REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE

Ministério dos Transportes e Comunicações

Economic Growth

Sustainable Future

Mode of Choice

Livable Cities

Access for All

PUBLIC TRANSPORT MASTER PLAN

2024

Acknowledgements

The Government of Timor-Leste and the Ministry of Transport and Communications would like to thank all government agencies that have contributed to the development of this Public Transport Master Plan for Timor-Leste.

We also acknowledge the significant contributions made by Arup Australia Pty Ltd in various areas, including consultation with the government agencies, analysis of the current public transport system, field surveys, analysis of future public transport needs, analysis of public transport investments, proposal of a draft master plan, and capacity building of the government agencies.

Finally, we would also like to thank the Asian Development Bank (ADB) for providing the resources to develop this Public Transport Master Plan and for advising the government agencies.

This Public Transport Master Plan is funded by ADB's Technical Assistance for the Southeast Asia Transport Project Preparatory Facility Phase 2.

Foreword

As the Minister of Transport and Communications for Timor-Leste who is responsible for the design, execution, coordination and evaluation of the policy, defined and approved by the Council of Ministers, for the areas of transport and communications, it is my pleasure to present this Public Transport Master Plan (PTMP) because the vision, goals, and plan set out in the PTMP are consistent with the Timor-Leste's Strategic Development Plan 2011-2030. In particular, the PTMP also aligns with the Development Program of the 9th Constitutional Government led by the Prime Minister of the Republic of Democratic of Timor-Leste, H.E. Kay Rala Xanana Gusmão, which stipulates in number 3.5.1. on Land Transport that the comfort and safety of public transport passengers will be improved. The system will be introduced on suitable routes so that passengers have access to a more comfortable, efficient and safe public transport network.

The Ministry of Transport and Communications is entering a new phase of land transport sector development, namely the need to develop and expand a quality public transport sub-sector, which is essential to meet the growing demands of Timor-Leste's population and socio-economic activities. The urgent issue is how to improve the quality and quantity of public transport using limited land and development resources. There is also a need to develop public transport systems and services that are resilient to the risks of recent climate change and that contribute to the reduction of greenhouse gas emissions, which are a factor in climate change. In response to these needs, the Ministry of Transport and Communications through the National Directorate of Land Transport with support from the Asian Development Bank developed the PTMP.

To develop public transport in Timor-Leste to provide a better service, the PTMP provides the following vision: "Public transport in Timor-Leste is an attractive, accessible, inclusive, and future-ready transport mode that supports economic growth, urban development, and quality of life across the country," which was set with the goal of further improving the quality of life for each citizen based on the economic growth to the present day. The plan also outlines five key goals, which include: (i) providing strategic linkage and linking key district centers/generators; (ii) providing accessible public transport services; (iii) integrating transport with urban activity centers; (iv) ensuring seamless, high-quality journeys; and (v) building climate and disaster resilience. It also presents an indicative investment plan up to 2035 that will improve the quality, safety, sustainability, and resilience of public transport systems and services to climate change and other risks in Timor-Leste.

The PTMP serves as a dynamic long-term planning document that provides a roadmap to guide the future growth and development of public transport in Timor-Leste. This document is based on local context and needs, and projects future realistic development possibilities to better serve the people of Timor-Leste. However, this PTMP is not a rigid document – it can and should be revised and expanded as circumstances change in the future.

To realize the vision, goals, and investment plan of the PTMP, the Ministry of Transport and Communications will strengthen its institutional capacity, and I hope to have collaboration from the private sector, international development partners, civil society, and communities to work hand in hand with each other. In this way, we can provide the people of Timor-Leste with sustainable, safe, and modernized public transport systems and services.

In closing, on behalf of the 9th Constitutional Government, I would like to express our gratitude and appreciation for the financial support from the ADB and to all those who have contributed to the development of the PTMP. Your support, dedication, and expertise have been instrumental in bringing this PTMP to reality. Now, let us embark on this transformative journey together, towards a future where public transport serves as a catalyst for progress and prosperity. Thank you.

H.E. Eng. Miguel Marques Goncalves Manetelu, Minister
Ministry of Transport and Communications

Preface

The Asian Development Bank (ADB) is very pleased to support the development of the Timor-Leste Public Transport Master Plan (PTMP) with technical assistance from the ADB. ADB has been supporting the Government of Timor-Leste in its efforts to diversify its economy since 1999. In the transport sector, ADB's portfolio has focused on transport projects, mainly road rehabilitation and upgrading to improve the connectivity of the country's road networks.

In the future, the movement of people and goods within the country is expected to increase, along with robust growth in capital investment and consumption. Going forward, there is a need to improve the performance of the transport system itself, taking advantage of the improving road network. As seen in other countries, along with economic activity, there will be an increase in personal mobility, such as private cars and motorcycles, and along with it, we will see the emergence of traffic congestion and air pollution problems. Before this happens, the existing public transportation system needs to be updated to accommodate future economic activity. Therefore, this Public Transport Master Plan has been developed. And this Public Transport Master Plan will be part of the Transport System Master Plan, which is part of the low carbon development defined in the Nationally Determined Contribution Timor-Leste 2022–2030, a roadmap for energy efficient growth in the transport sector.

We hope that the Government of Timor-Leste will use this Public Transport Master Plan to improve the public transport system, further improve the quality of life of all people in Timor-Leste, and achieve further sustainable economic development of the nation.

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Timor-Leste is Southeast Asia's newest country located between Indonesia and Australia. It includes the eastern half of the island of Timor (with an area of about 14,000 km^2), an exclave on the northwestern side of the island known as Oecusse (815 km^2), Atauro Island to the north (150 km^2), and Jaco Island to the east (11 km^2).[1] Altogether, the country has a cumulative area of about 15,000 km^2 with a total population of about 1.34 million (based on the 2022 Census). Population has grown at an average of 1.8% per year from 2015 to 2022, and the population is projected to reach 1.59 million by 2030.[2,3]

Dili, the capital of Timor-Leste, is located along the northern coast as shown **Figure ES.1**. It has some 324,000 residents (based on the 2022 Census) having grown at an average rate of 2.7% per year from 2015 to 2022, much faster than that nationally (at 1.8% annually).[4] Dili is projected to grow to over 833,000 residents by 2030. Other major cities include Ermera (138,000 residents), Baucau (134,000 residents), and Bobonaro (107,000 residents).

Source: Australian National University

Figure ES.1: Map of Timor-Leste

Based on the 2022 Census, Timor-Leste is predominantly rural with nearly 68% of the population living in rural areas and villages scattered throughout the country. The most populous city of Dili has a population density of 1,425 residents/km^2, while other rural

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[1] Source: http://timor-leste.gov.tl/?p=91&lang=en

[2] Source: Ministry of Finance. 2022. Population and Housing Census 2022 – Preliminary Results.
The population trends in the Census 2022 reveal that the population growth has steadily slowed since the last census conducted in 2015 and 2022 (for instance, the average annual growth rate in 2010 and 2015 was 2.4% and 2.1%, respectively).

[3] Source: ADB. 2022. Timor-Leste – Public Transport Master Plan Update.

[4] Source: Ministry of Finance. 2022. Population and Housing Census 2022 – Preliminary Results.

cities have densities of less than 100 residents/km^2 (except for Ermera at 179 and Liquica at 152 residents/km^2).

According to the 2022 Census, Timor-Leste has a population of 1.34 million residents, equating to a density of 89.8 residents/km^2.[5] The population increased by about 160,000 from the last 2015 Census, with an annual average growth rate of 1.81% between 2015 and 2022. At the municipality level, Dili has the largest population with around 325,000 residents, followed by Ermera (138,000), Baucau (135,000), and Bobonaro (107,000), respectively. Municipalities with more rapid population growth include Dili (2.78%), Oecusse (2.28%), and Liquica (2.18%), and Ainaro (2.12%). Table ES.1 summarizes the population and density by municipality based on the 2015 Census and 2022 Census.

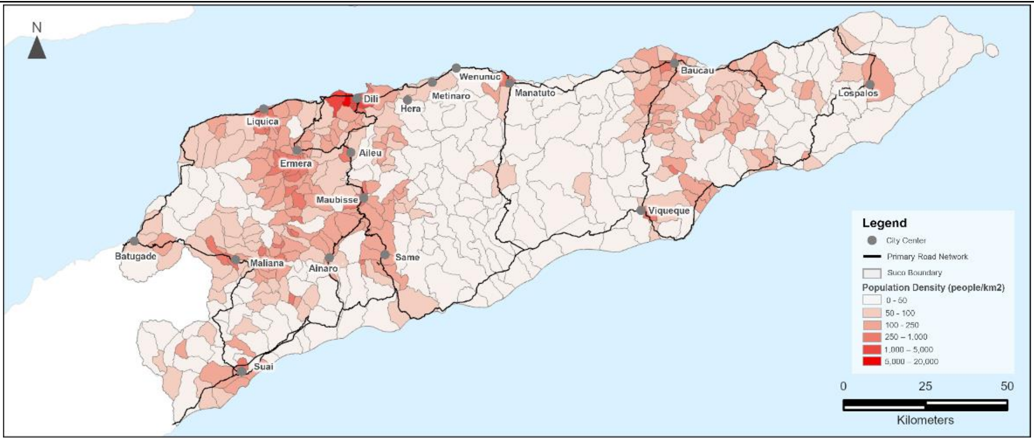
Table ES.1: Population and Density by Municipality (2015 vs. 2022)

Municipality	Area (km^2)	Population		Population (%)		Population Density (Residents/km^2)		Population Growth (%)
		2015	2022	2015	2022	2015	2022	
Aileu	735	48,837	54,324	4.1%	4.0%	66.4	73.9	1.53%
Ainaro	802	63,136	73,115	5.3%	5.4%	78.7	91.2	2.12%
Atauro	141	9,274	10,295	0.8%	0.8%	65.8	73.0	1.50%
Baucau	1,494	123,203	134,878	10.4%	10.1%	82.5	90.3	1.30%
Bobonaro	1,374	97,762	106,639	8.3%	7.9%	71.2	77.6	1.25%
Covalima	1,207	65,301	73,933	5.5%	5.5%	54.1	61.3	1.79%
Dili	228	268,005	324,738	22.6%	24.2%	1,175.5	1,424.3	2.78%
Ermera	759	125,702	137,750	10.6%	10.3%	165.6	181.5	1.32%
Lautem	1,817	65,240	70,022	5.5%	5.2%	35.9	38.5	1.02%
Liquica	562	71,927	83,658	6.1%	6.2%	128.0	148.9	2.18%
Manatuto	1,787	46,619	50,859	3.9%	3.8%	26.1	28.5	1.25%
Manufahi	1,338	53,691	60,665	4.5%	4.5%	40.1	45.3	1.76%
Oecusse	817	68,913	80,685	5.8%	6.0%	84.3	98.8	2.28%
Viqueque	1,888	76,033	80,176	6.4%	6.0%	40.3	42.5	0.76%
Timor-Leste (All Municipalities)	**14,949**	**1,183,643**	**1,341,737**	**100.0%**	**100.0%**	**79.2**	**89.8**	**1.81%**
Timor-Leste (Study Area) [A]	**13,991**	**1,105,456**	**1,250,757**	**93.4%**	**93.2%**	**79.0**	**89.4**	**1.78%**

Source: Timor-Leste 2022 Population and Housing Census, Preliminary Results.
Notes:
[A] The total population for the study area excludes that of Atauro and Oecusse.

The population density by suco level is illustrated in **Figure ES.2**. Areas with higher population densities are concentrated in Dili and other key districts such as Ermera and Baucau (shown in darker red shading). These areas are mostly found along the major road networks built across the country. In contrast, areas with low population density are in the central region as well as the eastern portion of the country (illustrated in white shading).

[5]Source: Ministry of Finance. 2022. Population and Housing Census 2022 Main Report.



Source: Estatica Municipio (2015)
Note: Population density by suco is based on the 2015 Census as the 2022 Census did not record/provide suco level population.

Figure ES.2: Population Density Map

According to the World Bank, Timor-Leste's gross domestic product (GDP) exceeded US$2.7 billion in 2021 (based on constant 2015 US$), which translates to around US$2,061 per capita.[6] While this represents a significant increase from previous years (US$1.59 billion in 2018, US$1.96 billion in 2019, and US$2.59 billion in 2020) despite the economic impacts from the COVID-19 pandemic, the per capita GDP remains near the bottom of Southeast Asian countries. For instance, the per capita GDP for Timor-Leste is only above that of Myanmar (US$1,317) and Cambodia (US$1,429), but below that of Papua New Guinea (US$2,413) and Indonesia (US$3,893). GDP is projected to grow by 3.0% in 2023.[7]

GDP contributions originate mainly from industrial, service, and agriculture sectors (as per a 2017 Central Intelligence Agency (CIA) World Factbook finding).[8] The main exports of the country are offshore petroleum and natural gas, which collectively account for around 80% of the country's GDP. [9] In addition, coffee and other agricultural products also serve as major export commodities.

Land Use Planning

A review of key land use planning documents reveals the following findings relevant to country-wide spatial and land use development are as follow:

- **Priority Growth Poles Planned Along East-West Corridors on Northern and Southern Regional Corridors** – Two priority growth poles have developed and are prioritized in the north and south of the country. Major economic cities such as Dili and Baucau play pivotal roles in accelerating growth of the Northern Regional Corridor, where nearly half of the population resides including Dili (24.2%), Baucau (10.1%), Liquica (6.2%), and Manatuto (3.8%). Improving connectivity along this corridor is key to enhancing the livelihood and economic prospects of local residents. In contrary, cities lying on the Southern Regional Corridor are relatively smaller in terms of the population but have potential to develop their oil/petroleum industries and agricultural sectors to boost the regional economy – both of which would require a strong logistics network and supply chain.

[6] Source: World Bank. 2022. GDP (constant 2015 US$) – Timor-Leste (https://data.worldbank.org/country/timor-leste?view=chart)
[7] Source: https://www.adb.org/countries/timor-leste/economy
[8] Source: https:///www.cia.gov/the-world-factbook/countries/timor-leste/#economy
[9] Source: https://www.timorleste.tl/east-timor/about/economy/

- **Concentric Zone Model with Three Transport Hubs in the East, West, and South Peripheral Zones** – Dili is envisioned to develop radially outward from the current central area to periphery zones in the east, west and south. Each zone is to serve as a gateway between Dili and external cities, handling inbound/outbound trips at three existing public transport terminals (i.e., Becora, Tasitolu, and Taibessi). Becora Terminal in the east is the closest access point to/from eastern municipalities (i.e., Baucau, Lospalos, Viqueque), while Tasitolu Terminal serves the western municipalities (i.e., Liquica, Maliana), and finally Taibessi Terminal connects with southern municipalities (i.e., Aileu, Same, Suai).
- **Well-Connected, Efficient Transport Network Between Dili and Outlying Municipalities Essential to Reducing Inter-Region Imbalances** – Limited regional connectivity imposes mobility challenges for rural residents (which comprises over 68% of the national population). Key activity centers attracting trips from residential areas are clustered in markets, commercial and business districts in Dili. Thus, a well-connected, efficient transport network and system between Dili and outlying municipalities is essential to sustaining the development of the country's growth, while reducing inter-region imbalances in terms of access to economic opportunities and services.

Existing Conditions

Existing Public Transport Services

The public transport system in Timor-Leste is served by a variety of public transport modes (both formal and informal), including bus, microlet, and angguna. These are largely operated by individual operators or small associations without fixed service schedule and limited regulation/oversight from the government in terms of safety, security, and service quality.[10]

Microlets are small vans with 14 seats, accessible via a side door on the left side of the vehicle. Microlets are licensed by the DNTT and renewed annually. Each license includes route information (e.g., origin-destination, names of streets served), a unique vehicle color, as well as route number assigned to each route. This information is affixed or painted/printed on the front and rear of the vehicle. Microlets are operated by individual owners or small private enterprises (who then hire individual drivers). Microlets serve as the main urban public transport mode (i.e., within Dili) and are used for everyday commute. Although routes are fixed, there is no fixed departure schedule.

The microlets in Dili provide a comprehensive intra-urban service connecting to key generators as well as providing first/last-mile connections with the major regional terminals on the periphery of the city. In addition, terminals served by regional buses also house microlet routes to encourage and facilitate interchange. As such, it is also important to understand the microlet network and whether potential opportunities exist to restructure or optimize the network, as microlet service/routes serve as inputs to the sizing of public transport facilities throughout the country. In Dili, there are currently 13 licensed microlet routes operating in circular loop routes (with Route 13 starting service in December 2022).[11] As of 2023, a total of 906 microlets are currently registered in Dili.[12]

[10] Source: Asia Foundation. 2015. A Political Economy of Public Transportation in Timor-Leste.
[11] Source : https://tatoli.tl/2022/12/28/infografia-mtk-halo-abertura-ba-mikrolete-diresaun-013/
[12] Source: DNTT statistics received in early 2023.

Source: DNTT, 2023.

Figure ES.3: Dili Microlet Network

Long-distance, inter-regional bus services also operate throughout the country (for instance Dili to other municipalities such as Baucau). Referred to in this report as regional buses, regional buses can accommodate up to 30 passengers (including 24 seats and 6 standees). Goods are often placed on the roof of the bus. Each bus is painted with vivid colors, with a unique name printed on the front along with the destination(s) that the bus serves along its route. In total, there are 11 regional bus routes linking Dili with outlying municipalities outside (i.e., Baucau, Lospalos, etc.). As of 2021, a total of 290 regional buses are registered in Timor-Leste. It is estimated that regional buses carry approximately 5,200 passengers per day (two-way) between Dili and other municipalities.[13] No service schedule is published, with departure times varying based on destination. Some overnight routes are also operated. Based on discussions and observations, regional buses may not only serve terminals and formal bus stops, but also directly pick up and drop off passengers at their respective residences and when hailed on the road. Fares range from US$2.00 to US$12.00 depending on the destination.[14] **Figure ES.4** shows the regional bus routes in Timor-Leste.

Source: DNTT Regional Bus Maps (2023)

Figure ES.4: Timor-Leste Regional Bus Network

Lastly, anggunas are medium-sized trucks with two benches for seating in the open back of the vehicle. Anggunas can accommodate up to 20 passengers with most people standing.

[13] Based on the survey results verified by the Arup Team.
[14] Source: 2023 Dili Urban Master Plan.

In some cases, anggunas transport passengers and goods at the same time. Anggunas are commonly operated on intra-district routes between sub-district centers (without designated routes). As of 2021, a total of 97 anggunas are currently registered in Timor-Leste, carrying some 1,200 passengers daily.[15] Anggunas are important parts of the first/last-mile network, but are informally served at terminals. No fixed routes/maps exist. Thus, anggunas are not a key focus of this study and no detailed assessment of their services is undertaken (although they must be accommodated in terminal designs to allow for seamless interchanges).

Existing Public Transport Facilities

Timor-Leste currently boasts four major bus terminals – three in Dili, the capital and largest city, and one in Baucau, the second largest city in the country. These terminals serve as crucial transport hubs, catering to both inner-city and inter-city travel needs. Based on local observations, the existing terminals serve as the principal boarding/alighting locations for passengers (with more minor activities at intermediate locations).

In Dili, the Tasitolu Terminal, Taibessi Terminal, and Becora Terminal are bustling hubs where buses from various districts converge, facilitating travel within the city and connecting to other regions. Microlet routes also serve these terminals allowing interchange between regional buses and microlets. Similarly, the Baucau Terminal in Baucau plays a vital role in connecting the eastern part of Timor-Leste, enabling residents and visitors to access destinations along this east-west corridor on the northern coast.

