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

Part II: Feeder Bus Network Planning

August 2014

Japan International Cooperation Agency (JICA)

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

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(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
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Appendix B: Estimation of Station Plazas
Appendix C: Breakdown of Cost Estimation
Appendix D: Environmental Legal and Institutional Framework
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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 II: Feeder Bus Network Planning

7 BUS NETWORK PLANNING

7.1 Key Planning Principles

1) Alignment with the Public Transport Policy in Ho Chi Minh City

According to the latest government policy (Decision 5745/2009/QD-TTg, dated 08/08/2013), targeting public transport modal share is 20-25% in 2020, 35-45% in 2030, 50-60% in 2050 while achieving a reduction in private transport modal share as the policy direction.

Master Plan for Public Transport Development in HCMC until 2025 was formulated to develop the plan of public transport system until 2025 as the basic for the development of sustainable urban transport system. In this plan, a concept of hierarchical network of public transport and the idea of integration of railway station and bus terminal with other modes were proposed.

In order to achieve the above modal share of public transport in government policy, restructuring bus network including new feeder bus system which cover the catchment area of railway station, and good coordination/connection between bus network and railway stations, will be indispensable. Figure 7.1.1 shows the outline of such a rationalization based on the conceptual idea of trunk-line and feeder-line network.

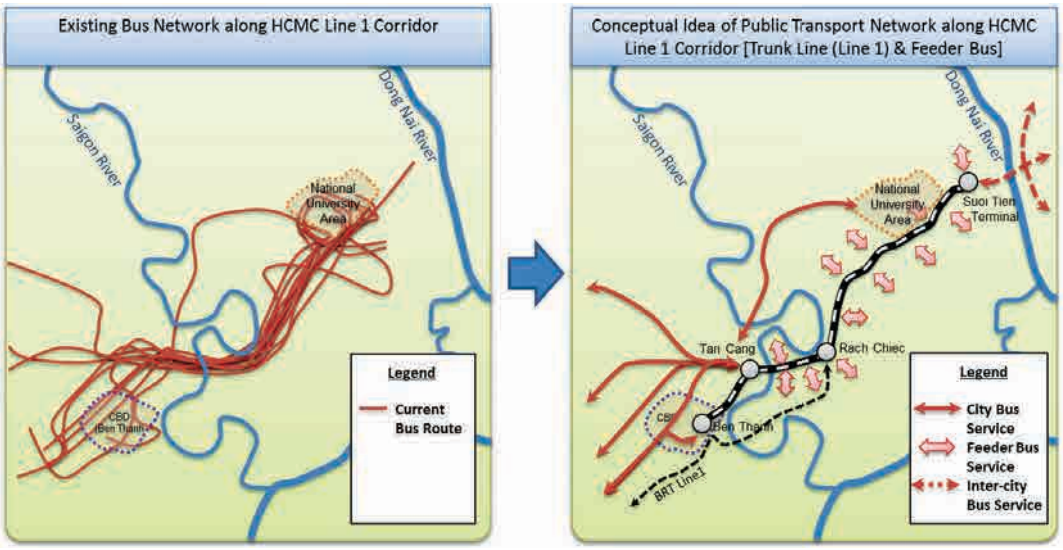


Figure 7.1.1 - Conceptual Idea of the Trunk-Line & Feeder-Line Network

2) Basic Principle on Route Competition

For the route planning process on competing route, there are a number of options:

Option 1 - Do-nothing/business as usual

In this option there is no action to modify existing bus services and essentially allows the market (passengers) to decide which services are most convenient to use. Feeder lines to the UMRT can be added but existing bus services that may duplicate HCMC UMRT Line 1 services are permitted to remain operational.

Option 2 - Removal of all existing bus services that duplicate UMRT

This option removes all existing bus routes which duplicate the HCMC UMRT Line 1. It, then, adds complementary feeder bus routes to service surrounding areas. It forces all the public transport passenger traffic in the corridor onto the HCMC UMRT Line 1.

Option 3 - Coordinated UMRT/bus routes

This option is a hybrid of Option 1 and 2, allowing some bus services to continue to operate in parallel to the HCMC UMRT Line 1 and also servicing passengers to the UMRT. Dedicated feeder routes can be added to the UMRT where required. This option gives passengers maximum choice to select the most convenient mode.

Table 7.1.1 evaluates the 3 options.

Table 7.1.1 - Evaluation of Options on Route Competition

	Advantage	Disadvantage	Required Measures
Option 1: Do nothing/ business as usual	• Retains the existing services in the present coverage area (least disruption to existing passengers)	• Large duplication of services is inefficient • Loss of bus passengers to rail will reduce bus viability • Competing services to rail will also reduce rail viability • Does not create added value of a complementary system	• Minor relocation of bus stops close to stations.
Option 2: Removal of all parallel bus services and replaced with UMRT& feeder bus	• Provides the necessary spatial coverage and is operationally efficient by non-duplication between UMRT line and bus lines	• Creates additional passenger transfers (on and off rail) • Reduces accessibility as UMRT stations are located a greater distance apart • May reduces passenger travel efficiency for some passengers	• Need to create good transfer conditions at UMRT stations and connecting access services at both ends of the UMRT • Bus/rail timetables to be coordinated • Fares and ticketing need to be integrated • Requires coordinated management of bus and rail to develop service integration
Option 3: Hybrid design Network (in-between Option 1 and 2)	• Increases services and maximizes passenger options • May improve travel efficiency for passengers • Creates a healthy competition for passengers which may improve service levels • Carries the combined benefits of Option 1 and 2	• May reduce UMRT passengers as it does not force all public transport passengers onto UMRT	• Same as Option 2 • Some coordination of remaining bus services to connect to rail, stations (to act as feeders)

Source: Study Team

Option 3 is the recommended option as it offers passengers the most convenience and places public transport as a whole in a more competitive position against private modes. This advantage helps to offset any potential impact of the relative competition that is created between parallel rail/bus routes. The overall efficiency of the bus/rail combination is efficient because services can be tailored to suit demand. Integrated fares and ticketing and good coordination between services will further enhance the overall efficiency gains.

3) Objectives and Methodology for Redesigning Bus Routes

The objectives and methodology for redesigning bus routes is as follows:

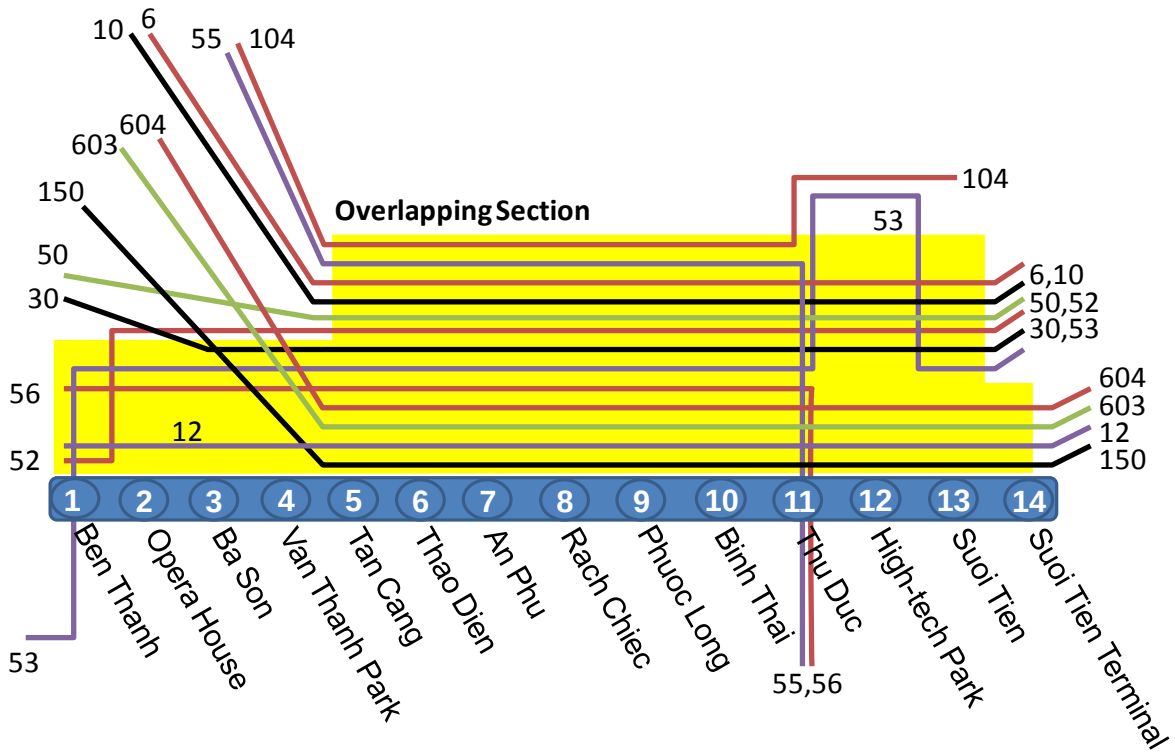
Objectives

- To reduce competition between bus routes and HCMC UMRT Line 1
- To design route patterns considerate of the overall passenger travel experience mindful not to create unnecessary transfers that inconvenience passengers and increase travel time.
- To provide high frequency services dedicated to serving HCMC UMRT Line 1, and branded as an UMRT service.
- To develop the UMRT service and adjoining bus routes as an integrated public transport network with the aim to boost total ridership.
- To utilize existing bus routes where possible, but subject to being able to meet all the criteria of a UMRT feeder service, such as level of service frequency, reliability and incentive to perform.
- To develop win-win situations where UMRT benefit existing operators with additional passenger growth, shorter operating routes.

To realize these objectives, the following methodology is employed:

Methodology

- Routes that have a major overlap to the HCMC UMRT Line 1 shall be eliminated or shortened to reduce overlap and competition. The following figure shows the overlapping section between the HCMC UMRT Line 1 and existing bus routes. There are 13 existing bus routes that overlap with the UMRT corridor. These 13 routes, namely, 6, 10, 12, 30, 50, 52, 53, 55, 56, 104, 150, 603 and 604, overlap the UMRT between Tan Cang Station and Thu Duc station by more than 8 km. These routes will be examined during the course of the study.



Source: Study Team

Figure 7.1.2 - Overlapping Section between the HCMC UMRT Line 1 and Existing Bus Routes

- Some bus routes that have an overlap to HCMC UMRT Line 1 shall be continued to operate in parallel to HCMC UMRT Line 1 and also servicing passengers to the UMRT. These routes also have the following functions
  - To cover the area between railway stations: location of existing bus stops along Hanoi Highway is shown in Figure 7.1.3. Especially, the area between Phuoc Long Station and Thu Duc Station, bus stops are covering existing residential areas. These services should be kept by existing bus routes.
  - To manage an event such as an UMRT service interruption (e.g., accident during railway operations).

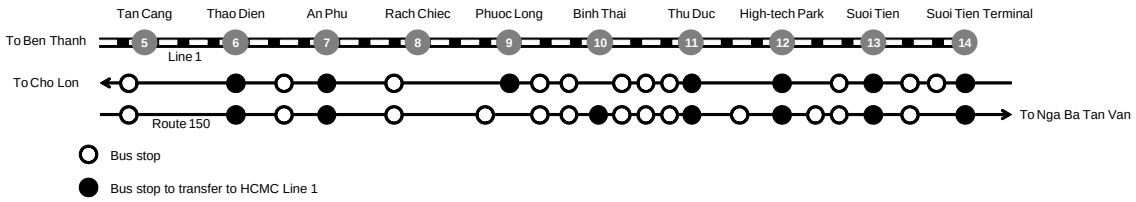
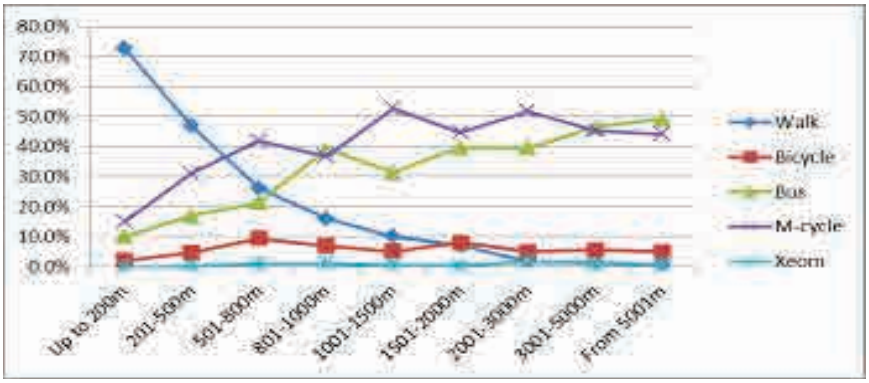


Figure 7.1.3 - Location of Existing Bus Stops along the Hanoi Highway (in case of Route No. 150)

- Minor overlap in proportion to overall route distance will be allowed.
- Longer distances served by existing routes will be adapted where possible to connect with the UMRT.
- The planning for the feeder bus routes is based on assisting passengers that live in up to 5 km from the stations, as per the demand indicated in the Stated Preference Survey, as shown in Figure 7.1.4.
- The design of the actual feeder bus route is based on existing road condition and future road plans, with feeder routes connecting potential high demand areas, such as high-rise apartments/condominiums, universities/schools, supermarkets and office buildings to the HCMC UMRT Line 1.
- Typical feeder bus route designs are shown in Figure 7.1.5 with relevant comments on their suitability and constraints.



Source: Study Team

Figure 7.1.4 - Stated Preference of Access Mode to Station in HCMC UMRT Line 1

Closed Circular Route:

A circular route is inconvenient unless buses operate in both directions

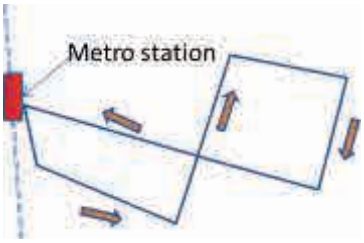
Single Route:

This is the most common idea for a feeder route, servicing passengers to and from the station

Single Combined Circular Route:

The circular loop on this type of route should be small and used just to improve distribution in a suburb. Passengers should not perceive much added distance to their trip when travelling in a circle.

'Figure-8' Type Route:



The one way direction of a Figure 8 route has the same disadvantages as a one-way circle route. This type of route does not offer any advantage but may be necessary if one way road design dictate it use.

Cross-suburb feeder route (can also operate as a 'Figure-8')

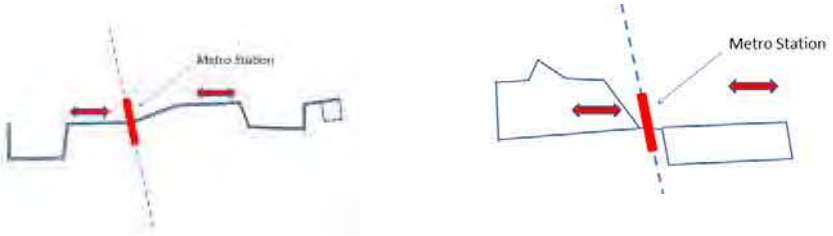


Figure 7.1.5 - Typical Route Designs for Feeder Services

4) Requirements of the Feeder Bus System

Requirements of the feeder bus system to meet the UMRT service level is shown in Table 7.1.2.

Thus, the main objectives of the feeder bus system concentrate to provide access to railway stations and connect development clusters within a radius of 5 km from the station center. Therefore, its role and market do not overlap with existing bus service.

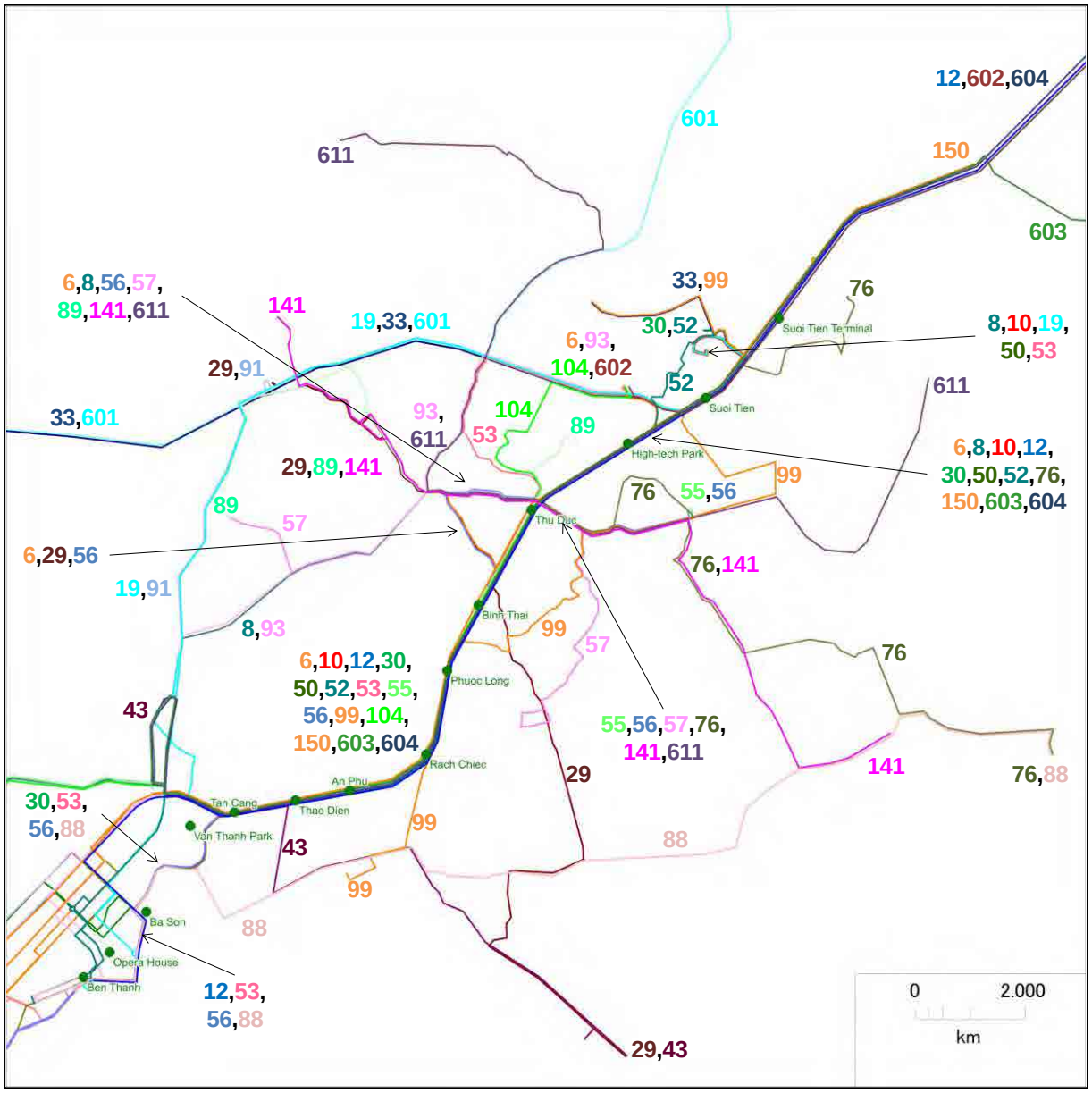
Table 7.1.2 - Requirement of Feeder Bus System

Item	Feeder Bus Routes
Coverage Area	✓ Catchment area of the HCMC UMRT Line 1 (5 km from railway stations) and links between development clusters within the catchment area and the stations.
Bus Frequency and Schedule	✓ Bus frequency and time schedule should be adjusted based on the operation schedule of the HCMC UMRT Line 1 (train runs every 4.5 minute in peak hours)
Bus Fleet Size	✓ Bus fleet size also should be selected by considering the size of the rolling stock on the HCMC UMRT Line 1 (3-car trains at the opening stage and 6-car trains in the future)
Interval of Bus Stops	✓ Interval of bus stops is often shorter than that of general buses. According to our survey (in Thao Dien and An Phu station areas), people are willing to walk for a maximum distance of 200 m to feeder bus stations. Therefore, the interval should be shorter than 400 m.
Ticketing and fare integration with the UMRT	✓ For the ease of transferring between feeder buses and the UMRT, there is often a need to integrate the two systems in terms of ticketing (e.g., a common smart card) and fare.

7.2 Proposal of Bus Routes Modification and New Feeder Bus Routes

1) Existing Bus Routes

Existing bus routes to influence by HCMC UMRT Line 1 are shown in Figure 7.2.1. There are 13 existing bus routes that overlap with the UMRT corridor. These are routes 6, 10, 12, 30, 50, 52, 53, 55, 56, 104, 150, 603 and 604, and most of routes overlap the UMRT by more than 8 km during Tan Cang Station and Thu Duc Station. These routes will be examined during the course of the study.



Source: Study Team

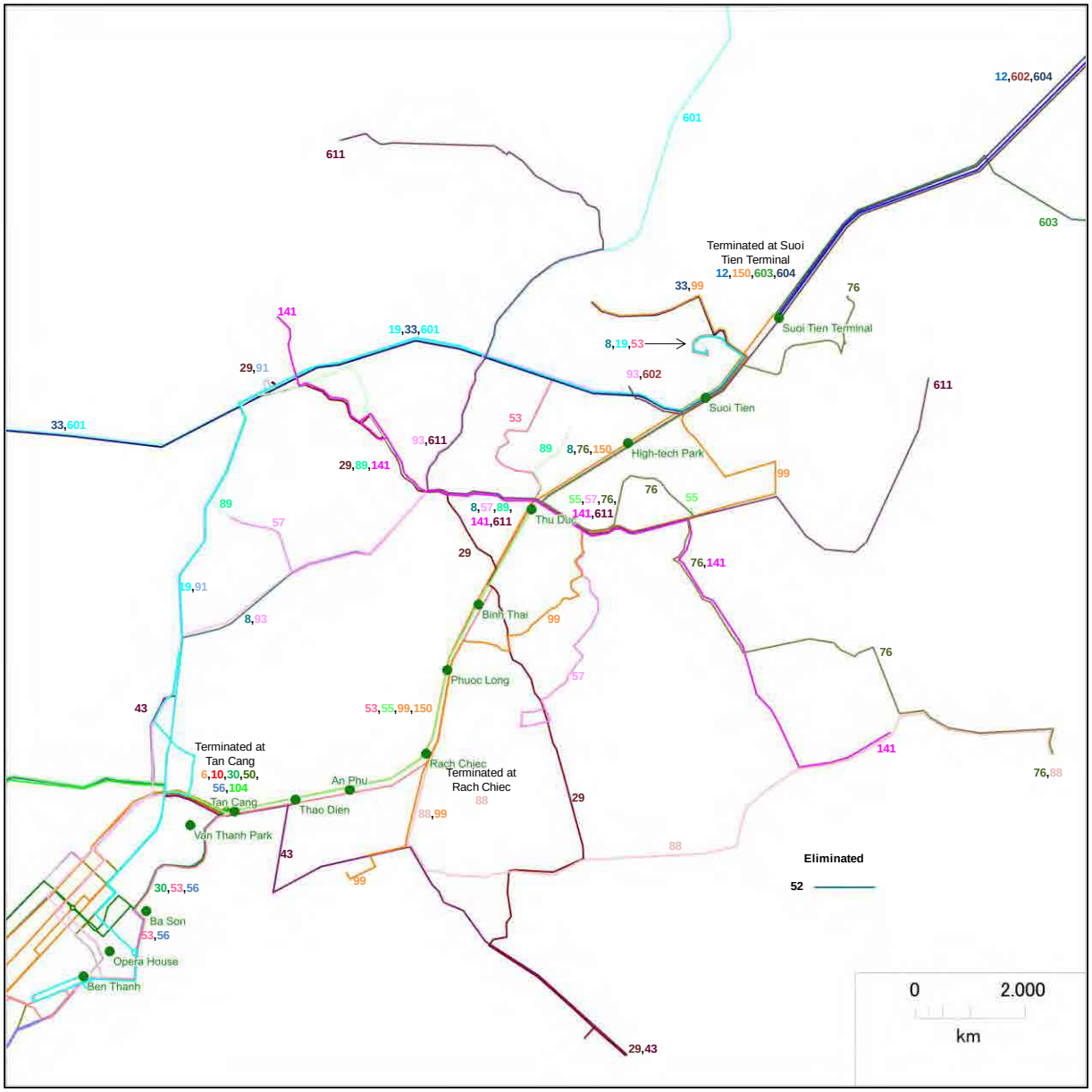
Figure 7.2.1 - Existing Bus Routes along the HCMC UMRT Line 1 Corridor

2) Modified Bus Routes

The proposed modification of existing bus routes is shown in Figure 7.2.2. Major modifications are as follows:

- Routes 6, 10, 30, 50, 56 and 104 will be terminated at Tan Cang Station, the eliminated section will be covered by the HCMC UMRT Line 1, proposed feeder bus routes and modified existing bus routes.
- Route 52 will be eliminated. Bus services in these sections will be covered by the HCMC UMRT Line 1, proposed feeder bus routes and modified existing bus routes.
- Routes 12, 603 and 604 function 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 shall be terminated at Suoi Tien Terminal Station and the bus service to the east shall be retained otherwise heavy competition between the UMRT and bus routes will occur.
- Routes 53 and 88 will be required to have some minor modifications to adjust/cover other modifications for the following reasons:
    - Route 53: This route should cover the Linh Trung area instead of route 104.
    - Route 88: This route will overlap with the BRT 1 from Mai Chi Tho Street to the city center. Therefore, this route should be connected to Rach Chiec Station to connect with both of the HCMC UMRT Line 1 and BRT 1.
- Route 55 and 150 shall be kept the same as the current route.

Detailed explanation of modified bus routes are mentioned on Chapter 7.3.

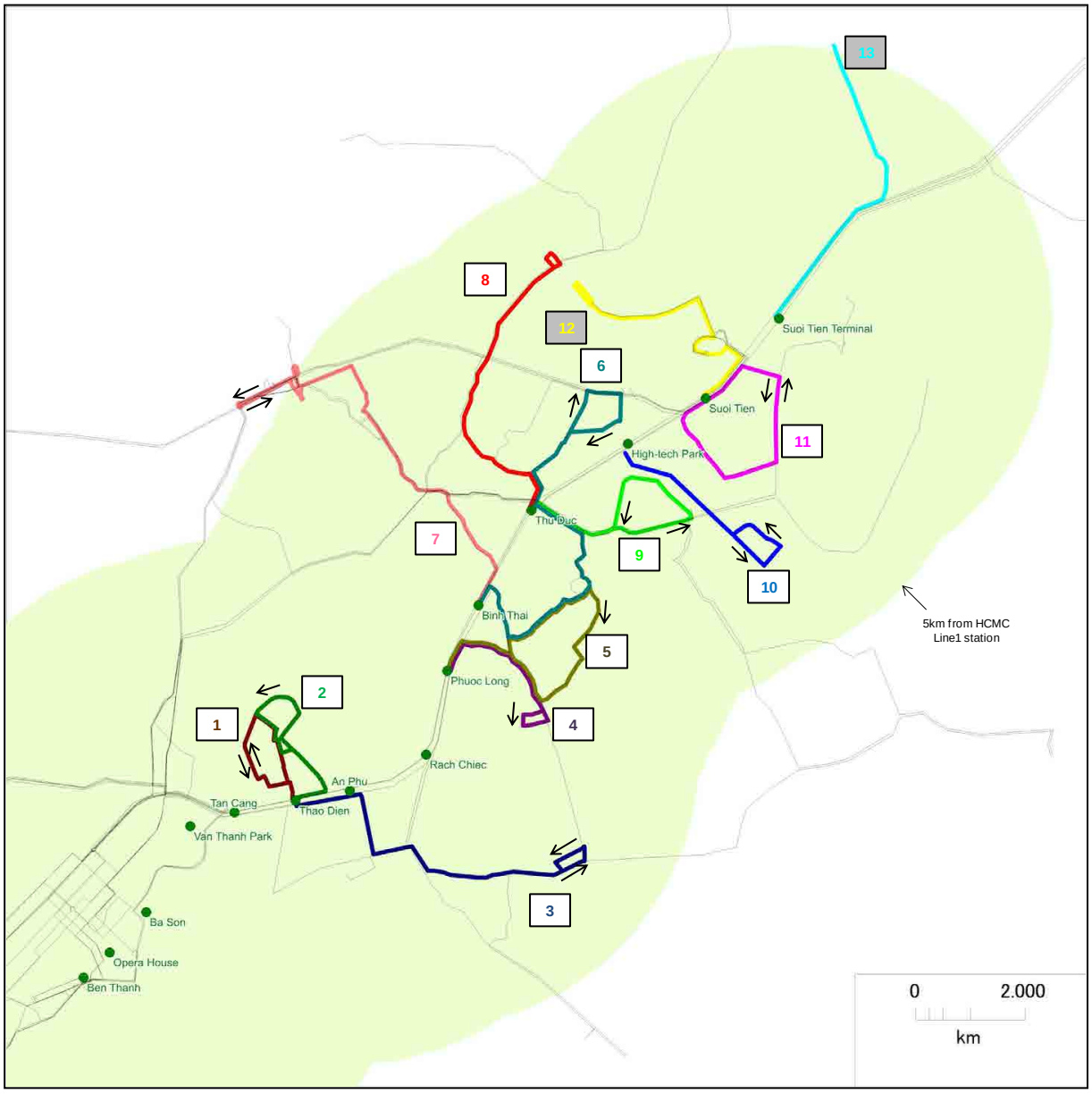


Source: Study Team

Figure 7.2.2 - Modified Bus Routes

3) Proposed Feeder Bus Routes

Outline of Proposed Feeder Bus Routes: 13 new feeder bus routes for the HCMC UMRT Line 1 are proposed as shown in Figure 7.2.3 and Table 7.2.1.



