.6% | 7.6% | 17.8% | 100.0% |
| 2020 | 71.8% | 10.5% | 17.7% | 100.0% |
| 2040 | 55.4% | 27.7% | 16.9% | 100.0% |

* Passenger vehicles only
 Source: Study Team

3) Demand Forecast Result

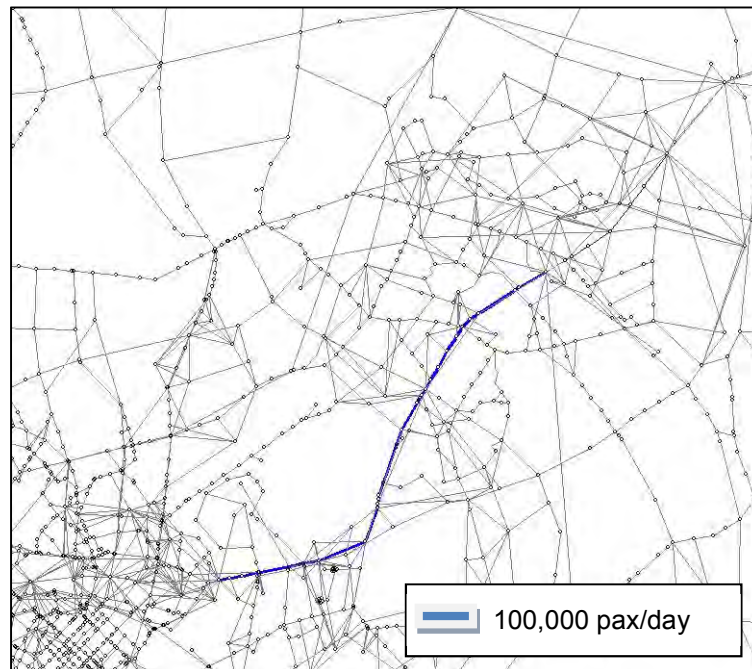
Table 5.3.2 shows the summary of the demand forecast of HCMC UMRT Line 1. The 2040 demand of HCMC UMRT Line 1 is almost 2.13 times of its 2020 figure.

Table 5.3.2 - Demand Forecast by Station on the HCMC UMRT Line 1

| | Station | 2018 (pax/day) | 2020 (pax/day) | 2040 (pax/day) |
|----|-----------------------|---------------------------|---------------------------|---------------------------|
| 1 | Ben Thanh | - | 90,000 | 178,000 |
| 2 | Opera House | - | 26,000 | 96,000 |
| 3 | Ba Son | - | 15,000 | 44,000 |
| 4 | Van Thanh Park | - | 7,000 | 15,000 |
| 5 | Tan Cang | 32,000 | 22,000 | 39,000 |
| 6 | Thao Dien | 3,000 | 15,000 | 51,000 |
| 7 | An Phu | 5,000 | 4,000 | 8,000 |
| 8 | Rach Chiec | 12,000 | 19,000 | 51,000 |
| 9 | Phuoc Long | 6,000 | 15,000 | 32,000 |
| 10 | Binh Thai | 7,000 | 19,000 | 37,000 |
| 11 | Thu Duc | 10,000 | 22,000 | 33,000 |
| 12 | High Tech Park | 7,000 | 12,000 | 13,000 |
| 13 | Suoi Tien | 6,000 | 10,000 | 11,000 |
| 14 | Suoi Tien Terminal | 14,000 | 27,000 | 41,000 |
| | Total | 102,000 | 303,000 | 649,000 |