Source: Arup Study Team

Figure ES.5: Existing Terminal Facilities in Timor-Leste

Key issues identified through investigations of existing public transport facilities in Timor-Leste are summarized below:

Key Issues Relevant to Public Transport Facilities
Planning/Locations of Terminals • **Most Municipalities (Including Dili) Lack a Central Public Transport Hub:** Many municipalities lack formal public transport facilities, with the general practice by operators being to collect passengers on the street. In Dili, facilities are located on the periphery of the urban area (east, west, and south of Dili City), with some of these (including at Tasitolu) being vacant land used on an ad-hoc basis by operators. • **Minimal Integration with Surrounding Area / Key Generators:** There is minimal integration between public transport facilities and the surrounding urban

[15] Source: ADB. 2022. Timor-Leste – Public Transport Master Plan Update.

Key Issues Relevant to Public Transport Facilities
environment. The location of the facilities is not located near destinations where most passengers want to go (i.e., to/from key generators – such as universities, etc.). This limits attractiveness of facilities, while encouraging passengers to contact drivers directly for pickups. • **Minimal Provision for Economic Activities at Facilities:** Minimal provisions are made for economic activity within existing facilities. While there is some micro-retail within passenger waiting areas (e.g., Becora), these are largely "ad-hoc" vendors without dedicated infrastructure or any coordination by DNTT. • **Facility Prominence:** The existing facilities do not have significant prominence within the community. Some facilities have large gateways however these have not been maintained. • **No Coordinated Planning:** The existing facilities were constructed by the Indonesian Government and as such there is limited strategic coordination in the current operation of bus and microlet services and the placement of facilities (i.e., the facilities may not align with the needs of the current service network in terms of convenient location and interchange). There have been no new bus stops or smaller strategic connection points for passengers implemented in recent times. • **Inconvenient Locations Resulting in Inefficient Operation:** In some locations, such as Taibessi, the passenger facility is located off the main road in local streets. This has been highlighted as an issue that creates additional travel time for passengers and operators in navigating local roads to reach the terminal, reducing overall efficiency of the network. ***Operation / Spatial Allocation (Within Terminal)*** • **Multitude of Vehicles Using Passenger Facilities:** In some places there is a combination of anggunas (primarily trucks carrying passengers and other belongings on the back) and public transport passenger vehicles (regional buses and microlets) using the same facilities, increasing conflict, and impacting safety of passengers within the terminals. • **Smaller Municipalities Lack Facilities:** The lack of public transport facilities in some locales means that public transport systems are informal – thus passengers lack dedicated facilities, vehicles circle around the area without dedicated parking or staging areas, and there is a lack of operational coordination among operators (i.e., fixed, and reliable schedules are difficult to enforce). • **Limited Parking Space:** There is limited parking available for dropping and collecting passengers with a disability at the terminals. • **Lacking Concept of Operations:** There is no clear concept of operations that governs the facilities. For example, there is no clearly marked area for buses and microlets to park when collecting passengers, and no clear layover locations for vehicles with longer dwell periods. • **Minimal Maintenance and Cleaning:** The facilities demonstrate a lack of periodic maintenance and cleaning – which has resulted in deteriorating infrastructure and unclean passenger environments. • **No Dedicated Kiss "n" Ride Areas:** There are no dedicated Kiss "n" Ride drop-off areas provided adjacent the facilities for passengers dropped off by private vehicles or two-wheelers. ***Passenger Amenities at Terminal*** • **Facilities Perceived as Unsafe:** It has been highlighted by MOTC that passengers perceive the Becora Terminal in Dili (as one example) to be unsafe for passengers. This may be due to limited amenities (such as lighting) or clear delineation (line marking) between passengers and vehicles. • **Lack of Paved Circulation Areas:** In many instances, circulation areas for these facilities are unpaved and uneven, with puddles collecting during wet weather,

Key Issues Relevant to Public Transport Facilities
turning the surface into slippery mode. This can create impediments to easy access to vehicles by users of all abilities, including those with disabilities. • **Curbs Limit Access for Those with Disabilities:** Where pedestrian crossings are provided that connect to facilities, wheelchair drop ramps are not provided, further impeding access for those with disabilities. • **Narrow Pedestrian Connections to Bus Stops:** Pedestrian connections to bus stops are narrow, forcing potential passengers onto the road and further impeding access to those with disabilities and the elderly. • **Poorly Lit Facilities:** There is minimal lighting at bus facilities – Becora has lighting although it appears relatively dim. No lights were observed in the Baucau Terminal or at the bus stops. This creates the perception of an unsafe and treacherous environment, particularly for women, girls, and other vulnerable users at night. • **Conflict at Pedestrian Access Points:** The facilities are surrounded by high fences with key access points for pedestrians shared with vehicles. For example, in Baucau and Becora, both facilities are surrounded by high fences, with key entry/exit points shared by passengers and vehicles without safety measures, and without direct and safe connections to surrounding commercial/retail destinations. • **Minimal Wayfinding:** There is no wayfinding information within the walking catchments surrounding the facilities to assist in navigation between key trip generators and the facilities, and vice versa. • **Minimal Service Information:** Facilities lack passenger information relating to routes, time of day operations, or key connecting destinations. • **Minimum Waiting Areas Without Seats/Covered Facilities:** There is limited provision of passenger amenities at waiting areas (e.g., seats, overhead shelter) or in some cases is missing altogether. In particular, this reduces the quality of the passenger experience such as lack of protection from the intense sun as well as rain. This also disproportionately impacts disadvantaged or vulnerable users (i.e., disabled people, elderly passengers). • **Minimal Rubbish Bins:** There are no bins provided within facilities, which results in rubbish being discarded of across the facilities – reducing the amenity of the area.

Existing Institutional Framework

A robust institutional framework for public transport is a critical element in delivering a modern and inclusive system for the people of Timor-Leste. Without appropriate institutions, investment in modernizing the Timor-Leste's public transport system risks under-delivering on its promise, as services and facilities may not operate as planned, without appropriate operational and maintenance capabilities on the part of the Government and the private sector.

Currently in Timor-Leste, public transport is characterized by disorganized, informal, and largely unregulated services owned and/or operated by private individual operators (this includes smaller microlets as well as longer-distance regional buses). As a result, the public transport system is unable to deliver an efficient and quality service to passengers, is often unsafe and insecure, undermines economic competitiveness and is ultimately regressive for community development and poverty reduction. Specific issues of the existing institutional and operating model of public transport system in Timor-Leste include:

- Vehicles wait, or circulate around town, to fill up with passengers before departing, resulting in journey time delays, poor reliability, and little sense of a predictable schedule.

- Drivers race and compete with one another to capture the same passengers in a day, leading to crashes, as well as risks to pedestrians and cyclists.

- Services may duplicate one another and be over-supplied in some high-demand locations/corridors, such as city Centers and main roads, or at peak times of day, and under-supplied in lower-density outer areas and during non-peak periods.

- Services stop or engage in *keliling* on-street, even where terminal facilities are provided, often on main roads, causing congestion, impacting street activity, and raising safety concerns.

- Vehicle crews fail to give adequate consideration (e.g., in assisting boarding, or intervening in abuse by other passengers) to the disabled, children, women or those with special needs.

- Vehicles are old, poorly maintained, dilapidated, polluting, fuel intensive, inaccessible, and generally unfit to provide a modern, safe, reliable public transport service.

- Driver job security and payment are linked directly to the volume of passengers carried, as drivers lease or rent vehicles on an individual basis, encouraging specific driving behavior (thus employees are not salaried, nor do they have legally enforceable rights/protections).

Many of these challenges stem from the underlying institutional and regulatory structures, and business models, that govern the public transport system. Unless these root causes are addressed, limited or ad hoc service and infrastructure initiatives such as providing new terminal facilities or short-term enforcement are unlikely to succeed and live up to their promise and vision.

Issues of Existing Public Transport Service

In summary, key issues that currently impedes the development of Timor-Leste's Public Transport system include the following elements:

Table ES.2: Existing Issues in Public Transport System

#	Element	Description of Issues
1	Growth and Development	• **Growing Population and Demand for Travel** – The population in Timor-Leste is expected to grow to 1.59 million by 2030 (833,000 in Dili), resulting in higher trip demand, additional vehicles on the road and congestion, as well as more congested public transport operations. More people traveling will increase the stress and strain on the existing public transport system, predominantly operated by informal enterprises. More people will drive or use private vehicles, leading to congestion and emissions, if step-changes are not made to improve public transport and make it more attractive as a travel alternative.
2	Network & Connectivity	• **Weak Regional Connectivity** – Improving regional connectivity remains a key challenge. Dili acts as the hub for public transport in Timor-Leste with main routes radiating to west, east and south to the district capitals (often taking hours on a single trip).
3	Level of Services	• **Unreliable Services Due to Lack of Schedules**– Unscheduled and unreliable services result in long waiting time which pose significant security risks for women. Nearly 50% of users (in a 2015 public transport user survey) cited schedule departure as a key area for improvement in public transport provision. • **Overcrowded, Uncomfortable Vehicles** – Overcrowded low-capacity vehicles create a negative impression of bus services. Nearly 20% of users (in the same user survey) thought the vehicles are not safe at all, citing overcrowding as the main source of concern. Over 80% of the respondents said lighting at terminals need to be improved for security reason.

#	Element	Description of Issues
		• **Limited Operating Hours** – Some regional buses are operated during daylight hours only (according to 2015 Asia Foundation study), whereas other routes. Microlet services in Dili operate from 6:00AM to 6:00PM significantly limiting access to services and interchange opportunities between regional and city transport services. • **Unsafe Driving Behavior** – Unsafe behaviors of operators and drivers crate an unsafe environment and poor riding experience for passengers which are manifested in frequent overcrowding, unsafe driving, poor conditions of vehicles (such as no-air conditioned and older, poorly maintained vehicles), and unnecessary noise and distractions during driving.
4	Infrastructure	• **Poorly Maintained Bus Infrastructure** – Bus infrastructure including bus stops, shelters, and terminals are in relatively poor condition. First/last-mile access to/from the bus stops and terminals has not been prioritized, making walking trips (and interlinkage with other modes such as private vehicles or motorbikes) inconvenient and uncomfortable. • **Lack of Enhanced Passenger Amenities** – Existing bus terminals lack enhanced passenger facilities/amenities such as waiting areas and toilets and not integrated with urban activity centers (which needs have been voiced by MOTC and DNTT officials during the workshops). • **Lack of Access-for-All Facilities** – There is also a lack of access-for-all facilities at terminals and bus stops to ensure safe and inclusive experiences for women and disadvantaged groups, which result in uncomfortable and unsafe public transport journeys. About 28% of the same user survey (mostly women) responded public transport facilities are not safe at all. • **No Proper Allocation of Space Within Terminal** – No proper allocation of loading/unloading and layover spaces (for pick-up, drop-off, and parking) are provided for microlet and regional buses. • **Climate-Change Impacts on Infrastructure** – Current and future bus infrastructure (including bus stops and terminals) will continue to face inundation and climate change related impacts such as flooding. Planning and design must integrate the latest urban resilience and sustainable designs to minimize forthcoming impacts on public transport and allow buses to serve as a viable, safe, and convenient mode during these events.
5	Institutional & Legal	• **Legal Framework is Unclear and Inconsistent:** The current legal framework governing public transport provides a starting point, with some key elements contained therein, however there is a general lack of specificity around roles and responsibilities for public transport planning and operations. • **Limited Enforcement of Current Legal Framework:** There is limited enforcement of the legal framework in Timor-Leste, with DNTT being short on resources and not having adequate capacity building programs in place to support the resourcing and skills needed for enforcement of public transport standards. • **Policy Framework Lacks Specificity on Public Transport:** The current policy framework lacks appropriate vision and objectives related to public transport, nor are targeted initiatives identified to improve the system. • **Government is Under-Resourced with Limited Expertise in Public Transport (DNTT):** The lack of budget allocated to DNTT limits the Directorate's ability to coordinate, manage and enforce standards for the public transport system. DNTT currently has inadequate staffing to perform a full suite of public transport functions required to operate a modern public transport network. • **Limited Technical Expertise (DNTT):** Based on the human resource database of DNTT, there is limited direct expertise in public transport planning within the Directorate. Furthermore, qualified high-level policy-making staff who can perform analytical and critical initiatives are limited. • **No Specific Public Transport Delivery Experience:** Public transport assets in Timor-Leste have not been delivered by existing authorities. While there have been delivery of road projects and buildings projects, there are unique nuances that require specific public transport capabilities for quality outcomes. • **Limited Monitoring or Oversight of Public Transport:** Beyond licensing and route allocation, DNTT plays a limited role in the oversight, monitoring, evaluation, and enforcement of public transport service operations. • **License Conditions:** Current public transport license conditions are basic and do not leverage the opportunity that DNTT has to implement more stringent

#	Element	Description of Issues
		requirements on operators to deliver a higher-quality public transport system for community benefit. • **Informal Private Sector:** The current network is operated by individual operators rather than a coherent and coordinated operator body. This sector is informal and creates challenges that stem from operator incentives, skills, and capacity. This results in difficulty enforcing scheduling, difficulty in ensuring equitable outcomes (such as for students) and is overall less reliable and punctual for passengers. • **Economic Incentives Fall on Drivers:** The economic responsibility and incentive falls directly on drivers of vehicles, creating a range of issues for the reliability and safety of the network. Equity is disincentivized in service operations (i.e., drivers are not incentivized to pick up students due to reduced fares, or to serve lower patronage routes due to lower passenger revenue). • **No Service Schedule:** Due to a combination of technical capacity of DNTT for public transport scheduling, and the current operator incentives of the network, there are no functioning schedules for bus or microlet services. Drivers prioritize waiting until vehicles are full before departing (as this directly impacts their revenue). • **Limited Private Sector Capacity and Skills:** The informal nature of the private sector leads to a lack of private sector capacity building and skills development activities. • **Facilities in Poor Condition:** Existing public transport facilities were constructed by the Indonesian Government, and since ownership has been transferred to the Government of Timor-Leste, there has been limited maintenance undertaken – resulting in the poor condition of the current facilities.

Future Conditions

According to the 2015 Census, Timor-Leste's population is projected to grow from about 1.20 million in 2015 to about 1.85 million in 2050.[16] The population is forecasted to increase by about 0.65 million, with an annual average growth rate of 1.25%. A detailed breakdown of projected population by five-year interval from 2015 to 2050 is presented in **Table ES.3**.

Table ES.3: Timor-Leste Population Projection between 2015-2050

Year	2015	2020	2025	2030	2035	2040	2045	2050
Population	1,200,379	1,299,412	1,391,221	1,483,947	1,578,959	1,674,121	1,766,252	1,854,520
Average Annual Growth (%)	-	1.60%	1.49%	1.42%	1.38%	1.34%	1.30%	1.25%

Source: Timor-Leste Population and Housing Census 2015. Vol. 9 Population Projection.

Key findings are as follows:

- **11 Functional Zones Guiding Spatial Development of the Country** – The territory of Timor-Leste is divided into 11 functional zones to guide the spatial development strategies (i.e., municipal land use plans), planning proposals, and development measures. For example, Zone 6 (Dili) will continue to serve as the economic hub of the country (with various road improvement plans in place to improve reginal connectivity), whereas Zone 9 (Baucau) is reserved for industrial activities with adequate infrastructures and environmental protection measures.

[16] A set of three population forecasts are presented in the 2015 Census based on different fertility rates ranging from high, medium, and low fertility trends. The Census assumed the medium scenario as the most likely projection for future populations given historical fertility trends and population growth rates in Timor-Leste.

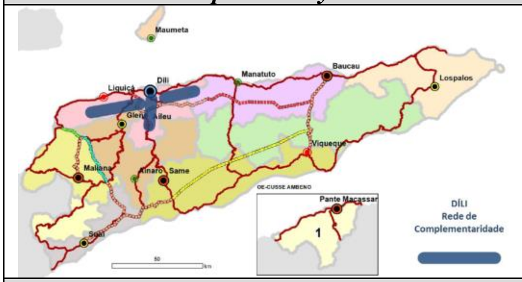
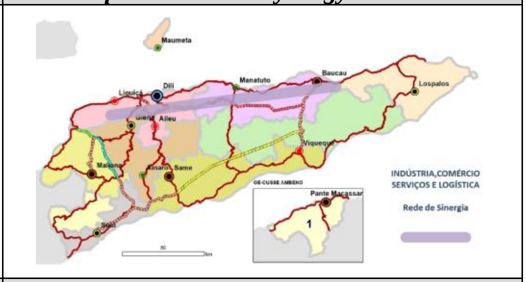
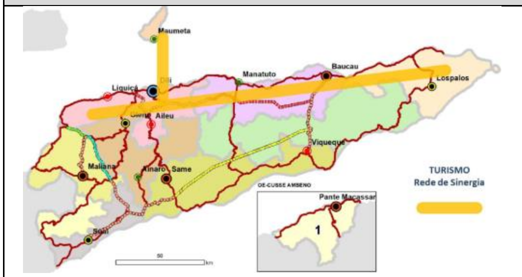
Table ES.4: Functional Zones

Zone #	Municipality	Description of Functional Zones
1	Oecusse ambeno	Part of the ZEESM[A] with potential developments in the livestock, poultry, and tourism sectors.
2	Agropecuaria norte	An agglomeration of several fishing and agricultural activities around Maliana and Batugadé
3	Fronteira	Less developed area with potential developments in the forestry and poultry sectors
4	Suai	Zone with potential developments in the oil sector, alternatively in agriculture.
5	Ataúro	Part of the ZEESM[A], with the possibility of developing into a tourism zone in conjunction with environmental conservation.
6	Dili	Encompasses a coastal strip of land uses with diversified job opportunities including trade and services, industry, logistics and tourism, as well as ancillary facilities (for food production) and decentralized areas (close to Railaco, Aileu, and Laulara).
7	Central	Popular for their production of coffee and spices, as well as the presence of diversified job markets.
8	Agricola sul	Known for their production of rice and mill and other food products
9	Manatuto-baucau	Industrial and mining zone with strong emphasis on environmental protection
10	Agricola do eixo central	Zone specializing in the agro-forestry sector and other related activities.
11	Leste	Specializing in the tourism sector with a thrust on environmental conservation and enhancement.

Source: Plano Nacional de Ordenamento do Território de Timor-Leste (2022)
Note:
[A] ZEESM stands for Zona Especial de Economia Social de Mercado de Oecusse Ambeno e Ataúro, one of Timor-Leste's territorial planning strategies to systematically concentrate investment efforts and economic activities in the territory.