Source: Study Team

Figure 7.2.3 - Proposed Feeder Bus Routes

Table 7.2.1 - Proposed Feeder Bus Routes for HCMC UMRT Line 1

Route No.	Type*	Servicing Station	Route Description	Distance (km)**		Catchment Area
				One Way	Round Trip	
1	2	Thao Dien	Thao Dien Station - Quoc Huong - Xuan Thuy - Quoc Huong - So 47 - So 66 - Nguyen Van Huong - Nguyen Cu - Xuan Thuy - Quoc Huong - Thao Dien Station	-	4.2	Residential Areas in the North of Thao Dien Station
2	4	Thao Dien	Thao Dien Station - Thao Dien - Nguyen Van Huong - So 66 - turn right to Nguyen Van Huong - Thao Dien - Thao Dien Station	-	6.4	Residential Areas in the North of Thao Dien Station
3	3	Thao Dien, An Phu	Thao Dien Station - Song Hanh - An Phu Station - Song Hanh - Nguyen Hoang - Luong Dinh Cua - Nguyen Thi Dinh - Nguyen Duy Trinh - So 6 - So 42 - So 39 - Nguyen Tuyen - Nguyen Duy Trinh and return via reverse direction to Thao Dien Station	6.9	13.7	Residential Areas in the Southeast of An Phu Station and Binh Trung
4	1	Phuoc Long	Phuoc Long Station - Hanoi HW - Tay Hoa - Do Xuan Hop - Dai Lo 3 - HCMC Vocational College Facility 3	3.4	6.7	Residential Areas in the East of Phuoc Long Station
5	3	Phuoc Long	Phuoc Long Station - Hanoi HW - Tay Hoa and trun left to Do Xuan Hop - Tang Nhon Phu - Dinh Hoi - Do Xuan Hop and return via Tay Hoa to Phuoc Long Station	-	8.8	Residential Areas of Phuoc Long B
6	3	Binh Thai, Thu Duc	Binh Thai Station - Hanoi HW - Do Xuan Hop - Tang Nhon Phu - Dinh Phong Phu - Le Van Viet - Hanoi HW - Thu Duc Station - Le Van Chi - Thu Duc Hospital	8.9	17.8	Residential Areas in the East of Binh Thai Station
7	1	Binh Thai	Binh Thai Station - Dang Van Bi - Vo Van Ngan - To Ngoc Van - Tam Ha -Tam Chau - Go Dua - Thu Duc Wholesale Market	8.5	17.0	Existing Urban Areas in Tam Binh
8	1	Thu Duc	Thu Duc Station - Le Van Chi - Hoang Dieu 2 - Kha Van Can - QL1K - Intersection in fromt of Big C Di An	6.3	12.6	Existing Urban Areas in the North Part of Thu Duc District
9	4	Thu Duc	Thu Duc Station - Le Van Viet - University of Transport and turn left to Man Thien - turn right to Le Van Viet and return via reverse direction to Thu Duc Station	-	7.4	Existing Urban Areas in Tang Nhon Phu and University of Transport
10	4	High-tech Park	High-Tech Park Station - High Tech Park Road - High-tech Park Area	3.7	7.4	High-tech Park Area
11	2	Suoi Tien	Suoi Tien Station - NH1 service road - So 154 - Hoang Huu Nam - Cau Xay - Nam Cao - NH1 service road - Suoi Tien Station	-	6.1	Residential Areas in the East of Suoi Tien Station
12	1	Suoi Tien	Suoi Tien Station - NH1 - National University Area	6.0	12.0	National University Area
13	1	Suoi Tien Terminal	Suoi Tien Terminal Station - NH1 - TL16 - Tran Van Elementary School	6.0	12.0	Residential Areas in the North of Suoi Tien Terminal Station

Note: *Route type; 1: shuttle service, 2: two-way loop service, 3: clockwise loop service, 4: anti-clockwise loop service
**Round trip is from the station to same station, one way trip distance is from UMRT station to the last stop of the feeder bus line.

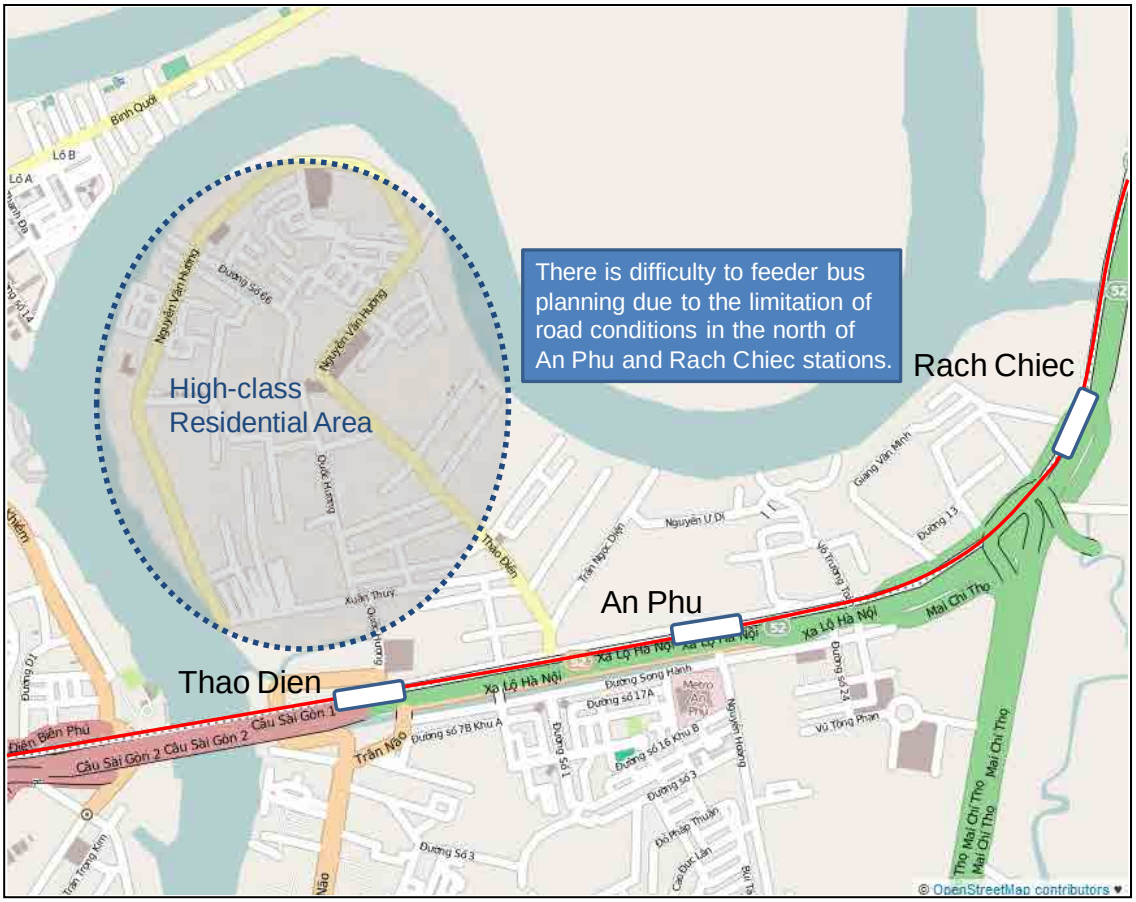
CBD Area (Stations 1-5): Ben Thanh, Opera House, Ba Son, Van Thanh Park, Tan Cang: There are no new feeder bus routes proposed for these stations in the CBD area as there are many existing bus routes that can be modified to service the new UMRT stations. Bus routes operating along the major bus corridor of Dien Bien Phu will connect to the HCMC UMRT Line 1 at Tan Cang Station, where major interchange facilities will be developed. This bus interchange will have a major importance at the inauguration of the HCMC UMRT Line 1 (Stage 1 in 2018) as the UMRT will operate from Tan Cang station to Suoi Tien Terminal, making the station an important bus interchange point.

As many of the access roads around the CBD stations are narrow inner city streets, a special emphasis should be made on improving the walking space to UMRT stations; clearing footpaths from obstructions and improving the walking environment.

Thao Dien Station: The high-class residential area in the north of Thao Dien Station has a high usage of private vehicles, whereas the area to the south of Thao Dien is still developing. To win these passengers over to the UMRT will requires a high level of service. The catchment area of **Feeder 1** and **2** covers these areas. At Thao Dien Station the feeder bus stops will be located both sides of the station; **Feeder 1** and **2** terminate at the north side and **Feeder 3** terminates at the south side.

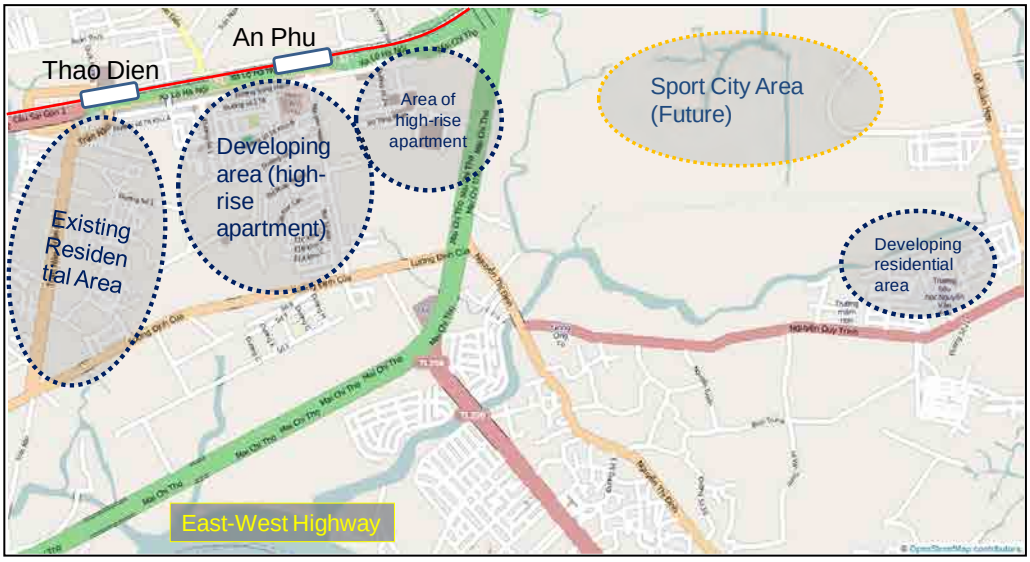
An Phu Station: Feeder bus services are not necessary to the northern area of An Phu Station because it is within easy walking distance to the station. From the south, the station is serviced by **Feeder 3** servicing the areas to the east of District 2 via Nguyen Duy Trinh. On this route passengers can get on/off at the bus stop on the south side of An Phu Station; but this route terminates at the south side of Thao Dien Station since the bus cannot turn around at An Phu station.

Rach Chiec Station: Feeder bus services are not necessary to the northern area of Rach Chiec Station because it is within easy walking distance to the station, but future development to the south may require future feeder bus routes to connect to Rach Chiec station. Construction of bus stop facilities on the south side can be completed later when the area is developed.



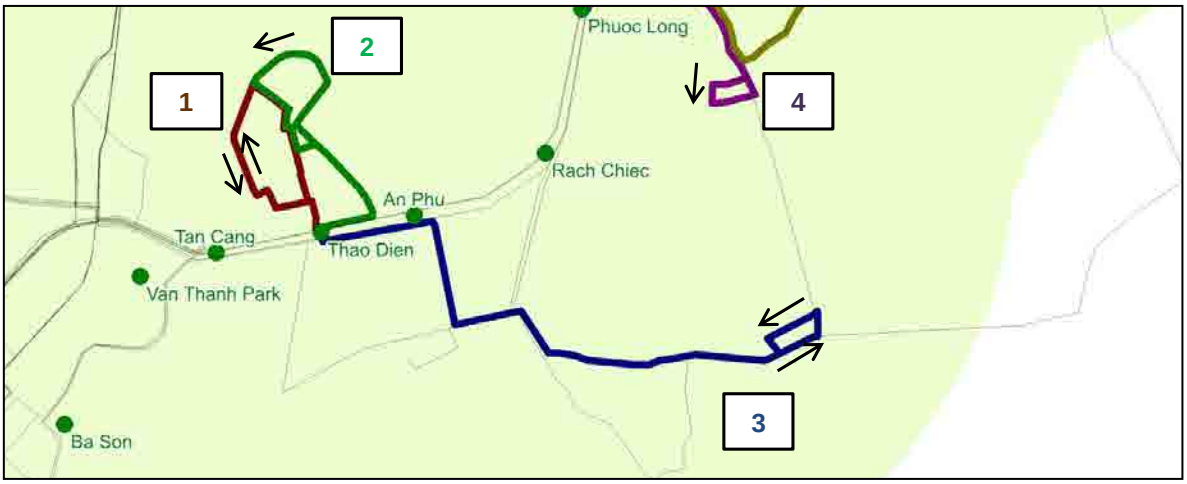
Source: Study Team

Figure 7.2.4 - Area Potential (North An Phu Area)



Source: Study Team

Figure 7.2.5 - Area Potential (South An Phu Area)



Source: Study Team

Figure 7.2.6 - Feeder Bus Alternatives (An Phu Area)

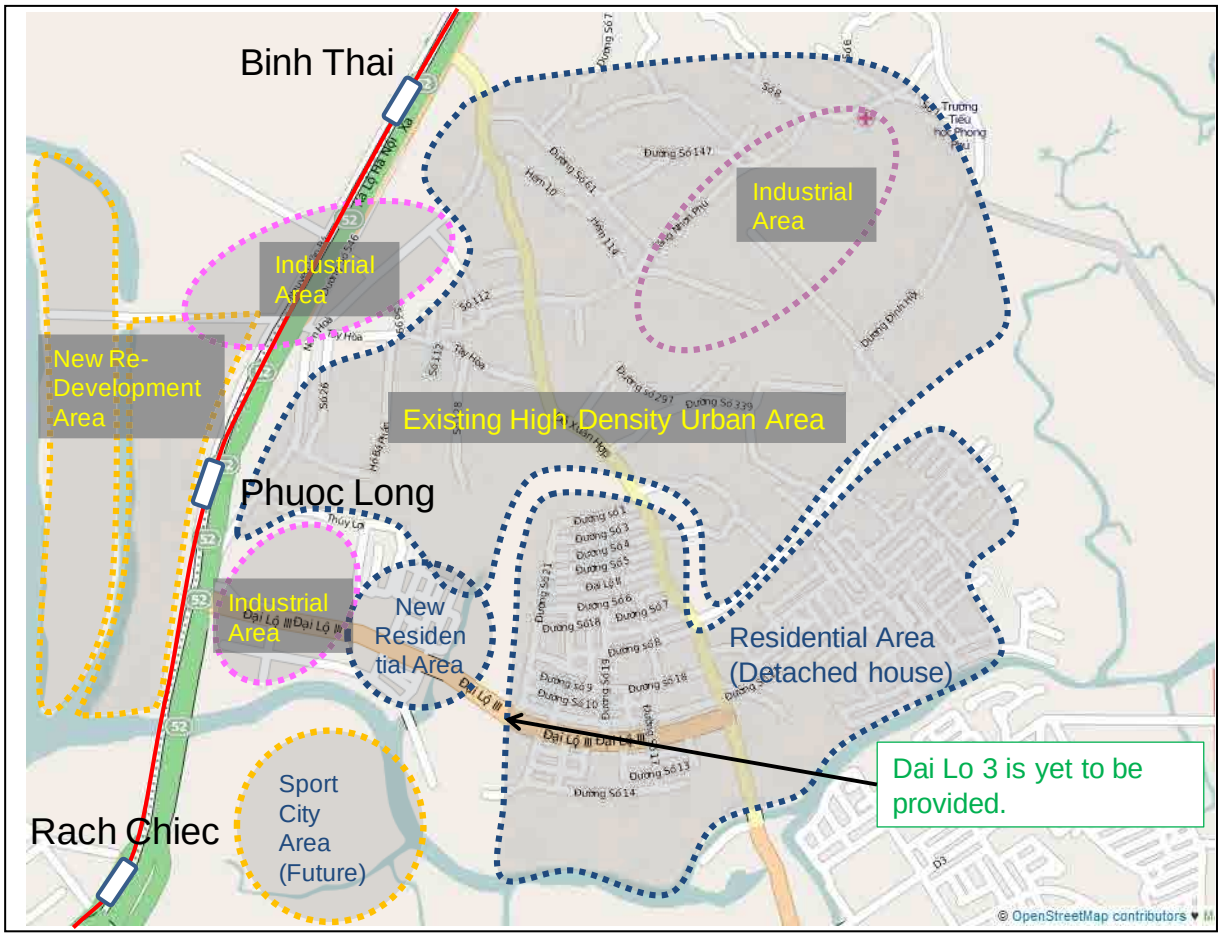
Phuoc Long Station: A large-scale urban redevelopment is planned for what is presently a mainly industrial area to the west of the station, but feeder buses are not necessary because it is within an easy walking distance to the station. Suburbs to the east of the station are serviced by two feeder routes being **Feeder 4** and **5** to Phuoc Binh, Phuoc Long B and Tang Nhon Phu B. Both of the feeder routes will run on Tay Hoa – Do Xuan Hop, but the catchment area will be different and both routes will be required to meet the demand of these areas. At Phuoc Long Station the feeder bus stops will be located on both sides of the Hanoi Highway.

Binh Thai Station: There are high-density existing residential areas around Binh Thai Station. **Feeder 7** operates in the west as far as Thu Duc Wholesale Market and **Feeder 6** operates on the east side in a "reverse C" pattern to connect to Thu Duc Station and Thu Duc Hospital. At Binh Thai station the bus stops will be provided on the service road on the west side of the Hanoi Highway only. On the west side of the station, feeder bus service is not proposed because there is no road with sufficient width and condition for bus services. There is potential demand in this area; additional feeder bus routes should be considered after the planned roads are provided.

Thu Duc Station: There are high-density existing residential areas around the Thu Duc UMRT station and industrial areas and universities to the north of the station. The central area of Thu Duc Disrict around Thu Duc Market is covered by existing routes and **Feeder 7**. The northern area is served by two feeder routes being **Feeder 6** which connects Thu Duc Hospital and **Feeder 8** running on Hoang Dieu 2 and Kha Van Can (NH 1K).

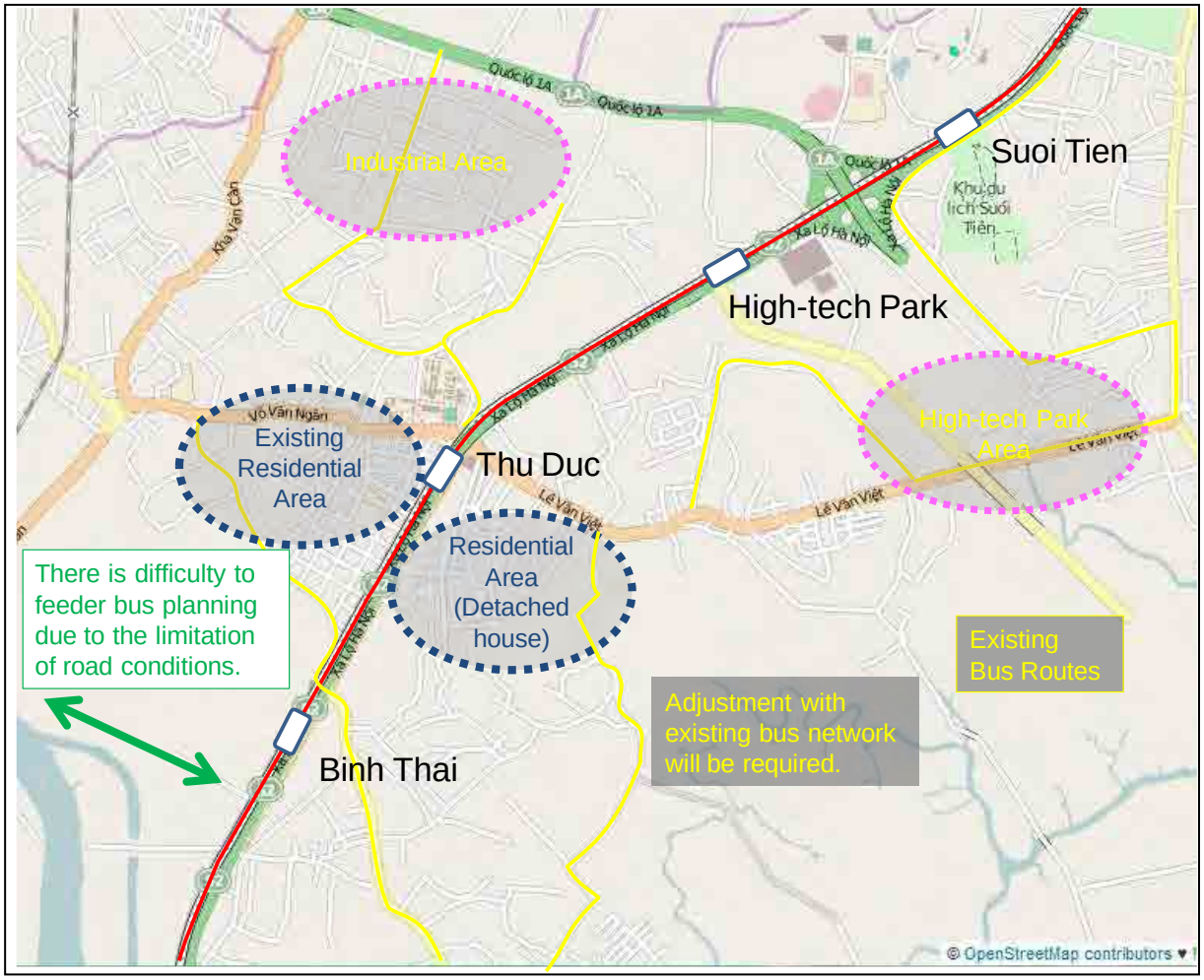
To the east, two feeder routes being **Feeder 6** and **9** operate to Tang Nhon Phu B and Tang Nhon Phu A respectively. **Feeder 9** will also be utilized for the commute of students of the University of Transport and Communication Campus 2 (UTC2). Future planning includes new residential areas but requires the development of good access roads to introduce feeder bus services. At Thu Duc station the bus stops will be located on the west side of the station only, serving all feeder bus routes.

High Tech Park Station: High Tech Park station has the **Feeder 10** feeder service to the High Tech Park. At High Tech Park station the bus stops will be located on the southeast side of the Hanoi Highway only.



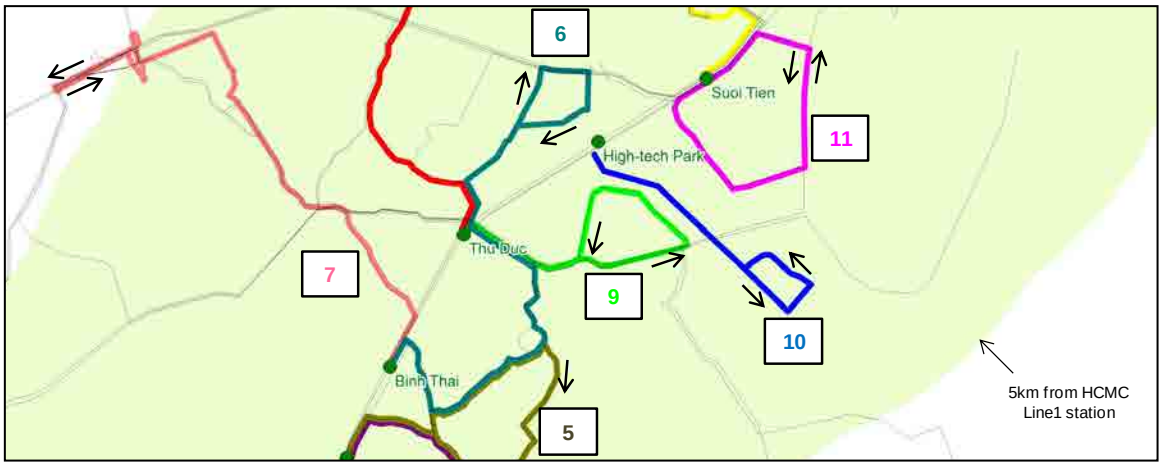
Source: Study Team

Figure 7.2.7 - Area Potential (South Thu Duc Area)



Source: Study Team

Figure 7.2.8 - Area Potential (North Thu Duc Area)



Source: Study Team

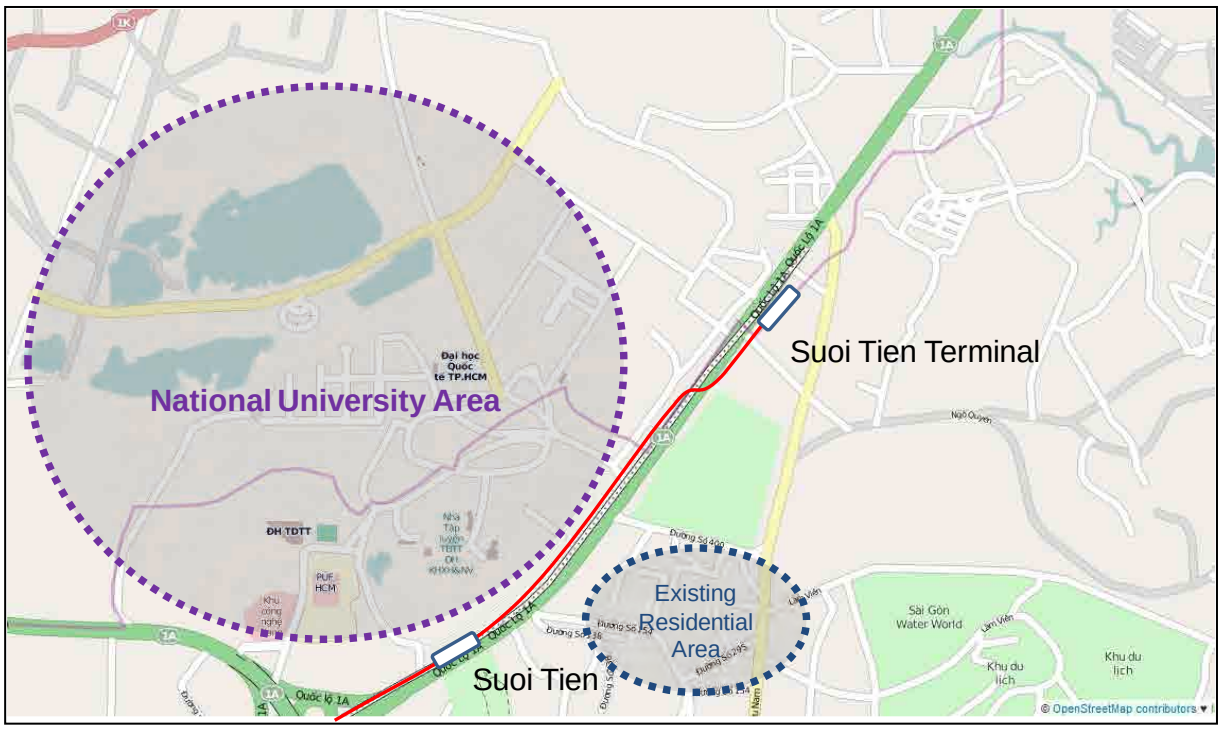
Figure 7.2.9 - Feeder Bus Alternatives (Thu Duc Area)

Suoi Tien Station: The National University has applied for a name change for this station to National University as it is a major attraction for the station. The area is also well known for the Suoi Tien Water Park. **Feeder 11** provides a two-way circular service to connect the residential areas to the east of the station.