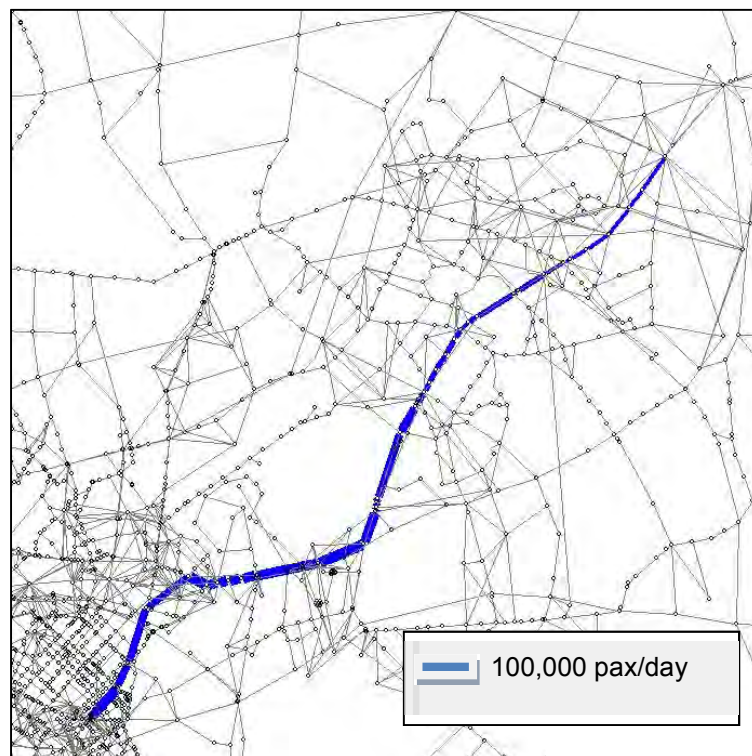
Source: Study Team

The demand forecast results in 2018, 2020 and 2040 are shown in Figure 5.3.2, Figure 5.3.3 and Figure 5.3.4.