- **Four Growth Corridors Formulated to Prioritize Development Efforts** – The following four corridors are envisioned in the 2038 National Spatial Plan to prioritize development efforts in Timor-Leste. These include:
    - **Dili's Complimentary Network** – This east-west corridor spanning three cities facilitates Dili City's strategic expansion to Liquica to the west, Aileu to the south, and Metinaro to the east. These three zones have different functions. Liquica is a focal point for logistics, industrial and agricultural activities, Aeilu as an educational, sports, technological innovation, and public services center, as well as Dili's supplier of agricultural food products, and Metinaro / Hera as an industrial, agricultural, and future administrative function.
    - **Liquica-Baucau Synergy Network** – The Liquica-Baucau axis encompasses most of the country's logistical, commercial, and industrial activities. Proximity to transport infrastructure is essential to increase the scale and interdependence in value chains, complemented by logistical facilities and concentration of urban developments along the corridor.
    - **Synergy Network for Tourism** – The tourist potential is particularly high on the north coast (as well as Atauro and Oecusse). The promotion of tourism industries requires the establishment of hotels, transport infrastructures, as well as supporting facilities (such as tourist information center) to offer high quality experience for tourists arriving from the airport and seaport. Thus, integration of various transport modes and creating synergy effects is essential to promoting tourism potential.
    - **Agro-Forestry and Livestock Synergy Network** – The integration of Zone 4, 8 and 10 (mostly agricultural lands) via well-connected logistical

infrastructure is essential to maximizing the production and export of agricultural products to other regions to sustain the growth of the country.

Dili's Complimentary Network	*Liquica-Baucau Synergy Network*
	
Synergy Network for Tourism	*Agro-Forestry and Livestock Synergy Network*
	

Source: 2038 National Spatial Plan.

Figure ES.6: 2038 National Spatial Plan – Key Growth Corridors

Vision & Goals

The Vision of the Timor-Leste Public Transport Master Plan is: ***"Public Transport in Timor-Leste is attractive, accessible, inclusive, and future-ready transport mode that supports economic growth, urban development, and quality of life across the country."***

In support of this vision, the following five key pillars will guide the establishments of the goals of the Master Plan:

Table ES.5: Vision and Five Key Pillars for Timor-Leste's Public Transport System

Five Key Pillar	Description
Economic Growth	The public transport system supports economic growth and the growth of urban Centers. It connects Dili with other strategic Centers and enables the movement of people and goods to support the economy.
Access for All	The public transport system provides the entire community with better access to jobs and services. Affordable, reliable services meet people's needs, are inclusive of marginalized groups like women and the disabled and improve social mobility.
Livable Cities	The public transport network and facilities are integrated with urban activity Centers. The system underpins healthy, safe, and connected places that improve livability in urban Centers and beyond.
Mode of Choice	The public transport network provides seamless and integrated journeys that encourage sustainable travel choices, attracting more users and reducing private vehicle use and congestion.
Sustainable Future	The public transport system plays a key role in meeting the goals of the Paris Agreement including by encouraging mode shift to reduce the emissions intensity of travel and harnesses new technologies and innovative features to support climate mitigation and resilience.

Based on the above vision and key pillars, the following five goals are proposed for the Master Plan:

Table ES.6: Linkage between Vision and Goals for Public Transport System

#	Key Goals from Vision	Implications on Public Transport Services and Facilities
1	Providing Strategic Linkage and Linking Key District Centers / Generators	• Routing of public transport services is planned / determined to ensure strategic relevance to the country-wide public transport network (including interchange opportunities with key district centers) and accommodate future growth and development. • Providing public transport services to higher density and cluster of key generators would generate higher sustained ridership (which are more suitable to public transport than locations with fewer or more sparse key generators). • Improving interurban public transport network is essential to strengthen the position of Dili as the transport hub in the country as well as enhance the regional connectivity for inclusive development of the country.
2	Providing Accessible Services	• To attract passengers from all groups (including women, people with disabilities), public transport services must not only be scheduled and reliable, but last must have adequate passenger facilities/amenities at terminals (including en-route bus stops along regional routes) to create a safe, inclusive, and comfortable environment for all users.
3	Integrating Transport with Urban Activity Centers	• Terminal locations adjacent to urban activity centers and key generators are more suitable for public transport as they would widen trip-making opportunities connecting passengers to social and economic activities (thus increasing prospective passengers).
4	Ensuring Seamless, High-Quality Journeys	• Improved passenger information (such as route maps, schedule, real-time information) would help passengers plan their trip more efficiently without hassle and enhance their overall journey experience. Provision of in-advance booking system or app-based passenger information system would improve customer service and attract passengers. • Provision of enhanced in-vehicle experience (such as seat availability, air-conditioning, lighting, CCTV) is essential to ensuring safety, security, and comfort of public transport users, which in effect will improve the perception of overall public transport service quality.
5	Building Climate and Disaster Resilience	• Provision of climate resilience measures at public transport facilities (e.g., covered waiting areas at terminals/bus stops, emergency operation plan, terminals in less vulnerable areas) would ensure that passengers continue to have access to public transport services in the event of natural disasters with safety provision, while minimizing potential hazard and risks to users throughout their journey.

Route Review and Recommendations

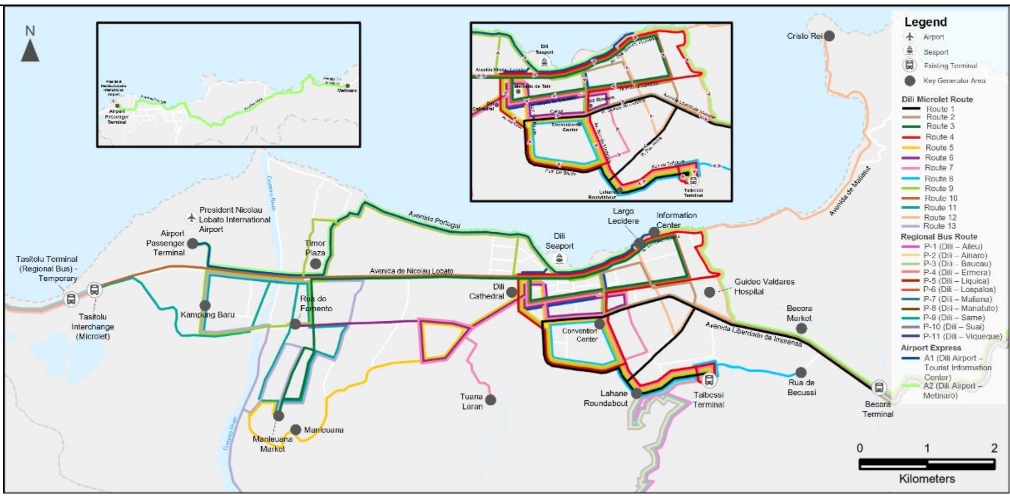
A summary of the modified Dili microlet routes (a total of 12 routes) as well as the two proposed Airport Express routes (between Airport and Tourist Information Center / Metinaro) is shown in

Table ES.7, with the map presented in **Figure ES.7**.

Table ES.7: Overview of Modified Dili Microlet Routes and Proposed Airport Express Routes

Route #	Origin	Destination	Via	Direction	Roundtrip Distance (km)	Terminals Serving [A]
M-1	Becora Terminal	Becora Terminal	Ave. Liberdade de Impresa, Estr. De Balide, R. Caicoli	Clockwise	14.8	Becora Terminal, Taibessi Terminal
M-2	Becora Terminal	Becora Terminal	Ave. Liberdade de Impresa, Ave. Bpo de Madeiros	Counter-Clockwise	10.1	Becora Terminal
M-3	Manleuana Market	Manleuana Market	Ave. de Nicolau Lobato, R. Jacinto de Candido	Clockwise	16.8	Manleuana Market
M-4	Taibessi Terminal	Taibessi Terminal	Estr. De Balide, Av. Alm Americo Tomas, R. Jacinto de Candido	Clockwise	15.9	Taibessi Terminal
M-5	Taibessi Terminal	Manleuana Market	Rua de Taibessi, Ave. de Manleuana	Clockwise	21.6	Taibessi Terminal, Manleuana Market
M-6	Rua do Fomento	Rua do Fomento	Rua Hudi-Laran, R. Caicoli, R. Jacinto de Candido,	Clockwise	12.2	No Terminal (serves Rua do Fomento)
M-7	Taibessi Terminal	Tuana Laran	Rua de Taibessi, Rua de Ai Lok Laran	Clockwise	15.9	Taibessi Terminal
M-8	This route is proposed for cancellation and merged with Microlet Route#4.					
M-9	Kampung Baru	Kampung Baru	Ave. de Nicolau Lobato, Av. de Portugal, Av. Salazar	Clockwise	22.7	Taibessi Terminal
M-10	Tasitolu Terminal	Tasitolu Terminal	Ave. de Nicolau Lobato, R. Jacinto de Candido	Clockwise	19.9	Tasitolu Terminal
M-11	Tasitolu Terminal	Manleuana Market	Rua de Tali-Laran, Ave. de Nicolau Lobato, Rua de Has Laran	Clockwise	14.6	Tasitolu Terminal, Manleuana Market
M-12	Rua de Cristo Rei	Rua de Cristo Rei	Ave. dos Direitos Humanos, Ave. de Matiatut	Clockwise	15.9	No Terminal (serves Cristo Rei)
M-13	Kasnafar	Kasnafar	Ave/ Praia dos Conqueiros, Rua de Lesibutak	Clockwise	20.6	Manleuana Market
Total for Dili Microlet					**200.9**	
AE-1	Airport	Tourist Information Center	Timor Plaza	EB/WB	19.1	Airport
AE-2	Airport	Metinaro	Timor Plaza, Tourist Information Center	EB/WB	71.3	Airport
Total for Airport Express					**90.4**	

Notes:
[A] The terminal(s) serving this route may change subject to the MOTC's decision on future terminal locations.



Source: Arup Study Team

Figure ES.7: Modified Dili Microlet Network with Proposed Airport Express Routes

A summary of the regional route recommendations (no change to the existing 11-route network) is shown in **Table ES.8**, with the map presented in **Figure ES.8**.

Table ES.8: Overview of Regional Route Recommendations

Route #	Origin	Destination	Direction	One-Way Distance (km)	Terminals Serving [A]	Region Covered by Route
P-1	Dili	Aileu	NB/SB	44.3	Taibessi	South
P-2	Dili	Ainaro	NB/SB	109.3	Taibessi	South
P-3	Dili	Baucau	EB/WB	117.7	Becora	East
P-4	Dili	Ermera	NB/SB	46.0	Tasitolu	West
P-5	Dili	Liquica	EB/WB	23.1	Tasitolu	West
P-6	Dili	Lospalos	EB/WB	205.1	Becora	East
P-7	Dili	Maliana	EB/WB	132.7	Tasitolu	West
P-8	Dili	Manatuto	EB/WB	58.7	Becora	East
P-9	Dili	Same	NB/SB	112.1	Taibessi	South
P-10	Dili	Suai	NB/SB	171.0	Taibessi	South
P-11	Dili	Viqueque	EB/WB	176.6	Becora	East
Total				1,196.6		

Notes:
[A] The terminal(s) serving this route may change subject to the MOTC's decision on future terminal locations.

Source: Arup Study Team

Figure ES.8: Timor-Leste Regional Bus Network

Facility Recommendations

Defining strategic principles for locating public transport passenger facilities requires being very clear on the fundamental purpose of public transport. Public transport, like all transport systems, is not provided for transport's sake. It is a means to an end – the purpose is to connect people from "where they are" (origin) - to useful destinations, or "where they want to go" (destination). Public transport has an especially important role in the broader transport system, in that when well-designed it can reduce and altogether avoid for some users the reliance on private vehicles, facilitating mobility that is based on a combination of active travel (walking or cycling) and public transport. To achieve an integrated and sustainable transport system, active travel should be the primary access mode for public transport.

Five key strategic principles for locating public transport facilities are provided below, aligned to the vision for public transport in Timor-Lest developed by Arup for this study, and validated with the Ministry of Transport and Communications (MOTC). While these strategic principles aligned to the vision for public transport for Timor-Leste are intended to guide the strategic identification of preferred sites, they also must be supplemented with technical criteria (such as size of site to accommodate required capacity, engineering feasibility, etc.) that will be expanded further in later sections.

Table ES.9: Five Key Strategic Principles for Public Transport Facilities Location

Public Transport Vision Statement		*Passenger Facility Location Principles*
Economic Growth: The public transport system supports economic growth and the growth of urban centers. It connects Dili with other strategic centers and enables the movement of people and goods to support the economy.	→	***1. Alignment with Policy Documents and Strategic Location:*** *Facilities should be located to align with strategic planning and policy documents and within urban centers to maximize economic benefit.*
Access for all: The public transport system provides the entire community with better access to jobs and services. Affordable, reliable services meet people's needs, are inclusive of marginalized groups like women and the disabled and improve social mobility.	→	***2. Regional Distribution & Inclusivity:*** *Facilities should be equitably distributed to provide access across Timor-Leste, while also being conveniently located to enable walk-up access for a range of user groups.*
Livable Cities: The public transport network and facilities are integrated with urban activity centers. The system underpins healthy, safe, and connected places that improve livability in urban centers and beyond.	→	***3. Convenient Access to Activities:*** *Facilities should facilitate convenient access to activity-generating land use to maximize the network's usefulness in connecting convenient destinations.*
Mode of Choice: The public transport network provides seamless and integrated journeys that encourage sustainable travel choices, attracting more users and reducing private vehicle use and congestion.	→	***4. Seamless Journeys with Efficient Operation:*** *Facilities should be located to enable efficient operation of the public transport network, both for passengers and their travel time, and bus operators.*
Sustainable Future: The public transport system plays a key role in meeting the goals of the Paris Agreement including by encouraging mode shift to reduce the emissions intensity of travel and harnesses new technologies and innovative features to support climate mitigation and resilience.	→	***5. Future-Proof Against Climate Change:*** *Facilities should be located to avoid negative environmental impacts while prioritizing access for active travel and future low emissions technologies.*

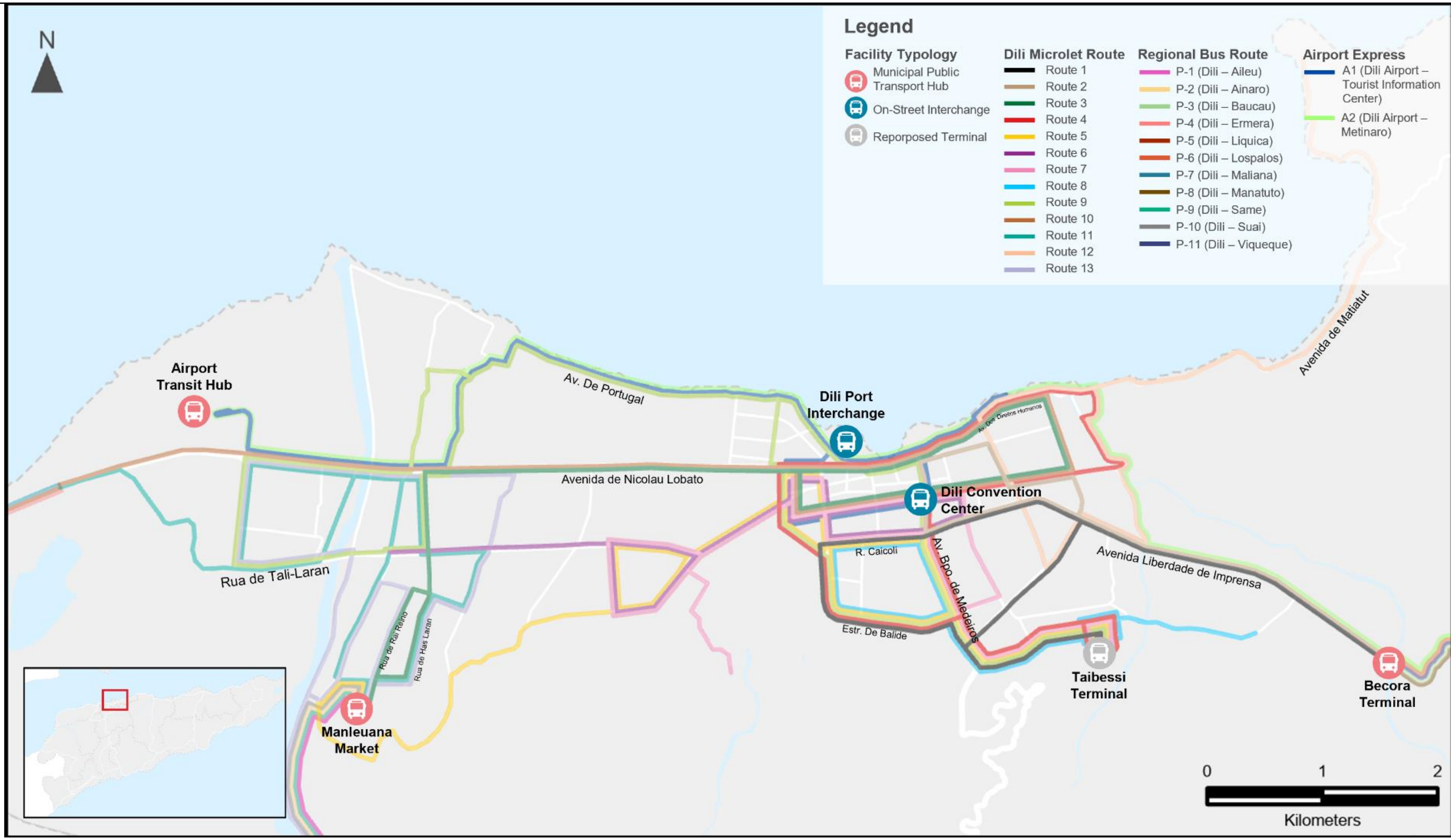
The two maps below provide a summary of the preferred passenger facilities across Timor-Leste, and more specifically across Dili. Together, these facilities once implemented can provide high-quality, safe, and amenable access to public transport services for the population of Timor-Leste, contributing to the country's economic and social development objectives.

- **Municipal Public Transport Hubs** are recommended in areas with the highest combination of regional and microlet bus services – namely Dili and Baucau. These facilities support the interchange between the relatively highest number of regional bus services each day, with urban microlet services. These locations act as natural convergence points for regional bus services travelling to and from a range of more remote municipalities. As such, both the number of bays required, and the number of passengers serviced requires a high-quality facility with adequate space and amenities.
- **On-Street Interchanges with Layover Parking** is recommended at municipal locations with "terminating" regional bus services. Most of these locations only require 1-2 passenger pick up/drop off bays to support the number of combined regional and microlet services during the peak hours. In many cases, these locations do not experience more than 2 regional buses per day. By making the distinction between passenger pick up / drop off bays and layover parking bays – the provision of on-street interchanges in these municipalities can be optimized for maximum passenger accessibility and spatial efficiency, while layover parking in the long term can be provided in more remote locations (outside of the core urban area).
- **On-Street Interchanges** (without layover parking) are provided at key "through" destinations on regional bus routes, and in urban areas for Dili. These locations do not have terminating services or layovers, and act primarily as a pickup / drop off point for through routes.