While the National University has its own plans for internal shuttle bus services, the UMRT feeder bus route plan implements **Feeder 12** from the north side of the station. The design of the routes relies on the construction of two-way service roads on both sides of the NH1, and for the safe crossing of the NH1 the construction of the D400/NH1 overpass. At Suoi Tien station the bus stops will be located on the service roads on both sides of the Hanoi Highway; that of **Feeder 11** will be located on the southeast side and that of **Feeder 12** will be located on the northwest side.

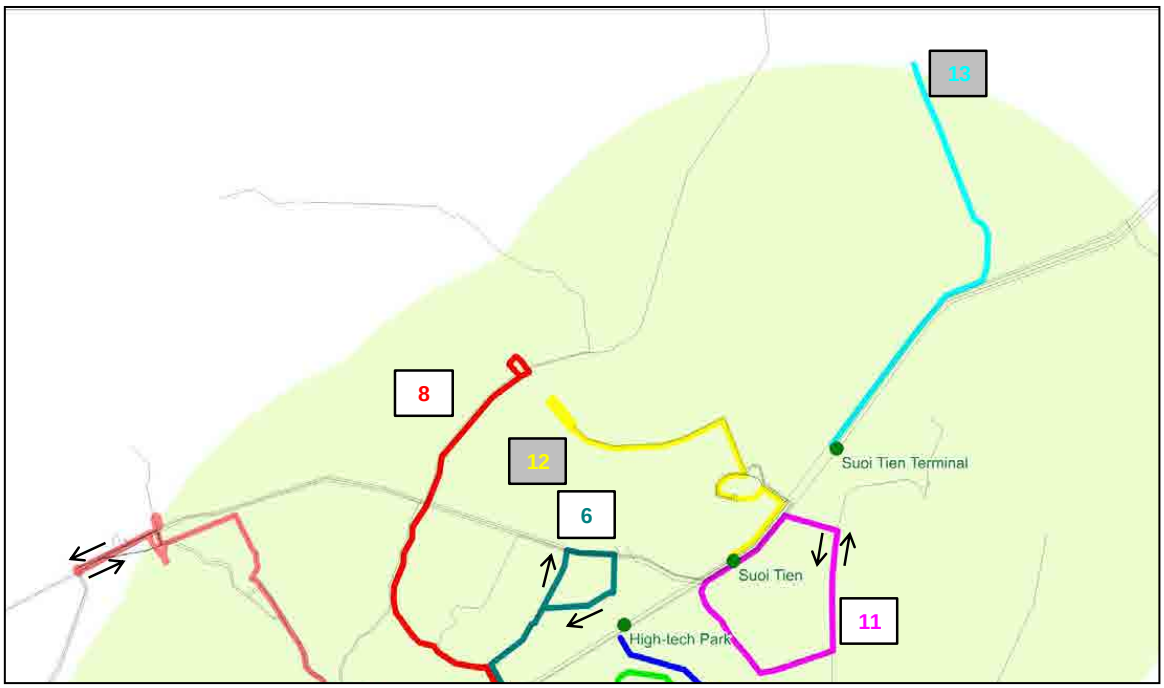
Suoi Tien Terminal Station: This station is the terminus station of the UMRT and is located on the south-east side of NH1. This station will be the major interchange for connecting bus services to and from the north. **Feeder 13** operates to the North-West to Hoa An running on TL16. The terminal of **Feeder 13** will be located in the planned bus terminal at this station (a separate project).

Regarding major trunk routes connecting from the UMRT to the north, SAMCO is developing the plans for a new bus terminal at Suoi Tien Terminal station which will replace the Mien Dong bus terminal and will involve the development of BRT routes to Binh Duong New City.



Source: Study Team

Figure 7.2.10 - Area Potential (Suoi Tien Area)

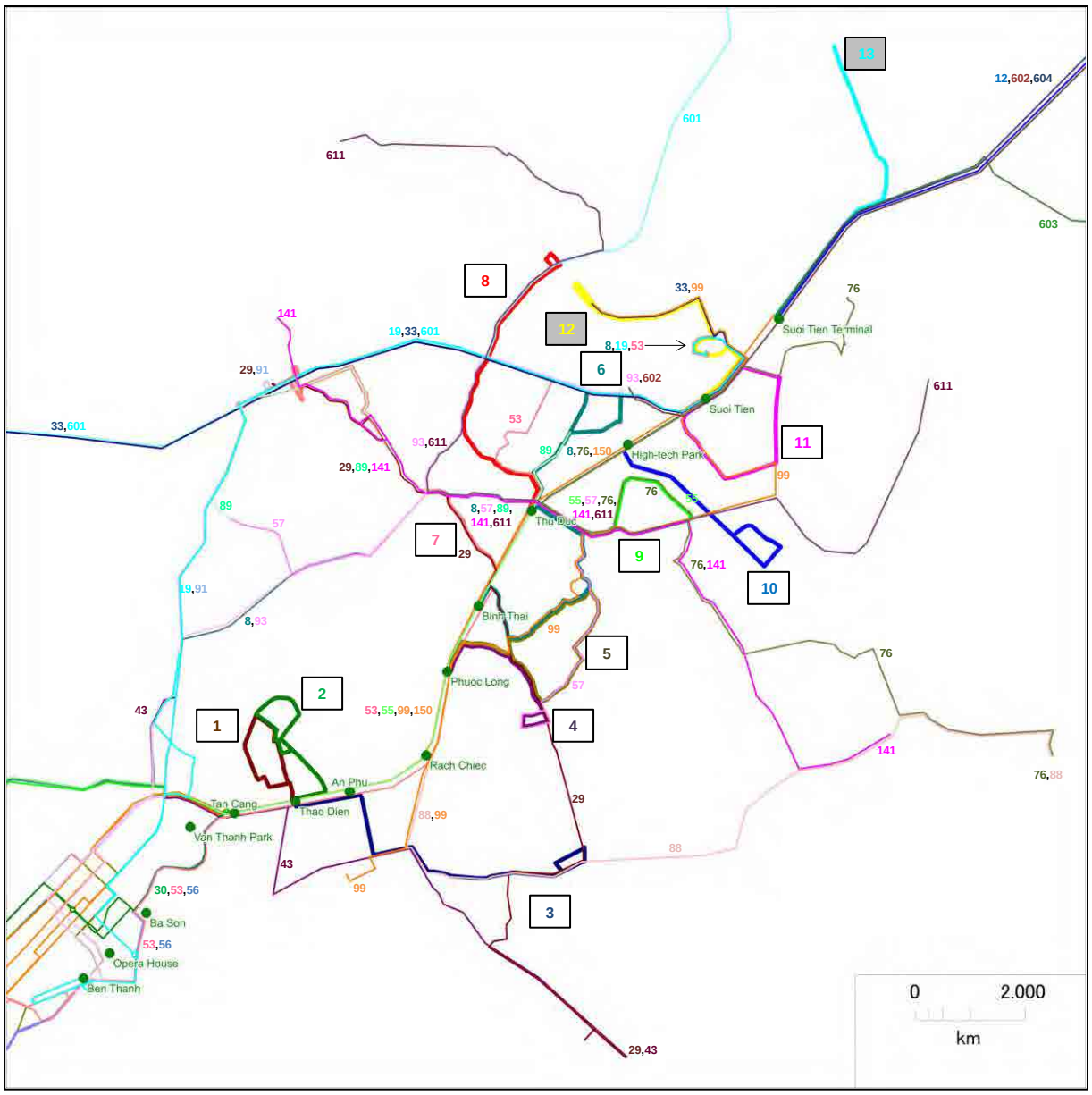


Source: Study Team

Figure 7.2.11 - Feeder Bus Alternatives Suoi Tien Area

4) Overall (Including Modified and Proposed Feeder Bus Routes)

The proposed feeder bus routes and modified bus routes are shown in Figure 7.2.12.



Source: Study Team

Figure 7.2.12 - Modified Bus Routes along HCMC UMRT Line 1 Corridor

7.3 Details of the Modifications of the Existing Bus Routes

Detailed explanation on the modification of existing bus routes in consideration to the proposed feeder bus routes and the opening of the HCMC UMRT Line 1 are shown below:

Route 6 (Cho Lon Bus Terminal - Agricultural University), 26.5 km
Overlap section will be from Tan Cang to Suoi Tien.
Action: This route shall be terminated at Tan Cang Station.
Explanation: The section from Cho Long Bus Terminal to Tan Cang shall be kept and the frequency increased to meet with demand to/from the HCMC UMRT Line 1. The section from Tang Cang to Agricultural University shall be eliminated to avoid overlap with the HCMC UMRT Line 1. The section from Suoi Tien to Agricultural University can be covered by Route 33.

Route 10 (National University - Mien Tay Bus Terminal), 30.55 km
Overlap section will be from Tang Cang to Suoi Tien
Action: This route shall be terminated at Tan Cang Station.
Explanation: The section from Mien Tay Bus Terminal to Tan Cang shall be kept and frequency increased to meet with the demand to/from the HCMC UMRT Line 1. The section from Tang Cang to the National University shall be eliminated to avoid overlap with the HCMC UMRT Line 1. The section from Suoi Tien to the National University can be covered by Feeder Bus Route 12.

Route 12 (Ben Thanh - Giang Dien Waterfall), 52.0 km
Overlap section will be from Ben Thanh to Suoi Tien Terminal.
Action: This route shall be terminated at Suoi Tien Terminal Station and the eastern section of the route shall be kept.
Explanation: This route has been utilized as the main trunk public transit line on the Hanoi Highway; however, its role will be taken over by the HCMC UMRT Line 1. The current bus operation in HCMC should be terminated. Regarding the eastern section from Suoi Tien Terminal to Giang Dien Waterfall, this section shall be kept with a connection to Suoi Tien Terminal. Operational plans during this section should be determined by the relevant authorities in Dong Nai Province.

Route 30 (Cho Tan Huong - International University), 19.05 km
Overlap section will be from Tan Cang to Suoi Tien.
Action: This route shall be terminated at Tan Cang Station.
Explanation: The section from Cho Tan Huong to Tan Cang shall be kept and the frequency increased to meet the demand to/from the HCMC UMRT Line 1. The section from Tang Cang to the International University shall be eliminated to avoid overlap with the HCMC UMRT Line 1. From Suoi Tien to the International University, this section can be covered by Feeder Bus Route 12.

Route 43 (Mien Dong BT - Cat Lai Ferry Point), 16.55 km
Overlap section will be from Tan Cang to An Phu.
Action: This route shall be kept the same as the current service and connect to the south station plaza of Thao Dien Station.
Explanation: It is important to keep the service between Mien Dong Bus Terminal and Cat Lai Ferry Point, as a function to connect both terminals of public transport. However, it will be necessary to adjust the frequency to the travel demand due to the introduction of the feeder bus routes and the transfer at Mien Dong Bus Terminal.

Route 50 (University of Technology - National University), 29.95 km
Overlap section will be from Tan Cang to Suoi Tien.
Action: This route shall be terminated at Tan Cang Station.
Explanation: The section from the University of Technology to Tan Cang shall be kept and frequency increased to meet the demand to/from the HCMC UMRT Line 1. The section from Tang Cang to the National University shall be eliminated to avoid overlap with the HCMC UMRT Line 1. The section from Suoi Tien to the National University can be covered by Feeder Bus Route 12.

Route 52 (Ben Thanh - National University), 21.0 km
Overlap section will be from Ben Thanh to Suoi Tien.
Action: This route shall be eliminated due to overlap with the HCMC UMRT Line 1.
Explanation: The section from Tang Cang to the National University shall be eliminated to avoid overlap with the HCMC UMRT Line 1. The section from Suoi Tien to the National University can be covered by Feeder Bus Route 12.

Route 53 (Le Hong Phong - National University), 29.35 km
Overlap section will be from Ben Thanh to Suoi Tien.
Action: This route shall be retained but rerouted to go through Linh Trung Industrial Park Area in compensation of the elimination of Route 141.
Explanation: The majority of the route will overlap with the HCMC UMRT Line 1 but the role of this route connecting the university areas should be kept after the opening of the HCMC UMRT Line 1. (Current) Le Hong Phong - Ben Thanh - Hanoi HW - Nguyen Van Ba - Le Van Chi - Hoang Dieu 2 - Kha Van Can - NH1K - NH1 - National University (Modified) Le Hong Phong - Ben Thanh - Hanoi HW - Nguyen Van Ba - Le Van Chi - Hoang Dieu 2 - So 7 - Linh Trung - So 14 - NH1 - National University

Route 55 (Quang Trung Software Park - High-Tech Park), 29.8 km
Overlap section will be from Tan Cang to Thu Duc.
Action: This route shall be kept.
Explanation: Although the section from Tan Cang to Thu Duc will overlap with the HCMC UMRT Line 1, it will be required to be retained because the elimination of all of the existing bus routes will affect the passengers on the Hanoi Highway in a big way. Also it is necessary to keep service on the overlapping section for short trips and for back-up purposes in case of a temporary suspension of the UMRT service. After the opening of the HCMC UMRT Line 1, the frequency of this route should be examined.

Route 56 (Cho Lon Bus Terminal - University of Transport), 23.35 km
Overlap section will be from Ben Thanh to Thu Duc.
Action: This route shall be terminated at Tan Cang Station.
Explanation: The section from Cho Lon Bus Terminal to Tan Cang shall be kept and frequency increased to meet the demand to/from the HCMC UMRT Line 1. The section from Tang Cang to the University of Transport shall be eliminated to avoid overlap with the HCMC UMRT Line 1. The section from Suoi Tien to the University of Transport can be covered by Route 55 and Feeder Bus Route 9.

Route 57 (Cho Phuoc Binh - Hiep Binh High School), 12.9 km
This route will cross HCMC UMRT Line 1 near Thu Duc Station.
Action: Keep current service, adjust the location of the bus stop considering the connection to Thu Duc Station
Explanation: It is suitable to keep the service for east-west travelling passengers crossing the Hanoi Highway. The location of the bus stop should be adjusted for convenient transfers at Thu Duc Station.

Route 76 (Long Phuoc - Den Vua Hung), 24.9 km
Overlap section will be from Thu Duc to Suoi Tien.
Action: This route shall be retained.
Explanation: This route serves the role for connecting many small residential areas in the south and east of the HCMC UMRT Line 1 and only a small part of it overlaps the Hanoi Highway.

Route 88 (Ben Thanh - Cho Long Phuoc), 22.45 km
Overlap section will be from Ben Thanh to Ba Son. Catchment area between Thao Dien and Rach Chiec will be slightly overlapped with the HCMC UMRT Line 1.
Action: Modify, shorten to terminate at Rach Chiec Station
Explanation: Part of the catchment area of this route overlaps with that of the HCMC UMRT Line 1 and BRT line in the south part of An Phu. The connection to the HCMC UMRT Line 1 and BRT 1 will be required in order to shorten the travel time to the CBD. (Current) Ben Thanh - Ham Nghi - Ton Duc Thang - Nguyen Huu Chanh - Thu Thiem Bridge - Luong Dinh Cua - Nguyen Thi Dinh - Nguyen Duy Trinh - Cho Long Phuoc (Modified) Rach Chiec UMRT Station - Mai Chi Tho - Nguyen Thi Dinh - Nguyen Duy Trinh - Cho Long Phuoc

Route 89 (BV Da Khoa Thu Duc - Hiep Binh High School), 12.2 km
This route will cross the HCMC UMRT Line 1 at near Thu Duc Station.
Action: Keep current service, adjust the location of the bus stop considering the connection to Thu Duc Station
Explanation: It is suitable to keep this service for travel within the Thu Duc District. The location of the bus stop should be adjusted for convenient transfer at Thu Duc Station.

Route 99 (Cho Binh Khanh - National University), 21.3 km
Overlap section will be from An Phu to Suoi Tien.
Action: This route shall be retained.
Explanation: This route serves the role of connecting many small residential areas to the east of the HCMC UMRT Line 1 and only a small part of it overlaps with the Hanoi Highway.

Route 104 (An Suong Bus Terminal - Agricultural University), 30.5 km
Overlap section will be from Tan Cang to Thu Duc.
Action: This route shall be terminated at Tan Cang Station.
Explanation: The section from Tang Cang to the Agricultural University shall be eliminated to avoid overlap with the HCMC UMRT Line 1. The service to the Linh Trung Industrial Park Area will be kept by the rerouting of Route 53.

Route 141 (Cho Long Truong - Linh Trung Industrial Park 2), 18.7 km
This route will cross the HCMC UMRT Line 1 near Thu Duc Station.
Action: This route shall be retained.
Explanation: It is suitable to keep service between District 9 and Thu Duc District.

Route 150 (Cho Lon Bus Terminal - Nga Ba Tan Van), 28.75 km
Overlap section will be from Tan Cang to Suoi Tien Terminal.
Action: This route shall be terminated at Suoi Tien Terminal Station.
Explanation: This route shall serve as the supplemental and backup transport of the HCMC UMRT Line 1 but with the current frequency, heavy competition will occur. The section from Suoi Tien Terminal Station to Nga Ba Tan Van shall be eliminated and this section can be replaced by Feeder Bus Route 13, Binh Duong BRT and several routes from Dong Nai Province (the authority of the extension of these routes is under the DOT of HCMC, Binh Duong and Dong Nai Province). After the opening of the HCMC UMRT Line 1, the frequency of this route should be examined.

Route 603 (Mien Dong Bus Terminal - Nhon Trach Industrial Park), 58.5 km
Overlap section will be from Tan Cang to Suoi Tien Terminal.
Action: This route shall be terminated at Suoi Tien Terminal Station and the eastern section shall be kept.
Explanation: This route has been utilized as the main trunk for public transit on the Hanoi Highway, however, its role will be taken by the HCMC UMRT Line 1. The current bus operation in HCMC should be terminated. Regarding the eastern section from Suoi Tien Terminal to Nhon Trach Industrial Park, this section shall be kept with the connection to Suoi Tien Terminal. Operational plans during this section should be determined by the relevant authorities in Dong Nai Province.

Route 604 (Mien Dong Bus Terminal - Ho Nai), 32.0 km
Overlap section will be from Tan Cang to Suoi Tien Terminal.
Action: This route shall be terminated at Suoi Tien Terminal Station and the eastern section shall be kept.
Explanation: This route has been utilized as main trunk for public transit on the Hanoi Highway, however, its role will be taken by the HCMC UMRT Line 1. The current bus operation in HCMC should be terminated. Regarding the eastern section from Suoi Tien Terminal to Ho Nai, this section shall be kept with a connection to Suoi Tien Terminal. Operational plans during this section should be determined by the relevant authorities in Dong Nai Province.

Route 611 (Thu Duc - Di An), 22.5 km
This route will cross the HCMC UMRT Line 1 near Thu Duc Station.
Action: Keep current service, adjust the location of the bus stop considering the connection to Thu Duc Station
Explanation: The location of the bus stop should be adjusted for convenient transfers at Thu Duc Station.

7.4 Profiles of Proposed Feeder Bus Routes

1) Proposed Feeder Bus Routes in District 2

Figure 7.4.1 to 7.4.2 and Table 7.4.1 to 7.4.2 shows areas with high demand potential along Feeder Bus route in District 2. Along the Route 1 and 2 high-end residential areas and several educational areas including international schools are located. In surrounding areas of the eastern section of Route 3, high-rise buildings are dotted along the existing residential area.

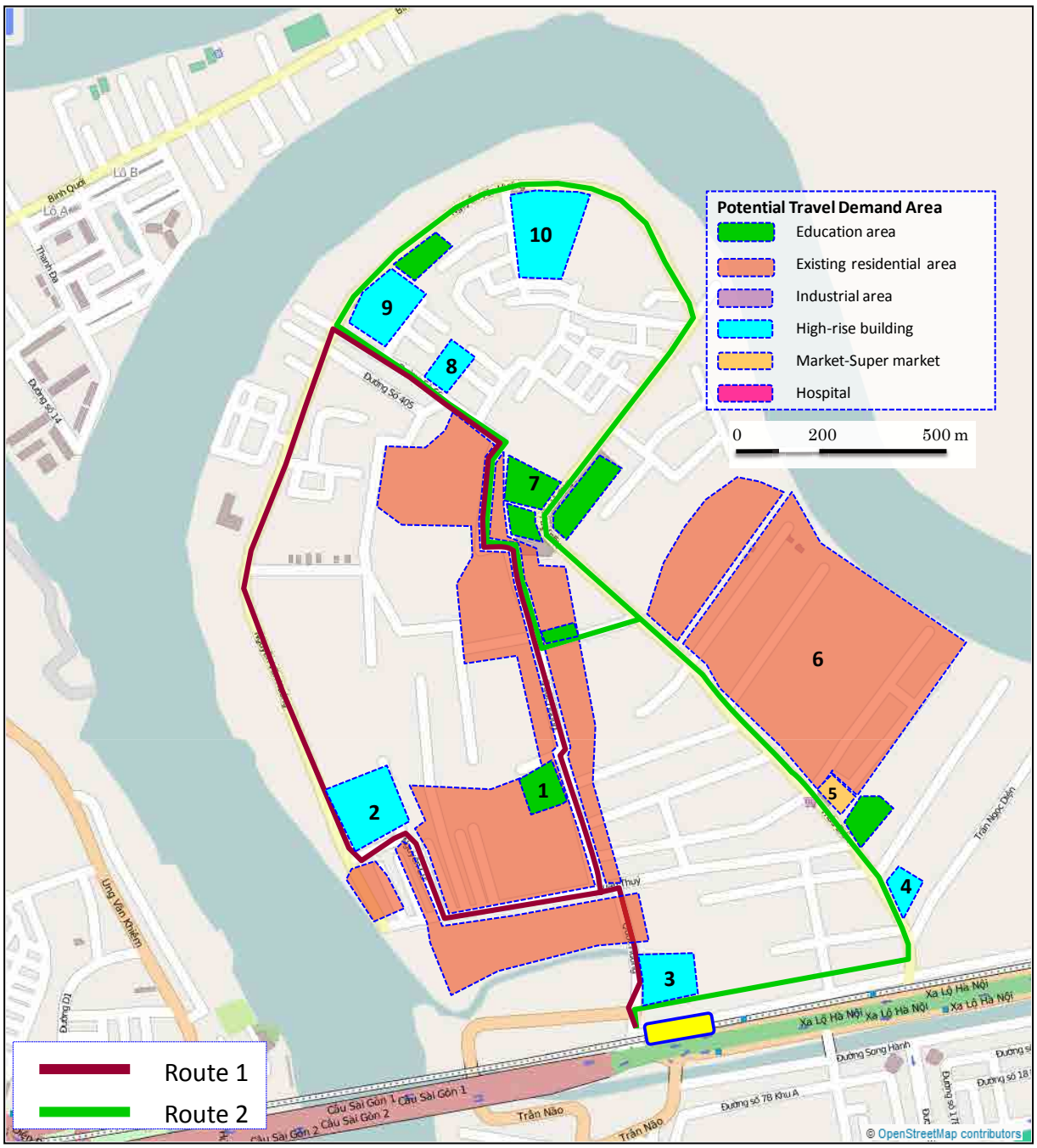


Figure 7.4.1 - Distribution of High Demand Potential Area along Feeder Bus Route 1 and 2

Table 7.4.1 - Distribution of High Demand Potential Area along Feeder Bus Route 1 and 2

Potential Travel Demand Area	Description
1. University of Culture	About 5,000 students.
2. Hoang Anh Riverview	High density buildings, apartment buildings. 6 blocks, 25 floors.
3. Thao Dien Pearl	Shopping center, apartment buildings, 3 blocks, 33 floors.
4. Fideco Building	High density buildings, apartment buildings with 15 floors.
5. An Phu Supermarket	Supermarket.
6. High-end residential area	Luxury mansion area, high income.
7. College of navigation	About 1,500 students.
8. Tropical Garden	High density buildings, apartment buildings. 5 blocks, 27 floors.
9. River Garden	High density buildings, apartment buildings. 3 blocks, 27 floors.
10. Xii Riverview	High density buildings, apartment buildings.
Existing residential area	Local residential area (the area to live and trade) and area for tenants (mostly students and others). High density population area.

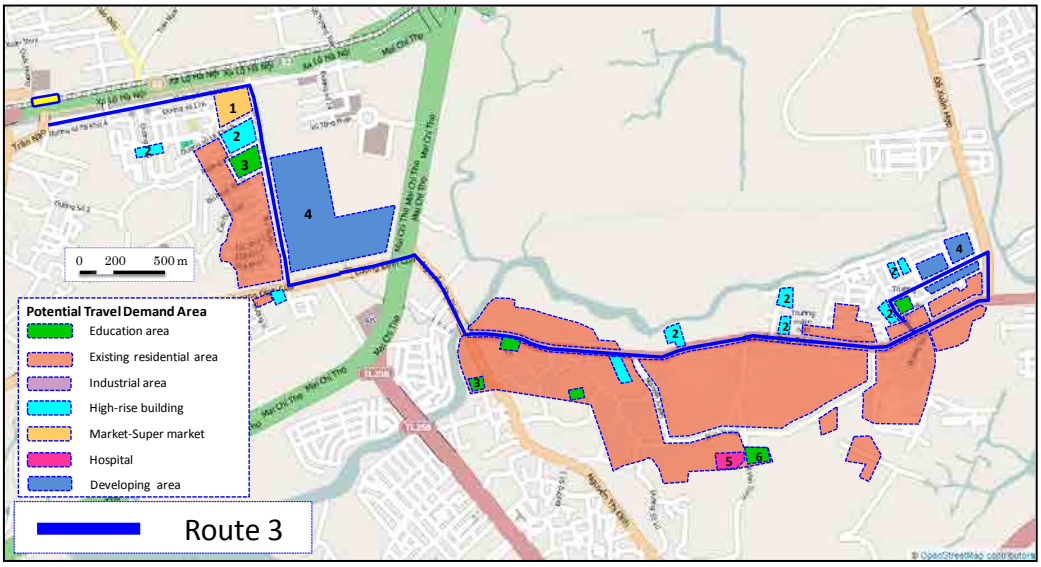


Figure 7.4.2 - Distribution of High Demand Potential Area along Feeder Bus Route 3

Table 7.4.2 - Distribution of High Demand Potential Area along Feeder Bus Route 3

Potential Travel Demand Area	Description
1. Metro supermarket	A major supermarket in Ho Chi Minh city.
2. Apartment building	15-20 floors.
3. High schools	1,500-2,000 students per school.
4. Area of high rise apartment	High density building, apartment buildings. (Under construction)
5. District 2 hospital	-
6. District 2 vocational college	2,000-3,000 students.
Existing residential area	Local residential area (the area to live and trade) and area for tenants (mostly students and others). High density population area.

2) Proposed Feeder Bus Routes in Thu Duc Area

Figure 7.4.3 to 7.4.7 and Table 7.4.3 to 7.4.7 shows areas with high demand potential along Feeder Bus routes in Thu Duc Area.

Along Route 4, several educational areas are located in dominant residential areas. There are industrial areas along Route 5 and the southern section of Route 6, and also, two hospitals are located along Route 6. In the vicinity of Route 7, existing residential areas are dominant. The terminal of Route 7 is Thu Duc Wholesale Market, where passengers can transfer to several routes of City Bus. Route 8 goes through near the Linh Trung Industrial Area; workers in this area are potential passengers of this route. Many universities are located along Route 9, so the majority of the passengers will be university students.