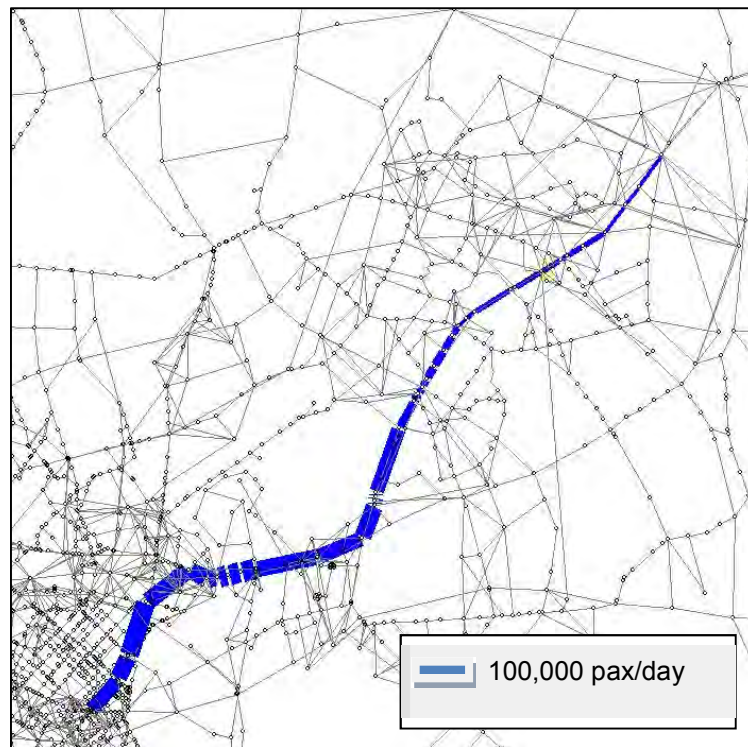
Source: Study Team

Figure 5.3.2 - HCMC UMRT Line 1 Demand in 2018



Source: Study Team

Figure 5.3.3 - HCMC UMRT Line 1 Demand in 2020

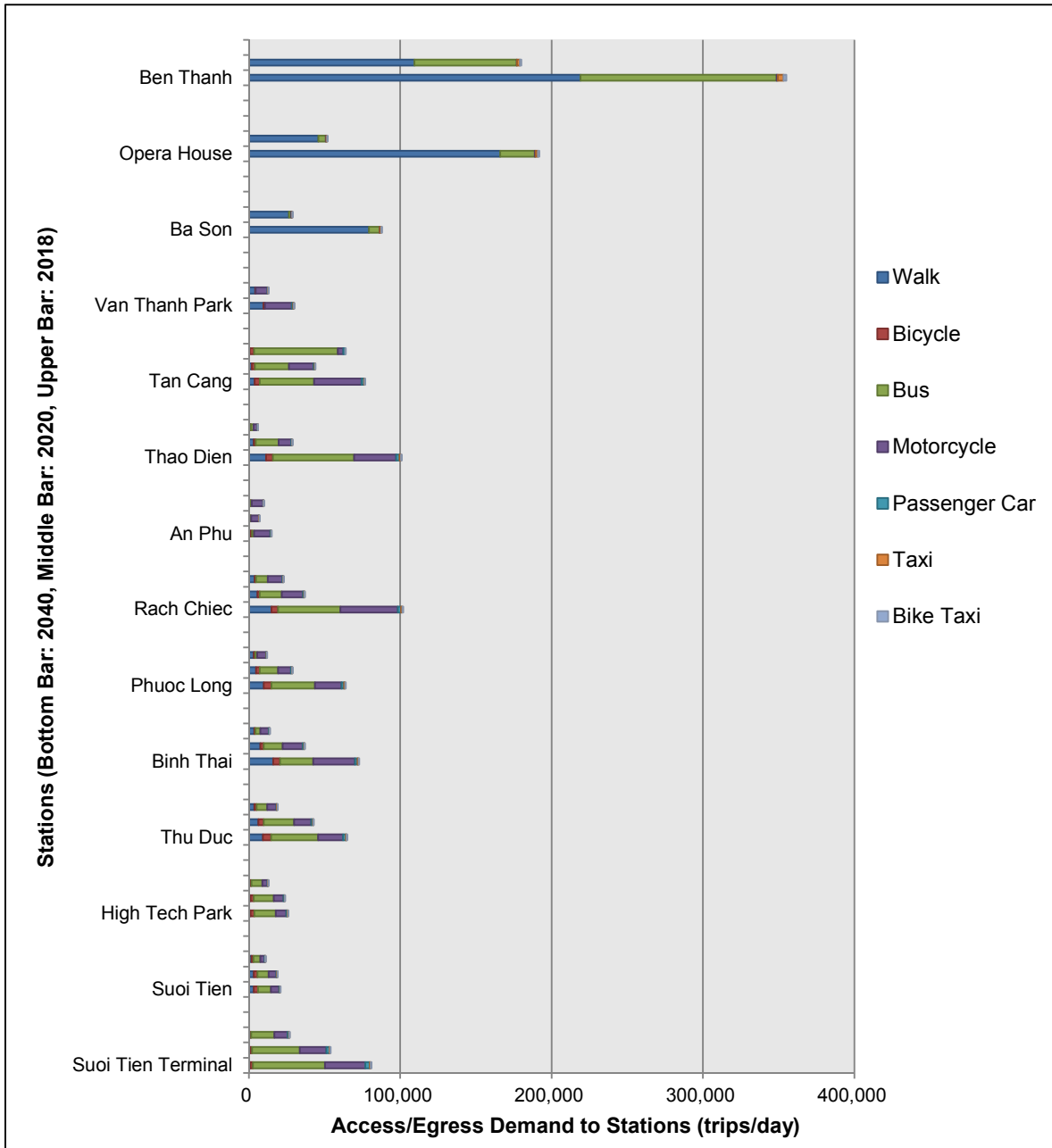


Source: Study Team

Figure 5.3.4 - HCMC UMRT Line 1 Demand in 2040

4) Access/Egress Trips to Stations on the HCMC UMRT Line 1

Access/egress trips to stations on the HCMC UMRT Line 1 by mode is shown in Figure 5.3.5 and Table 5.3.3. In the 3 stations of CBD area, namely Ben Thanh, Opera House and Ba Son, the modal share of walking as access/egress trips to the stations are higher than that of other stations. On the other hand, the share of motorcycles and feeder buses as access/egress trips seems to be high on the elevated stations in the suburban areas such as in Districts 2, 9 and Thu Duc District. Therefore, development of intermodal facilities such as motorcycle parking, physical space for bus and private vehicles in front of the station will be an important consideration to promote usage of the UMRT.