Figure ES.9, **Figure ES.10**, and **Table ES.10** summarize the proposed facility types and locations within Dili and across Timor-Leste as well as the infrastructure phasing plan to develop the facilities in the short-, medium- and long-term:

Source: Arup Study Team

Figure ES.9 Timor-Leste Facility Locations and Typologies



Source: Arup Study Team

Figure ES.10 Dili Facility Locations and Typologies

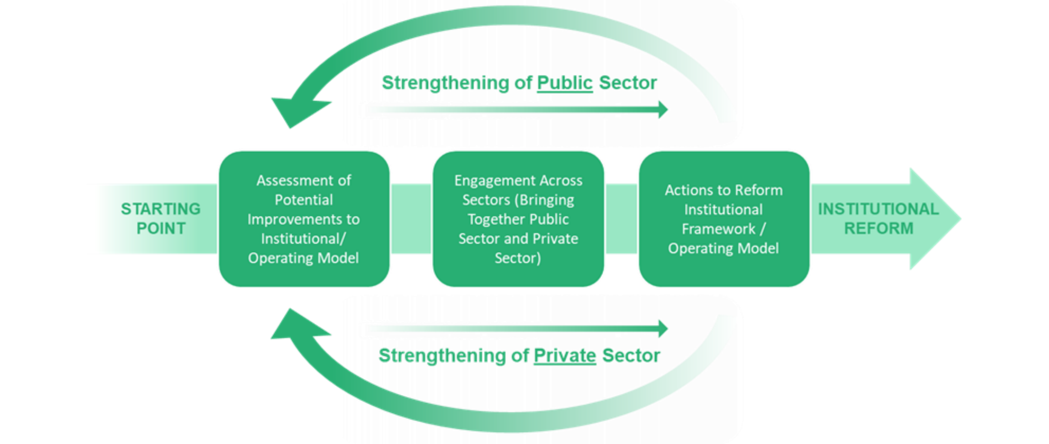
Table ES.10: Timor-Leste Public Transport Facility and Infrastructure Phasing

ID	Facility	Location	Name	Proposed Facility Type in Future	Short Term 2023-2025	Medium Term 2026 - 2030	Long Term 2031 - 2035
1	Bus Stop	Dili	Dili Bus Stops	On-Street Bus Stop and Pedestrian Facility	X		
2	Interchange	Dili - Central	Dili Convention Center	On-Street Interchange		X	
3	Terminal	Dili - East	Becora Terminal	Municipal Public Transport Hub		X	
4	Terminal	Dili - West	Airport Transit Hub	Municipal Public Transport Hub		X	
6	Terminal	Dili - South	Manleuana Market	Municipal Public Transport Hub		X	
7	Terminal	Baucau	Aldeia Samalakuliba, Baucau	Municipal Public Transport Hub		X	
8	Terminal	Maliana	Maliana	On-Street Interchange with Layover Parking		X	
9	Terminal	Suai	Suai Market	On-Street Interchange with Layover Parking		X	
10	Terminal	Lospalos	Lospalos Bemoris	On-Street Interchange with Layover Parking		X	
11	Terminal	Viqueque	Viqueque City Center	On-Street Interchange with Layover Parking		X	
12	Interchange	Dili - Central	Dili Port Interchange	On-Street Interchange			X
13	Interchange	Dili - West	Ulmera	On-Street Interchange			X
14	Interchange	Dili – West	Tibar	On-Street Interchange			X
15	Interchange	Dili - East	Hera [A]	On-Street Interchange			X
16	Interchange	Dili - East	Wenunuc	On-Street Interchange			X
17	Interchange	Dili - East	Metinaro	On-Street Interchange			X
18	Terminal	Aileu	Aileu – Plot 1	On-Street Interchange with Layover Parking			X
19	Interchange	Maubisse	Maubisse – Plot 1	On-Street Interchange with Layover Parking			X
20	Terminal	Manatuto	Manatuto – Plot 1	On-Street Interchange with Layover Parking			X
21	Terminal	Same	Same – Plot 1	On-Street Interchange with Layover Parking			X
22	Terminal	Ainaro	Ainaro – Plot 2	On-Street Interchange with Layover Parking			X
23	Terminal	Liquica	Liquica – Plot 1	On-Street Interchange with Layover Parking			X
24	Interchange	Batugade	Batugade – Plot 1	On-Street Interchange			X
25	Terminal	Ermera	Ermera	On-Street Interchange with Layover Parking			X

Notes:
[A] During a consultation mission held in Dili, Timor-Leste, from 8-12 April 2024, the MOTC requested to consider Hera as a strategic bus terminal in the investment plan as there is sufficient potential for a bus terminal in the future. Based on the Mission's site visits attended by ADB/MOTC, it was agreed that the Hera terminal could be positioned to serve the needs of nearby cities (as a bus terminal), while the Becora hub would focus on serving the connectivity needs of Dili and act as a central link between Dili and Hera.

Institutional Recommendations

Evident from international case studies around the world, institutional reform should be pursued through incremental change rather than a "big bang" approach. Lessons learned from overseas for countries that have embarked on public transport reform agendas clearly show that these processes are complex, difficult, and highly political. Therefore, an iterative approach should be adopted that seeks to strengthen both the public and private sectors over time as the public transport system in Timor-Leste modernizes over the coming decade(s).



Source: Arup Study Team

Figure ES.11: A Model for the Incremental Reform of the Institutional Model Governing Public Transport in Timor-Leste

Over time, a key objective of institutional strengthening and building capacity and skills across both the public and private sector will see a reduced reliance on technical assistance and stronger ability plan, design and deliver public transport initiatives at a local level.

Source: Arup Study Team

Figure ES.12: Level of Technical Assistance vs. Level of Local Capacity

As such, the recommended actions for reform of the public transport sector are separated into three key stages as follows:

- **Short-Term (Up to 2025):** Introduce preliminary reform initiatives that improve existing conditions based on existing laws and policies, begin the process towards LTA establishment and the establishment of a Public Transport Department therein, and outline processes for public transport passenger facility operations.

- **Medium-Term (2026-2030):** Enact deeper reform to the public transport sector that being to address the fundamental issues and move towards a modern operating model, including the introduction of more formalized scheduling, formalization of an operator association and associated negotiation between this association and the government, and service reform (such as full timetabling).
- **Long-Term (2031-2035):** Modernization of the public transport system, building on foundations laid by previous actions and strengthening across public and private sectors. These actions include full operation contracting model, vehicle procurement, modernization of infrastructure and implementation of digital technologies.

Each of the key moves identified in Table ES.11 require some capacity building interventions to enable. These capacity-building actions will be required across the dimensions of the institutional model for public transport presented earlier in the report. More detailed description of specific actions is included in **Table ES.12**.

Table ES.11: Key Moves for Reforming the Public Transport Sector in the Short, Medium and Long Term

Short Term "Key Moves" (Up to 2025)	Medium Term "Key Moves" (2026-2030)	Long Term "Key Moves" (2031-2035)
In the short term, key actions are: • Increase enforcement efforts for laws that are already in place, such as traffic, use of facilities, collection of students and vehicle safety. • Introduce a basic timetable of regional bus services and enforce them at key municipal departure locations. • Begin to outline and implement the Public Transport Department of the Land Transport Authority as part of the Transition Plan of the LTA. • Develop systems and processes for facility operations (discussed in next section) as Centerpiece of institutional and regulatory reform following a recognized vision of best practice. • Facilitate operator forums to discuss establishment of operator association. • Engage with MPW on road improvement / maintenance to improve travel times and reliability of inter-city services.	In the medium-term, and building on the momentum established with the short-term actions, key actions are: • Invest in the professionalization of the operator sector through targeted capacity building programs. • Enact collaborative governance between public and private sector (through an operator association) to move away from dealing with individuals. • Implement more stringent requirements in the private sector (move beyond the licensing model) including requirements for service quality (punctuality, reliability, customer experience). • Undertake collective negotiation between public sector and operator association. • Implement timetabled services for both regional and microlet vehicles for regional and urban services. • Implement new systems and processes across public and private sectors, for public transport facilities and broader functions to build capacity and professionalization among both sectors.	In the long-term, building on the momentum of the short- and medium-term actions, key actions are: • Move towards a more organized franchising/ contracting model that is competitively tendered (underpinned by a fully skilled and capacitated Public Transport Department within the LTA that manage operating contracts). • Procure new public transport vehicles. • Implement modern infrastructure and associated maintenance programs. • Implement digital technologies for the management and optimization of public transport networks. • Implement customer charter.

Table ES.12: Key Actions for Capacity Building and Institutional Reform/Strengthening

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
SHORT-TERM *Short-term actions can be recommended with the most certainty as they are based on addressing the current capacity gaps based on the existing situation.*						
1	Increase enforcement efforts for laws that are already in place, such as traffic, use of facilities, collection of students and vehicle safety.	x			Currently there are some traffic enforcement efforts, however specific enforcement around public transport is limited. For example, keliling is still commonplace, vehicles travel over-capacity (even in Dili) with school children hanging off the side, and public transport vehicles can be selective about using terminals.	**1.1** **Law-Enforcement Training:** Organize specialized training programs for law enforcement officials on traffic and public transport laws. This can include understanding these laws, their enforcement methods, and dealing with violations effectively. **1.2** **Inter-Agency Collaboration:** Strengthen collaboration between transport departments, law enforcement agencies, and judicial systems. This can ensure coherent enforcement of laws, swift handling of violations, and effective legal recourse. **1.3** **Public Awareness Campaigns:** Conduct public awareness campaigns to educate the general public, transport operators, and users about traffic and public transport laws. An informed public can aid in better compliance and enforcement.
2	Introduce a basic timetable of regional bus services and enforce at key municipal departure locations.	x			There are currently no timetables for services – with the business model of driver/operators resulting in drivers waiting until buses are full before departing. There is limited capacity for public transport planning and scheduling within DNTT.	**2.1** **Timetable Development Training:** Organize training sessions for public sector officials on the basic principles of bus timetable development, including concepts of route frequency, peak and off-peak scheduling, and interconnections with other services. **2.2** **Stakeholder Engagement:** Consult with bus drivers and passengers during the timetable development process. Their input can provide valuable on-the-ground insights to refine the timetable.
3	Begin to outline and implement the Public Transport Department of the Land Transport Authority as part of the Transition Plan of the LTA.	x			While the LTA has been outlined, the relevant Laws have not been submitted/passed by the Government of Timor-Leste, and as such there has been limited progress towards establishment of the LTA.	**3.1** **Establish Government Mandate:** Submit and pass relevant legislation to provide government mandate for LTA establishment. **3.2** **Public transport Functions:** Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
						3.3 **Align with Broader LTA Establishment Efforts:** Refer to detailed reform proposals as part of previous LTA establishment work and road mapping.
4	Develop systems and processes for facility operations as centerpiece of institutional and regulatory reform following a recognized vision of best practice.		**x**		There is no current operational framework that surrounds facility operations. Operationally, vehicles move through facilities in an ad-hoc fashion. Public transport facilities were constructed under the Indonesian Government and over the past twenty years have deteriorated in quality without maintenance.	**4.1** See the table in Section 7.3 for detailed institutional and capacity building recommendations associated with public transport facility operation.
5	Facilitate operator forums to discuss establishment of operator association.			**x**	Current bus operations occur on an individual driver basis, establishment of a bus operator association has been highlighted in the previous LTA establishment work however has not been progressed.	**5.1** **Operator Organizational Skills Training:** Educate the private sector operators on the principles, requirements, and functions of an association.
6	Engage with Ministry of Public Works on road improvement/maintenance to improve travel times and reliability of inter-city services.	**x**			Road quality remains a major inhibitor to public transport service quality and reliability, particularly for regional buses. The road quality between Dili and most municipalities is of poor quality, creating longer travel times, and creating safety risk for passengers.	**6.1** **Stakeholder Engagement:** Engage with operators and passengers on road quality impacts on service quality and reliability on the network to prioritize maintenance/improvement efforts. **6.2** **Collaboration with MPW:** DNTT to engage and collaborate with MPW in planning of road renewal and maintenance programs.
MEDIUM-TERM *Medium-term actions assume some capacity is developed in the short-term in-line with the above recommendations, however become more contingent and uncertain due to this reliance. Medium-term actions should be revisited and assessed prior to implementation.*						
7	Enact collaborative governance between public and private sector (through an operator association) to move away from dealing with individuals.		**x**		Limited capacity in both the public and private sectors for collaborative governance around public transport – private sector particularly will need professionalizing and organizing in order to realize collaborative governance.	**7.1** **Professionalization of Private Sector:** Invest in the professionalization of the private sector through targeted capacity building programs, in terms of public transport and organizational management. **7.2** **Developing Collaboration Frameworks:** Establish clear frameworks outlining the roles, responsibilities, and expectations of all parties in the collaborative governance

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
						process. This can help prevent misunderstandings and ensure all stakeholders are working towards the same objectives.
8	Implement more stringent requirements on the private sector (move beyond the licensing model) including requirements for service quality (punctuality, reliability, customer experience).	**x**			Current licensing terms are basic and do not incorporate broader public transport outcomes. There is limited public transport skills within the government currently to strategize and incorporate context-specific requirements into licensing agreements.	**8.1** **Public transport Skills Training:** Government training programs to support knowledge and skills development in public transport systems and the principles of good networks. **8.2** **Funding and Staffing:** Increase government budget allocation for planning and policy roles to improve the government's ability to identify and monitor service quality objectives and link these to license agreements.
9	Undertake collective negotiation between public sector and operator association.		**x**		As per Item 7, there is limited capacity in the public and private sectors around public transport collective negotiation due to the current informal nature of the private sector.	**9.1** **Collaborative Governance and Bargaining:** Invest in training government and the private sector in collaborative governance and bargaining. **9.2** **Legal and Regulatory Understanding:** Develop a thorough understanding of the legal and regulatory context in which the negotiations take place. This can inform the negotiation strategy and ensure that any agreements reached are legally sound and enforceable. **9.3** **Understanding Stakeholder Interests:** Develop capacity in understanding and responding to the interests and concerns of the operator association. This includes regular engagement with the association and its members to understand their perspectives. **9.4** **Developing Negotiation Agendas:** Develop capacity in creating clear, focused negotiation agendas. Agendas should outline the topics to be discussed, the objectives of the negotiation, and the expected outcomes.
10	Implement timetabled services for both regional and microlet vehicles for regional and urban services.	**x**			As per Item 2, there is limited capacity within the government currently for timetable scheduling. It is assumed that some technical skills can be developed through the implementation of regional timetables in the short-term, with this medium-term imitative then building on that momentum.	**10.1** **Public transport Skills Training:** Building on momentum of skills development in previous actions, invest in government skills development in public transport scheduling and timetabling. **10.2** **Stakeholder Engagement:** Facilitate engagement with key stakeholders throughout timetabling process, including passengers, operators, and business owners.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
11	Implement new systems and processes across public and private sectors, for public transport facilities and broader functions to build capacity and professionalization among both sectors.		x		Currently limited capacity to deliver sector-wide systems and processes beyond licensing and monitoring of facilities. Implementation of new public transport facilities will both require additional technical capabilities to be developed while also acting as a cornerstone for broader capacity and skills development.	**11.1** See the table in Section 7.**3** for detailed institutional and capacity building recommendations associated with public transport facility operation.
LONG-TERM *Long-term capacity building actions can be recommended with the least certainty as they are highly contingent on previous phases. Long-term actions should be revisited at the time of implementation and assessed against prior actions and capacity development success.*						
12	Move towards a more organized franchising/ contracting model that are competitively tendered (underpinned by a fully skilled and capacitated Public Transport Department within the LTA that manage operating contracts).		x		As per previous items highlighted in the short- and medium-term, current capacity is very limited, however it is assumed that some capacity will be developed over time through actions in the short and medium terms.	**12.1** **Training on Franchising and Contracting Models:** Invest in training sessions on the various aspects of franchising and contract models in public transport – including how various models are structured, the principles of competitive tendering and contract management. **12.2** **Legal and Regulatory Framework Development:** Develop or refine the legal and regulatory frameworks necessary to support franchising and competitive tendering. **12.4** **Private Sector Capacity Building for Competitive Bidding:** Develop the capacity of local operators to participate in competitive bidding. This can include training on preparation of proposals/bids, understanding contract requirements, and the implications of contract obligations.
13	Procure new public transport vehicles.	x			Procurement capacity in the government more broadly has proven adequate to procure broader infrastructure assets, however public transport-specific capacity is limited.	**13.1** **Training on Vehicle Procurement:** Invest in training programs for government officials on the principles and best practice of vehicle procurement. This includes understanding specifications, procurement processes, and negotiating contracts with vehicle suppliers. **13.2** **Develop Technical Specifications:** Develop capacity in developing technical specifications for public transport vehicles. These specifications form the basis for procurement and should reflect the needs of the public transport system.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
						13.3 **Engagement with Manufacturers and Suppliers:** Engage and develop relationships with vehicle manufacturers and suppliers to understand the range of options available and to ensure the availability of vehicles over time. **13.4** **Post-Purchase Asset Management:** Build capacity in managing assets post-purchase. This includes understanding maintenance requirements, lifecycle cost analysis, and replacement planning.
14	Implement modern infrastructure and associated maintenance programs.	**x**			As per previous items highlighted in the short- and medium-term, current capacity is very limited however it is assumed that some capacity will be developed over time through actions in the short and medium term – particularly through the preparation of systems and processes for the operation and maintenance of public transport facilities.	**14.1** **Training on Infrastructure Planning and Maintenance:** Conduct training programs on modern infrastructure planning, implementation, and maintenance. This includes understanding the lifecycle of infrastructure assets, modern maintenance techniques, and the cost impacts. **14.2** **Infrastructure Standards:** Adopt standards for public transport infrastructure to guide the construction and maintenance of public transport. **14.3** **Procurement and Contract Management:** Build capacity in procurement and contract management for public transport projects specifically, working with the National Procurement Commission (NPC). **14.4** **Establishing Regular Maintenance Programs:** Establish regular, preventive maintenance programs for public transport infrastructure. This should include post-purchase asset management of vehicles as per Action 13.4 above.
15	Implement digital technologies for the management and optimization of public transport networks.	**x**			The only current application of digital technologies within the public transport system is a database managed by DNTT for storing vehicle registrations. There is no existing capacity for applying digital technologies for service delivery, planning or optimization of the network.	**15.1** **Digital Technology Training:** Provide training to public sector officials on the use and benefits of digital technologies in managing and optimizing public transport. **15.2** **Partnerships with Technology Providers:** Establish partnerships with technology providers who can supply the tools and expertise necessary for implementation. **15.3** **Data Management Capabilities:** Build capacities in collecting, managing, and analyzing the large amounts of data that digital technologies can generate.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
						15.4 **Pilot Projects:** Adopt an iterative approach built around pilot projects to test different technologies before rolling them out at scale. This allows parties to understand impacts and make any necessary adjustments ahead of scaling up initiatives. **15.5** **Cybersecurity Measures:** Develop capacities in cybersecurity to protect the integrity of digital systems and the privacy of users.

Indicative Investment Plan by Phase

The indicative investment plan with cost estimates for three phases is presented below with Phase 1 (2023-2025) in **Table ES.14**, Phase 2 (2026-2030) in **Table ES.15**, and Phase 3 (2031-2035) in **Table ES.16**. Three timelines for the action plan are proposed to align with the Dili 2045 Urban Master Plan as follows:

- **Phase 1 (up to 2025)** – Short-term actions/initiatives that can be adopted relatively quickly to improve service and facilities, including technical studies and operation costs for a pilot bus system, with minimal implementation timeline for infrastructure enhancements, as well as minimal modifications to existing institutional or regulatory frameworks (e.g., service and routing changes, operating protocol refinements for terminals, and formulation of design guidelines) – possibly implemented by MOTC and the Timorese Government to facilitate larger-scale investments in latter phases;

- **Phase 2 (2026-2030)** – Medium-term actions/initiatives involving more significant infrastructure enhancements requiring additional design, environmental and social safeguard, as well as land acquisition activities, as well as involving/requiring more substantive institutional and regulatory changes (e.g., new terminals in Dili, regulatory refinements to facilitate creation of a public transport authority (PTA), and capacity building to prepare for eventual contracting); and

- **Phase 3 (2031-2035)** – Long-term actions/initiatives that align with new developments and growth areas in Dili (including Metinaro), as well as continued growth in the population and workforce throughout the country, as well as more substantial changes to the regulatory/institutional framework to enable service contracting.