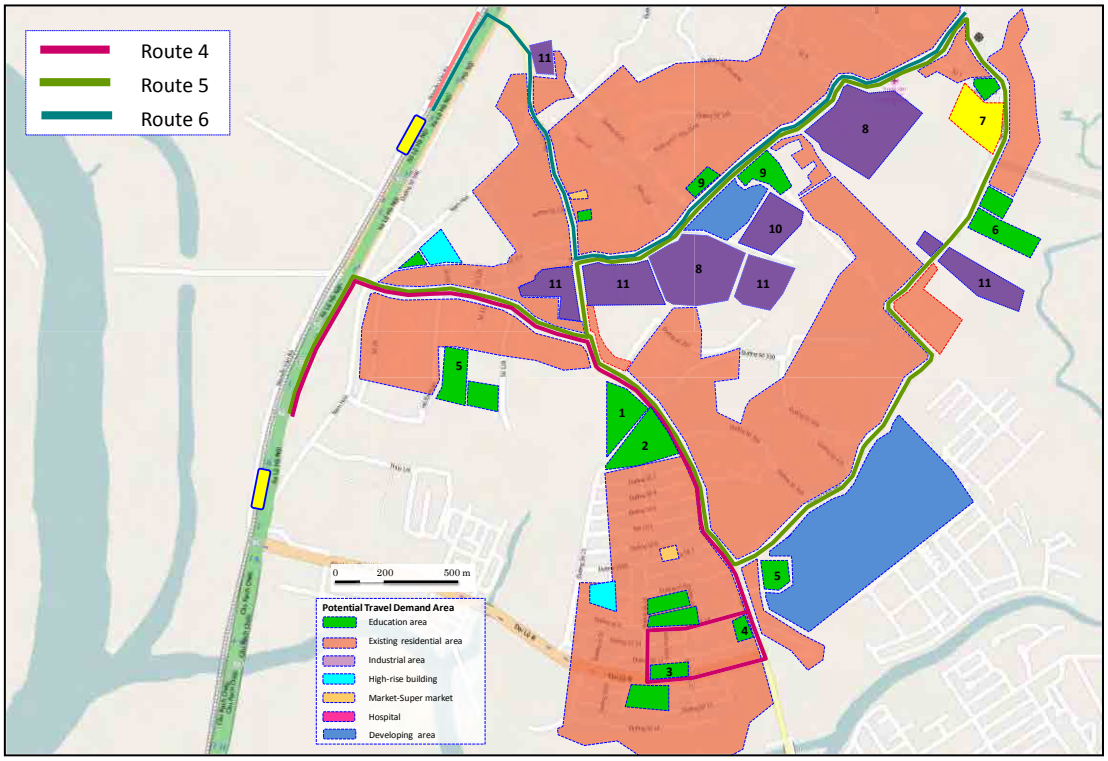


Figure 7.4.3 - Distribution of High Demand Potential Area along Feeder Bus Route 4 and 5

Table 7.4.3 - Distribution of High Demand Potential Area along Feeder Bus Route 4 and 5

Potential Travel Demand Area	Description
1. University of Culture (Campus 2)	About 5,000 students.
2. A vocational school	About 1,000 students.
3. College of Economic (campus 2)	About 2,000 students.
4. Le Thi Rieng vocational school	About 1,000 students.
5. High schools	About 1,000-1,500 students per school.
6. Ho Chi Minh College of Transport	About 4,500-5,000 students.
7. Phong Phu Temple	National historical monuments.
8. Textile factories	About 2,000-3,000 employees per factory.
9. College of Industry and Trade	About 12,000 students.
10. Furniture factory	About 1,000 employees.
11. Other factories	Others factories with many employees.
Existing residential area	Local residential area (the area to live and trade) and area for tenants (mostly students and workers). High density population area.

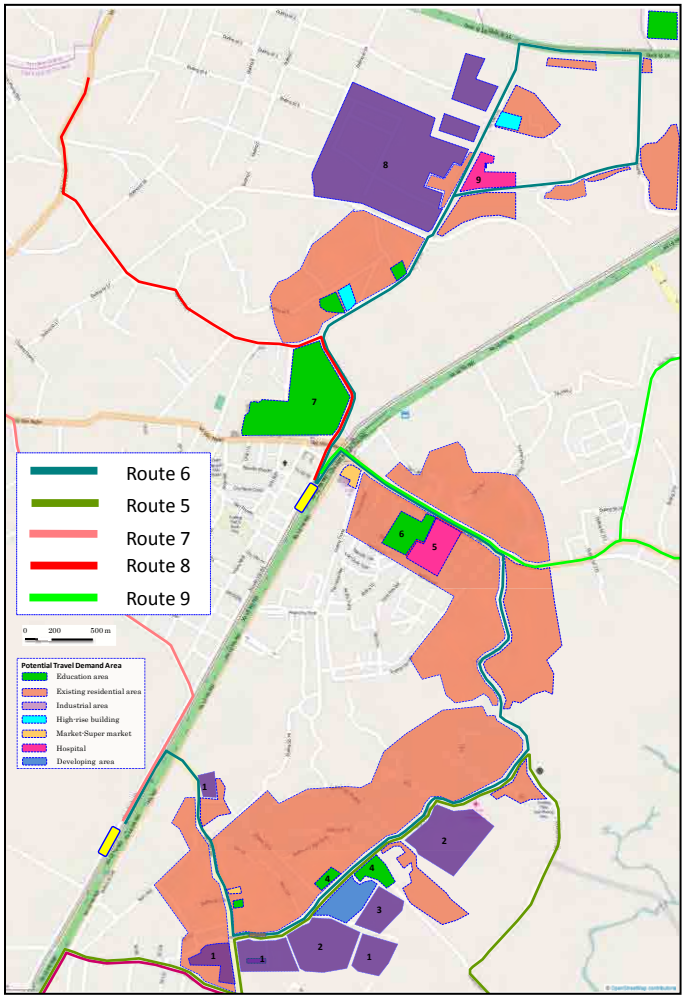


Figure 7.4.4 - Distribution of High Demand Potential Area along Feeder Bus Route 6

Table 7.4.4 - Distribution of High Demand Potential Area along Feeder Bus Route 6

Potential Travel Demand Area	Description
1. Other factories	Others factories with many employees.
2. Textile factories	About 2,000-3,000 employees per factory.
3. Furniture factory	About 1,000 employees.
4. College of Industry and Trade	About 12,000 students.
5. Hospital	-
6. School of Military Medicine II	About 2,000 students.
7. University of Technical Education	With over 26,000 students.
8. Linh Trung Export Processing Zone I	Industry area of textile, footwear, mechanical, furniture -with 29 factories- a large number of workers working in this area (60,000-70,000 workers).
9. Thu Duc Hospital	-
Existing residential area	Local residential area (the area to live and trade) and area for tenants (mostly students and others). High density population area.

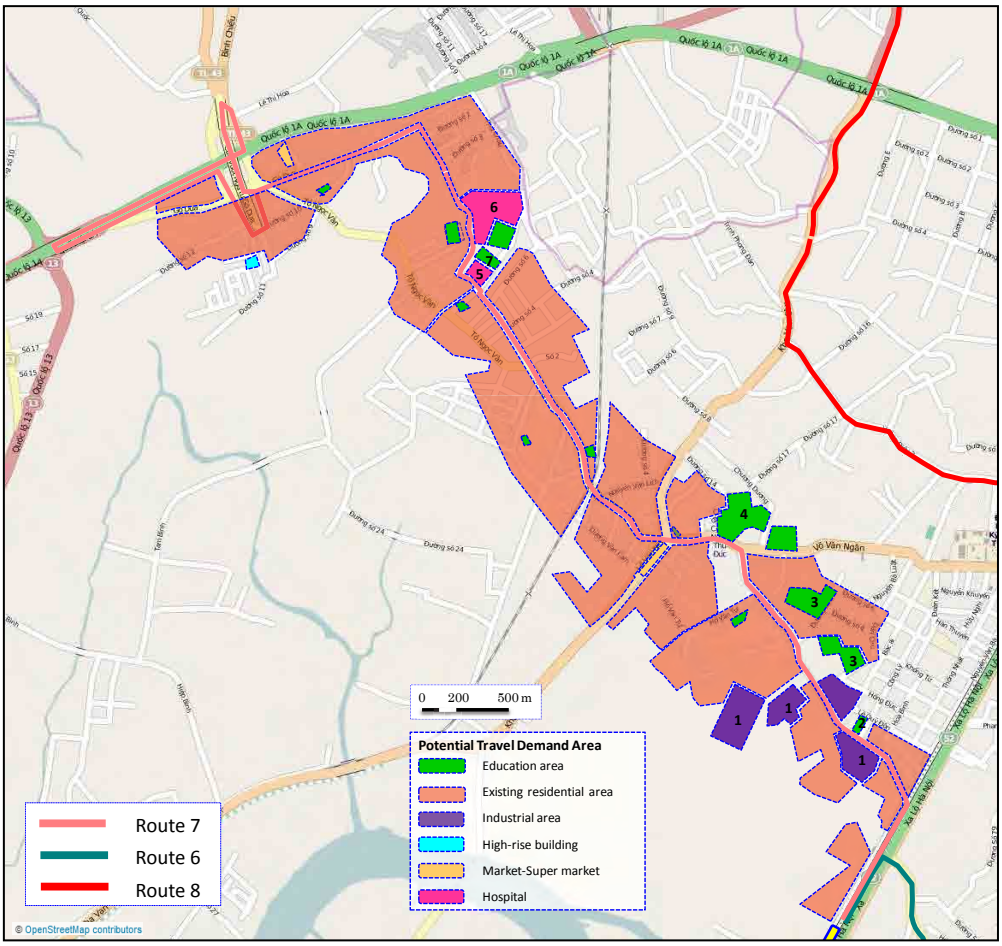


Figure 7.4.5 - Distribution of High Demand Potential Area along Feeder Bus Route 7

Table 7.4.5 - Distribution of High Demand Potential Area along Feeder Bus Route 7

Potential Travel Demand Area	Description
1. Vina Milk Factories	-
2. University of Architecture - Campus 2	Under construction
3. High School	About 1,500-2,000 pupils per school.
4. Thu Duc College	About 4,500 students.
5. Thu Duc District hospital	-
6. Mental Hospital	-

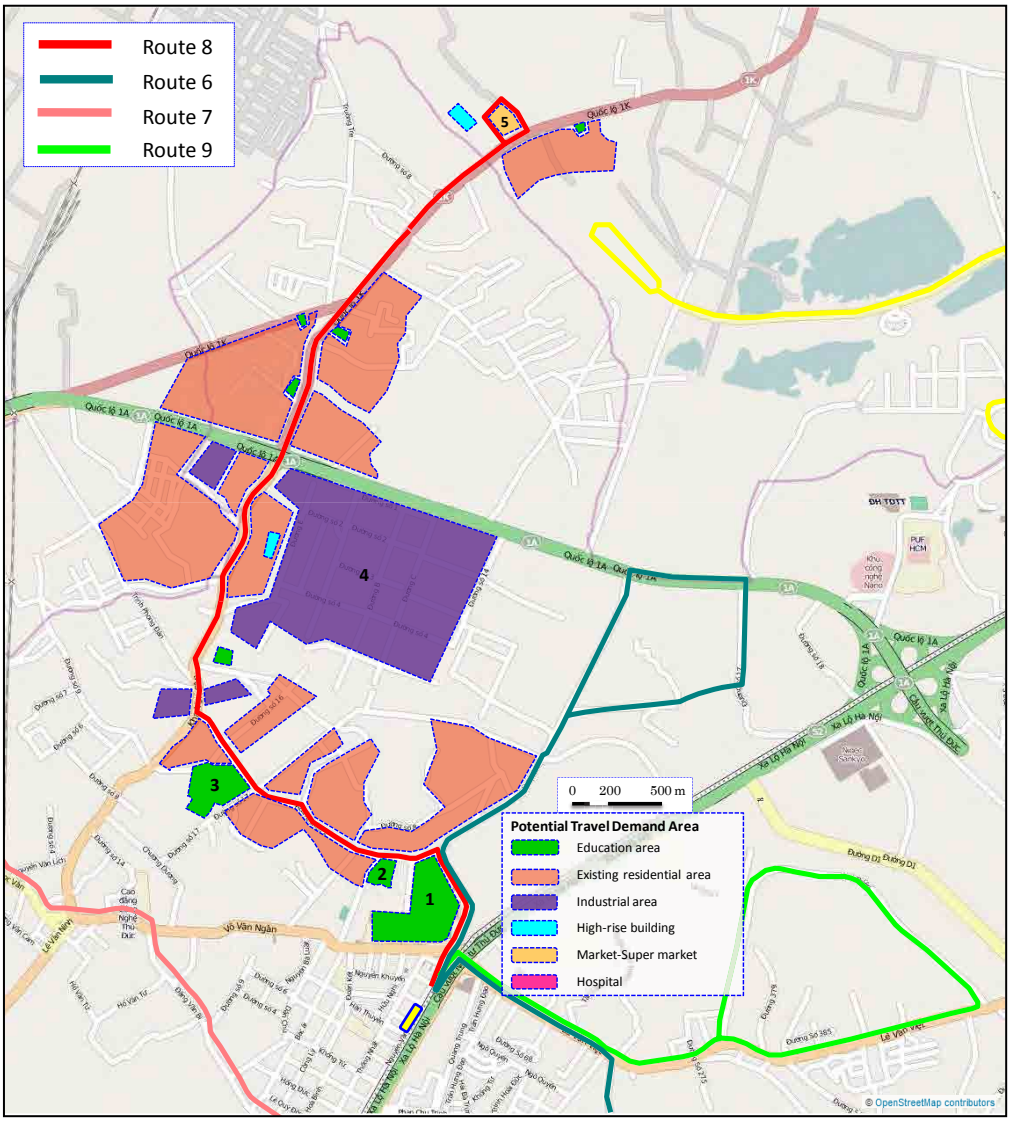


Figure 7.4.6 - Distribution of High Demand Potential Area along Feeder Bus Route 8

Table 7.4.6 - Distribution of High Demand Potential Area along Feeder Bus Route 8

Potential Travel Demand Area	Description
1. University of Technical Education	With over 26,000 students.
2. Dormitory	-
3. Banking University HCM City	About 5,000 students.
4. Linh Trung Export Processing Zone I	Industry area of textile, footwear, mechanical, furniture -with 29 factories- a large number of workers working in this area (60 000-70 000 workers)
5. Big C Supercenter	-
Existing residential area	Local residential area (the area to live and trade) and area for tenants (mostly students and workers). High density population area.

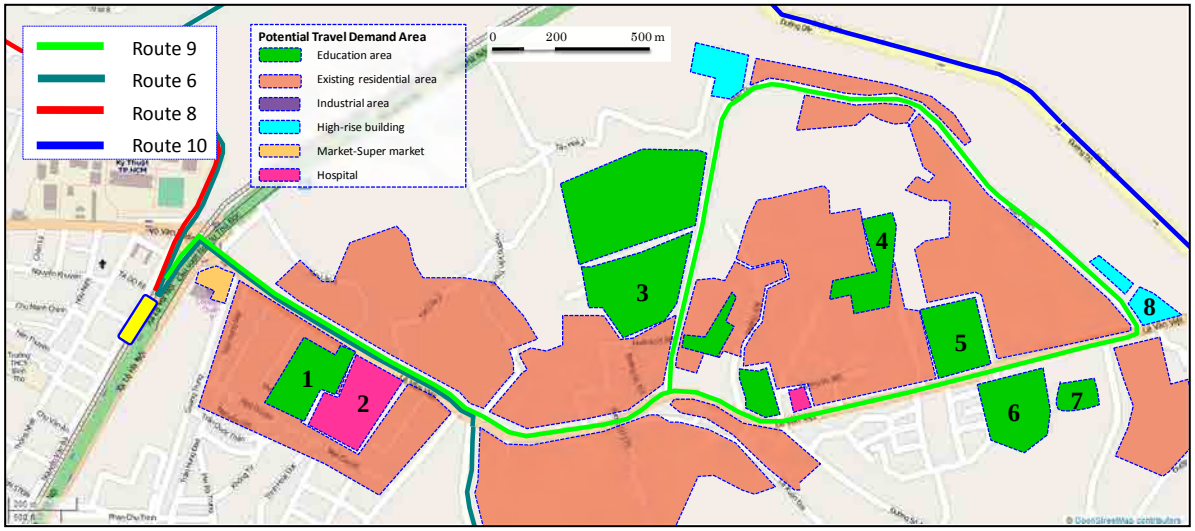


Figure 7.4.7 - Distribution of High Demand Potential Area along Feeder Bus Route 9

Table 7.4.7 - Distribution of High Demand Potential Area along Feeder Bus Route 9

Potential Travel Demand Area	Description
1. School of Military Medicine II	About 2,000 students.
2. Hospital	About 200 inpatient beds.
3. Posts and Telecommunications Institute of Technology	About 4,500 students.
4. College of Finance and Custom	About 2,000 students.
5, 6. University of Transport and Communications	About 7,500 students.
7. Dormitory	-
8. High-rise building	-
Existing residential area	Local residential area (the area to live and trade) and area for tenants (mostly students and workers). High density population area.

3) Proposed Feeder Bus Routes in the High-Tech Park and National University Area

Figure 7.4.8 to Figure 7.4.10 and Table 7.4.8 to Table 7.4.10 shows areas with high demand potential along Feeder Bus routes in High-tech Park and National University Area.

The demand of Route 10 will depend on the ability of the High-tech Park to attract more companies and other bus routes provided by tenant companies or High-tech Park. Also, the demand of Route 12 will depend on the planned bus routes provided by National University. These routes are necessary to be continuously re-examined for the coordination with other buses. Route 11 will provide feeder service to people living scattered residential areas in the east of Suoi Tien Station.

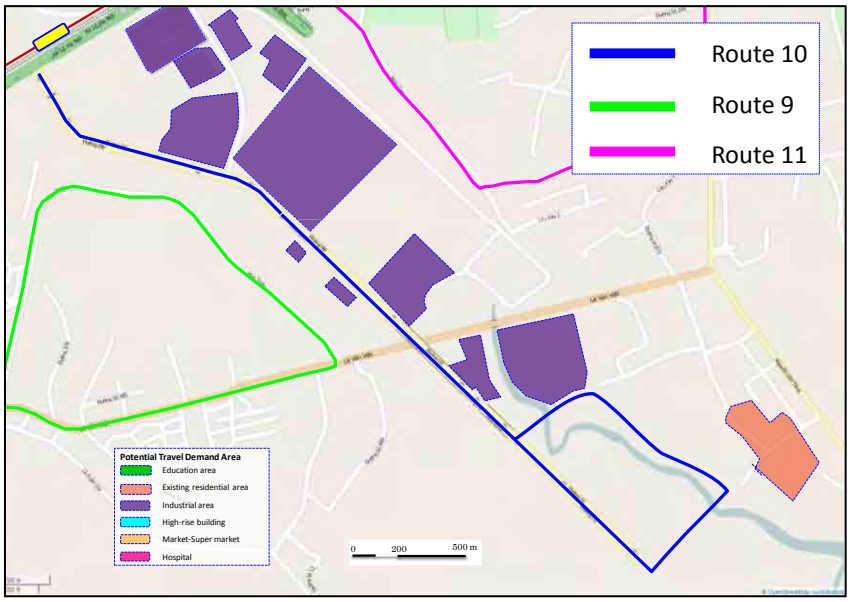


Figure 7.4.8 - Distribution of High Demand Potential Area along Feeder Bus Route 10

Table 7.4.8 - Distribution of High Demand Potential Area along Feeder Bus Route 10

Potential Travel Demand Area	Description
Nidec Copal Precision, Nidec Sankyo, Nidec Viet Nam Corporation, Nidec Servo, Intel Viet Nam	About 12,000-13,000 employees.
Existing residential area	Local residential (the area to live and trade).

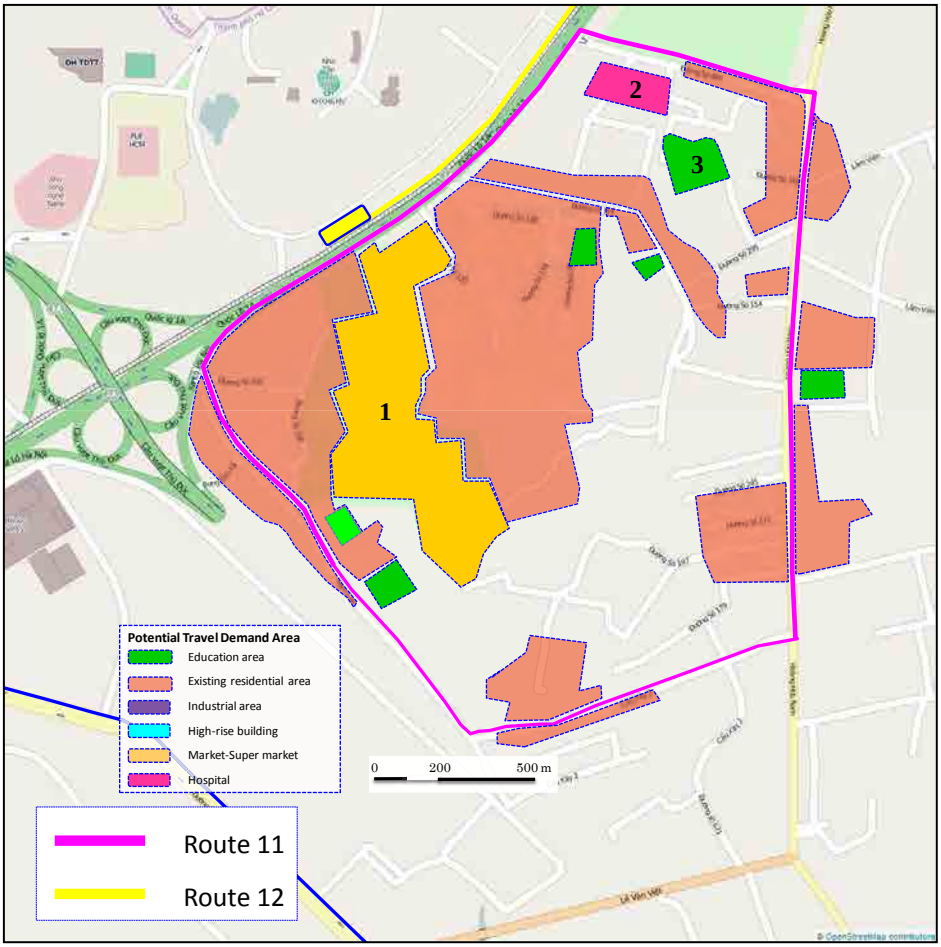


Figure 7.4.9 - Distribution of High Demand Potential Area along Feeder Bus Route 11

Table 7.4.9 - Distribution of High Demand Potential Area along Feeder Bus Route 11

Potential Travel Demand Area	Description
1. Suoi Tien Amusement Park	Suoi Tien is one of most popular theme parks in Vietnam.
2. Hospital	A major hospital of Ho Chi Minh will be constructed
3. Middle Agricultural Engineering School	-
Existing residential area	Local residential – high density population area.

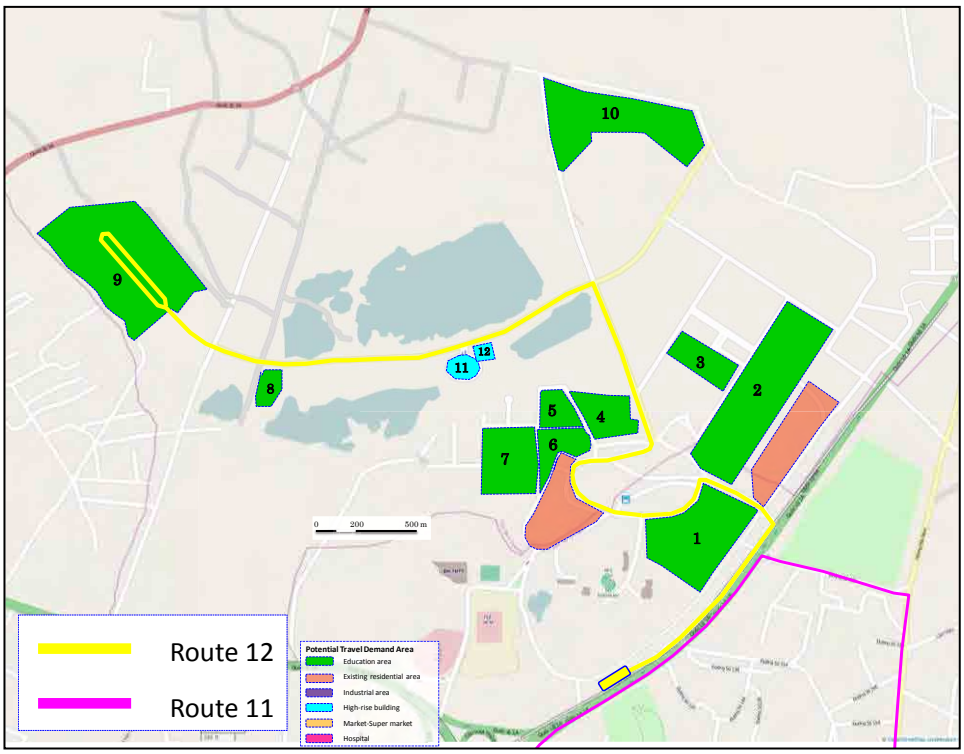


Figure 7.4.10 - Distribution of High Demand Potential Area along Feeder Bus Route 12

Table 7.4.10 - Distribution of High Demand Potential Area along Feeder Bus Route 12

Potential Travel Demand Area	Description
1. Security Service College	About 2,000 students.
2. A Dormitory	About 9,500 students.
3. Ho Chi Minh City University of Technology	-
4. Ho Chi Minh City International University	About 4,000 students.
5. VNU-HCM High School for the Gifted	About 500 students.
6, 7. University of Science	-
8. Scientific Research Institute-National University HCMC	-
9. B Dormitory	About 7,000 students and it will increase to about 40,000 students in the future
10. Center For National Defense Education-Vietnam National University HCMC	About 25,000 students per year.
11. Guest House-National University HCMC	Capacity: 100-170 people.
12. High building	Ongoing construction.
Existing residential area	High density and low floor.

4) Proposed Feeder Bus Routes in Suoi Tien Terminal Area

Figure 7.4.11 and Table 7.4.11 shows areas with high demand potential along Feeder Bus Route 13. There are scattered residential areas along this route.

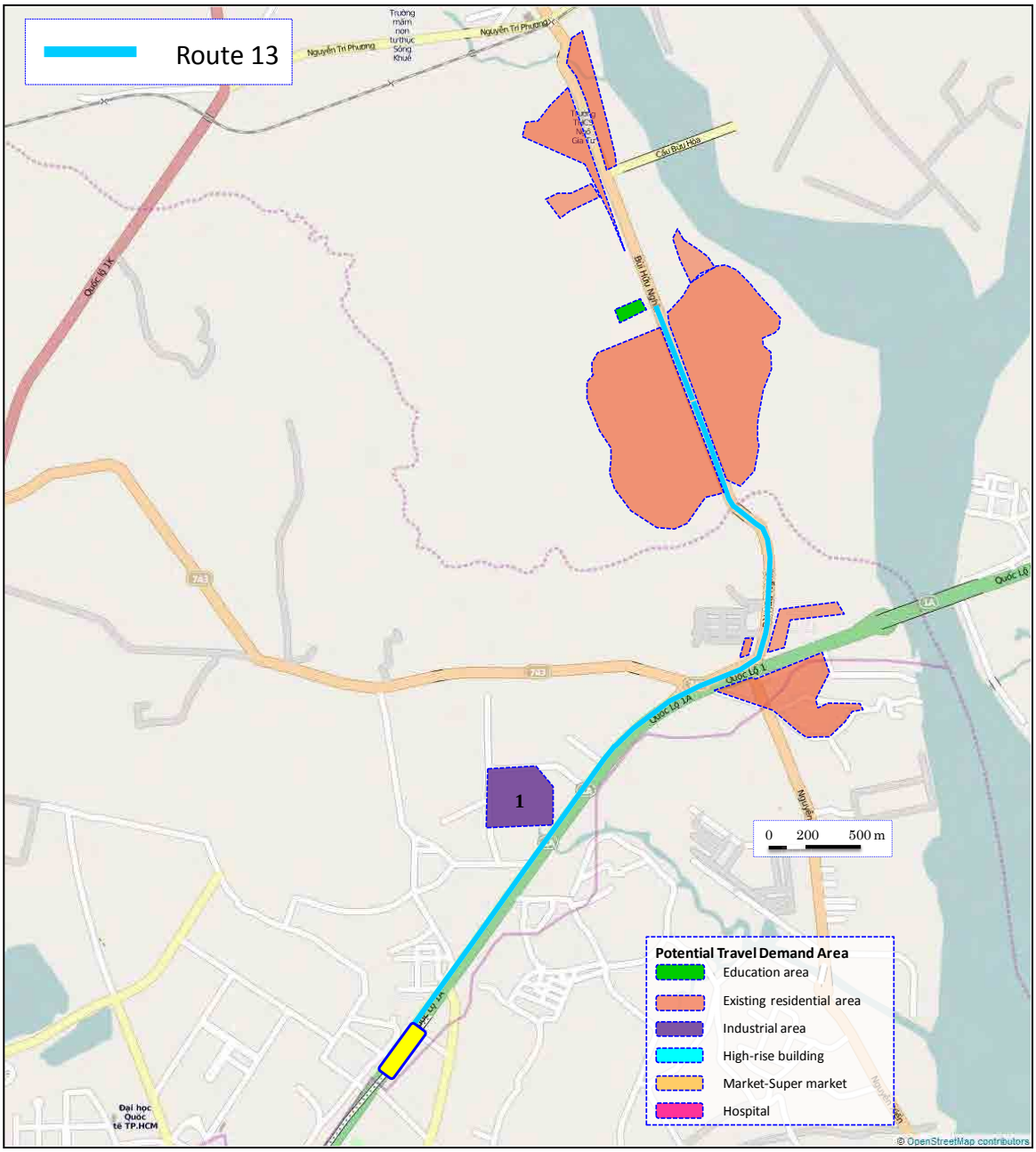


Figure 7.4.11 - Distribution of High Demand Potential Area along Feeder Bus Route 13

Table 7.4.11 - Distribution of High Demand Potential Area along Feeder Bus Route 13

Potential Travel Demand Area	Description
1. Industrial area	Textiles industrial zone with many factories and workers.
Existing residential area	Local residential (the area to live and trade), low floor.