Source: Study Team

Figure 5.3.5 - Access/Egress Trips to Stations on the HCMC UMRT Line 1

Table 5.3.3 - Access/Egress Trips by Mode to Stations

| Station | Year | Walk | Bicycle | Bus | Motorcycle | Passenger Car | Taxi | Bike Taxi |
|--------------------|------|------|---------|-----|------------|---------------|------|-----------|
| Suoi Tien Terminal | 2018 | 4% | 2% | 56% | 32% | 4% | 1% | 1% |
| | 2020 | 2% | 2% | 58% | 33% | 4% | 1% | 1% |
| | 2040 | 1% | 2% | 59% | 33% | 4% | 1% | 1% |
| Suoi Tien | 2018 | 15% | 13% | 41% | 26% | 3% | 1% | 1% |
| | 2020 | 17% | 13% | 39% | 26% | 3% | 1% | 1% |
| | 2040 | 16% | 13% | 40% | 26% | 3% | 1% | 1% |
| High Tech Park | 2018 | 5% | 9% | 55% | 26% | 3% | 2% | 1% |
| | 2020 | 5% | 9% | 55% | 27% | 3% | 1% | 1% |
| | 2040 | 5% | 9% | 55% | 27% | 3% | 1% | 1% |
| Thu Duc | 2018 | 19% | 8% | 37% | 32% | 3% | 1% | 1% |
| | 2020 | 15% | 8% | 46% | 26% | 3% | 1% | 1% |
| | 2040 | 14% | 8% | 48% | 25% | 3% | 1% | 1% |
| Binh Thai | 2018 | 26% | 6% | 22% | 41% | 2% | 2% | 1% |
| | 2020 | 21% | 6% | 34% | 36% | 2% | 1% | 1% |
| | 2040 | 22% | 6% | 30% | 38% | 2% | 1% | 1% |
| Phuoc Long | 2018 | 27% | 8% | 12% | 48% | 3% | 2% | 1% |
| | 2020 | 17% | 8% | 42% | 29% | 3% | 1% | 1% |
| | 2040 | 15% | 8% | 45% | 28% | 3% | 1% | 1% |
| Rach Chiec | 2018 | 17% | 4% | 33% | 42% | 2% | 1% | 1% |
| | 2020 | 15% | 4% | 39% | 38% | 2% | 1% | 1% |
| | 2040 | 15% | 4% | 40% | 37% | 2% | 1% | 1% |
| An Phu | 2018 | 9% | 5% | 6% | 75% | 3% | 2% | 1% |
| | 2020 | 9% | 5% | 8% | 72% | 3% | 1% | 1% |
| | 2040 | 9% | 5% | 9% | 73% | 3% | 1% | 1% |
| Thao Dien | 2018 | 20% | 5% | 26% | 46% | 2% | 2% | 1% |
| | 2020 | 11% | 5% | 53% | 28% | 2% | 1% | 1% |
| | 2040 | 11% | 5% | 53% | 28% | 2% | 1% | 1% |
| Tan Cang | 2018 | 1% | 5% | 86% | 6% | 2% | 0% | 1% |
| | 2020 | 5% | 5% | 51% | 37% | 2% | 1% | 1% |
| | 2040 | 5% | 5% | 47% | 41% | 2% | 1% | 1% |
| Van Thanh Park* | 2018 | | | | | | | |
| | 2020 | 32% | 3% | 0% | 60% | 3% | 2% | 1% |
| | 2040 | 32% | 3% | 0% | 59% | 3% | 2% | 1% |
| Ba Son* | 2018 | | | | | | | |
| | 2020 | 91% | 0% | 6% | 2% | 0% | 1% | 1% |
| | 2040 | 90% | 0% | 8% | 0% | 0% | 1% | 1% |
| Opera House* | 2018 | | | | | | | |
| | 2020 | 89% | 0% | 9% | 1% | 0% | 1% | 1% |
| | 2040 | 87% | 0% | 12% | 0% | 0% | 1% | 1% |
| Ben Thanh* | 2018 | | | | | | | |
| | 2020 | 61% | 0% | 38% | 0% | 0% | 1% | 1% |
| | 2040 | 62% | 0% | 36% | 0% | 0% | 1% | 1% |

Note: *Ben Thanh, Opera House, Ba Son and Van Thanh Park stations not be open in 2018

Source: Study Team

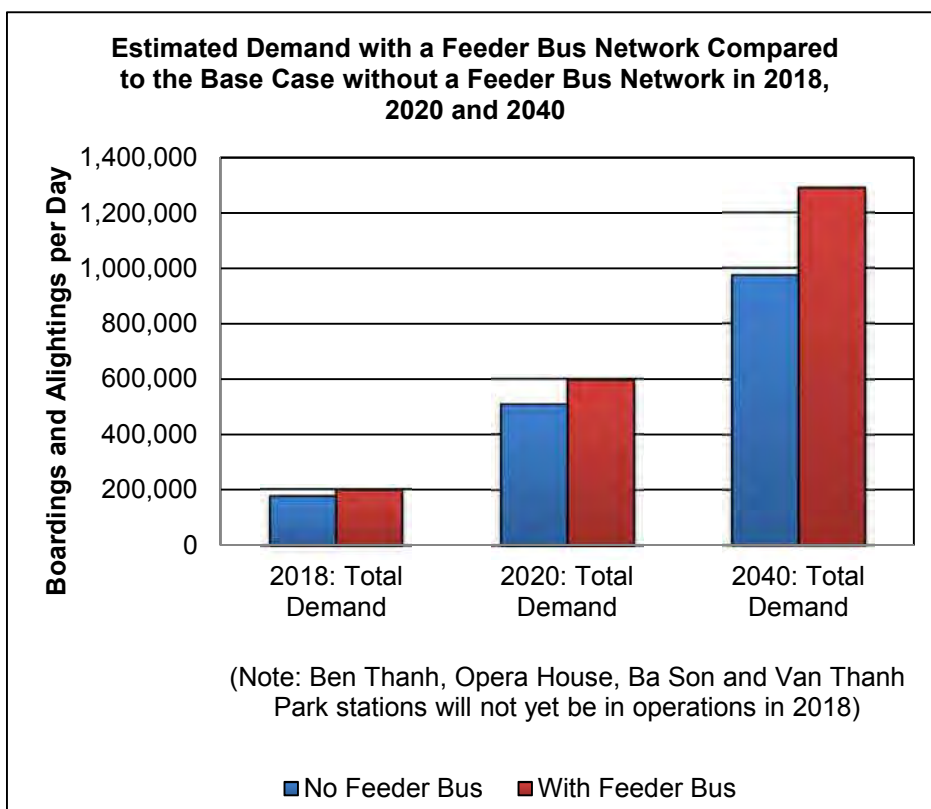
5) Demand Forecast of the HCMC UMRT Line 1 with the Feeder Bus Network