Table ES.13: Indicative Investment Plan (2023-2035)

Component	2023-2025	2026-2030	2031-2035	Total [A]	% of Total
	US$	US$	US$	US$	
Operation [B]	12,710,000	0	0	12,710,000	36.2%
Facility [C]	1,850,000	11,680,000	1,800,000	15,330,000	43.6%
Institutional [D]	0	250,000	250,000	500,000	1.4%
Capacity Building [D]	600,000	600,000	900,000	2,100,000	6.0%
DED	1,500,000	0	0	1,500,000	4.3%
Technical Study [E]	500,000	2,000,000	0	2,500,000	7.1%
Monitoring [F]	0	0	500,000	500,000	1.4%
Total	**17,160,000**	**14,530,000**	**3,450,000**	**35,140,000**	100.0%
% of Total	48.8%	41.3%	9.8%	100.0%	

Notes:
[A] Summations in this table by component may not match the totals from other due to rounding.
[B] Operation cost includes capital costs (including procurement of 12m diesel buses, bus stops, and depot) as well as annualized operating/maintenance costs (including vehicle-related such as fuel and maintenance, personnel, as well as indirect bus operating costs such as admin, indemnity) are included. Other capital costs such as terminal (included in facility costs), ITS, bus lanes, sidewalk/crossing improvements, as well as additional costs for land acquisition/resettlement are not included. Further assessment of capex and operating costs is required under a separate technical study.
[C] Facility improvements include three bus terminals in Dili, one on-street interchange in Dili, one bus terminal in Baucau, on-street interchanges in other regional locations, as well as 50 bus stops improvements in Dili. Facility costs exclude land acquisition and compensation associated with resettlement.
[D] Activities under this category include a series of technical support for institutional/regulatory as well as capacity building. Details are shown in the action plan below.
[E] Technical studies include DED for terminal improvement, Dili parking strategy, Dili traffic improvement, feasibility study for Dili pilot bus, fares and ticketing system, Dili active mobility, and Dili urban transport modernization.
[F] Safeguard monitoring includes monitoring of the progress of project implementation to ensure compliance with ADB safeguards policy and procedures.

The total investment cost is US$35.1 million, divided as follows: (i) Phase 1 (up to 2025) – US$17.2 million; (ii) Phase 2 (2026-2030) – US$14.5 million; and (iii) Phase 3 (2031-2035) – US$3.5 million. The biggest cost item is the proposed facility improvements (including three bus terminals in Dili, one bus terminal in Baucau, one on-street interchange in Dili, on-street interchanges in regional locations, as well as 50 bus stops improvements in Dili – facility costs exclude land acquisition and compensation associated with resettlement), followed by operation of a pilot bus system in Dili, technical studies, capacity building, institutional refinement efforts, as well as monitoring (for long-term).

Table ES.14: Short-Term Indicative Investment Plan (2023-2025)

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
1	Short	2023-2025	Microlet Route Restructuring	Operation	Dili	• Restructure Dili microlet routes and operate 207.2 km with 13 routes serving key generators/activity centers in Dili	• Improve the efficiency and performance of microlet services through expanding, truncating, rerouting, or combining routes that are currently underperforming.	✓	-	✓	✓	-	-	DNTT	Restructuring of Dili microlet routes completed in this Public Transport Master Plan Update
2	Short	2023-2025	Microlet Service Refinements	Operation	Dili	• Refine Dili microlet services (headway/required vehicles) to meet demand, while improving performance for each route	• Improve the efficiency and performance of microlet services through the adjustment of service frequencies and vehicles deployed to provide the appropriate level of service for each route given its existing and future demand characteristics.	✓	-	✓	✓	-	-	DNTT	-
3	Short	2023-2025	Regional Bus Service Refinements	Operation	Country-Wide	• Refine regional bus services (trips per day/required vehicles) to meet demand, while improving performance for each route	• Improve the efficiency and performance of microlet services through the adjustment of trips operated per day and number of vehicles required to provide the appropriate level of service for each route given its existing and future demand characteristics.	✓	-	✓	✓	-	-	DNTT	-
4	Short	2023-2025	Dili Bus Stops	Facility	Dili	• Provide 50 bus stops across Dili in key demand-generating locations.	• Bus stop infrastructure (including clear pole and signage; shelter and seating) as well as pedestrian improvements benefit both passengers and operational efficiency.	✓	✓	✓	-	-	1,850,000	MOTC, MPW	-
5	Short	2023-2025	Timetable for Regional Bus	Operation	Country-Wide	• Introduce a timetable of regional bus services including providing training sessions to public officials and consulting with bus drivers and passengers.	• Timetables for public transport service adds to the reliability of the system - while broad scale timetables (e.g., microlets) will require further planning and development of the operating sector - introducing a basic timetable for regional bus services aligns with passenger preferences and will improve the user experience of the system.	✓	-	✓	✓	-	-	DNTT	-
6	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• Outline and implement the Public Transport Department of the Land Transport Authority as part of the Transition Plan of the LTA	• Further specificity around a public transport department of the LTA is needed to clearly define roles and responsibilities for public transport within the broader LTA functions.	-	-	-	-	✓	-	MOTC	-
7	Short	2023-2025	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Facilitate operator forums to discuss establishment of operator association	• The current individual owner-operator model in Timor-Leste creates individual operator incentives that limit the overall passenger focus of the network - establishing an operator association is the first step in a more coordinated and professionalized operator sector.	-	✓	-	✓	-	-	MOTC	-
8	Short	2023-2025	Road Improvement and Maintenance	Supporting Infrastructure	Country-Wide	• Engage with MPW on road improvement / maintenance to improve travel times and reliability of inter-city services	• Road quality is essential for shorter public transport travel times and greater reliability of services, particularly for regional routes.	✓	-	-	✓	-	-	MOTC	-
9	Short	2023-2025	Design Guidelines	Institutional	Country-Wide	• Establish design guidelines for public transport facilities including bus stops, terminals, and depots.	• Clear design guidelines linked to passenger outcomes will contribute to quality design and implementation - resulting in comfortable, safe, and operationally efficient facilities.	-	✓	✓	✓	✓	-	MOTC	-
10	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Organize specialized training programs for law enforcement officials on traffic and public transport laws, strengthen inter-agency collaboration, and promote public awareness campaigns on traffic and public transport laws.	• Improve the efficiency of current operations - including reducing keliling, improving route adherence and maintaining safe vehicles. These initial actions provide preparation for a more coordinated and professionalized sector in the medium and long term.	-	✓	✓	-	-	100,000	MOTC	-
11	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Organize specialized training programs for law enforcement officials on traffic and public transport laws. This can include understanding these laws, their enforcement methods, and dealing with violations effectively.	• Currently some level of traffic enforcement is conducted, however specific enforcement around public transport is limited.	-	✓	✓	✓	-	100,000	MOTC	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
12	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Organize specialized training programs for road safety, for DNTT and the Police who are responsible to managing traffic conditions.	• Road conditions are observed to be unsafe, with public transport vehicles contributing to this. Microlet drivers in some instances are observed cutting across busy traffic with full vehicles. Passengers can be observed hanging from the side of the vehicle. Such training can lead to better understanding of potential safety risks.	-	✓	✓	✓	-	100,000	MOTC	-
13	Short	2023-2025	Existing Law Enforcements	Institutional	Country-Wide	• Strengthen collaboration between transport departments, law enforcement agencies, and judicial systems, including between DNTT and PNTL and SEII.	• This can ensure coherent enforcement of laws, swift handling of violations, and effective legal recourse.	-	✓	✓	✓	-	-	MOTC, PNTL, SEII	-
14	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Conduct public awareness campaigns to educate the general public, transport operators, and users about traffic and public transport laws. Specific public awareness campaigns should include sexual harassment campaigns on public transport.	• An informed public can aid in better compliance and enforcement.	-	✓	✓	✓	-	100,000	MOTC	-
15	Short	2023-2025	Timetable for Regional Bus	Capacity Building	Country-Wide	• Organize training sessions for public sector officials on the basic principles of bus timetable development, including concepts of route frequency, peak and off-peak scheduling, and interconnections with other services.	• There is currently no timetable for services – with the business model of driver/operators resulting in drivers waiting until buses are full before departing. here is limited capacity for public transport planning and scheduling within DNTT.	-	-	-	✓	-	100,000	MOTC	-
16	Short	2023-2025	Timetable for Regional Bus	Institutional	Country-Wide	• Consult with bus drivers and passengers during the timetable development process.	• Operator input to timetable development can provide valuable on-the-ground insights and operational perspectives, ensuring any changes benefit both users and the operators.	-	✓	-	✓	-	-	MOTC	-
17	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• If the Government decides to proceed with the LTA, submit and pass relevant legislation to provide government mandate for LTA establishment.	• While the LTA has been outlined, the relevant laws have not been submitted/passed by the Government of Timor-Leste, and as such there has been limited progress towards establishment of a Public Transport Department.	✓	-	-	✓	-	-	MOTC	-
18	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• If the Government decides to proceed with the LTA, incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning.	• Currently the public transport department within the proposed LTA has had limited definition, and further clarity of roles and responsibilities is required to operate the network effectively.	✓	-	-	✓	-	-	MOTC	-
19	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• If the Government decides to proceed with the LTA, refer to detailed reform proposals as part of previous LTA establishment work and road mapping.	• Ensure alignment to previous work and leverage insights and recommendations that have been developed.	✓	-	-	✓	-	-	MOTC	-
20	Short	2023-2025	Facility Operations	Institutional	Country-Wide	• Develop operational framework for facility operations, defining model selected and roles of the private sector (fully public / DNTT; public private partnership; or contracting models).	• There is no current operational framework that surrounds facility operations. Operationally, vehicles move through facilities in an ad-hoc fashion. Public transport facilities were constructed under the Indonesian Government and over the past twenty years have deteriorated in quality without maintenance.	✓	-	-	✓	-	-	MOTC	-
21	Short	2023-2025	Facility Operations	Capacity Building	Country-Wide	• Include municipal authorities in capacity building of facility management to ensure integration with surrounding urban area.	• Municipalities play an important role in managing the urban environment and involving them in capacity building can benefit the broader system, particularly as it relates to public transport operations surrounding terminals.	✓	✓	✓	✓	-	100,000	MOTC	-
22	Short	2023-2025	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Educate the private sector operators on the principles, requirements, and functions of an association.	• Current bus operations occur on an individual driver basis, establishment of a bus operator association has been highlighted in the previous LTA establishment work however has not been progressed.	✓	✓	-	✓	-	-	MOTC	-

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals					Order-of-Magnitude Costs (US$)	Lead Party	Note
								Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future			
23	Short	2023-2025	Road Improvement and Maintenance	Institutional	Country-Wide	• Engage with operators and passengers on road quality impacts on service quality and reliability on the network to prioritize maintenance/ improvement efforts.	• Road quality remains a major inhibitor to public transport service quality and reliability, particularly for regional buses. • The road quality between Dili and most municipalities is of poor quality, creating longer travel times, and creating safety risk for passengers.	✓	-	-	✓	✓	-	MOTC, MPW	-
24	Short	2023-2025	Road Improvement and Maintenance	Institutional	Country-Wide	• DNTT to engage and collaborate with MPW in planning of road renewal and maintenance programs.	• Road quality remains a major inhibitor to public transport service quality and reliability, particularly for regional buses. • The road quality between Dili and most municipalities is of poor quality, creating longer travel times, and creating safety risk for passengers.	✓	-	-	✓	✓	-	MOTC, MPW	-
25	Short	2023-2025	Feasibility Study for Pilot Bus Service	Technical Study	Dili	• Carry out a feasibility study on pilot bus corridor to formulate operating plans, infrastructure plans, costs, financial, E&S, etc.	• Piloting of a new bus system is envisioned by MOTC to operate modern public transport services along the major corridor(s) in Dili using clean high-capacity vehicles suited to the built environment of the city.	✓	✓	✓	✓	✓	500,000	MOTC	-
26	Short	2023-2025	Detailed Engineering Design & Related Surveys	DED	Country-Wide	• Carry out a detailed engineering design on selected facilities	• DED consultants are expected to carry out detailed design on selected terminals based on the results of 2023 ADB feasibility study.	✓	✓	✓	✓	✓	1,500,000	MOTC	DED is expected to be sourced from national government funding.
27	Short	2023-2025	Capex for Piloting of New Bus System in Dili City	Operation	Dili	• Introduce/pilot a new bus system in Dili connecting key generators and developments across the city.	• Support the continued growth of Dili's public transport services with newer and higher capacity vehicles while promoting more environmentally friendly transport modes in align with Timor-Leste's Nationally Determined Contribution and Paris Agreement. On top of this, the Minister supports this idea and is keen to realize this within his term (thus proposed in a short-term plan).	✓	✓	✓	✓	✓	9,720,000	MOTC	Other capital costs such as terminal, ITS, bus lanes, sidewalk/crossing improvements, as well as additional costs for land acquisition/resettlement are not included as these require further assessment under a separate technical study.
28	Short	2023-2025	Annualized Opex for Piloting of New Bus System in Dili City	Operation	Dili	• Support the operation and maintenance of the pilot bus services in Dili.	• Support the continued growth of Dili's public transport services with newer and higher capacity vehicles while promoting more environmentally friendly transport modes in align with Timor-Leste's Nationally Determined Contribution and Paris Agreement. On top of this, the Minister supports this idea and is keen to realize this within his term (thus proposed in a short-term plan).	✓	✓	✓	✓	✓	2,990,000	MOTC	Annualized O&M costs include (i) vehicle-related operating costs (fuel, maintenance, etc.), personnel/labor, as well as indirect bus operating costs (such as admin, indemnity, etc.) - assumed as USD130,000 per bus based on the benchmarking of regional experience; and (ii) O&M costs for bus stops assumed at 2% of capex and depot at 5% of capex. Further refinement of O&M costs is required under a separate technical study.
												Total	**17,160,000**		

Table ES.15: Medium-Term Indicative Investment Plan (2026-2030)

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals					Order-of-Magnitude Costs (US$)	Lead Party	Note
								Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future			
1	Medium	2026-2030	Airport Express Service Proposal	Operation	Dili	• Operate 19.1 km Airport Express from Dili Airport to Tourist Information Center	• Expand the scope of urban public transport services to cover the needs of airport visitors to increase passenger convenience and facilitates the growth of the tourism industry.	✔	-	✔	✔	-	-	DNTT	-
2	Medium	2026-2030	Becora Terminal	Facility	Dili	• Construct a new, modern Becora Terminal on existing site to act as primary interchange location for Microlet services and Eastern Regional Bus routes.	• The current Becora Terminal is outdated and has not been subject to routine maintenance. It is considered unsafe by passengers. A modern facility to support interchange between regional and urban public transport services can improve network efficiency and customer experience.	✔	✔	✔	✔	✔	3,000,000	MOTC, MPW	-
3	Medium	2026-2030	Manleuana Market Terminal	Facility	Dili	• Construct Terminal at Manleuana Market to act as interchange location for Microlet services and Southern Regional Bus routes.	• Manlauana Market already acts as an informal public transport interchange; however, it lacks dedicated infrastructure. • Integrating a passenger facility with the market contributes to economic growth and improved passenger experience.	✔	✔	✔	✔	✔	2,900,000	MOTC, MPW	-
4	Medium	2026-2030	Airport Transit Hub	Facility	Dili	• Construct Airport Transit Hub adjacent airport to act as primary interchange location for Microlet services and Western Regional Bus routes.	• The development of an Airport Transit Hub will improve international connectivity (between Indonesia border and Dili Airport), while also acting as a primary interchange location between regional and urban bus services - improving network efficiency, accessibility, and customer experience.	✔	✔	✔	✔	✔	3,800,000	MOTC, MPW	-
5	Medium	2026-2030	Dili Convention Centre Interchange	Facility	Dili	• Construct on-street interchange at Dili Convention Centre to service urban bus through-routes.	• The Dili Convention Centre Interchange is currently used as an informal interchange location for a large number of microlet services that travel through this location. • However, the absence of passenger infrastructure/amenities reduces the quality of the public transport experience.	✔	✔	✔	✔	✔	200,000	MOTC, MPW	-
6	Medium	2026-2030	Tasitolu Interchange	Facility	Dili	• Construct a more formal on-street interchange at Tasitolu for microlet services	• Improve network efficiency, accessibility, and customer experience in west of Dili.	✔	✔	✔	✔	✔	-	MOTC, MPW	-
7	Medium	2026-2030	Baucau Terminal (Aldeia Samalakuliba)	Facility	Baucau	• Construct Terminal at Baucau Market to act as interchange location for microlet services and regional bus routes	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	1,300,000	MOTC, MPW	-
8	Medium	2026-2030	Lospalos Interchange	Facility	Lospalos	• Construct on-street interchange at Lospalos Bemoris to service microlet and regional bus with additional layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-
9	Medium	2026-2030	Viqueque Interchange	Facility	Viqueque	• Construct on-street interchange at Viqueque City Center to service microlet and regional bus with additional layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-
10	Medium	2026-2030	Suai Interchange	Facility	Suai	• Construct on-street interchange at Suai Market to service microlet and regional bus with layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-
11	Medium	2026-2030	Maliana Interchange	Facility	Maliana	• Construct on-street interchange at Maliana to service microlet and regional bus with layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	**Phase**	**Timeline**	**Strategic Intervention**	**Discipline**	**Location**	**Initiatives**	**Rationale**	**Goal 1: Economic Growth**	**Goal 2: Access for All**	**Goal 3: Livable Cities**	**Goal 4: Mode of Choice**	**Goal 5: Sustainable Future**	**Order-of-Magnitude Costs (US$)**	**Lead Party**	**Note**
12	Medium	2026-2030	Facility Operations	Institutional	Country-Wide	• Develop systems and processes for facility operations as centerpiece of institutional and regulatory reform	• Implementation of modern passenger facilities require effective management and operations to realize the benefits - as such this presents the opportunity to form the centerpiece of broader capacity building efforts.	✓	✓	-	✓	-	-	MOTC	-
13	Medium	2026-2030	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Invest in the professionalization of the operator sector through targeted capacity building programs	• Professionalization of the private sector is integral to the modernization of the public transport sector.	✓	-	-	✓	-	100,000	MOTC	-
14	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Enact collaborative governance between public and private sector (through an operator association) to move away from dealing with individuals	• The current operational structure makes it difficult to coordinate outcomes that are best for passengers. • Collective engagement of the operator sector on the whole offers the opportunity to achieve coordinated outcomes.	✓	-	-	✓	-	-	MOTC	-
15	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Implement more stringent requirements in the private sector (move beyond the licensing model) including requirements for service quality (punctuality, reliability, customer experience)	• Currently operators have limited quality standards imposed on them, and none around the operation of the service (only focused on vehicle safety). • As such, there is no direct incentive to maintain a high-quality service.	-	✓	-	✓	-	-	MOTC	-
16	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Undertake collective negotiation between public sector and operator association	• Collective negotiation between the public and private sectors contributes to fair and transparent decision-making and outcomes that work for each party.	✓	-	-	✓	-	-	MOTC	-
17	Medium	2026-2030	Timetable for Regional Bus and Urban Services	Operation	Country-Wide	• Implement timetabled services for both regional and microlet vehicles for regional and urban services	• Improve the punctuality and reliability of the public transport service country-wide, leading to an improved service quality for passengers.	✓	✓	✓	✓	-	-	MOTC	-
18	Medium	2026-2030	Systems and Processes	Institutional	Country-Wide	• Implement new systems and processes such as technology and management across public and private sectors, for public transport facilities and broader functions to build capacity and professionalization among both sectors	• Modern management and operational approaches can be significantly enhanced by modern technology systems and standard operating procedures to provide consistency and accountability within the public and private sectors.	✓	-	-	✓	-	-	MOTC	-
19	Medium	2026-2030	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Invest in the professionalization of the private sector through targeted capacity building programs, in terms of public transport and organizational management.	• Limited capacity in both the public and private sectors for collaborative governance around public transport – the private sector particularly will need professionalizing and organizing in order to realize collaborative governance.	✓	✓	-	✓	-	-	MOTC	-
20	Medium	2026-2030	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Establish clear frameworks outlining the roles, responsibilities, and expectations of all parties in the collaborative governance process.	• Collaboration frameworks can help prevent misunderstandings and ensure all stakeholders are working towards the same objectives.	✓	-	-	✓	-	-	MOTC	-
21	Medium	2026-2030	Public Transport Governance	Capacity Building	Country-Wide	• Government training programs to support knowledge and skills development in public transport systems and the principles of good networks.	• Current licensing terms are basic and do not incorporate broader public transport outcomes. • There is limited public transport skills within the government currently to strategize and incorporate context-specific requirements into licensing agreements.	✓	-	-	✓	-	100,000	MOTC	-
22	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Increase government budget allocation for planning and policy roles to improve the government's ability to identify and monitor service quality objectives and link these to license agreements.	• Additional funding and staffing will be required to monitor service and quality outcomes.	✓	-	-	✓	-	-	MOTC	-
23	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Collaborative Governance and Bargaining: Invest in training government and the private sector in collaborative governance and bargaining.	• There is limited capacity in the public and private sectors around public transport collective negotiation due to the current informal nature of the private sector.	✓	-	-	✓	-	-	MOTC	-