7.5 Improvement of Transfers between Buses and the HCMC UMRT Line 1

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

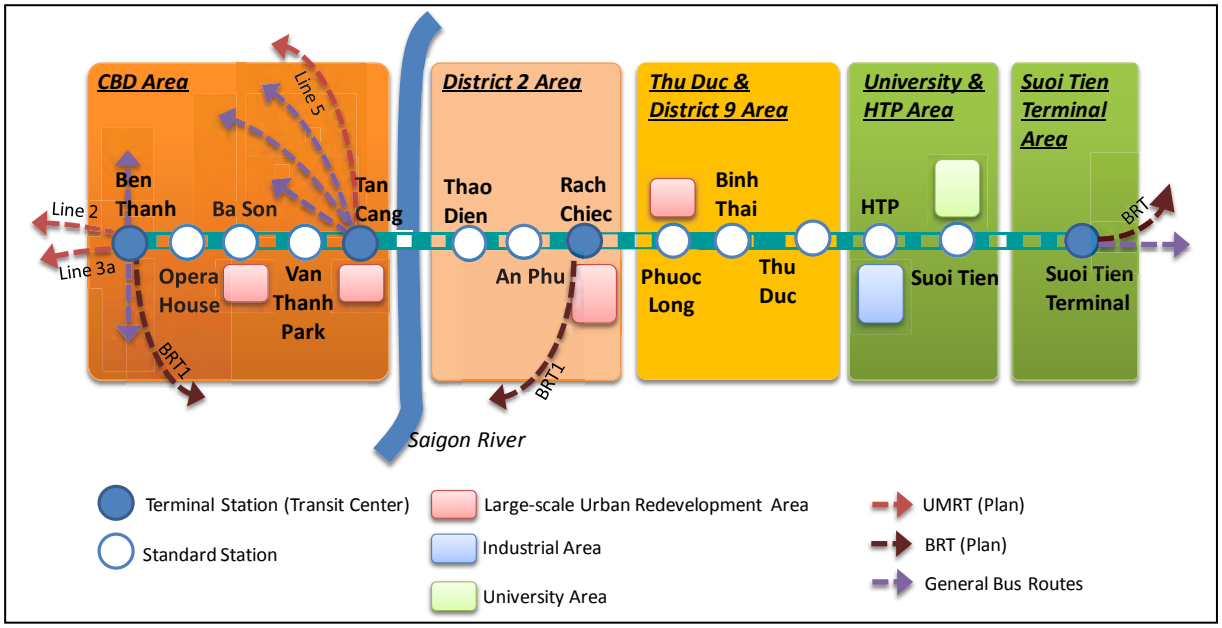


Figure 7.5.1 - Terminal Stations along the HCMC UMRT Line 1

1) 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. The underground plan for Ben Thanh station is shown as follows.

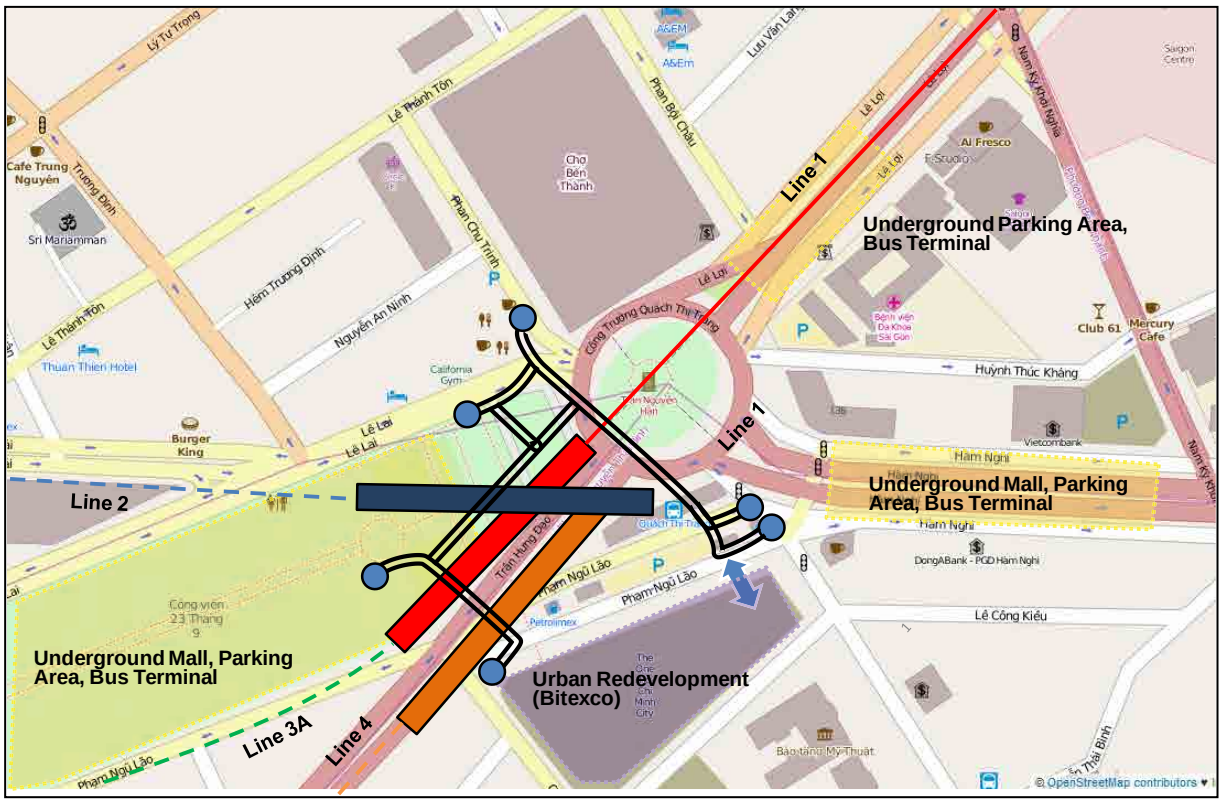


Figure 7.5.2 - Future Plan around Ben Thanh Station

2) Tan Cang Station

Tan Cang station is a major node that is located west of the Saigon Bridge at junction between Dien Bien Phu street and Nguyen Huu Canh street. It is a strategic transport hub on the eastern edge of the central area of Ho Chi Minh City. Currently, including both city buses and interprovincial bus lines, there are 15 bus routes that are operating over the Saigon Bridge.

Also, according to the 2020 transport master plan, there are plans for the connection of UMRT Line 5 at this station and in the future, this will be a major transfer station between the UMRT and the existing bus routes.

As per the proposal in Section 6.2 of this study, after the opening of the UMRT Line 1, regarding the existing bus routes that will be competing with the UMRT Line 1, with the exception of a portion of the existing bus routes, most will terminate at Tan Cang station. At Tan Cang station, the readjustment of targeted existing bus routes will involve the bus operation plan to run shuttle services to Tan Cang station.

The existing bus routes targeted for readjustment are shown in more detail in the Table 7.5.1 and Figure 7.5.3.

Also, for bus routes 43, 53, 55 and 150 which will go beyond Tan Cang station, for the convenience of crossing the Saigon Bridge, these bus routes will not be able to enter the station plaza. Therefore, as much as possible, it is proposed to build a new bus stop or move the existing bus stop as close as possible to Tan Cang station.

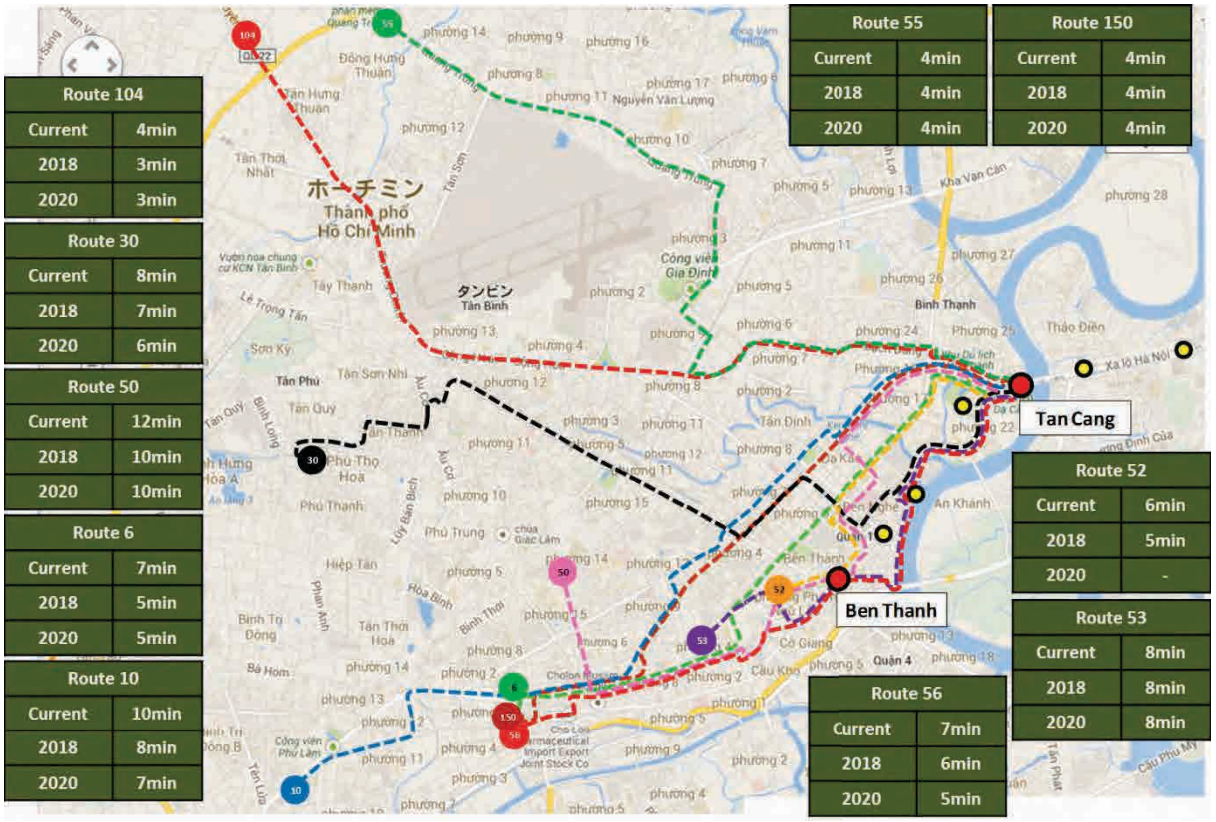
In addition, regarding bus vehicle operations (arrival, waiting, departure) inside the Tan Cang station plaza, the operation plan is discussed in more detail in Chapter 8.

Table 7.5.1 - Bus Frequency and Required Bus Fleet for the Proposed Plan

Bus Route	Magnitude of Impact		Feeder (Non-Overlapping) Section						Overlapping Section					
	2018	2020	Interval (min)			Required Bus Fleet			Interval (min)			Required Bus Fleet		
			2013	2018	2020	2013	2018	2020	2013	2018	2020	2013	2018	2020
6	-30%	-50%	7	5	5	26	15	15	7	-	-	26	-	-
10	-30%	-50%	10	8	7	18	12	13	10	-	-	18	-	-
19	-10%	-20%	6	7	8	32	28	24	6	7	8	32	28	24
30	-20%	-40%	8	7	6	20	14	16	8	-	-	20	-	-
50	-35%	-50%	12	10	10	11	8	4*	12	-	-	11	-	-
52	-40%	-80%-	6	5	-	11	10	-	6	-	-	11	-	-
53	-60%	-80%-	8	8	8	24	24	24	8	8	8	24	24	24
55	-40%	-50%	4	4	4	32	32	32	4	4	4	32	32	32
56	-35%	-80%-	7	6	-	25	16	12*	7	-	-	25	-	-
99	-20%	-50%	6	8	12	21	21	21	6	6	6	21	21	21
104	-30%	-50%	4	3	3	34	26	26	4	-	-	34	-	-
150	-20%	-30%	4	4	4	51	51	51	4	4	4	51	51	51
Total						305	257	238				305	156	152

Note: *After the opening of the final section of the UMRT Line 1 from Ben Thanh to Tan Cang, for bus routes 50 and 56, bus service will stop between the section from Ben Thanh to Tan Cang and the bus service will act as a feeder service to from Ben Thanh to the western part of HCMC

Source: Study Team



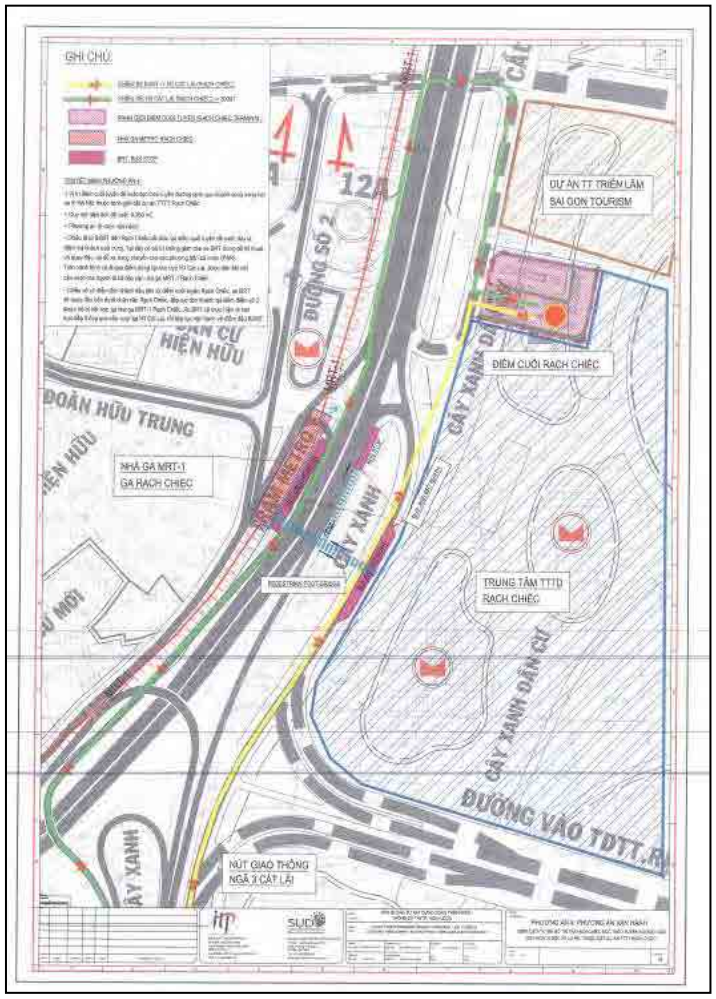
Source: Study Team

Figure 7.5.3 - Option for Service Improvement of the Feeder Section from Tan Cang to the West Part of HCMC by the Proposed Plan

3) Rach Chiec Station

In the future, Rach Chiec station will become a transfer point between the UMRT Line 1 and the BRT Line 1.

In the southeast of Rach Chiec station, there is a plan for a mixed used development which will incorporate a sports complex. Although developers from Singapore and Hong Kong have received development rights for this development, detailed planning is not progressing at the moment. Regarding the readjustment of existing bus routes at this location, it is proposed that bus route 88 have a new connection at this station. Also, for existing bus routes that run along the Hanoi Highway, at this moment, there isn't any reserved land in the station for bus stops but during the opening of the UMRT Line 1, 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 Line 1 and BRT Line 1.



Source: HCMC BRT Line 1 Study Team

Figure 7.5.4 - Connection between the BRT Line 1 and Rach Chiec Station

4) Suoi Tien Terminal Station

At the Suoi Tien Terminal station, on the adjacent land south of the station, according to SAMCO (state-owned transport company), there is a plan to relocate the eastern bus terminal and to build a new eastern bus terminal at this location. Also, there is a plan for a BRT system to connect to the new Binh Duong New City. 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.

Regarding the development of an integrated station plaza at Suoi Tien Terminal station with urban development and the Binh Duong New City BRT, a JICA public private partnership (PPP) feasibility study (F/S) is currently progressing. 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 of 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.

Also, with regards to readjusting interprovincial bus routes and changing the departure point of existing bus routes (which may require extensions) to neighboring provinces to this station, not only is the consultation with the Ho Chi Minh City DOT necessary, but consultation with Binh Duong Province as well as Dong Nai Province is necessary before any decisions are finalized.

5) Adjustment between the Existing Bus Stops and the HCMC UMRT Line 1 Stations

After the opening of the HCMC UMRT Line 1, retained overlapping bus routes (e.g. Route 150) will serve as the access/egress transport of UMRT Line 1 and as the backup of temporal suspension of it. When the UMRT Line 1 is opened, new bus stops shown in Figure 7.5.5 should be provided to transfer to HCMC UMRT Line 1 in order to strengthen the collaboration between existing bus and UMRT.

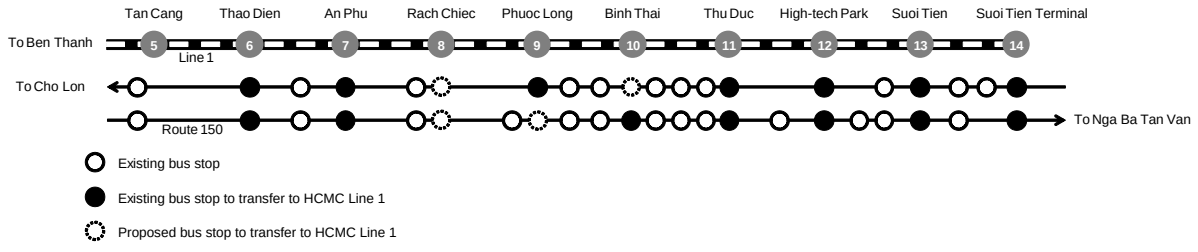


Figure 7.5.5 - Adjustment of Bus Stop (Route No. 150)

8 FEEDER BUS OPERATIONS PLAN AND INSTITUTIONAL ARRANGEMENTS

The practical operation plan, required bus fare system, and desirable institutional design for the proposed feeder bus routes are examined in this chapter. Through these examinations, the required action program and its implementation schedule until the opening of the HCMC UMRT Line 1 are identified.

8.1 Operational Plan for the Proposed Feeder Bus Routes

1) Bus Fleet Size for the Feeder Bus Network

The size of the vehicles used for the feeder bus routes are 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 feeder bus line is shown in Table 8.1.1.

Table 8.1.1 - 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

Note: *(A): clockwise, (B): anti-clockwise

Source: Study Team

However, feeder bus routes 10 and 12 will operate in the special areas of the High Tech Park and the National University Area so after the HCMC UMRT Line 1 opens, the route and operation plan need to be revised. The sizing of the vehicles for both feeder bus routes 10 and 12 are explained in greater detail as follows.

Feeder Bus Route 10 (in the High-Tech Park)

Based on the viewpoint of road width, it is possible to operate large sized buses. However based on the demand, medium sized buses are more suitable.

In the High Tech Park, currently there are private buses operated by companies located in the High Tech Park and the High Tech Park is also separately considering operating a bus service within the High Tech Park. Also, the future feeder bus demand is largely dependent on the ability of the High Tech Park to attract more companies as tenants. Therefore, for this study, only one feeder bus route to this area is proposed.

In the future, based on periodic consultations and based on the progress of attracting companies to the High Tech Park, it is advisable to re-examine the feeder bus route and operational plan while planning for the coordination with other buses.

Feeder Bus Route 12 (in the National University Area)

In addition to the proposed feeder bus route 12 on the route from the National University Area to Suoi Tien station, existing bus routes 33 and 99 originating from the Student Dormitory B area also exist. Therefore, the demand for feeder bus route will be large enough that medium sized buses will be suitable.

Also, according to the National University Area master plan, in the future, there are plans to operate a bus within the National University Area so for this study, only one feeder bus route will be proposed.

In the future, based on periodic consultations with the National University and based on the development of the National University Area, it is advisable to re-examine the feeder bus route and operational plan while planning for the coordination with other buses.

2) Feeder Bus Operation Plan

Table 8.1.2 summarizes the feeder bus operation plan at the opening stage of the HCMC UMRT Line 1 in 2018. This is determined based on the estimated passenger demand from the peak hour and bus fleet size considered in the previous section.

Table 8.1.2 - Proposed Feeder Bus Operation Plan

Route No. ****	Distance (km)*		No. of Pax in Peak Hour**	Bus Type	No. of Seats	Frequency in Peak Hour	Frequency in Off-Peak Hour***	Required Bus Fleet
	One Way	Round Trip						
2018								
1 (A)	-	4.2	180	Small	30	8	13	3
1 (B)	-	4.2	180	Small	30	8	13	3
2	-	6.4	190	Small	30	8	13	4
3	6.9	13.7	770	Large	55	5	8	11
4	3.4	6.7	640	Medium	55	4	6	8
5	-	8.8	660	Medium	55	4	6	9
6	8.9	17.8	600	Medium	55	5	8	15
7	8.5	17.0	290	Medium	55	10	16	7
8	6.3	12.6	650	Large	80	7	11	8
9	-	7.4	370	Medium	55	8	13	4
10	3.7	7.4	210	Medium	55	15	25	3
11 (A)	-	6.1	250	Small	55	6	10	5
11 (B)	-	6.1	90	Small	55	13	21	3
12	6.0	12.0	220	Medium	80	13	21	4
13	6.0	12.0	510	Large	80	9	15	6
Total								93
2020								
1 (A)	-	4.2	210	Small	30	7	11	3
1 (B)	-	4.2	210	Small	30	7	11	3
2	-	6.4	200	Small	30	8	13	4
3	6.9	13.7	1,770	Large	55	2.5	4	22
4	3.4	6.7	760	Medium	55	3.5	5	9
5	-	8.8	770	Medium	55	3.5	5	10
6	8.9	17.8	1,080	Medium	55	2.5	4	29
7	8.5	17.0	530	Medium	55	5.5	9	12
8	6.3	12.6	940	Large	80	4	6	13
9	-	7.4	490	Medium	55	5.5	9	6
10	3.7	7.4	210	Medium	55	15	21	3
11 (A)	-	6.1	210	Small	55	7	11	5
11 (B)	-	6.1	90	Small	55	13	21	3
12	6.0	12.0	300	Medium	80	9	15	6
13	6.0	12.0	1,010	Large	80	4	6	14
Total								142

* Round trip is from the origin station to the same station, one way trip is from the UMRT station to the last stop of the feeder bus line

** Heavier direction traffic volume at peak hour (1 hour) which is estimated by the transport demand forecast model

*** Frequency in the off-peak hour is assumed to be 60% of that in the peak hour

**** (A): clockwise, (B): anti-clockwise

Source: Study Team

3) Bus Operation at UMRT Stations

The required parking spaces and number of bus vehicles for the feeder buses at each UMRT station is shown in Figure 8.1.3. For the off-peak hours, it is assumed that the number of bus vehicles will be 60% of that required in the peak hour. Because of this, it is necessary to secure parking spaces for the remaining 40% of the bus vehicles during the off-peak hours.

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.

Currently, on various bus routes, there is the practice of reducing the operating bus vehicles in the off-peak time periods at the first and last stops of bus routes with regards to bus parking. Although this is efficient from the viewpoint of the total travel distance of the bus, it leads to an increase in the working time for bus operators. In developed countries including Japan, regarding bus parking in the off-peak time periods, during the nighttime, the practice is for buses to be returned to the bus operations and maintenance center where for the purposes of safe driving for bus operators, there are resting and eating facilities provided. After the break time is over, the practice is for the bus dispatchers to call out bus operators to report for duties.

Also, for the turnaround facilities at the last stop on the bus route, there should be an area where the number of required bus vehicles can temporarily wait/queue for the turnaround operation. For the case when there is an increase in the number of bus routes, there is the need to continuously secure land for parking spaces for the bus vehicles during the off-peak time periods. Hereafter, due to economic growth, there will be pressures on finances to secure the land due to rising land values.

Table 8.1.3 - Proposed Bus Operation Plan 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

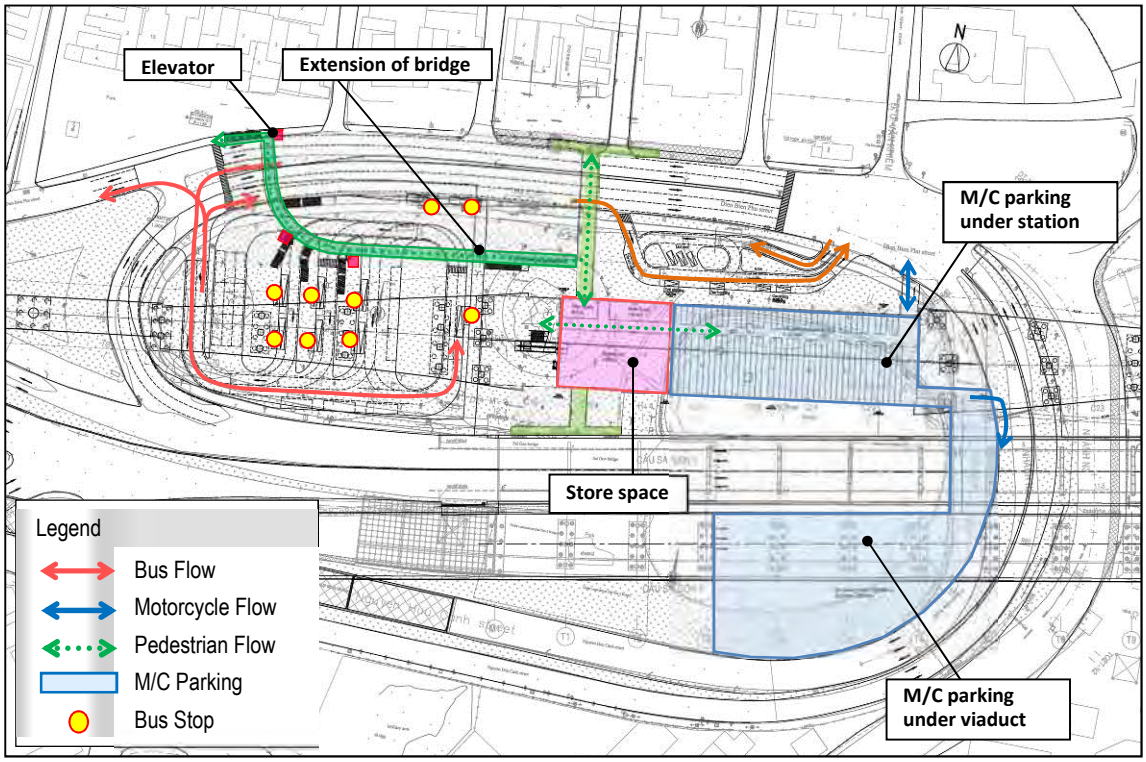
Source: Study Team

Bus parking space at UMRT stations are proposed as follows.