An integrated multi-modal approach is necessary for securing ridership on the HCMC UMRT Line 1 especially with regards to users' access to the stations. Therefore, the demand of each station on the HCMC UMRT Line 1 was also estimated with the addition of a feeder bus network for access/egress to the stations. The results can be seen in Figure 5.3.6 in terms of the total demand of all stations on the line with and without a feeder bus network.

It can be seen that in 2018 with the partial opening of the line the, difference between the total estimated demand for all stations on the line compared to the case without a feeder bus network is not so great.

However, with the full opening of the line in 2020, the estimated total demand with the feeder bus network is around 100,000 greater than the case without the feeder bus network.

By 2040, it can be seen that the addition of a feeder bus network has a significant impact on the estimated total demand of the stations on the HCMC UMRT Line 1. Compared to the case without a feeder bus network, it is forecasted that in 2040, the total demand of the stations on the line will be around 300,000 greater compared to the case without a feeder bus network.

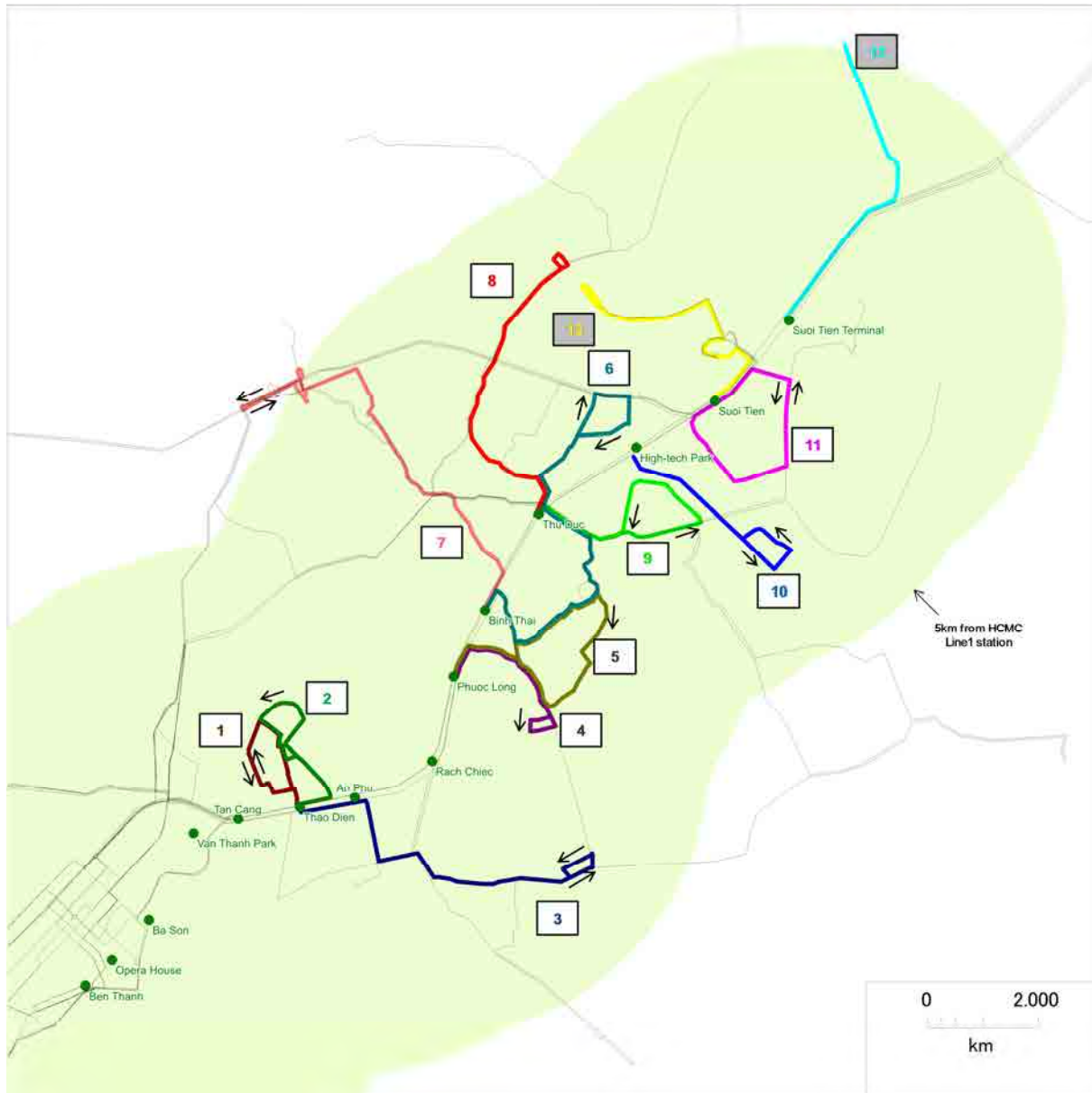


Source: Study Team

Figure 5.3.6 – Total HCMC UMRT Line 1 Station Demand with and without the Feeder Bus Network

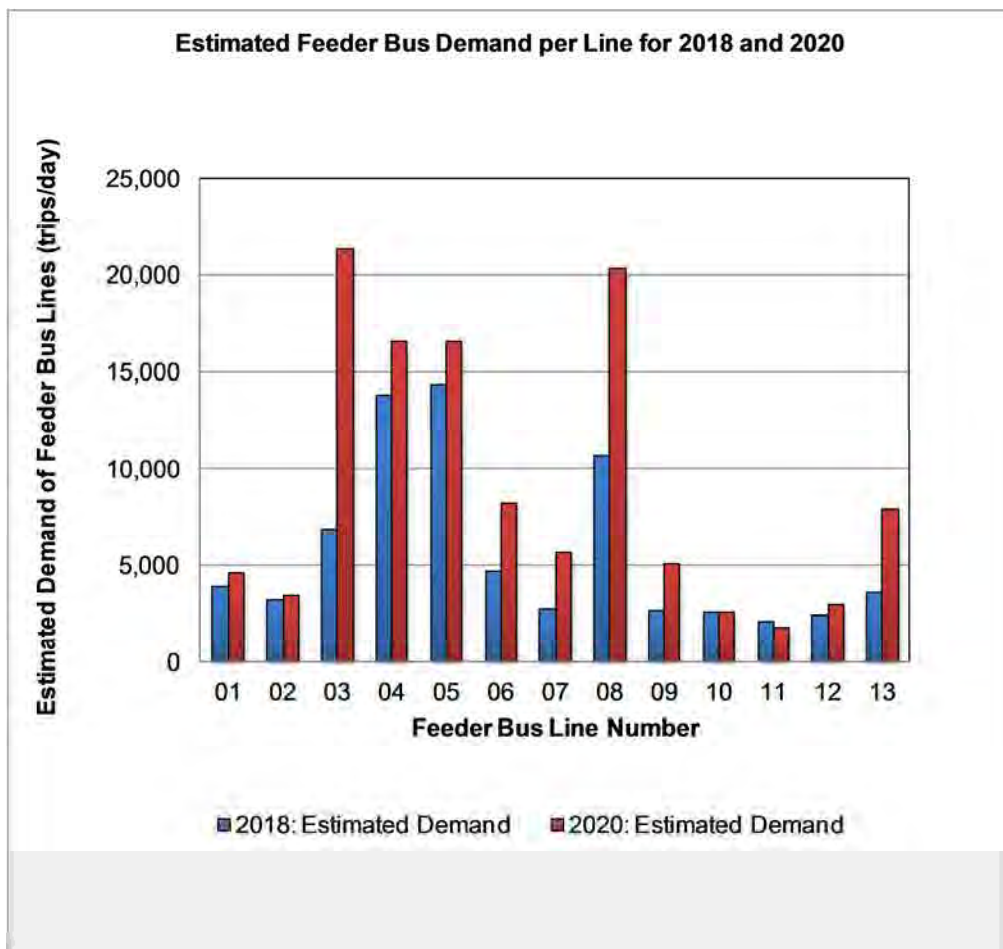
6) Estimated Demand of the Feeder Bus Lines

The optimized feeder bus lines for the HCMC UMRT Line 1 is shown in Figure 5.3.7 and the estimated feeder bus demand per line is shown in Figure 5.3.8.



Source: Study Team

Figure 5.3.7 - Optimized Feeder Bus Lines for the HCMC UMRT Line 1



Source: Study Team

Figure 5.3.8 – Estimated Feeder Bus Demand per Line for 2018, 2020 and 2040

In 2018, with the partial opening of the HCMC UMRT Line 1, the estimated demand for the feeder bus lines varies from a low of 2,000 trips/day to a high of around 14,000 trips/day. In particular, it is estimated that feeder bus line 05 will have the highest demand in 2018. The low to moderate demand for most of the feeder bus lines can be explained from the fact that none of the stations in the CBD will be open in the partial opening in 2018.