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals					Order-of-Magnitude Costs (US$)	Lead Party	Note
								Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future			
24	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Develop a thorough understanding of the legal and regulatory context in which negotiations take place.	• Legal and regulatory understanding can inform the negotiation strategy and ensure that any agreements reached are legally sound and enforceable.	✓	-	-	✓	-	-	MOTC	-
25	Medium	2026-2030	Public Transport Governance	Capacity Building	Country-Wide	• Develop capacity in understanding and responding to the interests and concerns of the operator association. This includes regular engagement with the association and its members to understand their perspectives.	• It is important that negotiations and agreements do not adversely impact the private sector, and as such stakeholder interests should be included and reflected in agreements.	-	✓	-	✓	-	100,000	MOTC	-
26	Medium	2026-2030	Public Transport Governance	Capacity Building	Country-Wide	• Develop capacity in creating clear, focused negotiation agendas. Agendas should outline the topics to be discussed, the objectives of the negotiation, and the expected outcomes.	• Ensures that negotiations are productive and targeted.	✓	-	-	✓	-	100,000	MOTC	-
27	Medium	2026-2030	Timetable for Regional Bus and Urban Services	Capacity Building	Country-Wide	• Building on momentum of skills development in previous actions, invest in government skills development in public transport scheduling and timetabling to foster the implementation of microlet timetables.	• There is limited capacity within the government currently for timetable scheduling. • It is assumed that some technical skills can be developed through the implementation of regional timetables in the short-term, with this medium-term imitative then building on that momentum.	-	✓	✓	✓	-	100,000	MOTC	-
28	Medium	2026-2030	Timetable for Regional Bus and Urban Services	Institutional	Country-Wide	• Facilitate engagement with key stakeholders throughout microlet timetabling process, including passengers, operators, and business owners.	• Ensure that timetable outcomes benefit users within the community, operators, and business owners.	✓	✓	-	✓	-	-	MOTC	-
29	Medium	2026-2030	Systems and Processes	Capacity Building	Country-Wide	• Conduct training programs on operational systems and process for effective management of public transport facilities.	• Currently limited capacity to deliver sector-wide systems and processes beyond licensing and monitoring of facilities. • Implementation of new public transport facilities will both require additional technical capabilities to be developed while also acting as a cornerstone for broader capacity and skills development.	✓	✓	✓	✓	✓	100,000	MOTC	-
30	Medium	2026-2030	Parking Strategy for Dili City	Technical Study	Dili	• Conduct a technical study on parking policies and strategies for Dili City	• Comprehensive parking management strategy to fully inventory parking patterns, illegal parking on the sidewalks, then identify city-wide parking restrictions, parking payment systems, areas for off-street lots, etc. to improve performance of public transport services.	✓	-	✓	-	✓	300,000	MOTC	-
31	Medium	2026-2030	City-Wide Traffic Improvement Study	Technical Study	Dili	• Conduct a technical study on traffic management system and improvement plans for Dili City	• Comprehensive traffic study would identify causes of congestion and recommendations to optimize traffic in Dili which will result in improving reliability and performance of public transport services.	✓	-	✓	-	✓	500,000	MOTC	-
32	Medium	2026-2030	Technical Study on Fares and Ticketing System in Public Transport	Technical Study	Country-Wide	• Conduct a technical study to formulate a roll-out plan for introducing a new ticketing system for Timor-Leste's public transport system.	• Modern ticketing system will improve efficiency and attractiveness of public transport system. • A gradual transition of the ticketing system is necessary together with implementation of standardized scheduling of public transport services and an enhanced passenger information system.	✓	✓	-	✓	✓	400,000	MOTC	-
33	Medium	2026-2030	Active Mobility Study	Technical Study	Dili	• Conduct a technical study on active mobility to create a safe, inclusive walking environment for all	• Walking is the start/end mode of every trip, and it is essential to create a safe, inclusive walking environment for all groups of society (including elderly, children, disabled people) to encourage modal shift from private vehicles to sustainable travel options such as public transport.	✓	✓	✓	✓	✓	300,000	MOTC	-
34	Medium	2026-2030	Dili Urban Transport Modernization Study	Technical Study	Dili	• Conduct a study to modernize and improve a city-wide bus-based public transport system,	• Transition to a modern bus-based system involves potential phase-out of existing microlet services (both vehicles and operators/drivers). The modern	✓	✓	✓	✓	✓	500,000	MOTC	

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals: Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
						with improved and modern contracting mechanisms that ensure supply meets demand.	public transport will include performance-based contracts, integrated fare collection systems, and streamlined service operations.								
35	Medium	2026-2030	Overarching Support for Regulatory/ Institutional Refinements	Institutional	Country-Wide	• Provide overarching support for institutional/regulatory refinements	• This covers various institutional/regulatory initiatives proposed in the medium term.	✓	✓	✓	✓	✓	250,000	MOTC	
												Total	**14,530,000**		

Table ES.16: Long-Term Indicative Investment Plan (2031-2035)

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals					Order-of-Magnitude Costs (US$)	Lead Party	Note
								Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Livable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future			
1	Long	2031-2035	Airport Express Service Proposal	Operation	Dili	• Operate 71.3 km Airport Express from Dili Airport to Metinaro	• Expand scope of urban public transport services to cover needs of airport visitors to increase convenience and facilitates growth of tourism industry in connection to the development of new urban area in Metinaro.	✓	-	✓	✓	-	-	DNTT	-
2	Long	2031-2035	Dili Port Interchange	Facility	Dili	• Construct Dili Port Interchange adjacent to port to act as primary interchange location for Microlet services	• Improve network efficiency, accessibility, and customer experience near Dili Port.	✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
3	Long	2031-2035	Ulmera Interchange	Facility	Dili	• Construct on-street interchange at Ulmera to service urban bus through-routes	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
4	Long	2031-2035	Tibar Interchange	Facility	Dili	• Construct on-street interchange at Tibar to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
5	Long	2031-2035	Hera Interchange	Facility	Dili	• Construct on-street interchange at Hera to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
6	Long	2031-2035	Wenunuc Interchange	Facility	Dili	• Construct on-street interchange at Wenunuc to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
7	Long	2031-2035	Metinaro Interchange	Facility	Dili	• Construct on-street interchange at Metinaro to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
8	Long	2031-2035	Aileu Interchange	Facility	Aileu	• Construct on-street interchange at Aileu to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
9	Long	2031-2035	Maubisse Interchange	Facility	Maubissa	• Construct on-street interchange at Maubisse to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
10	Long	2031-2035	Manatuto Interchange	Facility	Manatuto	• Construct on-street interchange at Manatuto to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
11	Long	2031-2035	Same Interchange	Facility	Same	• Construct on-street interchange at Same to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
12	Long	2031-2035	Ainaro Interchange	Facility	Ainaro	• Construct on-street interchange at Ainaro to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
13	Long	2031-2035	Liquica Interchange	Facility	Liquica	• Construct on-street interchange at Liquica to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
14	Long	2031-2035	Batugade Border Interchange	Facility	Batugade	• Construct on-street interchange at Batugade Border to service microlet and regional bus with additional layover parking to serve both inter or inner country travel		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
15	Long	2031-2035	Batugade Interchange	Facility	Batugade	• Construct on-street interchange at Batugade to service microlet and regional bus		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
16	Long	2031-2035	Ermera Interchange	Facility	Ermera	• Construct on-street interchange at Ermera to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
17	Long	2031-2035	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Invest in training sessions on the various aspects of franchising and contract models in PT – including how various models are structured, the principles of competitive tendering and contract management	• Prepare operators to be competitive for future franchising and contracting models as the public transport system modernizes.	✓	-	-	✓	-	100,000	MOTC	-
18	Long	2031-2035	Legal and Regulatory Framework Development	Institutional	Country-Wide	• Develop or refine the legal and regulatory frameworks necessary to support franchising and competitive tendering	• Establish the necessary legal and regulatory frameworks to support the coordinated operation of a modern public transport system.	✓	✓	-	✓	-	-	MOTC	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	**Phase**	**Timeline**	**Strategic Intervention**	**Discipline**	**Location**	**Initiatives**	**Rationale**	**Goal 1: Economic Growth**	**Goal 2: Access for All**	**Goal 3: Livable Cities**	**Goal 4: Mode of Choice**	**Goal 5: Sustainable Future**	**Order-of-Magnitude Costs (US$)**	**Lead Party**	**Note**
19	Long	2031-2035	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Develop the capacity of local operators to participate in competitive bidding. This can include training on preparation of proposals/bids, understanding contract requirements, and the implications of contract obligations	• Ensure that operators are informed and able to participate in modern bidding processes for public transport service operations.	✓	-	-	✓	-	-	MOTC	-
20	Long	2031-2035	Training on Vehicle Procurement	Capacity Building	Country-Wide	• Invest in training programs for government officials on the principles and best practice of vehicle procurement. This includes understanding specifications, procurement processes, and negotiating contracts with vehicle suppliers	• Prepare the Timorese government for future modernization of the public transport fleet and establish capacity for bulk procurement.	✓	-	-	✓	✓	100,000	MOTC	-
21	Long	2031-2035	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Invest in training sessions on the various aspects of franchising and contract models in public transport – including how various models are structured, the principles of competitive tendering and contract management.	• Current capacity is very limited; however, it is assumed that some capacity will be developed over time through actions in the short and medium terms.	✓	✓	-	✓	-	100,000	MOTC	-
22	Long	2031-2035	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Develop or refine the legal and regulatory frameworks necessary to support franchising and competitive tendering.	• Current legislative and regulatory frameworks are not clear enough on franchising/contracting of public transport service operations.	✓	-	-	✓	-	-	MOTC	-
23	Long	2031-2035	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Develop the capacity of local operators to participate in competitive bidding. This can include training on preparation of proposals/bids, understanding contract requirements, and the implications of contract obligations.	• Competitive bidding processes are most successful when the private sector can develop strong proposals and have adequate capacity to deliver them. • Local firms should be included and considered in these processes to maximize local benefit.	✓	✓	-	✓	-	100,000	MOTC	-
24	Long	2031-2035	Modern Vehicle Procurement	Capacity Building	Country-Wide	• Build capacity in managing vehicles post-purchase. This includes understanding maintenance requirements, lifecycle cost analysis, and replacement planning.	• Ensures a sustainable an ongoing high-quality system, not a 'once off' purchase that deteriorates over time and then cannot be replaced.	✓	-	-	✓	✓	100,000	MOTC	-
25	Long	2031-2035	Modern Infrastructure and Maintenance	Capacity Building	Country-Wide	• Conduct training programs on modern infrastructure planning, implementation, and maintenance. This includes understanding the lifecycle of infrastructure assets, modern maintenance techniques, and the cost impacts.	• Current capacity is limited, and existing public transport assets are not maintained.	✓	-	✓	✓	✓	100,000	MOTC, MPW	-
26	Long	2031-2035	Modern Infrastructure and Maintenance	Institutional	Country-Wide	• Adopt standards for public transport infrastructure to guide the construction and maintenance of public transport.	• Current capacity is limited, and existing public transport assets are not maintained.	✓	✓	✓	✓	✓	-	MOTC, MPW	-
27	Long	2031-2035	Modern Infrastructure and Maintenance	Capacity Building	Country-Wide	• Build capacity in procurement and contract management for public transport projects specifically, working with the National Procurement Commission (NPC).	• The NPC has broad experience over a range of infrastructure sectors however there has been limited procurement of public transport-specific assets.	✓	-	-	✓	-	100,000	MOTC, MPW, NPC	-
28	Long	2031-2035	Modern Infrastructure and Maintenance	Institutional	Country-Wide	• Establish regular, preventive maintenance programs for public transport infrastructure. This should include post-purchase asset management of vehicles.	• Contributes to the ongoing sustainability of high-quality assets that deliver an attractive public transport system for users.	✓	✓	✓	✓	✓	-	MOTC, MPW	-
29	Long	2031-2035	Digitization	Institutional	Country-Wide	• Provide training to public sector officials on the use and benefits of digital technologies in managing and optimizing public transport.	• The only current application of digital technologies within the public transport system is a database managed by DNTT for storing vehicle registrations. • There is no existing capacity for applying digital technologies for service delivery, planning or optimization of the network.	✓	-	-	✓	-	-	MOTC	-
30	Long	2031-2035	Digitization	Institutional	Country-Wide	• Establish partnerships with technology providers who can supply the tools and expertise necessary for implementation.	• The transfer of expertise and knowledge, such as from international implementation, can accelerate	✓	-	-	✓	-	-	MOTC	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	**Phase**	**Timeline**	**Strategic Intervention**	**Discipline**	**Location**	**Initiatives**	**Rationale**	**Goal 1: Economic Growth**	**Goal 2: Access for All**	**Goal 3: Livable Cities**	**Goal 4: Mode of Choice**	**Goal 5: Sustainable Future**	**Order-of-Magnitude Costs (US$)**	**Lead Party**	**Note**
							the learning curve in Timor-Leste on digital technologies.								
31	Long	2031-2035	Digitization	Capacity Building	Country-Wide	• Build capacities in collecting, managing, and analyzing the large amounts of data that digital technologies can generate.	• Data generated from public transport system operations provides a robust evidence base for the ongoing improvement of the network.	✓	-	-	✓	-	100,000	MOTC	-
32	Long	2031-2035	Digitization	Institutional	Country-Wide	• Conduct pilot projects to test different technologies before rolling them out at scale.	• This allows benefits and challenges to be understood, and parties to make any necessary adjustments ahead of scaling up initiatives.	✓	-	-	✓	-	-	MOTC	-
33	Long	2031-2035	Digitization	Capacity Building	Country-Wide	• Develop capacities in cybersecurity to protect the integrity of digital systems and the privacy of users.	• Cyber-attacks are a major risk associated with the implementation of digital technology. • Given the management of public data, it is important that this data is adequately protected for the benefit of the community.	✓	-	-	✓	✓	100,000	MOTC	-
34	Long	2031-2035	Safeguard Monitoring	Monitoring	Country-Wide	• Monitor and measure the progress of the project implementation (i.e., terminal development/improvement) to ensure compliance with ADB safeguards policy and procedures	• Ensuring compliance with environmental and social safeguards (including gender, settlement, indigenous people) will bring benefits to the affected residents and community located in the project areas.	-	✓	✓	-	✓	500,000	MOTC	-
35	Long	2031-2035	Overarching Support for Regulatory/ Institutional Refinements	Institutional	Country-Wide	• Provide overarching support for institutional/regulatory refinements	• This covers various institutional/regulatory initiatives proposed in the long term.	✓	✓	✓	✓	✓	250,000	MOTC	-
36	Long	2031-2035	Introduction of Intercity Transport between Dili and Metinaro	Operation	Dili	• Connect Dili city center and a planned administrative city Metinaro by introducing a direct public transport system to enhance regional connectivity along this key northern corridor.	• The development of Metinaro as a new administrative city will generate travel demand to/from Dili and providing newer and higher capacity public transport vehicles will contribute to improving the livelihood of people and enhancing economic activities along the corridor	✓	✓	✓	✓	✓	-	MOTC	US$2.7 million was assumed for procurement of 6 diesel buses for Intercity Transport (Dili-Metinaro) in Dili Urban Master Plan Update. Further assessment on the feasibility of the new bus system is required.
												Total	**3,450,000**		

Conclusion

This Public Transport Master Plan has considered previous analyses, analysis of existing conditions on the ground, as well as forecast conditions in the future. It serves as a roadmap to fundamentally alter and enhance the public transport system in Timor-Leste as well as urban areas including Dili – focusing not only on service modifications to better align service with demand (to both reduce duplication of service, vehicle surplus on the road, and network inefficiencies) and simplify/systematize the network to make it more accessible and convenient for all types of users. It also includes facility improvements to create better and safer passenger waiting areas, more efficient facility operations and renewed/new infrastructure to better use existing space and accommodate future growth (and possibly conversion of microlet to buses) at terminals as well as bus stops (including first/last-mile enhancements to sidewalks and crossings).

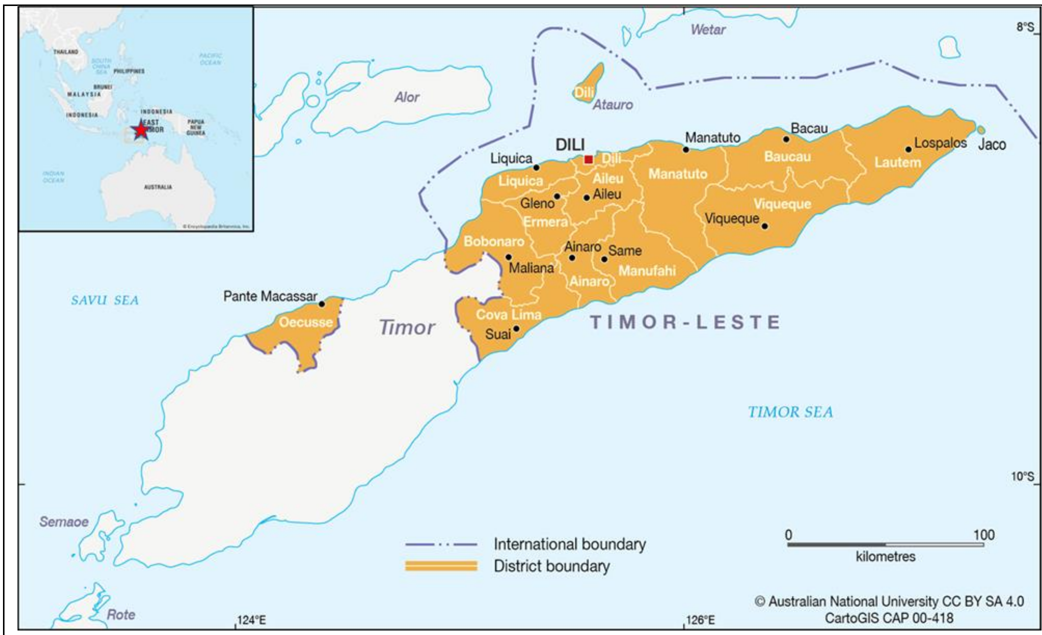
At the same time though, the Public Transport Master Plan highlights what else needs to be "done" to achieve the service and infrastructure aspirations. As shown by a comprehensive review of the overarching regulatory and institutional framework – various reforms and refinements are needed to evolve to a facilitating environment that better plans, manages, and regulates public transport services – this ranging from new roles and responsibilities, as well as institutions, etc. The pathway to go from today to the envisioned future also requires a strong capacity building element both for the public and private sector. The estimated investment packages envisioned by phase may be contrasted with national allocated budgets to identify funding requirements and potential innovations funding approaches/mechanisms. Lastly, it is hoped that this Public Transport Master Plan can not only inspire the Government and the municipalities and various stakeholders, but also be used to identify potential synergies with other development partners and stakeholders to enhance implementation and effectiveness of such measures.