Bus Operations at Tan Cang Station

From the proposal in Chapter 7.2 for the adjustment of existing bus routes, there will be 7 bus routes that use Tan Cang station as the first and last bus stop. The routes are 6, 10, 30, 50, 52, 56 and 104. Bus route 52 will be abolished in 2020. Also, there will be 4 existing bus routes (43, 53, 55 and 150) which will not be adjusted and will pass through Tan Cang station.

The concept plan of Tan Cang station is shown in Figure 8.1.1. In the station plaza of Tan Cang station, there are bus exclusive use facilities. There is one location for bus alighting (3 bus vehicles can stop there at the same time). In addition, there are 8 locations for departing buses to different destinations (2 of the locations are outside of the station plaza). Also, there is also space for 18 bus vehicles (6 routes x 3 vehicles/route) for the short waiting/queuing of buses when the bus departure timetable needs to be adjusted. During the peak time periods, for arriving buses that are waiting/queuing to depart once again, it is possible that there is enough space required inside the station plaza. However, in consideration of not enough space, it is possible to use the green space on the northeastern side of the station for bus parking.



Source: Study Team

Figure 8.1.1 - Concept Plan of Tan Cang Station Area (upon UMRT opening)

During the off-peak time period, for bus parking beyond for a definite period of time, it is possible for buses to move to the Van Thanh Bus Parking (18,000 m^2) on the north side of Dien Bien Phu Street for parking.

For the 7 bus routes that use Tan Cang station as the first and last stop (bus routes 6, 10, 30, 50, 52, 56 and 104; bus route 52 to be abolished in 2020), Table 7.5.1 in Chapter 7 shows the required number of bus vehicles for operations. It is estimated that in 2018, 101 bus vehicles will be required (including the bus vehicles for bus route 52 to be abolished in 2020). During the off-peak period, it is assumed that 40 bus vehicles will require parking spaces. Regarding the total area required for these 40 bus vehicles, 3,580 m^2 is required. The calculation is as follows. 1,760 m^2 for the bus stopping space (44 m^2/vehicle x 40 vehicles = 1,760 m^2). 1,820 m^2 is required for the access space (3.5 m x 40 vehicles x 13 m = 1,820 m^2). Therefore the 18,000 m^2 Van Thanh Bus Parking is more than sufficient for off-peak bus parking.

The detailed bus operation by direction at Tan Cang Station is summarized in Table 8.1.4.

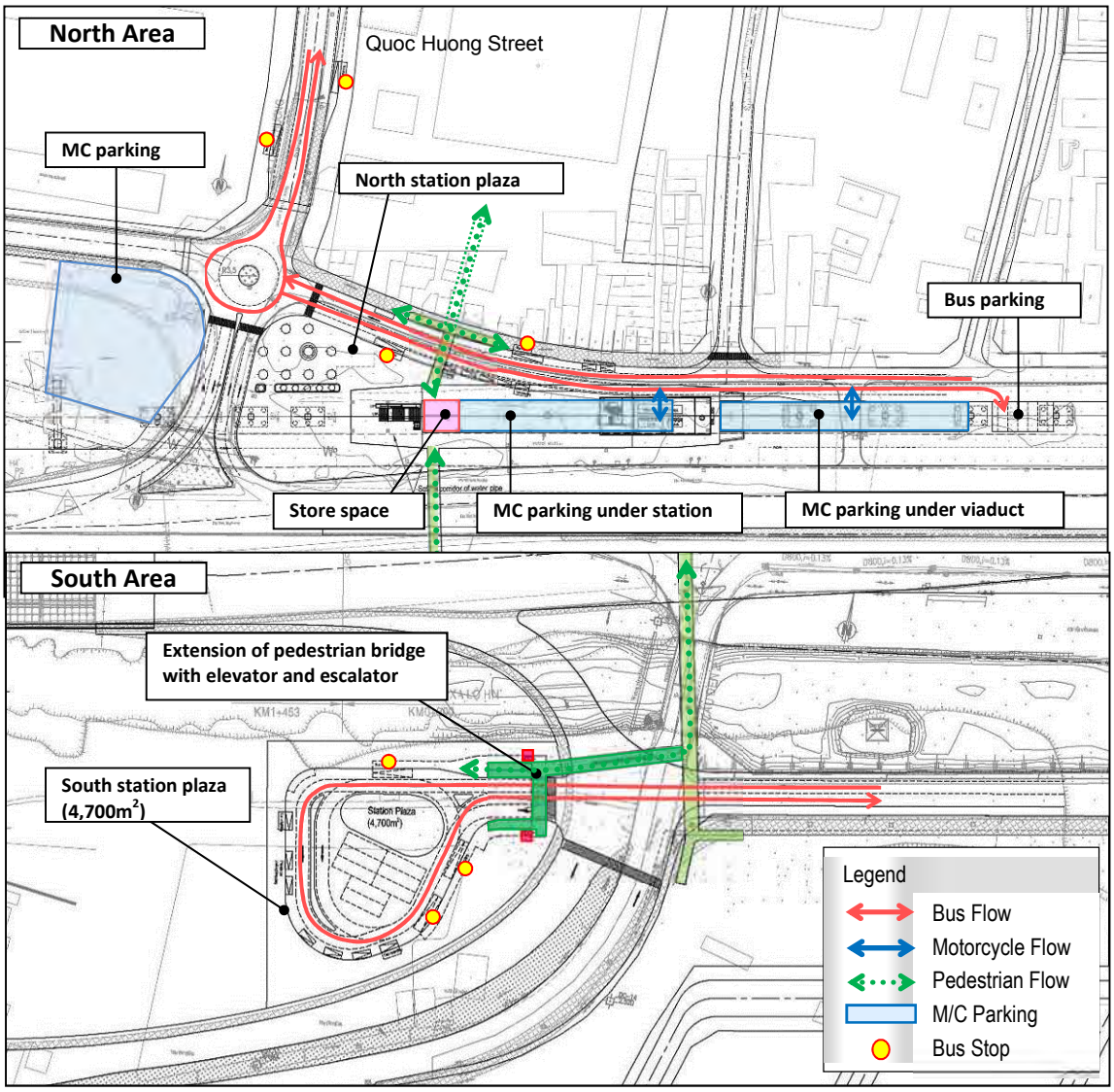
Table 8.1.4 - Detailed Bus Operation by Direction at Tan Cang Station

Direction	Route No.	Step	Description
Dien Bien Phu	6, 10, 50, 52, 104	1	For buses bound for Tan Cang station, after going around the service road of the interchange, the buses will turn left and enter the station plaza, stop at the bus alighting spot and let passengers alight from the bus
		2	After the passengers alight from the bus, the bus will wait/queue by moving to a parking spot inside the station plaza. In this case, when there is not enough space for buses to wait/queue in the allocated parking space inside the station plaza, the buses will wait/queue by moving to a parking spot outside the station plaza on the east side.
		3	When the waiting/queuing time until the next departure is short, the buses will wait and stop at the designated parking spot for the same route (but different direction) immediately behind the bus in front of it. Until the bus in front departs, the bus will wait/queue in the parking spot. However, in the case where the next bus has already departed, after arriving, the bus will quickly move into the designated parking spot for waiting/queuing.
		4	At the designated parking spot for buses for the same route (but different direction), after the next bus has departed, the bus will move into the designated parking spot to wait/queue.
		5	After departure from the designated parking spot, the bus will turn left from the station plaza and will progress towards Dien Bien Phu Street.
		6	During the off-peak time period, in the case of buses stopping beyond a definite time period, the buses will turn left from the station plaza, and will park at the Van Thanh Bus Parking that is located on the north side of Dien Bien Phu Street.
		7	After the operations as described in 6) above, the bus will depart from Van Thanh Bus Parking to meet the departure time as per the timetable at Tan Cang station. After leaving the Van Thanh Bus Parking, from Dien Bien Phu Street, the bus will go around the service road for the Tan Cang station interchange and make a left to enter the station plaza. The bus will then wait at the designated parking spot (for different directions) until the next departure.
Nguyen Huu Canh Street	30, 56	1	Same with 1-4 on Dien Bien Phu Street
		2	
		3	
		4	
		5	After departure from the designated parking spot, the bus will turn right from the station plaza, go around the Tan Cang interchange and progress towards Nguyen Huu Canh Street.
		6	In the case that buses stop beyond a definite period of time throughout in the off-peak time period, the bus will turn left from the station plaza, and park in the Van Thanh Bus Parking located on the north side of Dien Bien Phu Street.
		7	After the operations as described in 6) above, the bus will depart from Van Thanh Bus Parking to meet the departure time as per the timetable at Tan Cang station. After leaving the Van Thanh Bus Parking, from Dien Bien Phu Street, the bus will go around the service road for the Tan Cang station interchange and make a left to enter the station plaza. The bus will then wait at the designated parking spot (for different directions) until the next departure.
Bus Routes Going Through Tan Cang Station			
East	43, 53, 55, 150		For buses heading in the eastern direction, buses will stop at bus stops nearest to Tan Cang station (as much as possible, try to move the location of the bus stops closer to the station). The locations are: Dien Bien Phu Street (bus routes 43, 55, 150), Nguyen Huu Canh Street (bus route 53). After passengers have alighted from the bus, they will walk to Tan Cang station to transfer to the UMRT Line 1.
West			For the buses heading in the western direction, from the Hanoi Highway, the buses will make a right turn to enter the road on the side of Tan Cang station. Afterwards, the bus will make a right turn to enter the station plaza and stop at the designated parking space (for different directions). Buses from bus routes 43, 55, 150 will turn left from the station plaza, progress towards Dien Bien Phu Street while buses from bus route 53 will turn right from the station plaza, go around the Tan Cang station interchange and head towards the direction of Nguyen Huu Canh Street.

Source: Study Team

Feeder Bus Operation at Stations

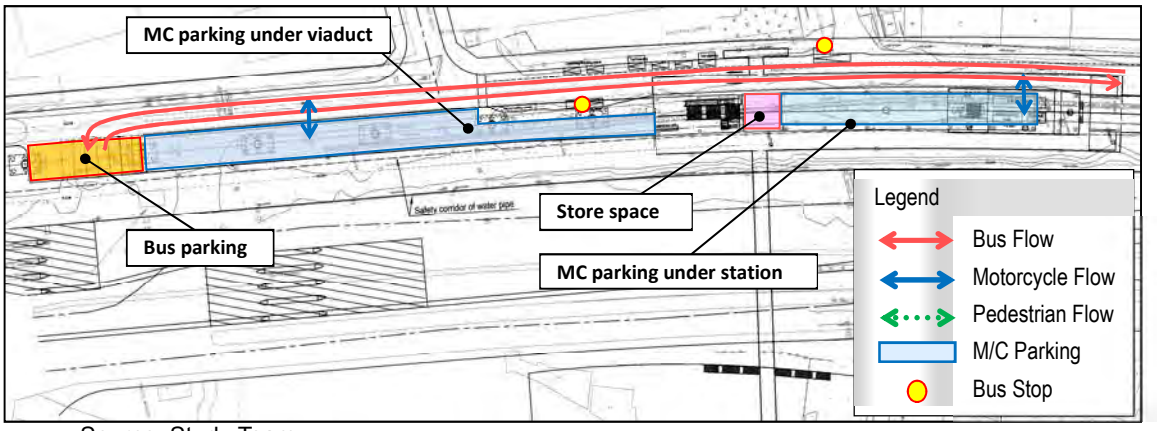
Thao Dien Station: At Thao Dien station, 2 feeder bus lines on the northern side and 1 feeder bus line on the southern side are planned. On the northern side, for the 2 feeder bus routes, on the eastern side of the station under the viaduct, 5 lots of parking space has been secured. For the feeder bus line on the southern side of the station, the buses will utilize the bus parking space inside the station plaza (can fit up to 8 bus vehicles).



Source: Study Team

Figure 8.1.2 - Concept Plan of Thao Dien Station Area (upon UMRT opening)

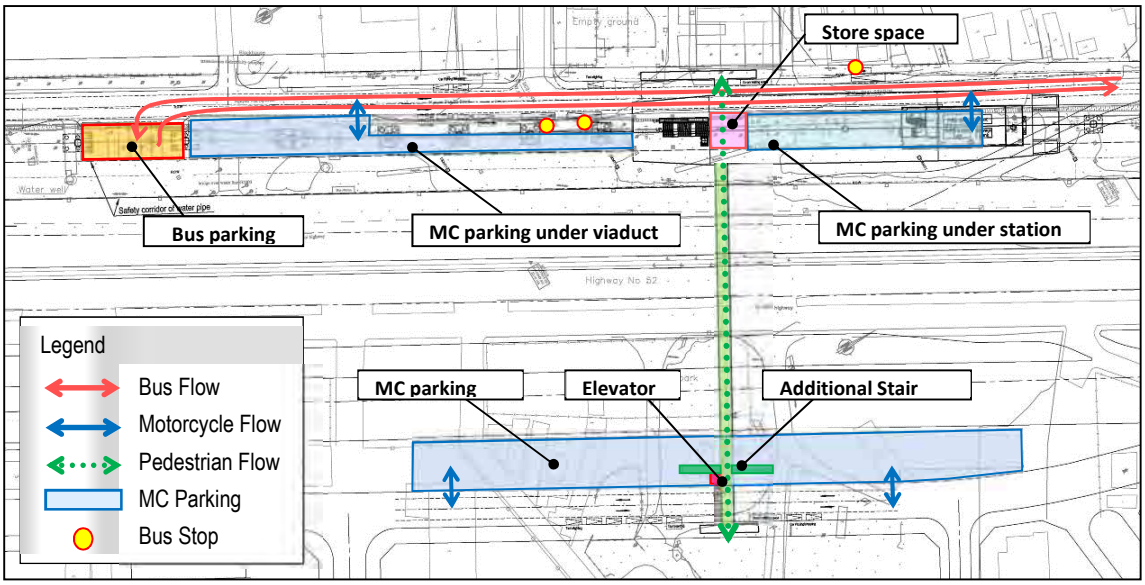
Phuoc Long Station: There are 2 feeder bus lines planned for the western side of Phuoc Long station. 6 lots of parking space under the viaduct of the UMRT line has been secured for the parking space for the 2 feeder bus lines.



Source: Study Team

Figure 8.1.3 - Temporary Development Plan of Phuoc Long Station Area (upon UMRT opening)

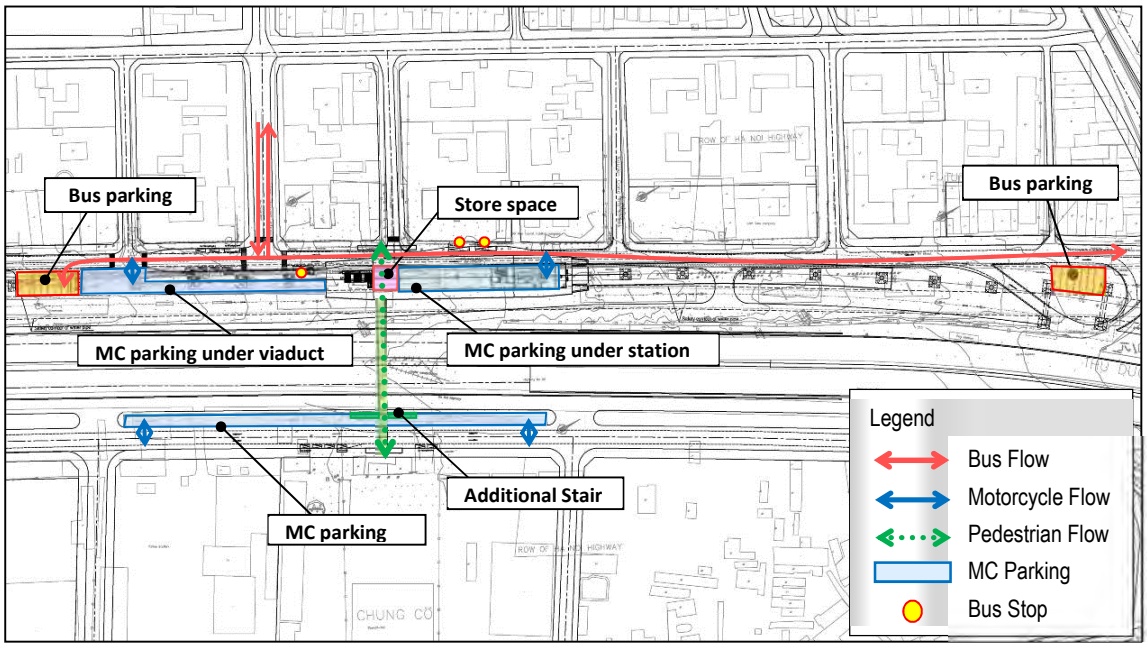
Binh Thai Station: At Binh Thai station, 2 feeder bus lines (FB6 and FB7) are planned for the western side of the station. There are restrictions in space under the viaduct so at Binh Thai station, only 5 lots of parking space is secured. Feeder bus route FB6 is a route via Thu Duc station so the bus operations involve the sharing of parking space under the viaduct of Thu Duc station.



Source: Study Team

Figure 8.1.4 - Concept Plan of Binh Thai Station Area

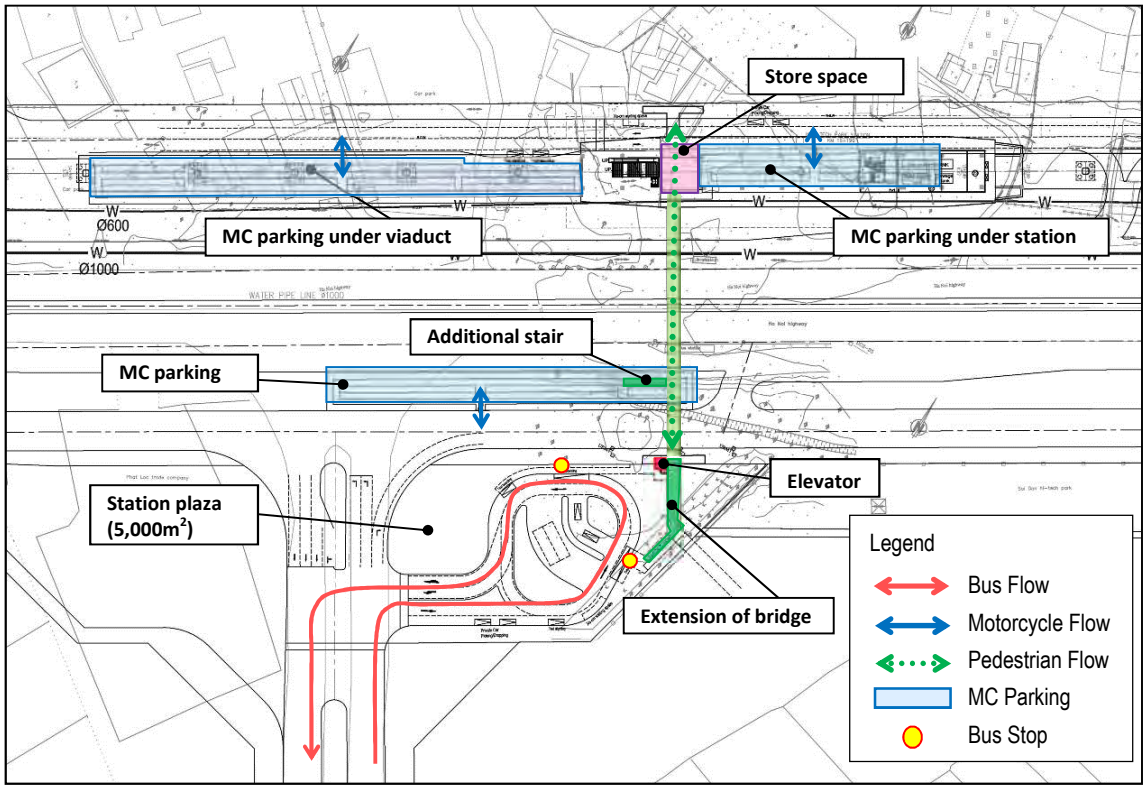
Thu Duc Station: At Thu Duc station, on the eastern and western side under the viaduct, there are 2 places where parking for 10 bus vehicles has been secured. Three feeder bus lines that connect with Thu Duc station, FB6, FB8 and FB9 will use this parking space.



Source: Study Team

Figure 8.1.5 - Concept Plan of Thu Duc Station Area (upon UMRT opening)

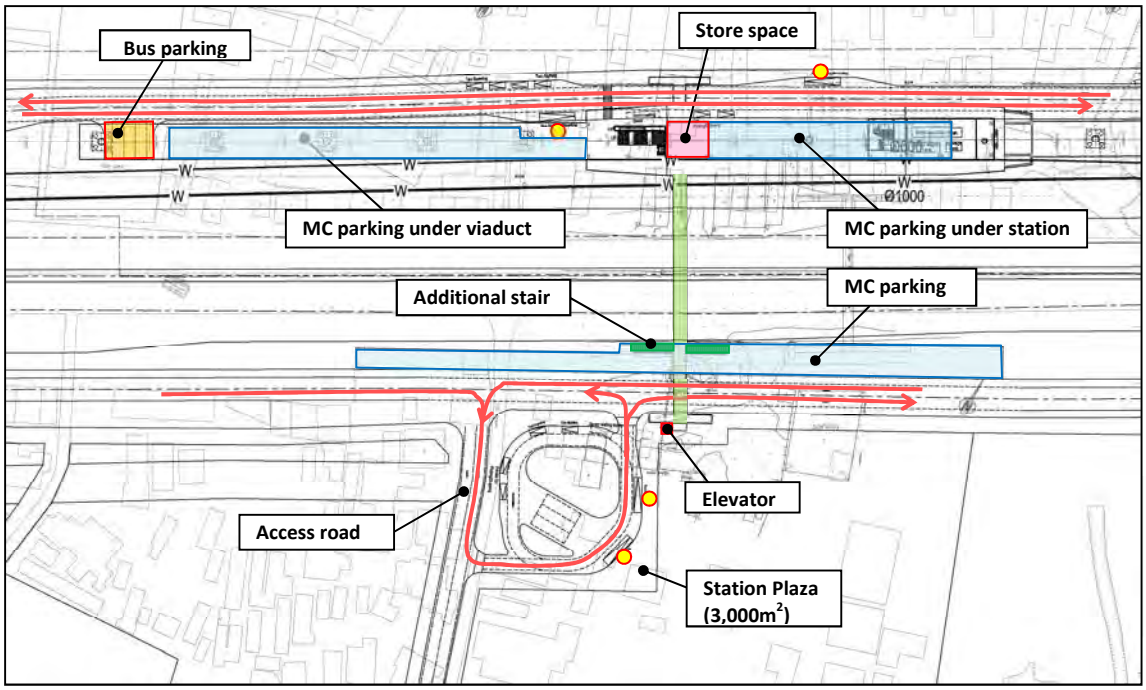
High-Tech Park Station: At High-Tech Park station, on the southern side, in the planned station plaza, space is secured for bus parking.



Source: Study Team

Figure 8.1.6 - Concept Plan of the High-Tech Park Station Area

Suoi Tien Station: At Suoi Tien station, parking space has been secured as follows. On the western side under the viaduct, there is enough space for 3 bus vehicles while on the eastern side of the station under the viaduct, there is enough space for 3 bus vehicles. FB11 and FB12 will utilize these parking spaces for the bus operations.



Source: Study Team

Figure 8.1.7 - Concept Plan of Suoi Tien Station Area (Phase II)

4) Bus Turnaround Plan at the End of Feeder Bus Routes

The current buses have long route lengths and because of this, considering the possibility of delayed operations as a result of traffic congestion, after the bus arrives at the final stop on the line, it is necessary to schedule slack time before the bus departs on its return journey on the route.

On the other hand, for the feeder buses that are being proposed, from the first bus stop to the last, the average route length for the roundtrip is only about 10 km so the possibility of delayed operations from traffic congestion is low.

For this reason, it is inefficient to schedule slack time at the stop on the end of the line in the residential areas. So, it is better to schedule slack time for the departure of buses at the UMRT stations.

Based on the above, because slack time is not necessary at the end of the feeder bus lines in the residential areas, it is not necessary to secure parking spaces for the buses to wait. In the residential area bus stops, the buses can adjust the time necessary to adhere to the timetable so it is possible to operate on a fixed timetable.

Table 8.1.5 summarizes the plan for turning around buses at the end of the feeder bus routes. Among the feeder bus routes, 4, 7, 8, 12 and 13 are the only ones which are not loop lines and so the bus turnaround plan for these feeder bus routes will be explained in greater detail.

Table 8.1.5 - Proposed Feeder Bus Turnaround Plan

Route No.	Route Type*	Servicing Station	Bus Turnaround Route	Distance (km)**	
				One Way	Round Trip
1	2	Thao Dien	Loop line	-	4.2
2	4	Thao Dien	Loop line (Nguyen Van Huong - So 66 - So 47 - Quoc Huong - turn left to Hem 76 - turn right to Nguyen Van Huong)	-	6.4
3	3	Thao Dien, An Phu	Loop line (Nguyen Duy Trinh - Do Xuan Hop - Duong A2 - Duong A4 - Nguyen Duy Trinh)	6.9	13.7
4	1	Phuoc Long	Return at the west area of HCMC Vocational College Facility 3 on Dai Lo 3	3.4	6.7
5	3	Phuoc Long	Loop line (Do Xuan Hop - Tang Nhon Phu - Dinh Hoi - Do Xuan Hop)	-	8.8
6	3	Binh Thai, Thu Duc	Loop line (Le Van Chi - Thu Duc Hospital - NH 1 - Duong 17 -Duong 16 - Le Van Chi)	8.9	17.8
7	1	Binh Thai	Turnaround at the "Thu Duc Wholesale Market" For exchanging with other buses (Bus no are 29, 91, 33, 19) and return at NH 13 through NH 1A	8.5	17.0
8	1	Thu Duc	Turnaround at the Big C Di An site	6.3	12.6
9	4	Thu Duc	Loop line (Le Van Viet - University of Transport and turn left to Man Thien - turn right to Le Van Viet)	-	7.4
10	4	High-Tech Park	Loop line (High Tech Park Road - High Tech Park Area - return along Rach Go Cong - High Tech Park Road)	3.7	7.4
11	2	Suoi Tien	Loop line	-	6.1
12	1	Suoi Tien	Turnaround at Dormitory B area	6.0	12.0
13	1	Suoi Tien Terminal	Turnaround in front of Tran Van Elementary School Alternative turnaround route plan is: Suoi Tien Terminal Station - NH1 - TL16 - Huong Lo 11- Intersection with NH 1K & Nguyen Ai Quoc & Nguyen Thi Ton - Huong Lo 11 and return via reverse direction to Suoi Tien Terminal Station	6.0	12.0

* Route Type: 1 - Shuttle service, 2 - Two-way loop service, 3 - Clockwise loop service, 4 - Anti-clockwise loop service

** Round trip is from the station to same station, one way trip is from UMRT station to the last stop of the feeder bus line.

Source: Study Team

Feeder bus route 4 will return back to the main route after reaching its final stop at the HCMC Vocational College Facility 3 via Dai Lo 3 as shown in Figure 8.1.8.

Source: Study Team

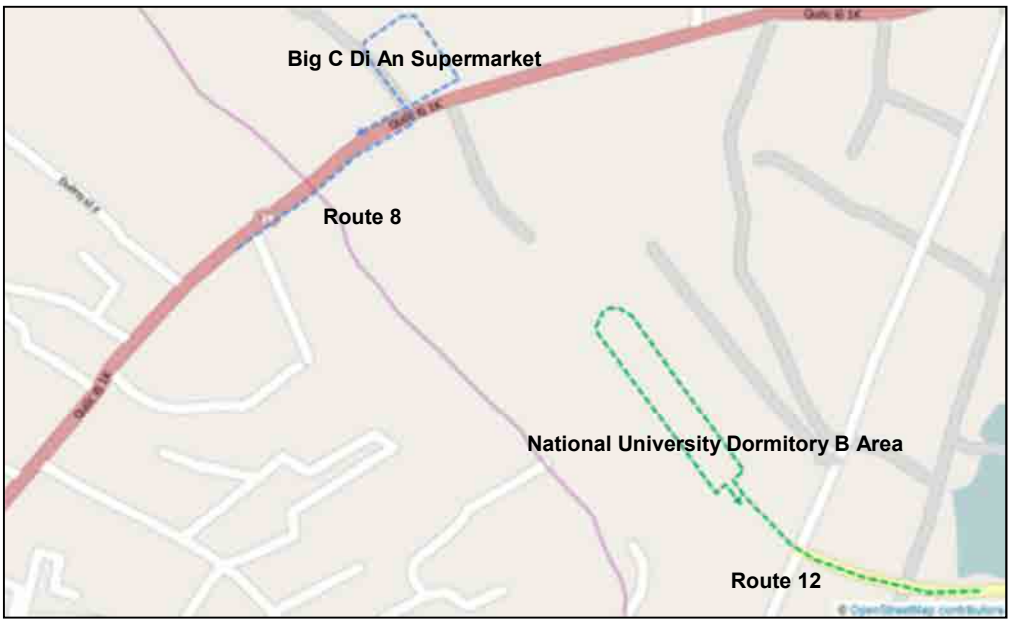
Figure 8.1.8 - Feeder Bus Route 4 Turnaround Plan

The bus turnaround plan for feeder bus route 7 is shown in Figure 8.1.9. The dotted red line shows the route of the bus to the Thu Duc Wholesale Market via the interchange. The dotted blue line shows the turnaround route for the bus. Once exiting the Thu Duc Wholesale Market, the bus will travel west along National Highway 1 until it reaches the roundabout with National Highway 13. At the roundabout, the bus will then turn back towards the eastern direction and then back to its normal route.