In 2020, with the complete opening of the HCMC UMRT Line 1, it is estimated that demand will soar for feeder bus lines 03, 06, 07, 08 and 13 while the estimated demand for feeder bus lines 01, 02, 10 and 12 will modestly increase compared to in 2018.

This can be explained by the socio-economic framework used in the demand forecasting (see Section 5.2 - Socio-Economic Framework for the Transport Demand Forecast for more details).

Feeder bus line 03 is located in District 2 and the population used in the transport demand forecast assumes that the population will grow from 177,913 in 2013 to 209,637 in 2020, around an 18% increase. Feeder bus lines 06, 07 and 08 are located in the already

urbanized Thu Duc District, so there will already be a built in demand for the feeder bus services as evidenced by the large estimated forecasts for 2020. Feeder bus line 13 will also see an increase in demand compared to 2018 because part of Di An District that is located next to District 9 and Thu Duc District is already urbanized while the eastern portion of the district still has yet to be urbanized and developed and it is estimated that the population will increase from 375,239 in 2013 to 406,743, around an 8% increase.

6 CONCLUSION, RECOMMENDATIONS AND NEXT STEPS

6.1 Conclusion and Recommendations

In order to maximize the project benefit of the HCMC UMRT Line 1, the Study Team proposed the following: (i) concept plan of Intermodal facility development for 10 stations and its basic design, (ii) 13 feeder bus routes and its operation plan and (iii) concept plan of transit oriented development (TOD) at 6 station areas. These developments are expected to lead to: (i) convenient, reliable and comfortable transit service, (ii) development of a hierarchical transport system and (iii) user-oriented urban development along the UMRT. These will generate the benefits such as less automobile use (mitigation of traffic congestion), affordable mobility, increased choices in transport and efficient and intensive land use along the Line 1 corridor.

HCMC UMRT Line 1 will be first trial of an urban railway in Vietnam, so the role sharing among relevant agencies for these developments is not clear. Therefore the demarcation of responsibilities also is proposed in order to smooth the implementation of them. The topics of Feeder Bus Network Planning, Intermodal Facility Development and Station Area Development were derived through the study process.

The detailed contents of these topics are contained in the following volumes of this study: Part II: Feeder Bus Network Planning, Part III: Intermodal Facility Development and Part IV: Station Area Development.

1) Feeder Bus Network Planning

- According to the traffic demand forecast, passenger demands in the walking distance from stations are very limited except for the 4 stations in the CBD, namely Ben Thanh, Opera House, Ba Son and Van Thanh Park stations. Most of the railway users are living or working in the areas a bit far from the stations thus they need to use bus services, the motorcycle or other alternative modes of transports. Looking at the estimated demand at the stations located on the east side of the Saigon River, users who access the railway by walking is just 11% while 43% of users have to transfer to the bus service. In conclusion, in order to reach and obtain a sufficient number of railway passengers, feeder bus services and improvements in transferring between the bus and HCMC UMRT Line 1 will definitely be necessary.
- 13 feeder bus services that were deemed sufficient based on the estimated demand were proposed for 8 stations located on the eastern side of the Saigon River. It was proposed to eliminate, reroute or reduce the operations of existing bus lines that currently run parallel to the HCMC UMRT Line 1.
- A practical feeder bus operation plan was proposed and the finalization and implementation is expected to be developed when the HCMC UMRT Line 1 opens.
- Feeder bus development will provide good accessibility to the station and generate an increase in UMRT ridership which in turn will bring positive impacts on the financial performance of the line

2) Intermodal Facility Development

- Intermodal facility development were proposed taking into the following considerations:
 - Intermodal facilities at each station from Thao Dien to Suoi Tien will be provided on both sides of the Hanoi Highway (along service roads) so as to provide better accessibility from the suburban areas on both sides of the highway to the respective station. Long pedestrian bridges will be constructed to cross the Hanoi Highway and it should be designed and constructed with the Universal Design concept and have comfortable facilities for the pedestrians who will use the bridges to cross the highway.
 - According to the people's opinion on the importance of complementary measures to attract more people to use the UMRT, they requested facilities for people with disabilities in the station area. Therefore, installation of both elevators and escalators were considered in the plan.
- Alternatives for the project implementation scheme were proposed as the “New construction package under the current loan” and “New construction package under a new loan”. The Study Team identified its advantages and disadvantages for each of the alternatives. The HCMC PC should make the final decision to assign the relevant organization(s) as the project owner and to select the appropriate project implementation scheme.
- Agencies responsible for the O&M of the intermodal facilities were proposed. Close coordination between the MAUR and DOT will be indispensable for smooth operations.
- The proposed intermodal facility development project was evaluated on its economic viability based on the EIRR estimate by comparing the economic costs and benefits over the life of the project. The EIRR was estimated at 20.6%, which proved to be feasible from an economic viewpoint.
- At Suoi Tien Terminal Station, a JICA PPP-FS is on-going and it covers the planning of intermodal facility development. For this study, the proposed feeder bus route, modification of existing bus routes, requirements of the station plaza and bus stops at Suoi Tien Terminal were identified in same way with that of other stations. The Study Team recommends that the demarcation of responsibilities between the public and private sectors be clarified based on the result of the JICA PPP-FS study.