1 Introduction and Background

1.1 Introduction

Timor-Leste is Southeast Asia's newest country located between Indonesia and Australia. It includes the eastern half of the island of Timor (with an area of about 14,000 km^2), an exclave on the northwestern side of the island known as Oecusse (815 km^2), Atauro Island to the north (150 km^2), and Jaco Island to the east (11 km^2).[17] Altogether, the country has a cumulative area of about 15,000 km^2 with a total population of about 1.34 million (based on the 2022 Census). Population has grown at an average of 1.8% per year from 2015 to 2022, and the population is projected to reach 1.59 million by 2030.[18,19]

Dili, the capital of Timor-Leste, is located along the northern coast as shown **Figure 1.1**. It has some 324,000 residents (based on the 2022 Census) having grown at an average rate of 2.7% per year from 2015 to 2022, much faster than that nationally (at 1.8% annually).[20] Dili is projected to grow to over 833,000 residents by 2030. Other major cities include Ermera (138,000 residents), Baucau (134,000 residents), and Bobonaro (107,000 residents).



Source: Australian National University

Figure 1.1: Map of Timor-Leste

Based on the 2022 Census, Timor-Leste is predominantly rural with nearly 68% of the population living in rural areas and villages scattered throughout the country. The most populous city of Dili has a population density of 1,425 residents/km^2, while other rural cities have densities of less than 100 residents/km^2 (except for Ermera at 179 and Liquica at 152 residents/km^2).

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[17] Source: http://timor-leste.gov.tl/?p=91&lang=en

[18] Source: Ministry of Finance. 2022. Population and Housing Census 2022 – Preliminary Results.
The population trends in the Census 2022 reveal that the population growth has steadily slowed since the last census conducted in 2015 and 2022 (for instance, the average annual growth rate in 2010 and 2015 was 2.4% and 2.1%, respectively).

[19] Source: ADB. 2022. Timor-Leste – Public Transport Master Plan Update.

[20] Source: Ministry of Finance. 2022. Population and Housing Census 2022 – Preliminary Results.

The public transport system in Timor-Leste faces key challenges that constrain/inhibit attractiveness and more widespread use:

- **Growing Population and Demand for Travel**[21] – As noted, the population in Timor-Leste is expected to grow to 1.59 million by 2030 (833,000 in Dili), resulting in higher trip demand, additional vehicles on the road and congestion, as well as more congested public transport operations. ***More people traveling will increase the stress and strain on the existing public transport system, predominantly operated by informal enterprises. More people will drive or use private vehicles, leading to congestion and emissions, if step-changes are not made to improve public transport and make it more attractive as a travel alternative.***

- **Public Transport Attractiveness Constrained by Level of Service and Infrastructure –** Public transport (comprised of buses, microlets, and anggunas) account for about 25% of all trips in Timor-Leste. Attractiveness of public transport as a viable alternative to private vehicles and motorbikes is constrained by unscheduled and unreliable services, overcrowded low-capacity vehicles, short operating hours, and poor riding experience (such as lack of air-conditioning and older, poorly maintained vehicles). Bus infrastructure including bus stops, shelters, and terminals are in relatively poor condition. First/last-mile access to/from the bus stops and terminals has not been prioritized, making walking trips (and interlinkage with other modes such as private vehicles or motorbikes) inconvenient and uncomfortable. There is also a lack access-for-all facilities at terminals and bus stops to ensure safe and inclusive experiences for women and disadvantaged groups. These myriad issues combine to create a negative impression of bus services, resulting in uncomfortable and unsafe public transport journeys. ***Concerted efforts to improve bus service, bus infrastructure, as well as the perception of bus services are essential to attracting public transport users.***

- **Weak Regional Connectivity Limits Access to Jobs and Services** – As noted, Timor-Leste is predominantly rural with nearly 68% of the population living in rural areas. Limited inter-city and inter-regional transport options impose challenges for rural residents in accessing community services, healthcare, education, and job opportunities in major cities such as Dili. ***Better access to reliable public transport systems in all regions of the country is essential for inclusive development of the country.***

- **Slow Travel Speeds Impacting Journey Experience by Public Transport** – Average travel speeds range from 10-20 kph (during the morning, mid, and evening peak hours on weekdays) in urban areas of Dili, to below 10 kph in areas such as Colmera.[22] Public transport speeds in urban areas are slower than normal due to congestion and slow-moving roads, as well as frequent stop-and-go (including to load/unload passengers). These relatively slow travel speeds can elongate journeys and make public transport modes less competitive against other modes and inhibit modal shift to public transport. ***Slow travel speeds can elongate journeys and make public transport modes less competitive and attractive.***

- **Climate Change Impact on Current and Future Bus Infrastructure** – Timor-Leste is vulnerable to natural disaster and climate change impacts, which threaten Dili and other cities. The frequency and severity of flooding is increasing, for

[21] Source: JICA 2016 Dili Urban Master Plan.
[22] Source: Ministry of Planning and Territory. 2022. Dili Urban Master Plan Update.

instance Tropical Cyclone Seroja in 2021 brought flash floods and landslides to all 13 municipalities in Timor-Leste, with nearly 80% of households in Dili being impacted.[23] During these inundation events, most main roads (particularly lowland, coastal areas in Dili) experience flooding, disrupting transport connectivity and causing significant direct/indirect economic losses. ***Current and future bus infrastructure (including bus stops and terminals) will continue to face inundation and climate change related impacts – thus planning and design must integrate the latest urban resilience and sustainable designs to minimize forthcoming impacts on public transport and allow buses to serve as a viable, safe, and convenient mode during these events.***

- **Limited Government Oversight on Efficiency, Safety and Attractiveness of Public Transport -** The Government maintains minimal oversight over intra-city and inter-regional services, as well as fixed microlet services. For instance, the Government approves the right to operate on a route, but does not specify/monitor service levels, service quality, or vehicle standards. Furthermore, the Government does not provide operating subsidies on these routes (except the noted subsidized fuel for microlet operators), encouraging operators to focus on profitable corridors and place less priority on routes providing "coverage" to key population areas or to provide high-quality services. Furthermore, the government does not penalize drivers for unsafe and unattractive conditions, leading to overcrowded vehicles, aggressive/coercive passenger herding (called *konja*), and long waits at terminals to fill up passengers (known as *keliling*).[24, 25] ***Therefore, the current institutional/regulatory framework does not incentivize quality of service and penalize unsafe and unlawful driving behavior – thus bus reform is not only an issue of service and infrastructure, but also creating an enabling framework.***

As part of this study, the Arup Study Team reviewed the following relevant documents that guide the preparation and update of the 2023 PTMP as shown

Table 1.1:

Table 1.1: Summary of Relevant Documents Reviewed

#	Document & Quick Summary	Agency	Year	Geographic Extent	Land Use Plan	Transport Master Plan	Public Transport Plan
1	Dili Urban Master Plan – Land use master plan for Dili up to 2030	JICA	2016	Dili	X		
2	Dili Urban Master Plan Update – Update to the 2016 Urban Master Plan with a roadmap up to 2045	Ministry of Planning and Territory (MPT)	2023	Dili	X		
3	Timor-Leste Public Transport Project Master Plan (PTMP) 2016 – Public transport master plan focusing on sector diagnostic, infrastructure, and institutional framework (no future vision proposed)	Asian Development Bank	2016	National			X
4	Timor-Leste Public Transport Master Plan 2022 – Update to the 2016 PTMP focusing on facility improvements	Asian Development Bank	2022	National			X
5	Timor-Leste Transport Sector Master Plan – providing policy and strategic directions in the area of	Ministry of Development and	2018	National		X	

[23] Source: Ministry of Planning and Territory. 2022. Dili Urban Master Plan Update (Draft). This study will be referred to as the 2022 Dili Urban Master Plan Update.
[24] Source: The Asia Foundation. 2015. A Political Economy of Public Transportation in Timor-Leste.
[25] Keiling (drivers slowly circling areas outside of a terminal to board more passengers) is illegal but tolerated by traffic police.

#	Document & Quick Summary	Agency	Year	Geographic Extent	Land Use Plan	Transport Master Plan	Public Transport Plan
	land transport, sea transport, and air transport at national level	Institutional Reform					

1.2 Objectives of the Study

Against this backdrop, the ADB is funding a multi-faceted study to improve public transport services and facilities in Timor-Leste by building on the findings and analysis from the 2022 Timor-Leste Public Transport Master Plan (PTMP) Update (hereinafter referred to as the 2022 PTMP).[26] This study will support the Government of Timor-Leste's planned public transport reforms to provide: (i) a high-quality, sustainable public transport system that meets the needs of users for safety, comfort, security, convenience, affordability, accessibility, and availability; and (ii) a transparent and stable regulatory environment that encourages on-going private sector investment and operations.

The findings from this ADB Study will strengthen the position of Dili as the principal transport hub in the country and lay the groundwork to develop a sustainable and viable public transport system that can be replicated and adopted for Timor-Leste – through enabling planning, operating, and institutional frameworks and structures – based on international best practice aligning with national and local considerations and conditions.

A focus of this study is to produce an independent updated PTMP (to be referred to as the 2023 PTMP) based on the review of the 2022 PTMP including a public transport sector assessment, route analysis and network optimization study, investment plans with phases and cost estimates, options analysis for public transport facilities, suggestions for innovative solutions, as well as areas for capacity building and regulatory development.

Focus of the Timor-Leste 2023 Public Transport Master Plan (i.e., 2023 PTMP)

As will be delved into in subsequent sections, the 2022 PTMP focused largely on developing the facility and infrastructure strategy for terminals handling both microlets and regional buses throughout the country. Provision of terminals and hard infrastructure, however, may not necessarily lead to the stepwise improvements in public transport sought in the country, to make public transport more attractive, convenient, and efficient as an effective alternative to driving and motor vehicles.

As such, this Update will not only look to refine the infrastructure strategy, but also focus on refining an overarching vision for public transport in Timor-Leste, improving efficiency of the microlet and regional bus operations and services, providing overarching guidelines for the design of various types of passenger/bus facilities, as well as assessing institutional and regulatory elements that can facilitate an enhanced level of service and operating environment. These elements will form the framework for the updated Public Transport Master Plan.

1.3 Purpose of the Master Plan

The purpose of the Timor-Leste 2023 Public Transport Master Plan is to review the previous 2022 PTMP and produce an independent PTMP (2023 PTMP) which contains a review of the latest existing information, routing/network assessment, field surveys, engineering studies, costing, legal/regulatory assessment, as well as institutional capacity assessment. ***This 2023 PTMP will contain a list of time-bound action plans and priority***

[26] The 2022 PTMP is an update of a previous iteration of the 2016 PTMP.

improvements measures for public transport services and facilities up to Year 2035. Three timelines for the action plan are proposed to align with the Dili 2045 Urban Master Plan as follows:

- **Phase 1 (up to 2025)** – Short-term actions/initiatives that can be adopted relatively quickly to improve service and facilities, with minimal implementation timeline for infrastructure enhancements, as well as minimal modifications to existing institutional or regulatory frameworks (e.g., service and routing changes, operating protocol refinements for terminals, and formulation of design guidelines) – possibly implemented by MOTC and the Timorese Government to facilitate larger-scale investments in latter phases;

- **Phase 2 (2026-2030)** – Medium-term actions/initiatives involving more significant infrastructure enhancements requiring additional design, environmental and social safeguard, as well as land acquisition activities, as well as involving/requiring more substantive institutional and regulatory changes (e.g., new terminals in Dili, regulatory refinements to facilitate creation of a public transport authority (PTA), and capacity building to prepare for eventual contracting); and

- **Phase 3 (2031-2035)** – Long-term actions/initiatives that align with new developments and growth areas in Dili (including Metinaro), as well as continued growth in the population and workforce throughout the country, as well as more substantial changes to the regulatory/institutional framework to enable service contracting.

The results of this report will guide the preparation of a feasibility study for selected projects to inform investment decisions and ensure ongoing and sustainability and operation of public transport facilities and support strategic procurement planning and procurement plan including recruitment assistance for the detailed engineering design consultant.

In addition, the Government of Timor-Leste published a 9th Five-Year Plan in July 2023 to improve the country's economy and prosperity. Land transport (or public transport) is one of the key focus areas briefly highlighted, which includes: (i) focusing on land transport infrastructure and facilities improvement; (ii) improving traffic lights and utilizing new traffic light technologies; (iii) improving public transport safety and security; (iv) improving public transport services; and (v) expanding, improving, and modernizing public transport facilities (terminals). This 2023 PTMP is aligned with the new government's strategic direction and can serve as a key roadmap for the Government of Timor-Leste.

1.4 Structure of the Master Plan

The Report is organized into ten sections as follows:

- **Section 1: Introduction and Background -** highlights the background for the Study, rationale for the Study, and purpose for this report.

- **Section 2: Review of Best Practices in Country-Level Public Transport Master Plan –** presents a review of international best practices, highlighting key elements forming country-level public transport master plans across the globe, informing the framework used for this 2023 PTMP.

- **Section 3: Existing Conditions –** highlights existing demographic and socio-economic conditions, as well as the land use plans for key municipalities in Timor-

Leste, as well as existing information on transport services, facilities, and key public transport issues in Timor-Leste.

- **Section 4: Future Conditions** – highlights future population, land use plans, and planned/committed transport projects including road, public transport, airport, and seaport initiatives in Timor-Leste.
- **Section 5: Vision & Goals** – presents the vision and goals for public transport Timor-Leste that would guide the future development of public transport services and facilities across the country.
- **Section 6: Public Transport Service Enhancements** – presents the detailed profile of Dili microlet routes and countrywide regional bus routes, an optimization framework to guide route-by-route enhancements and updated operating plans, as well as public transport improvement scenarios to inform the demand forecasting activities.
- **Section 7: Public Transport Facility Enhancements** – presents the detailed review of existing terminals and proposed terminal sites, facility assessment framework to identify priority sites, and a shortlist of terminal sites for improvement based on the forecasted demand and operating plans.
- **Section 8: Institutional & Legal Framework** – presents the underlying legal/regulatory framework governing public transport in Timor-Leste, assessment of roles and responsibilities of key stakeholders, and comparison with international best practices to guide proposed refinements to the institutional/legal framework of Timor-Leste.
- **Section 9: Investment Plan with Cost Estimates** – presents the cost estimates for specific initiatives, as well as a phased investment plan.
- **Section 10: Conclusion** – includes a summary of key findings and recommendations, followed by next steps.

1.5 Abbreviations

Abbreviation	Definition
AAGR	Average Annual Growth Rate
ADB	Asian Development Bank
ADN	Agencia de Desenvolvimento Nacional (National Development Agency)
APAD	Land Transport Public Agency, Malaysia
APORTIL	Administration of Ports of Timor Leste
AVC	Automated Passenger Counting System
AVL	Automatic Vehicle Location
ASEAN	Association of Southeast Asian Nations
ATP	Association of Public Transport, Malta
ATRACO	Association des Transports en Commun, Rwanda
BAU	Business as Usual
BOT	Built-Operate-Transfer
BPTJ	Badan Pengelola Transportasi Jabodetabek
BRT	Bus Rapid Transit
CAPEX	Capital Expenditure
CCD	Dili Convention Center
CIA	Central Intelligence Agency

Abbreviation	Definition
COVID	Coronavirus Disease
CAFI	Council for the Administration of the Infrastructure Fund
CBD	Central Business District
CCTV	Closed-Circuit Television
DMA	Dili Metropolitan Area
DBFO	Design, Build, Finance, Operate & Maintenance
DED	Deliverable Expectations Document
DGCS	Directorate General of Corporate Services
DGTC	Directorate General of General Transport and Communications
DGTF	Directorate General of Land and Property
DNTT	National Directorate of Land Transport of Timor-Leste
DNEPCC	National Directorate for Roads, Bridges, and Flood Control
DNSR	National Directorate of Road Safety
DRBFC	Directorate of Roads, Bridges, and Flood Control
EBRD	European Bank for Reconstruction and Development
ESTATAL	Ministry of State Administration
ERP	Electronic Road Pricing
GDP	Gross Domestic Product
GPS	Global Positioning System
GSA	Greater Suva Area
GSTS	Greater Suva Transportation Strategy
DNTT	National Directorate of Land Transport, Timor-Leste
HNGV	Guido Valdares National Hospital
IdFM	Île-de-France Mobilités
IT	Information Technology
ITS	Intelligent Transportation System
JICA	Japan International Cooperation Agency
KIR	Inspection Certificate
KL	Kuala Lumpur
KMTA	Kochi Metropolitan Transport Authority
KTMB	Keretapi Tanah Melayu Berhad
LNG	Liquefied Natural Gas
LEED	Leadership in Energy and Environmental Design
LTA	Land Transport Authority, Timor-Leste
LTMP	Land Transport Master Plan (Singapore)
LTFRB	Land Transportation Franchising and Regulatory Board, Manila
LTRC	Land Transport Regulatory Commission
MININFRA	Ministry of Infrastructure, Rwanda
MCA	Multi Criteria Analysis
MRT	Mass Rapid Transit
MOF	Ministry of Finance, Timor-Leste
MOI	Ministry of Interior
MOJ	Ministry of Justice
MOP	Ministry of Planning and Territory
MOTC	Ministry of Transport and Communications, Timor-Leste
MPS	Major Projects Secretariat
MPT	Ministry of Planning and Territory, Timor-Leste
MPW	Ministry of Public Works, Timor-Leste
MRCB	Malaysian Resources Corporation Berhad
MRT	Mass Rapid Transit
MRTA	Mass Rapid Transit Authority of Thailand

Abbreviation	Definition
NCDC	National Capital District Commission
NFC	Near Field Communication
NPC	National Procurement Commission, Timor-Leste
OPEX	Operating Expenditure
OSM	Open Street Map
PFT	Passenger Ferry Terminal
PITX	Paranaque Integrated Terminal Exchange
PMU	Project Management Unit
PNLIA	Presidente Nicolau Lobato International Airport
PNTL	National Police of Timor-Leste
PPP	Public Private Partnership
PTA	Public Transport Authority
PTC	Public Transport Council, Singapore
PTMP	Public Transport Master Plan
PUVMP	Public Utility Vehicle Modernization Programme, Philippines
QBP	Quality Bus Partnership
RACI	Responsible, Accountable, Consulted Informed
RFI	Request for Information
RFTC	Rwanda Federation of Transport Cooperatives
RTA	Road Transport Authority, Dubai
SL	Storstockholms Lokaltrafik
SLEX	South Luzon Expressway
SLTB	Sri Lanka Transport Board
STNK	Surat Tanda Nomor Kendaraan (Vehicle Certificate)
SUTI	Sustainable Urban Transport Index
SWOT	Strength-Weakness-Opportunity-Threat
TA	Technical Assistance
TBS	Terminal Bersepadu Selatan
TfL	Transport for London
TCRP	Transit Cooperative Research Program
TOD	Transit Oriented Development
TMPQ	2050 Transportation Master Plan for Qatar
TOR	Terms of Reference
UITP	International Association of Public Transport
UNTL	National University of Timor-Leste
UNPAZ	Universidade Da Paz
USAID	United States Agency for International Development
WB	World Bank
WCR	Walk-Cycle-Ride
WHO	World Health Organization
ZEESM	Special Zones of Social Market Economy

2 Review of Best Practices in Country-Level Public Transport Master Plan

2.1 Overview

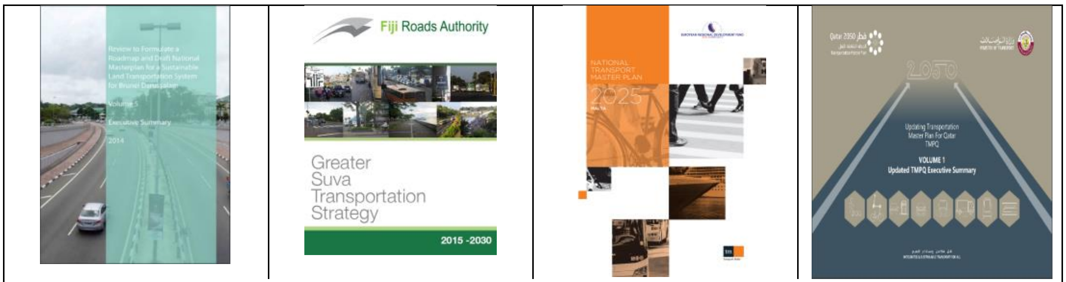
Prior to updating the 2022 PTMP, it is important to understand what other country-level public transport master plans have incorporated in their plans to identify gaps and areas for potential refinement. The purpose of this section is three-fold: (i) present case studies of global examples of country-level public transport master plans; (ii) identify key elements that constitute such public transport master plans; and (iii) conduct benchmarking of the 2022 PTMP against these best practices, identify gaps and areas for potential refinement in the 2022 PTMP, and propose new headings that would guide the update of the PTMP.