Source: Study Team

Figure 8.1.9 - Feeder Bus Route 7 Turnaround Plan

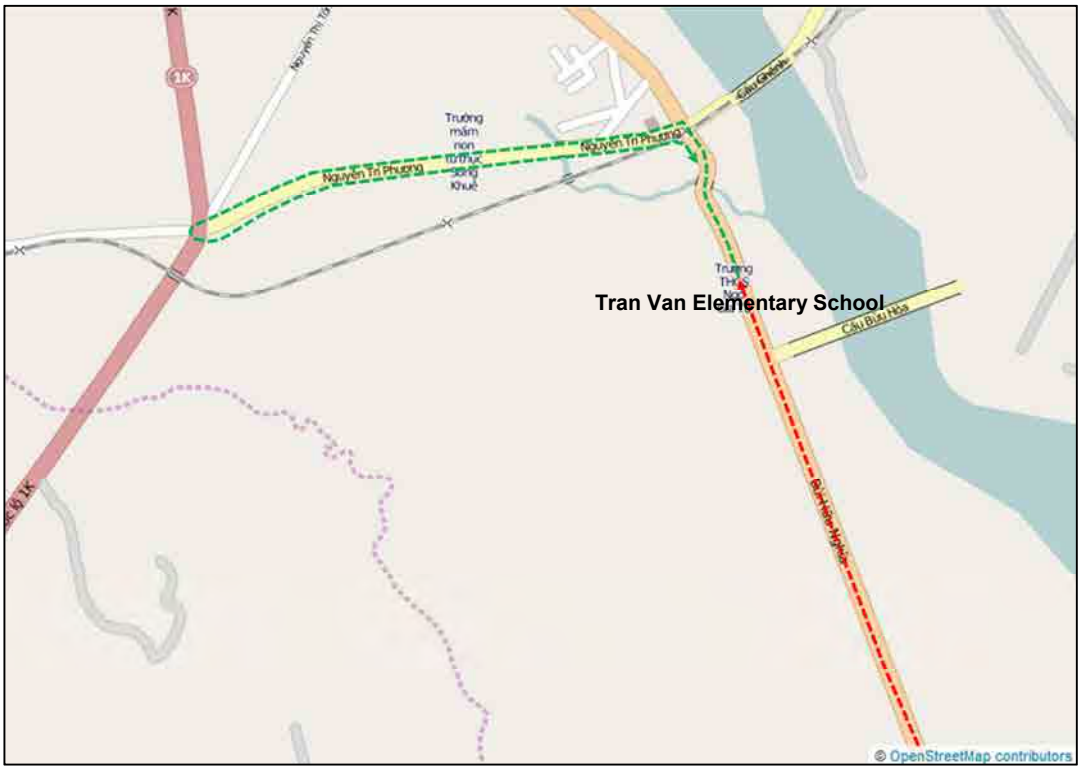
The bus turnaround plan for feeder bus route 8 and 12 are shown in Figure 8.1.10. For feeder bus route 8, the feeder bus will loop around the Big C Di An supermarket site in order to return to its normal route. For feeder bus route 12, the feeder bus will make a loop in the National University campus grounds around the Dormitory B area.



Source: Study Team

Figure 8.1.10 - Feeder Bus Route 8 and 12 Turnaround Plan

The bus turnaround plan for feeder bus route 13 is shown in Figure 8.1.11. There are two options. The first is to use the empty land in front of the Tran Van Elementary School to turn around the bus. This is shown in Figure 8.1.11 by the red dotted line. The alternative plan would be for the feeder bus to continue going down Bui Huu Nghia, turning left to Huong Lo 11, traveling down Huong Lo 11 until making a turnaround at the National Highway 1K roundabout. This is shown in Figure 8.1.11 by the green dotted line.



Source: Study Team

Figure 8.1.11 - Feeder Bus Route 13 Turnaround Plan

8.2 Required Bus Fare System

1) Examination of Profitability of the Feeder Bus Operation

Required Fare Level: Table 8.2.1 shows the proposed feeder bus operation costs and required fare levels in 2020. Based on the operation plan, the feeder bus operation cost is calculated as follows. Instead of the calculation being based on the number of times the bus service is being operated, the calculation will be done based on the total distance travelled by kilometers. The calculation is done based on multiplying the cost per kilometer in 2012 by the total distance travelled by kilometers.

The necessary required fare level for each feeder bus route is different. For feeder bus routes 4, 5, 8, 19, even if the required fare level is 3,000 VND, the possibility of profitability of the operations is high. On the other hand, for feeder bus routes 11(A) and 11(B), if the required fare level is over 10,000 VND, then the possibility of profitability of the operations is low. For the entire feeder bus operations, if the required fare level is set at 3,716 VND, even when compared with the fare system of the existing bus routes, this is the level where profitability from operations can be achieved.

Table 8.2.1 - Proposed Feeder Bus Operation Cost and Required Fare Level in 2020

Route No.	Frequency in Peak Hour (minute)	Frequency in Off-Peak Hour (minute)	Number of Planned Trips	Total Distance per Day	Total Costs (VND)	Required Fare Level (VND)
1(A)	7	11.0	100	420.0	7,715,837	3,312
1(B)	7	11.0	100	420.0	7,715,837	3,312
2	8	13.0	87	556.8	10,228,996	4,874
3	2.5	4.0	320	4,384.0	105,378,405	4,758
4	3.5	5.0	230	1,541.0	28,309,775	1,708
5	3.5	5.0	227	1,997.6	36,697,993	2,215
6	2.5	4.0	306	5,446.8	100,063,390	3,260
7	5.5	9.0	144	2,448.0	44,972,310	6,022
8	4	6.0	189	2,381.4	57,241,819	2,816
9	5.5	9.0	144	1,065.6	19,576,182	3,788
10	13	21.0	56	414.4	7,612,960	2,928
11(A)	7	11.0	132	805.2	14,792,363	11,379
11(B)	13	21.0	60	366.0	6,723,801	12,225
12	9	15.0	78	936.0	17,195,295	5,756
13	4	6.0	208	2,496.0	59,996,464	7,571
Total					524,221,427	3,716

Notes:

- *For the cost per kilometer, based on the bus operation subsidies in HCMC from the period of 2010-2012, for routes 4 and 14, the values from 2012 were used (Route 14 = 24,037 VND/km, Route 4 = 18,371 VND/km).
- From the bus operation cost is divided by the total number of users, the required average fare per user was calculated from the balance of income and expenditures.
- For the entire fare amount, the calculation was based on the 2012 kilometer unit price and does not consider the price increases up until the opening of the UMRT.

Source: Study Team

Discount Fare System: Regarding the existing bus routes which are operating in parallel and intersecting the HCMC UMRT Line 1, the percentage of users by different types of fares are shown in Table 8.2.2. In entire HCMC UMRT Line 1 corridor, students make up

55% of the total number of users. For this reason, when the base fares need to be decided, it is necessary to consider the provision of discounted fares for students. Currently, for the entire operational route length of buses, the student fare for one ride is 2,000 VND and the student fare for transfers to two bus routes on a one way journey is 4,000 VND.

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

Compared to the current bus routes, the length of the feeder bus routes are shorter, so it is desirable that the student fares for the feeder buses be half the cost of the current bus routes, that is, 1,000 VND.

Table 8.2.2 - Current Bus Usage Composition by Ticket Type in 2013

Route No.	Workers		Students	Workers			Others	Total
	5,000 VND	6,000 VND	2,000 VND	3,750 VND	4,500 VND	Prepaid Ticket	Free Fare	
6	-	23%	64%	-	4%	0%	10%	100%
10	-	38%	48%	-	3%	0%	11%	100%
30	-	36%	50%	-	5%	0%	8%	100%
43	49%	-	40%	2%	-	0%	9%	100%
50	-	7%	88%	-	2%	0%	3%	100%
52	-	12%	82%	-	2%	0%	4%	100%
53	-	17%	69%	-	4%	0%	10%	100%
55	-	24%	65%	-	5%	0%	7%	100%
56	-	27%	60%	-	4%	0%	9%	100%
57	26%	-	63%	1%	-	0%	10%	100%
76	-	40%	39%	-	2%	0%	20%	100%
88	-	57%	36%	-	3%	0%	5%	100%
89	30%	-	58%	2%	-	0%	10%	100%
99	-	19%	77%	-	1%	0%	3%	100%
104	-	26%	59%	-	5%	0%	10%	100%
141	-	28%	60%	-	2%	0%	11%	100%
150	-	41%	36%	-	5%	0%	18%	100%
Total	3%	28%	55%	0%	3%	0%	10%	100%

Source: Study Team

Required Fare Level in Consideration of the Discounted Fare System: Considering the environment along the bus routes for different bus routes, for the estimation of the percentage of users (regular users, students, free-fare) for each feeder bus route, based on the assumption of a 1,000 VND student fare, the necessary fare for regular users is calculated (refer to Table 8.2.3). Based on each feeder bus route, for the balance of income and expenditures, there is a great difference between the required fares for each route. So instead of considering different fares for each route, based on the entire operating cost for all the feeder bus routes, a uniform fare should be applied for all of the feeder bus routes.

From the above, the “worker’s fare” (base fare) was determined to be 6,489 VND. Although this base fare is not much different from the base fares for the current bus routes (this base fare is higher than the fare amount before the price increase in 2012), from the viewpoint of government policy, if it is necessary to consider the current bus users from the

same viewpoint as students, the base fare will need to be decreased and for the feeder buses, the introduction of a fare subsidy policy is necessary.

Table 8.2.3 - Proposed Feeder Bus Workers Fare & Average Fare Plan in 2020

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

Necessity of an Integrated Fare System: Currently for the UMRT fare system, although the system is calculated as a base fare of 8,000 VND + 800 VND/km, including the discount system, the entire fare system has not been decided yet. For this reason, considering the fares that feeder bus users have to pay, from now onwards, during the process of deciding the UMRT fares from the operating company of the UMRT, it is necessary to consider the UMRT fares alongside the feeder bus fares.

For the consideration of discounted fares of the UMRT along with the feeder buses, the fare settlement method in addition to the method for securing the revenues to cover the reduction in revenue accompanying the discount fare system, consultation with the DOT and MAUR is necessary. Afterwards, it is necessary to get a decision from the HCMC PC.

Recommendations on Setting the Bus Fares along the HCMC UMRT Line 1 Corridor

During the time of opening of the HCMC UMRT Line 1, the fares for the existing bus routes on the same corridor will be adjusted as follows. This is done by considering that the fare differences between the different public transport modes will not be so big.

Adjusted Existing Bus Routes Connecting with the HCMC UMRT Line 1

For existing bus routes that will be changed to feeder bus functions that will connect and intersect the HCMC UMRT Line 1, the fare system will be changed to that of the same for the new feeder bus routes for each UMRT station. Because the role of the adjusted existing bus routes will be the same as the feeder buses, and because of the short operational distance to UMRT stations to increase the convenience for users, the fares for the adjusted existed bus routes should be set the same with the new feeder bus routes.

Existing Bus Routes Running Parallel with the HCMC UMRT Line 1

For the existing bus routes (routes 53, 55, 99, 150) that will be retained after the opening of the HCMC UMRT Line 1, the fare system will be as follows. Comparing the case of fares from UMRT users and the case of fares from interprovincial bus (fare subsidies not allowed) users, the fares for the existing bus routes should be set as the same as the interprovincial bus routes. In other words, the fares for the existing bus routes should be set based on a distance-based zone system. The distance-based zone fare system for interprovincial buses are shown in Table 8.2.4.

Table 8.2.4 - 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 Giang 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 - Hố 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

2) Required Fare Policy and E-Ticketing (Smartcard)

Traditionally the government sets fare levels for public transport, set to a level which is affordable for the poor, but this often results in a poor quality system which is highly dependent on subsidies. The aim of a fare policy is accommodate affordability issues,

generate extra revenue where there is a “willingness to pay” (for better quality) or creating value for customers that generates patronage, and in turn creates value for the operating company.

A fare policy is developed on a set of principles as outlined in the followings:

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. For example:
  - Increasing the cost of a single trip (which most people can afford) and then discount trips for volume users (creates value and reward loyal customers)
  - Set the cost of a single trip higher to off-set discounts for special needs users (students and elderly)
  - Design fare schemes to generate “up-front” spending in return for generous discounts for volume travel (giving the customer added value)
  - Make fares distance-based to exploit willingness to pay for longer trips and create better value for short trips.

Principle 3:

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

A fare policy is used as a pricing mechanism to increase sales and revenue. This requires the government to set only the average fare, mindful of the cost of operation and forecasted passenger numbers (and perhaps its capacity for subsidy).

Under this average fare the UMRT operations and maintenance company develops its fare policy based on product value (such as distance/volume of travel) and market benefits (willingness to pay, loyalty rewards etc.).

It does this in much the same way as a commercial business adjusts prices to attract business; applying discounts to exploit revenue opportunities; rewarding customer loyalty and discounting prices to increase sales volume.

A more complex fare policy can be easily managed through e-ticketing (smartcards) allowing the UMRT operations and maintenance company to achieve multiple objectives, being:

- To win passengers – create value and reward frequent travelers
- Target and control discounts more accurately (students, seniors)
- Charge for better service where customers are willing to pay

3) Integrated Fares and Ticketing

Presently, passengers who transfer onto other services during their journey, suffer a cost penalty as they pay another boarding fee, making the cost of the trip higher, and often more expensive than using a motorcycle for the journey. Integrated fares and ticketing allows passengers to use a common ticket for the entire journey, with the system charging only the total distance travelled, regardless of transfers made.

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

Passengers will pay a boarding fee when entering the system and will pay only for the additional distance when transferring between modes (bus to rail and vice versa and bus to bus).

Integrated Ticketing is quite simply the ability to use one ticket across the system where the system recognises subsequent passenger trips as a part of a single through journey. This allows the passenger to pay only one boarding fee (when entering the system) and pay only for the additional distance when transferring between modes (bus to rail and vice versa). Integrated ticketing is widely regarded as essential to providing “seamless” transport services for the passengers as well as simplifying a major interface where passengers interact with the system.

E-ticketing (smartcards) manages this easily as it provides:

- A stored-value smartcard to “swipe on/swipe-off” when entering or existing the system and the system will charge the appropriate fare
- Time saving – making the transaction “cash-less”
- A record of passenger trip data for later analysis or use for ongoing service planning
- A way to charge for motorcycle or car parking costs at UMRT stations, recognizing this cost as part of the total trip cost.

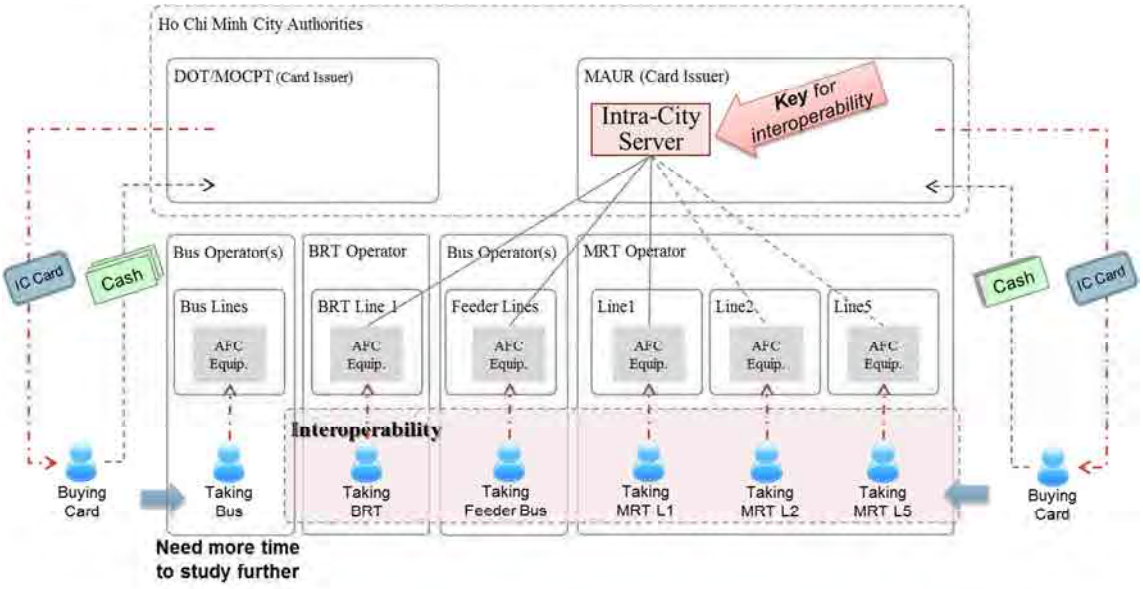
Fare and ticketing integration is largely concerned with the institutional and revenue sharing responsibilities more than the technology engaged.

With fares integrated across the whole network of bus and rail, and the use of a common ticket it is unclear who would take responsibility for managing the central fare collection at this moment.

One of the options is that MAUR (UMRT) and MOCPT (bus network) manage their own revenue collection systems and negotiate a revenue sharing mechanism for transferring passengers between the bus and the UMRT. This option would be available to implement, and requires technical assistance to set up the institutions for the appropriate institutions and to set up the necessary protocols.

4) Facilitation of Interoperability for the Smartcard System

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. Thus, it seems that the DOT and the MAUR will issue the public transport smartcard systems individually. Establishment of an "Intra-city Server" will be required for interoperability (refer to Figure 8.2.1). The Study Team recommends that the preparation of an action program 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.



Source: JICA Study "Data Collection Survey on E-Money and Transport Smartcard in Vietnam"

Figure 8.2.1 – Intra-city Server for Public Transportation in HCMC

8.3 Institutional Design

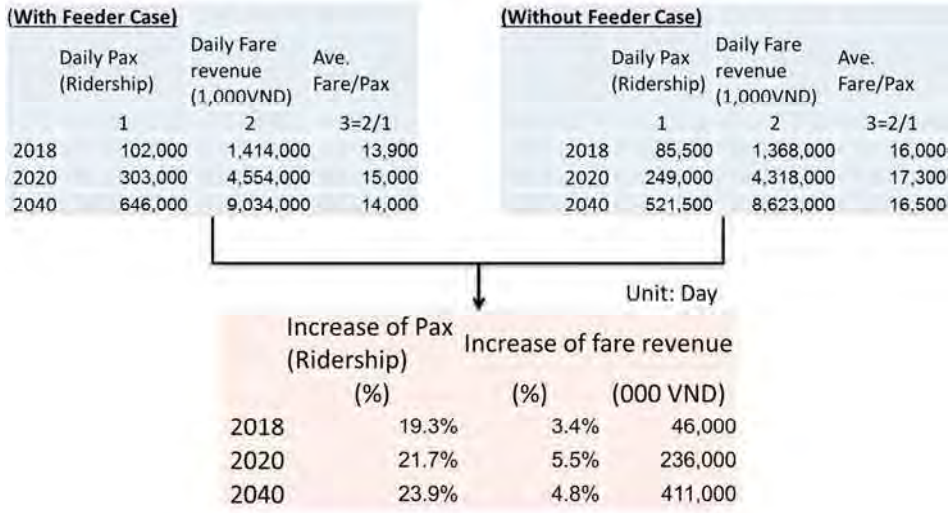
For the institutional design and business model for the feeder bus services, two scenarios are examined, being 1) "business as usual" where the feeder bus services are provided by private bus operators under the existing MOCPT licensing scheme, and 2) an "innovative commercial business model" to manage the business.

The HCMC Line 1 is the first UMRT system in Vietnam, and is expected to place a large subsidy burden on the city. With future UMRT lines under development, large on-going subsidies will not be sustainable, absorbing a large amount of public funding at the expense of other important needs of the city.

Traditional approaches of a subsidized public transport system are becoming outdated, as public transport systems have to compete for market share and win passengers from private transport. For this reason an innovative approach is evaluated, specifically to ensure that management is focused on financial performance; growing revenue by winning passengers to the system instead of being dependent on loss-compensating subsidies.

1) Cost of Feeder Bus Operations and the Impact on the HCMC UMRT Line 1 Financial Performance

Passenger travel demand forecasts show that the increased patronage on the UMRT from the introduction of feeder bus services in 2018 and 2020 is 19.3% and 21.7% respectively as shown in Figure 8.3.1. The additional revenue in 2018 generated by feeder buses is marginally higher than the cost of providing the service, but in 2020 feeder bus services generates a 236 million VND improvement in financial results improving the cost recovery from fare revenue to 94% with subsidy at 6% of operating costs.



Source: Study Team

Figure 8.3.1 – Increase of UMRT Ridership from the Feeder Bus Development

2) Objective and Revenue Impact of Feeder Bus Services on UMRT Operations

Objective:

Before evaluating the scenarios, it is worthwhile to propose some objectives to be agreed upon, and these are suggested as:

1. To develop revenue (improve profitability and reduce overall subsidies)
2. To operate efficiently (optimal schedules and reduce operating costs)
3. Develop incentives for providing good customer service quality (grow the business, win passengers and increase revenue)
4. To attract ridership to the UMRT to reduce the amount of private travel
5. Reduce the number of bus operators and reduce the high level of bus subsidies as a proportion of the city budget.

The institutional scenarios and business models will be evaluated on how they meet these multiple objectives.

Revenue impact of Feeder Bus Services on UMRT Operations:

The previous section showed the increase in passengers to the UMRT generated by the feeder bus services and additional UMRT revenue generated when these passengers buy a train ticket. It shows that the cost of providing the feeder bus services will have a "multiplier-effect" on revenue, significantly adding to reducing the subsidy requirement.

However, it is important to recognize that the positive revenue impact of the feeder bus services on the HCMC UMRT Line 1 is dependent on providing a fully integrated and quality bus to rail service - any compromise to bus service levels would quickly discourage passengers from using the service. Management incentives to maintain quality and efficiency are therefore a critical element for a sustainable system.

3) Scenario Analysis

Scenario 1 – "Business as Usual"

This scenario is where the feeder bus services are operated by the private sector operators, under the present licensing regime managed by the MOCPT. New feeder bus routes will be tendered out to the private bus operators and many of the existing bus routes eliminated or modified.

This option is generally favoured 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.

However, this option has certain disadvantages because

- General bus operators have no incentive to serve the UMRT, or to increase service levels. In fact they may compete with the UMRT if it serves their financial interests.

- Integrating fares and ticketing with the general bus network is problematic, as it needs a methodology to share revenue so that the rail and bus service are paid proportionally for each trip.

- There is no incentive to reduce bus subsidies, and the DOT may not agree to provide higher service levels if it adds to the subsidy cost.

- Under the capacity-based (balanced) service plan, occupancy levels may be low, causing the DOT to want to reduce services to reduce costs, as the DOT does not benefit from the extra UMRT revenue created.

It can be argued that these negative aspects can be managed through regulation, by for example: having strict contract requirements on the feeder bus operators to meet trains; paying operators per km to solve revenue sharing problems, and regulating a common ticket. Also the extra subsidy cost borne by the city to support feeder bus operations could be partially offset by the reduction in the UMRT subsidy due to the extra passenger revenue generated by the feeder buses.

This option however lacks the natural incentives for good performance, where the party that operates the services directly benefits from doing it well. Regulations may not produce the desired outcome in the same way that natural incentives can. The UMRT O&M company while expecting to benefit from extra passengers/revenue, will not be in control of the feeder bus operation, and may see their interests compromised, and the benefits to the UMRT reduced.

The DOT will also need to subsidize bus services, and will compensate for low occupancy (a possibility in the "balanced" service plan). However any action by the DOT to reduce service levels as a cost saving measure to reduce subsidies will harm the success of the HCMC UMRT Line 1 operations.

Scenario 2: The Innovative Commercial 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 People's Committee. It will self-fund the feeder bus services without any direct bus subsidy from the DOT.

This option does not require much amendment of the legal structures as the UMRT O&M company will become a "Bus Operator" under the existing MOCPT regulatory framework, by registering for and applying for a business certificate to operate bus services. It will propose to the MOCPT the service design and bus schedules and once approved, will obtain a license from the DOT to operate the services. The company would be required to meet all the regulations applicable to operating a bus service.

Such an arrangement avoids any conflict between the MAUR and the DOT as this does not infringe upon responsibilities traditionally held by 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.

Specifically the advantages of this option include:

- The UMRT O&M company has the financial motivation to provide efficient and effective feeder bus services that will specifically serve the UMRT and support its own business case.
- Having control of the feeder bus services gives the UMRT O&M company the ability to manage the operations; to improve service coverage and ensure good passenger access. Quality of service is therefore more assured.
- The immediate ticket and fare integration between rail and feeder bus (as single bus rail ticket) is easy to implement as it is an internal matter for the UMRT business.
- It reduces the subsidy burden for the DOT who would otherwise bear the responsibility for providing (and subsidizing) feeder bus services.

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.

4) Implementation Issues

Adapting the Operations of the UMRT to a Commercial Business Model

Discussions at various meetings to explore these options has shown a willingness to acknowledge of the benefits of a commercial business model for the UMRT, however some constraints have been raised including the existing UMRT charter (can it operate its own bus service?); treatment of subsidies (subsidies are only assigned to rail losses not bus losses) and that only the DOT is mandated to operate bus services. The DOT appears to wish to maintain control of bus services (even at the expense of bearing the cost of subsidies) and the UMRT management would be content to have the benefits of the feeder bus services without having to pay for them.

Further hesitation seems also to be due to the fact that the innovative commercial business model is a non-traditional approach; a disruption of the status quo - where management expects losses to be compensated; and subsidy support to be constant and reliable.

However, the innovative commercial business model is the only option that can develop sustainability for UMRT operations; where management is revenue dependent, active in promoting ridership, improving access, and creating value through its fare policy. A good example of such a commercial system is the Bangkok Skytrain which operates commercially and successfully without subsidies.

Legal Framework

For the UMRT O&M company to operate feeder bus services will require the HCMC People's Committee to issue a Decision which provides the additional legal framework. The content of this Decision should include the following:

- That the UMRT O&M company be appointed as the bus operator to provide feeder bus services and shall be registered to perform the business.
- Upon a proposal of schedules and an operating plan submitted to the MOCPT for approval, the UMRT O&M company shall be issued a license for the operation of feeder bus services.
- The MOCPT shall exercise a regulatory role specifically to ensure that the interests of the general public are respected, and to ensure safe standards of operation are met.
- The MOCPT shall engage with existing bus operators who are displaced to negotiate and manage route modifications, alternative route assignment or cessation of business.
- The UMRT O&M company shall be permitted to adjust the level of service to the most efficient levels to meet its needs, however shall not reduce services to below minimum service levels of 50% of train services met, unless it can provide the MOCPT with a case based on exceptional circumstances.
- The UMRT O&M company is directed to comply with the following regulation:
    - It shall operate feeder bus services exceeding the minimum service level that the MOCPT applies to general city bus services.
    - It will be wholly responsible for the financial support of the feeder bus routes and upholding the level of service, and is authorized to set individual fares within the average fare levels set by the HCMC People's Committee.
    - It is directed to provide a fully integrated ticketing system between the feeder bus services and the UMRT and to work cooperatively with the future city-wide ticketing integration plan.
    - It is permitted to apply a discounted fare for passengers connecting to the UMRT, without being ruled as engaging in competitive pricing behaviour with any parallel bus operators.
    - It is permitted to enter integrated ticketing arrangements with general bus operators that provide connecting services to the UMRT.
    - It shall advertise and promote the feeder bus services as an integral part of the UMRT system.
    - It is permitted to carry non-UMRT passengers on the feeder bus services at MOCPT fare level for the purposes of serving local travel needs of the community.
    - It will operate services under the rules and regulations administered by the

MOCPT unless authorized otherwise under the provision of this or subsequent Decisions.