3) Station Area Urban Development

- Conceptual transit oriented development (TOD) plans were prepared for the station areas in order to maximize the impact of the mass rapid transit system development and to promote a transit oriented society in the future. These stations are: An Phu, Rach Chiec, Phuc Long, Thu Duc, High-Tech Park and Suoi Tien. Further efforts are also required to promote TOD policy.
- Population density in station areas by TOD based integrated development at 6 station

areas is expected to reach to 150-300 persons/ha. These developments will contribute to increase the ridership on the HCMC UMRT Line 1. Thus, this will contribute to create benefits in terms of financial benefits (from the increased ridership) for the railway's O&M costs.

- In order to get a consensus and to confirm the policy among the relevant organizations including the HCMC PC, required amendments of the urban plan based on the proposed concept plan and procedures on the legalization of the proposed urban plans were proposed.

6.2 Next Steps

The next important steps for the following development phases comprises of the following activities:

1. The feeder bus network development which should be ready when the HCMC UMRT Line 1 opens
2. Planning and implementation of the intermodal facility development
3. Encouragement of station area development
4. Establishment of an appropriate institutional framework

1: “Feeder Bus Network Development”, 2: “Planning and Implementation of the Intermodal Facility Development” and 3: “Encouragement of Station Area Development” can be implemented under the present system and these should be started as soon as possible. 4: “Establishment of an Appropriate Institutional Framework” is a new legal and institutional mechanism to generate further project benefits for the HCMC UMRT Line 1. In order to establish the new framework, time is necessary; however, the study or necessary coordination with relevant agencies should be started as soon as possible.

The main agency should be responsible for each activity not only to implement it, but also to coordinate it with the other relevant agencies. Demarcation of responsibilities to implement the proposed activities is shown in Table 6.2.1. It is recommended that the HCMC PC should make a decision to identify the implementing agency to implement these activities with the concerned agencies immediately.

Table 6.2.1 – Demarcation of Responsibilities for the Proposed Activities

| Activity (Action Program/Procedure) | Implementing Agency (Main Agency) | Related Agencies |
|--|---|--------------------------------------|
| 1. Feeder Bus Network Development | | |
| Modification of Existing Bus Routes | City Buses: MOCPT Inter-Provincial Buses: DOT | Bus Operators |
| Feeder Bus Development | DOT/MOCPT | Bus Operators |
| Coordination for the Intermodal Facility Development | MAUR/MOCPT | DOT, Traffic Police, Bus Operators |
| Fare and Ticket Integration | MAUR/DOT | MOCPT, Bus Operators, UMRT Operator |
| 2. Planning and Implementation of the Intermodal Facility Development | | |
| Procedure for Loan Agreement | HCMC PC, MAUR (DOT), JICA | MOF, MPI |
| Technical Design and Preparation of Tendering | MAUR (DOT), JICA, | NJPT, 3 rd Party Verifier |
| Tendering Contractor | MAUR (DOT), JICA, | NJPT, 3 rd Party Verifier |
| Approval Procedure on the Investment Report by the HCMC PC | HCMC PC, MAUR (DOT) | DPI, DOT (MAUR), DPA |
| Updating of Zoning Plan in the HCMC PC | HCMC PC, DPA | MAUR, DOT, District PC |
| Transfer of Land Use Rights | HCMC PC, District PC | MAUR, DOT, DPA |
| Construction Works | Contractor | MAUR (DOT), NJPT |
| 3. Encouragement of Station Area Development | | |
| Amendment of Urban Plans for the Proposed Concept Plan | DPA | Private Investor, District PC |
| Procedure on the Legalization of the Proposed Urban Plans | HCMC PC, DPA | APC, MAUR |
| 4. Establishment of an Appropriate Institutional Framework | | |
| Institutional Design and Business Model for the Feeder Bus Service | HCMC PC | MAUR, DOT, MOCPT |
| Institutional Mechanism of Role Sharing for the O&M of the Intermodal Facility | HCMC PC | MAUR, DOT |
| New Schemes for Station Area Development | HCMC PC | DPA |

Source: Study Team