- Under special case circumstances as approved on an individual basis, the UMRT O&M company shall be permitted to engage private subcontractors to operate services under performance-based contracts, however the UMRT O&M company shall remain fully responsible for service performance as the main provider of services.

Modifications of Existing Routes and the Management of Displaced Operators

The MOCPT/DOT will be directed by the HCMC People's Committee to manage the reorganisation and rationalization of the affected operators, i.e. the operators of general bus routes that will have their routes eliminated, shortened or reassigned. This task needs to be managed carefully and sensitively, as operators may perceive that they have rights as an existing operator. Existing operators will be reduced in the case of the Innovative Commercial Business Model.

Subsidy implications

The Innovative Commercial Business Model has the best potential for reducing overall public transport subsidies and to reduce the burden on the city budget.

It will see a marked reduction of existing bus subsidies as bus services are replaced by the UMRT, but also if the UMRT takes responsibility for the feeder bus services. Controlling (and paying for) its own feeder bus services will make the UMRT O&M company focus closely on the cost/benefit of services and encourage them to operate an efficient and effective service.

8.4 Proposed Action Program for the Feeder Bus Development

1) Implementation Program

In order to develop the feeder bus system and to modify the existing bus routes, the Study Team recommends implementation of following programs before the opening of the HCMC UMRT Line 1;

A: Modification of the Existing Bus Routes for City Buses

- Program components related to bus routes which will be terminated at Tan Cang Station (Route 6, 10, 30, 50, 52, 56, 104)
    - Consultation with existing bus operators to change the contract of the existing bus operation (including methods to reduce the bus vehicles and priority measure at the time of bidding of the feeder bus)
    - Revised operation plan, fare setting and subsidy based on the service level of the HCMC UMRT Line 1
    - Development of Van Thanh Park Bus Terminal by DOT
- Program components related to bus routes which should be kept after the opening of the UMRT (Route 53, 55, 150)
    - Examination of adequate bus fares that is consistent with the fare of the HCMC UMRT Line 1 and inter-provincial buses
    - Discounted fare system for bus users of short distance trips (to provide the same fare level as the feeder bus)

B: Modification of Existing Bus Routes for Inter-provincial Buses

- Coordination between the HCMC DOT and Binh Duong/Dong Nai DOT will be required to modify inter-provincial bus routes as follows:
    - Route 12, Route 603 and 604 (between the HCMC DOT and Dong Nai DOT)
    - Proposed feeder bus route No. 8 (between the HCMC DOT and Binh Duong DOT)
    - Proposed feeder bus route No. 13 (between the HCMC DOT and Binh Duong DOT)
- Consultation with existing bus operators to terminate the current operations (including methods to replace the bus vehicles and priority measures at the time of bidding for the feeder buses)

C: Feeder Bus Development

- Finalization of feeder bus routes
- Finalization of the feeder bus operation plan

- Examination of an adequate fare setting including a discounted ticket system for students and UMRT users and its required fare and subsidy policy
- Preparation of the bidding procedure and its requirements
- Procurement of bus vehicles by a selected bus operator
- Preparation to install new bus stops and shelters

D: Coordination on Intermodal Facility Development

- Detailed bus operation method including location of bus stops and bus parking spaces at the station plazas
- Preparation to provide information for both the UMRT and feeder buses for users

E: Institutional Development and Other Measures

- Examination/consultation to formulate an integrated public transport fare policy and its ticketing system
- Facilitation of interoperability for the smartcard

2) Implementation Plan

Table 8.4.1 shows the implementation schedule for the feeder bus development and modification of existing bus routes.

Table 8.4.1 – Implementation Schedule on Feeder Bus Development and Modification Bus Routes

HCMC UMRT Line 1 Project	2014	2015	2016	2017	2018	2019
Construction Work on Package 2 (Elevated Section) (CP2)						
Testing and Commissioning on Package 3 (E&M System) (CP3)						
Commercial Operation of Entire Line						
Intermodal Facility Development*	2014	2015	2016	2017	2018	2019
1. JICA SAPI Study						
2. Procedure for Loan Agreement						
3. Technical Design & Preparation for Tendering						
4. Tendering of Contractor						
5. Approval Procedure on Investment Report by HCMC PC						
6. Updating of Zone Plan (Urban Planning) by HCMC PC						
7. Transfer of Land Use Right from Private Investor to HCMC PC						
8. Construction Works for Phase 1						
9. Construction Works for Phase 2						

Program Component	Implementing Agency	Related Agencies	2014	2015	2016	2017	2018	2019
A: Modification of Existing Bus Routes for City Buses								
Coordination with existing bus operators	MOCPT	Bus Operator						
Examination of bus fares and subsidies	DOT (HCMC) MOCPT							
B: Modification of Existing Bus Routes for Inter-provincial Buses								
Coordination between DOTs	DOT (HCMC)	DOT (Binh Duong/ Dong Nai)						
Coordination with existing bus operators	DOT	Bus Operators						
C: Feeder Bus Development								
Finalize feeder bus route design	MOCPT							
Finalize feeder bus operation plan	MOCPT							
Preparation of tender documents	DOT/MOCPT							
Tendering of bus operators	MOCPT	Bus Operators						
Procurement of the bus vehicles	Bus Operators							
Installation of bus stops & shelters	DOT (HCMC)	DOT (Binh Duong/ Dong Nai)						
(New bus route training)	Bus Operators							
D: Coordination on Intermodal Facility Development								
Bus Operation at Station Plaza	MOCPT	DOT, MAUR, Traffic Police, Bus Operators						
Preparation to provide information (including Digital Signage)	MAUR	MOCPT, Bus Operators						
E: Institutional Development and Other Measures								
Fare & ticket integration	DOT/MAUR	MOCPT						
Facilitation of interoperability for the smartcard	DOT/MAUR	MOCPT						

*: Implementation schedule for intermodal facility development in the "New Construction Package under the Current Loan"

Source: Study Team

8.5 Assessment of Impacts Caused by the Proposed Feeder Bus Routes

A bus network with 13 newly-added feeder bus routes are proposed by the SAPI Study Team, in order to increase the accessibility to/from the railway stations and promote the usage of HCMC UMRT Line 1.

In this section, results of examination of impacts that may be caused by the newly-added feeder bus routes are described.

1) Environmentally-Sensitive Spots Identified Along the Proposed Feeder Bus Routes

Figures 8.5.1 to 8.5.4 show the maps of proposed feeder bus routes and location of the environmentally-sensitive spots identified along these routes.

The Center of Biodiversity and Development (CBD) was entrusted by the SAPI Study Team in carrying out a survey in May 2014 on the environmentally-sensitive spots along these bus routes. The following tasks are included in the survey.

- Reviewing maps: road maps and digital maps (such as Google Maps) are used to identify the proposed bus routes and prepare the survey schedule. Environmentally-sensitive spots (such as hospitals, schools, kindergartens, churches, pagodas, parks, cultural/historical relics, etc.) existing along the proposed bus routes are identified firstly on these maps.
- Site reconnaissance survey: Land use conditions and environmentally-sensitive spots along the proposed bus routes are confirmed/identified by the site reconnaissance survey. Information such as location, building structure, characteristics, etc. of the environmentally-sensitive spots are collected during this survey.

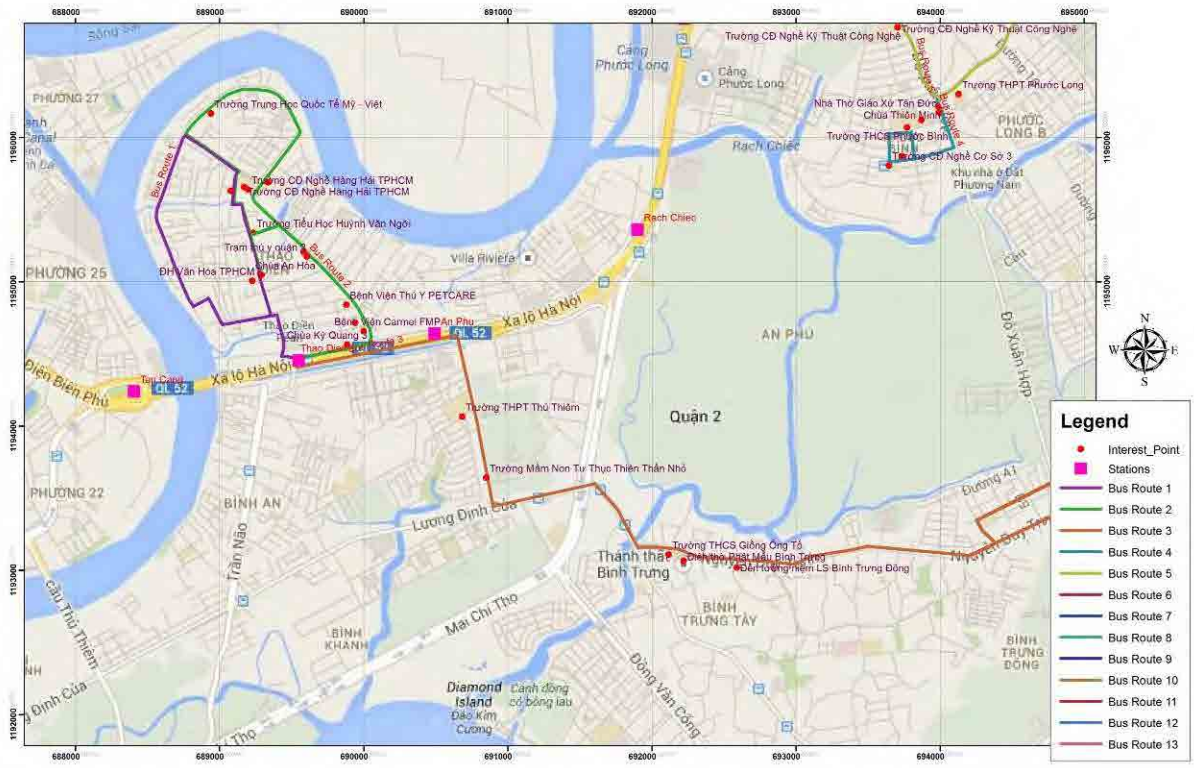


Figure 8.5.1 - Proposed Feeder Bus Routes No. 1~3 and Environmentally-Sensitive Spots

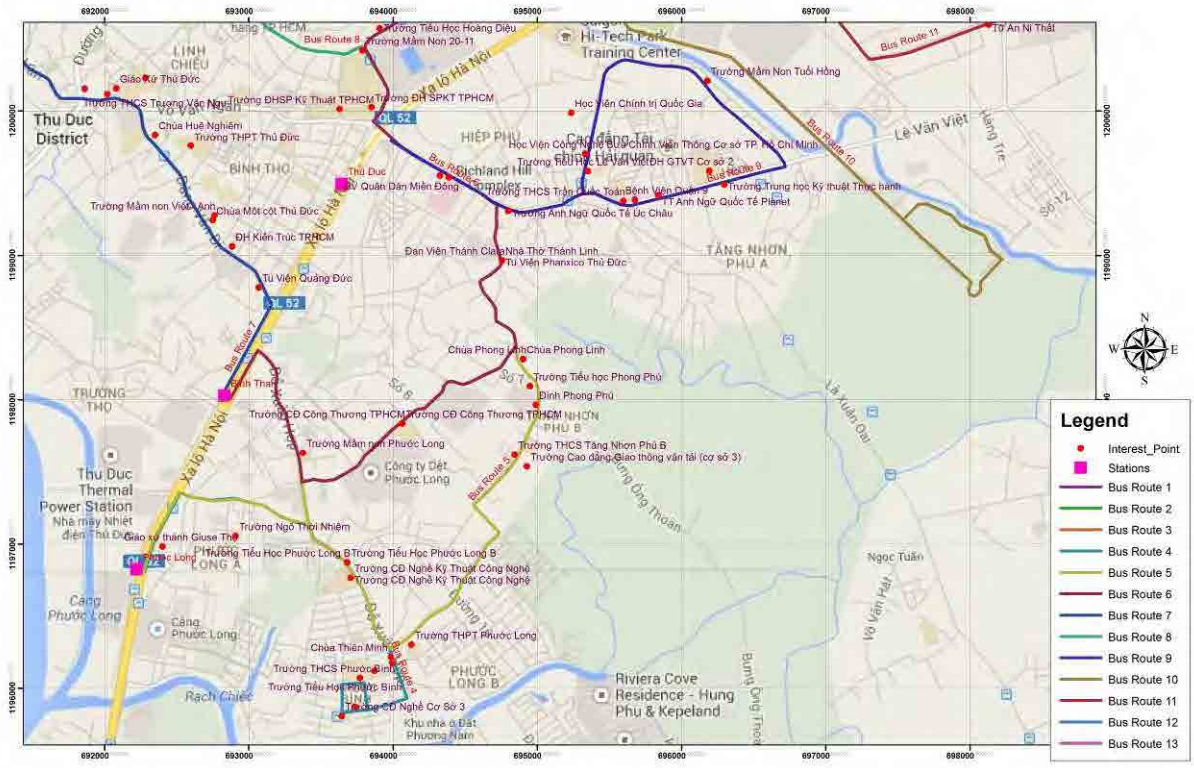


Figure 8.5.2 - Proposed Feeder Bus Routes No. 4~7 and No. 9 and Environmentally-Sensitive Spots

Figure 8.5.3 - Proposed Feeder Bus Routes No. 8, 10, 11, 12 and Environmentally-Sensitive Spots

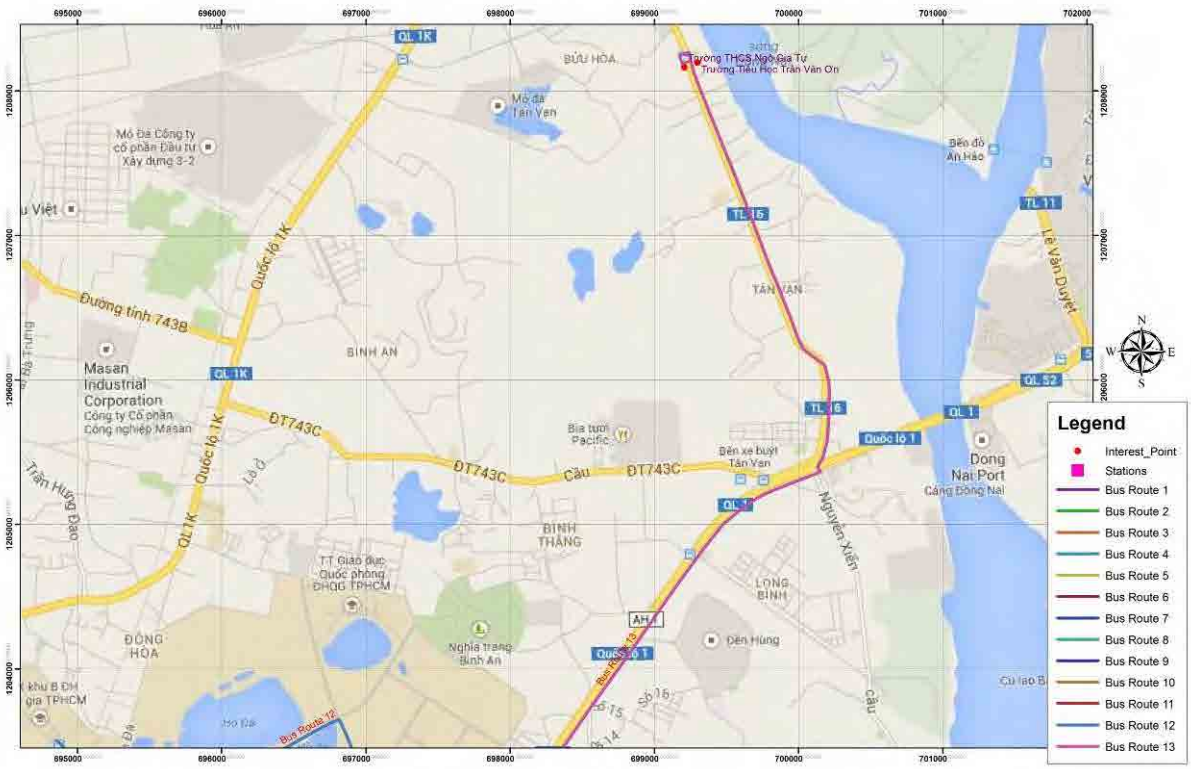


Figure 8.5.4 - Proposed Feeder Bus Routes No. 13 and Environmentally-Sensitive Spots

In total, 100 environmentally-sensitive spots were found along the 13 proposed bus routes (Table 8.5.1). Of which 94 spots are located right near the road, and the other 6 spots are located a little far from the road but within the 100m range from the road side. Detailed information on these spots are presented in Appendix E.

Table 8.5.1 - Number of Environmentally-Sensitive Spots Identified along the Proposed Feeder Bus Routes

Route No.	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
School	4	3	3	4	6	4	7	7	9		5	3	3	58
Religious (church, pagoda)	1	1	1	3	3	5	7	1			2		1	25
Heath care		3				3	2	1	2		1		1	13
Public (park)											1		1	2
Cultural, historical heritages			1										1	2
Total	5	7	5	7	9	12	16	9	11	0	9	3	7	100

Most of the above spots (81 sites) are located along the road sections where there are existing bus routes. Other spots (19 sites) are located along the road sections where there has not been any bus route in the past. Table 8.5.2 lists up these spots.

Table 8.5.2 - Environmentally-Sensitive Spots Identified Along the Proposed Feeder Bus Routes

Proposed Feeder Bus Routes		Environmentally-Sensitive Spot/Establishment			Predicted Impact and Proposed Mitigation Measures
No.	Operation Plan	No.	Name	Site Specification	
1	- Small bus fleet (30 seats) - Frequency on peak hour: in bound: 10 minutes, out bound: 10 minutes - Total number of buses on peak hour: 12 buses.	1	Hochiminh City Cultural University	Set back from the road: 3m to the front gate, 10m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 300-500 pers	Air pollution: meet the permissible standard Noise: 61.8 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: no; because of wide road (12m), small bus. Traffic accident: low risk; because of wide road (12m), small bus.
		2	An Hoa Pagoda	Set back from the road: 3m to the front gate, 18m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 50-70 pers	Air pollution: meet the permissible standard Noise: 61.8 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Traffic congestion: no; because of wide road (12m), small bus. Traffic accident: wide road (12m), small bus. But risk of accident because the pagoda is near T-junction (streets 41, 65 and Quoc Huong street). Mitigation: warning signs shall be installed and bus speed shall be limited.
		3	Huynh Van Ngoi Primary School	Set back from the road: 3m to the front gate, 20m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 500 pers	Air pollution: meet the permissible standard Noise: 61.8 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: no; because of wide road (12m), small bus Traffic accident: low risk; because of wide road (12m), small bus
		4	Viet Phuong Kindergarten	Set back from the road: 3m to the front gate, 8m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 120	Air pollution: meet the permissible standard Noise: 67.7 dB, higher than permissible standard (55 dB). Mitigation: Build brick wall of at least 20cm thick. Vibration: meet the permissible standard

Proposed Feeder Bus Routes		Environmentally-Sensitive Spot/Establishment			Predicted Impact and Proposed Mitigation Measures
No.	**Operation Plan**	**No.**	**Name**	**Site Specification**	
				pers	Traffic congestion: yes; narrow road (10m). Mitigation: regulating traffic in case of traffic jam Traffic accident: high risk because of narrow road. Mitigation: set up warning sign and limit speed of bus
		5	Maritime Vocational College	Set back from the road: 3m to the front gate, 8m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 500 pers	Air pollution: meet the permissible standard Noise: 61.8 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: no; because of wide road (12m), small bus Traffic accident: low risk; because of wide road low risk; because of wide road (12m), small bus.
2	- Small bus fleet (30 seats) - Frequency on peak hour: 9 minutes, - Total number of buses on peak hour: 7 buses.	6	Ky Quang Pagoda	Set back from the road: 1.5m to the front gate, 12m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 40-50 pers	Air pollution: meet the permissible standard Noise: 63.2 dB, higher than permissible standard (55 dB). Mitigation: increase thickness of and height the wall. Vibration: meet the permissible standard Traffic congestion: no; because of wide road (12m), small bus Traffic accident: wide road (12m), small bus. But risk of accident because the pagoda is near T-junction (Nguyen Ba Lan street and the street parallel with Hanoi highway). Mitigation: warning sign shall be installed and bus speed shall be limited.
		7	Post Office 2 Hospital	Set back from the road: 54m to the front gate, 54m to rooms/offices Existing of wall, fence: steel wall Number of visitor per day: 200 pers	Air pollution: meet the permissible standard Noise: 52.8 dB, meet permissible standard (55 dB). Vibration: meet the permissible standard Traffic congestion: yes; narrow road (10m). Mitigation: regulating traffic in case of traffic jam Traffic accident: high risk because of narrow road. Mitigation: set up warning sign and limit speed of bus.

Proposed Feeder Bus Routes		Environmentally-Sensitive Spot/Establishment			Predicted Impact and Proposed Mitigation Measures
No.	**Operation Plan**	**No.**	**Name**	**Site Specification**	
		8	Medical Clinic of Thao Dien Ward	Set back from the road: 2m to the front gate, 17m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 50 pers	Air pollution: meet the permissible standard Noise: 67.7 dB, higher than permissible standard (55 dB). Mitigation: Build brick wall of at least 20cm thick. Vibration: meet the permissible standard Traffic congestion: yes, because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) Traffic accident: high risk because of many vehicles especially cars. Mitigation: expansion of the road (the existing road width is 12 m) and regular police patrol.
		9	Thao Dien Special Education School	Set back from the road: 2m to the front gate, 10m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 200 pers	Air pollution: meet the permissible standard Noise: 67.7 dB, higher than permissible standard (55 dB). Build brick wall of at least 20cm thick. Vibration: meet the permissible standard Traffic congestion: yes, because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) Traffic accident: high risk because of many vehicles especially cars. Mitigation: expansion of the road (the existing road width is 12 m) and regular police patrol.
		10	Carmel FMP Hospital	Set back from the road: 2m to the front gate, 8m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 200 pers	Air pollution: meet the permissible standard Noise: 62.7 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: yes, because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) Traffic accident: high risk because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) and regular police patrol.

Proposed Feeder Bus Routes		Environmentally-Sensitive Spot/Establishment			Predicted Impact and Proposed Mitigation Measures
No.	**Operation Plan**	**No.**	**Name**	**Site Specification**	
		11	The British International School	Set back from the road: 2m to the front gate, 7m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 1000 pers	Air pollution: meet the permissible standard Noise: 62.7 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: yes, because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) Traffic accident: high risk because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) and regular police patrol.
		12	Vietnamese-American Secondary School	Set back from the road: 2m to the front gate, 15m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 200 pers	Air pollution: meet the permissible standard Noise: 67.7 dB, higher than permissible standard (55 dB). Mitigation: Build brick wall of at least 20cm thick. Vibration: meet the permissible standard Traffic congestion: yes, because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) Traffic accident: high risk because of many vehicles especially cars. Mitigation: expand the road (the existing road width is 12 m) and regular police patrol.
11	- Medium bus fleet (55 seats) - Frequency on peak hour: in bound: 13 minutes, out bound: 18 minutes - Total number of buses on peak hour: 13 buses.	13	Minh Duc Church	Set back from the road: 4m to the front gate, 25m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 200-300 pers	Air pollution: meet the permissible standard Noise: 62.7 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: yes; narrow road (8m) and medium bus. Mitigation: expand the road Traffic accident: high risk because of narrow road (8m), medium bus. Mitigation: set up warning sign and limit speed of bus.
		14	Mai Hoa Kindergarten	Set back from the road: 4m to the front gate, 25m to rooms/offices	Air pollution: meet the permissible standard Noise: 62.7 dB, higher than permissible standard (55 dB). Mitigation:

Proposed Feeder Bus Routes		Environmentally-Sensitive Spot/Establishment			Predicted Impact and Proposed Mitigation Measures
No.	Operation Plan	No.	Name	Site Specification	
				Existing of wall, fence: brick wall Number of visitor per day: 700 pers	increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: yes; narrow road (8m) and medium bus. Mitigation: expand the road Traffic accident: high risk because of narrow road (8m), medium bus. Mitigation: set up warning sign and limit speed of bus.
		15	Tan Phu Kindergarten	Set back from the road: 3m to the front gate, 40m to rooms/offices Existing of wall, fence: brick wall Number of visitor per day: 400 pers	Air pollution: meet the permissible standard Noise: 61.8 dB, higher than permissible standard (55 dB). Mitigation: increase thickness and height of the wall. Vibration: meet the permissible standard Traffic congestion: no because wide road (12m), low traffic Traffic accident: low risk because wide road (12m), low traffic
		16	Nguyen Minh Quang Primary School	Set back from the road: 6m to the front gate, 10m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 1200 pers	Air pollution: meet the permissible standard Noise: 64.6 dB, higher than permissible standard (55 dB). Mitigation: Build brick wall of at least 20m thick. Vibration: meet the permissible standard Traffic congestion: no because wide road (12m), low traffic Traffic accident: low risk because wide road (12m), low traffic
		17	Vietnam Institute of Youth and Adolescence	Set back from the road: 8m to the front gate, 50m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 800 pers	Air pollution: meet the permissible standard Noise: 63.4 dB, higher than permissible standard (55 dB). Mitigation: Build brick wall of at least 20m thick. Vibration: meet the permissible standard Traffic congestion: no because wide road (12m), low traffic Traffic accident: low risk because wide road (12m), low traffic
		18	Tu An Ni That Shrine	Set back from the road: 1.5m to the front gate, 15m to rooms/offices	Air pollution: meet the permissible standard Noise: 69.4 dB, higher than permissible standard (55 dB). Mitigation:

Proposed Feeder Bus Routes		Environmentally-Sensitive Spot/Establishment			Predicted Impact and Proposed Mitigation Measures
No.	**Operation Plan**	**No.**	**Name**	**Site Specification**	
				Existing of wall, fence: steel fence Number of visitor per day: 0 pers	Build brick wall of at least 20m thick. Vibration: meet the permissible standard Traffic congestion: no; many motobikes but few cars/trucks. Road width is 10 m Traffic accident: risk of motobike accident. Mitigation: set up warning sign
		19	Medical Clinic of Tan Phu Ward	Set back from the road: 3m to the front gate, 8m to rooms/offices Existing of wall, fence: steel fence Number of visitor per day: 50 pers	Air pollution: meet the permissible standard Noise: 67.7 dB, higher than permissible standard (55 dB). Build brick wall of at least 20m thick. Vibration: meet the permissible standard Traffic congestion: yes; small road (10m), few cars/trucks but many motobikes. Mitigation: set up warning sign, limit speed of bus Traffic accident: small road (10m), risk of motobike accident. Mitigation: set up warning sign, limit speed of bus

Note: Air pollution caused by buses is calculated in the Appendix (excel file). Predicted values are much lower than permissible standard (QCVN 05:2009/BTNMT)
Noise level in this table is calculated at gates/walls of sensitive spots. The noise level is reduced further with distance therefore the noise level at rooms/offices inside the spots is lower than that of at the gate/wall (see the appendix). The assessment of noise impact from bus routes should consider background noise level. Typical daytime noise levels in residential areas in Hochiminh City are around 75 dB, and exceed 80 dB at vicinity of major road corridors. These values already exceed the permissible levels of 55 dB and 70 dB for special areas and normal areas (QCVN 26:2010/BTNMT - National Technical Regulation on Noise). Accordingly, the noise by bus-routes would not worsen the existing noise level at sensitive spots.
References of vibration level measured at road with high traffic such as Highway 51 and baseline vibration level of Metro line 1 and Metro line 2 projects showed vibration level lower than 65 dB. This value is lower than permissible level (75 dB) of 27:2010/BTNMT - National Technical Regulation on Vibration. Therefore when feeder-bus-routes come into operation the vibration level would meet the standard.