2.2 Case Study Review

2.2.1 Selection of Case Studies

To narrow down potential case studies, we first focus on country-level or city-level transport master plans similar to Timor-Leste and Dili (as the PTMP focuses on the entire country, but also goes into some details for the plan for Dili). Second, the geographic context and conditions of the country must be similar to Timor-Leste – that is a smaller or medium-sized island or coastal nation (or in the case of a city, similar to Dili as a relatively small capital of an island or coastal nation). Third, the public transport element of the transport master plan must be comprehensive and detailed to inform that for Timor-Leste, containing: (i) a comprehensive public transport vision and strategy (either within the land transport section or a stand-alone public transport section); and (ii) time-based action plans or roadmaps. The latter elements will help to inform the vision and strategy for the updated Timor-Leste PTMP and the stratification of strategies and possibly how the phasing, funding, and other elements tie together in the action plan.

Based on these, four case studies are presented below with the cover page of each document shown in **Figure 2.1**: (i) Brunei (focusing on the country-level land transport master plan); (ii) Fiji (focusing on the capital-region's transportation master plan strategy in Suva); (iii) Qatar (focusing on the country-level transport master plan); and (iv) Malta (focusing on the country-level transport master plan). Transport master plans for other countries were also reviewed (such as Singapore, Belize, and Jamaica), although these lacked detailed visions/strategies or time-based roadmaps to inform the update of the Timor-Leste PTMP.



Sources : (i) https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20-%20Executive%20Summary.pdf; (ii) https://www.theprif.org/sites/default/files/2020-08/Fiji%20Greater%20Suva%20Transport%20Strategy%202015-2030.pdf; (iii) https://www.transport.gov.mt/strategies/strategies-policies-actions/national-transport-strategy-and-transport-master-plan-1343 ; and (iv) https://mot.gov.qa/sites/default/files/ LT/TIPDBMS/ VOLUME%201%20 English.pdf

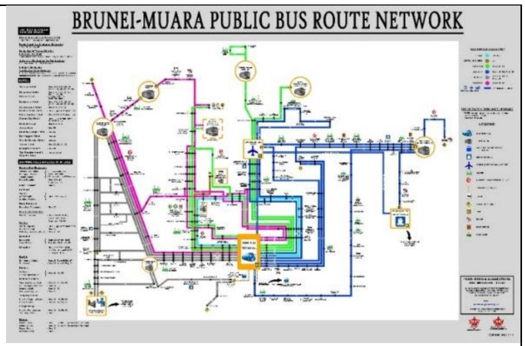
Figure 2.1: Cover Page of Selected Case Studies

2.2.2 Case Study#1 - Brunei

Background

Brunei Darussalam (or Brunei for short) is a country located on the north coast of the island of Borneo along the southern rim of the South China Sea. Brunei is bordered by the South China Sea to the north, as well as the Malaysian State of Sabah. Brunei's total area is 5,765 km^2, which is about one third of Timor-Leste's. With a population of approximately 445,000 centered around its capital of Bandar Seri Begawan, the country's major public transport mode is its bus system.[27] There is no rail network. According to the website of the Land Transport Department in March 2023, some 21 bus routes operate in the Brunei-Muara region (the western district of Brunei), as shown in **Figure 2.2**. According to surveys conducted in the preparation of the Land Transport Master Plan, Brunei's public transport network serves around 8,000 daily passengers, constituting a small proportion of all trips in the country. Brunei has one of the highest vehicle ownership rates (721 cars/1,000 residents as of 2020) in all of ASEAN, with private cars being the favored mode, with few choosing to walk or use bicycles for short-distance trips given the climate.[28]

Source: https://www.nationsonline.org/oneworld/map/brunei-political-map.htm



Source: https://www.jpd.gov.bn/SitePages/PUBLIC%20BUS%20ROUTE. aspx

Figure 2.2: Map of Brunei (Left) and Public Bus Network (Right)

Transport Master Plan (and Relevant Public Transport Elements)

Given this context, the Brunei Government formulated its country-level Land Transport Master Plan, which "sets out to reduce car dependency by improving public transport".[29] The outcome of this process is Brunei's guiding transport sector master plan, entitled "Review to Formulate a Roadmap and Draft National Masterplan for a Sustainable Land Transportation System for Brunei Darussalam".[30] Published in 2014, the plan is structured as follows:

- Outlines existing conditions and baseline conditions;
- Declares the vision and policy framework for the future transport network that Brunei should strive for;
- Deliberates on future improvements options to be taken;

[27] Source: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=BN
[28] Source: https://theaseanpost.com/article/bruneians-insatiable-appetite-cars
[29] Source: http://sqwchinagroup.com/brunei-to-overhaul-land-transport-system/
[30] Source: https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20-%20Executive%20Summary.pdf

- Sets out key themes to formulate the National Land Transport Policies; and
- Lays out the implementation plan, including funding needs and a phased delivery plan.

Key relevant elements of the master plan include the following:

- **Comprehensive Review of Existing Conditions** – The Master Plan contains a comprehensive review of existing conditions including travel mode share, origin-destination surveys, as well as perception surveys. For the latter, it is noted that 88% of adults and 72% of youth have never ridden a bus. Thus, perception surveys helped to inform potential enhancement strategies to improve the attractiveness of public transport.

Table 2 – Satisfaction of Public Transport Users

	Journey Time	Convenience	Frequency	Reliability	Information	Cost
Satisfied	45%	45%	28%	40%	40%	60%
Neither	20%	30%	28%	20%	25%	30%
Dissatisfied	35%	25%	44%	40%	35%	10%

Source: Attitude survey data collection, Consultant's

Source: https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20%20Executive%20Summary.pdf

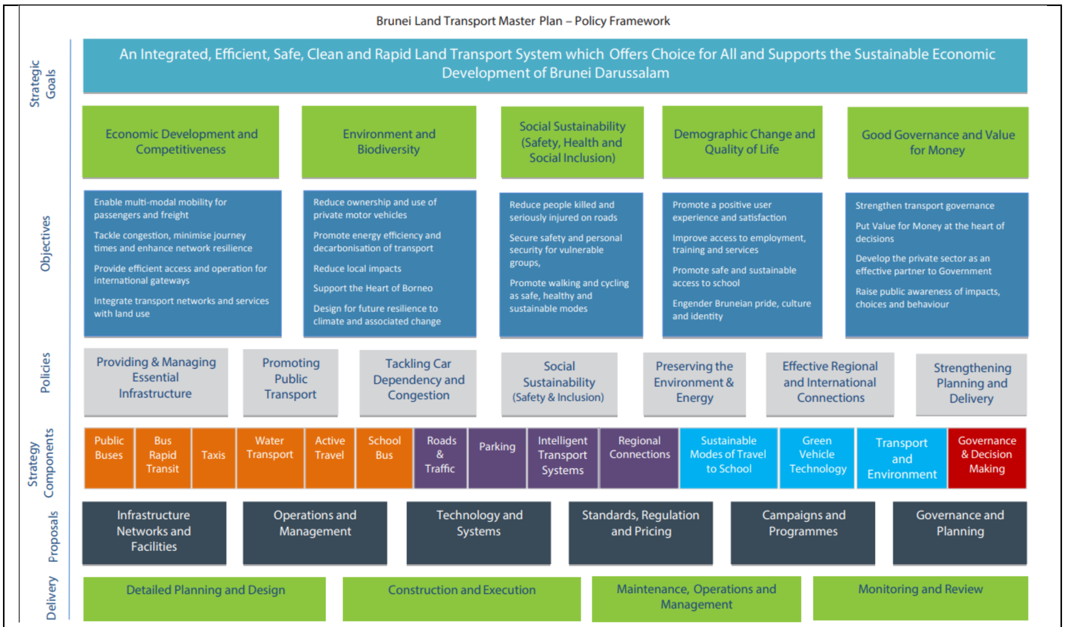
Figure 2.3: Interview Survey Results on Public Transport Perceptions - Brunei

- **Clearly Structured and Linked Vision, Objectives, and Policies** – Based on the comprehensive review of transport, the vision for Brunei's public transport system is as follows:

  "***Integrated, safe multi-modal land transport system which offers choice for all and supports the sustained and sustainable economic development of Brunei Darussalam.***"

  This overarching vision is supported by five strategic goals, 20 operational objectives, and 7 policy themes as shown below. Key policy goals include: (i) supporting economic growth through essential infrastructure; (ii) promoting public transport; (iii) tackling congestion and car dependency; (iv) promoting safety, security, and health; (v) safeguarding the environment and conserving energy; (vi) creating effective regional and international connections; and (vii) strengthening planning and delivery. Within the public transport component, public buses, and Bus Rapid Transit (BRT) are the principal components.

  Figure 2.4 depicts this linked process from vision, to objectives, to policies, to delivery, etc.



Source: https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20-%20Executive%20Summary.pdf

Figure 2.4: Linked Vision, Objectives, Policies, and Proposals for Transport (and Public Transport) - Brunei

Figure 2.5 then shows how strategic goals for the transport sector are then directly buttressed/supported by key objectives. This logical and linked framework is key to delivering the vision into reality and a key lesson learned for Timor-Leste's PTMP.

Table 4 – LTMP Strategic Goals and Objectives

Strategic Goal	Objective
Strategic Goal 1 – Support Brunei's economic development, international competitiveness across key growth sectors and planned spatial changes in economic activity	Objective 1.1 - Enable greater multi-modal mobility for passengers and freight especially by the development of sustainable modes, the deployment of new technology and provision of information on day-to-day travel choices
	Objective 1.2 - Tackle congestion, minimise journey times and enhance transport network resilience through investing in appropriate infrastructure capacity and management of demand
	Objective 1.3 - Provide efficient access and operation for international gateways for passengers and freight, including ports, jetties, airports and land border crossings
	Objective 1.4 - Ensure transport networks and services integrate between modes and with land use plans at the national, district and local level, especially for areas of commercial and industrial development, business activity, new housing and community services
Strategic Goal 2 – Minimise the transport sector's impact on the environment and in particular preserve Brunei's biodiversity, reduce energy use and minimise greenhouse gas emissions	Objective 2.1 – Reduce, and where feasible reverse, growth in the ownership and use of private motor vehicles, especially in BSB, Kuala Belait-Seria and other urban centres
	Objective 2.2 – Promote energy efficiency and the progressive decarbonisation of the vehicle fleet and fuel cycle
	Objective 2.3 – Reduce the local environmental impacts of the transport sector, especially on emissions, biodiversity, visual pollution and severance
	Objective 2.4 – Complement and support the Heart of Borneo in the interests of ecological conservation and sustainable tourism
	Objective 2.5 – Design and adapt transport infrastructure and services for future resilience to climate and associated environmental change
Strategic Goal 3 – Social Sustainability -Support safety, health and social inclusion	Objective 3.1 – Reduce in absolute and proportionate terms the number, and associated costs, of people killed and seriously injured on Brunei's highways
	Objective 3.2 – Secure and maintain a high level of perceived and actual safety and personal security for vulnerable groups, including public transport users, pedestrians and cyclists
	Objective 3.3 – Promote walking and cycling as safe, healthy and environmentally sustainable transport modes in their own right and as enablers of an attractive and functional public realm
	Objective 4.1 – Promote an inclusive, informed and positive user experience, and increased levels of confidence and satisfaction within and between transport modes and between regional, national and local networks

Source: https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20-%20Executive%20Summary.pdf

Figure 2.5: Strategic Goals Buttressed by Key Objectives - Brunei

- **Institutional and Regulatory Refinements** – The Plan also highlights proposed institutional and regulatory refinements to the current situation to enable the proposed bus and BRT improvements – including the formation of a new public transport authority (PTA). Thus, inclusion of these elements is fundamental to achieve the desired enhancements in the sector.

- **Roadmap with Responsible Stakeholders and Timelines** – The roadmap for different strategies clearly identifies the potential implementation organizations and lead ministries/ departments. This clarifies the lead agencies and proponents that will allow for targeted capacity building as well as funding.

- **Clear Time-Based Roadmap and Action Plan for Public Transport** – As shown in **Figure 2.6**, a clear time-based roadmap for public transport strategies is defined (for instance by 2012, 2025, 2035 and further down the line). This is based on necessity as well as funding availability.

Table 5 – Aligning Strategies with Strategy Components and Implementing Organisations

Strategies	Lead Ministry	Strategy Component	Implementation Organization	Lead Ministry / Department [1]
Reducing Car Dependency	Ministry of Communication	Bus Rapid Transit (BRT)	Bus Rapid Transit Project Group	Ministry of Communication
		Enhancing the Bus System	Department of Bus	Land Transport Department
		Improving Taxis	Department of Taxi	Land Transport Department
		Water Transport	Department of Water Transport	Marine Department
		Active Transport (Walking & Cycling)	Active Travel Working Group	Land Transport Department
		National School Bus System	School Bus Working Group	Ministry of Education/ Land Transport Department
Keep Traffic Moving	Ministry of Development	Managing Roads and Traffic	Public Works Department (JKR)	Public Works Department
		Intelligent Transport System	Brunei Transport Management and Coordination Centre	Public Works Department
		Managing Parking	Department of Parking	Land Transport Department
		Regional Connections	Various	Various

Source: https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20-%20Executive%20Summary.pdf

Figure 2.6: Key Implementation Stakeholders in Roadmap – Brunei

- **Bus Service and Infra-structure Enhancements in Overall Strategy** - As shown in **Figure 2.7**, the public transport sector strategy also includes bus service/ infrastructure enhancements in the overarching strategy. This is an important lesson learned for Timor-Leste, as the previous 2022 PTMP focused largely on infrastructure enhancements.

Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Strategic Goal 1 – Support Brunei's economic development, international competitiveness across key growth sectors and planned spatial changes in economic activity					
		Planned RKN and Temburong Crossing Improvements	National Road Network and Strategic Freight Network fully designated, designed and operating within defined levels of service	Required NRN and SFN capacity and management enhancements completed to maintain defined level of service	Fully defined, operational and effective National Road Network and Strategic Freight Network
Objective 1.1 - Enable greater multi-modal mobility for passengers and freight	BRT, Buses, Taxis, Water Transport, Roads and Traffic, Active Travel	VBRT None in 2012	BRT headways of 5 mins on key routes	BRT headways of 4 mins on key routes	4 urban BRT corridors - total length of 48 Km - every 4 minutes 3 Park and Ride sites 3 PTIs in Gadong, BSB and Rimba
			3 Park & Ride sites – Kilanas, Tungku and Airport Figure 10 refers	-	
			Gadong PTI Figure 10 refers	-	
		Bus fleet of 105 vehicles	Bus fleet of 275 vehicles	Bus fleet of 275 vehicles	More buses
		Bus headways of 30 mins	Bus headways of 15 mins	Bus headways of 10 mins	More frequent bus services

Source: https://www.mtic.gov.bn/Resources/LAND%20TRANSPORT%20MASTER%20PLAN%20-%20Executive%20Summary.pdf

Figure 2.7: Clear Time-Based Roadmap / Action Plan (for Public Transport) - Brunei

2.2.3 Case Study#2 - Fiji

Fiji is a Pacific Island country with a land area of 18,300 km^2 spread over one hundred islands.[31] While its overall land area is lightly larger than that of Timor-Leste, its population is lower at around 925,000 in 2021 – mainly concentrated on its three main islands - Taveuni, Vanua Levu, and Viti Levu.[32] The country's capital and largest city, Suva, is located on Viti Levu and accounts for around a third of the country's population in its greater metropolitan area. According to two separate reports (the Greater Suva Transport Strategy in 2014 and a SUTI Report in 2018), public transport accounts for about 57% of all trips in Greater Suva (with 46% of these on buses, 10% on taxis, and 1% on minibuses).[33,34]

Transport Master Plan (and Relevant Public Transport Elements)

National transport sector strategies (including land and maritime transport) are articulated in the 20-year Fiji National Transport Sector Plan (1993-2013), which was subsequently updated in 2016 (with support from ADB).[35] In addition, the Fiji Roads Authority prepared

[31] Source: https://www.adb.org/sites/default/files/institutional-document/472641/pacific-transport-2018.pdf
[32] Source: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=FJ
[33] Source: https://www.fijiroads.org/wp-content/uploads/2018/11/GSTS-REPORT-2015-2030.pdf
[34] Source: https://site2.mcttt.gov.fj/wp-content/uploads/2022/05/SUTIMobilityAssessmentReport Suva-1.pdf
[35] Source: https://ewsdata.rightsindevelopment.org/files/documents/01/ADB-47233-001_cBIJ1bF.pdf

a separate Greater Suva Transportation Strategy (GSTS) in 2014, which focuses on the land transport sector and strategy (including public transport) for the Greater Suva Area (GSA).

The GSTS lays out the vision "***to have an integrated and sustainable transport system that contributes to an inclusive, prosperous and environmentally responsible region***". To realize this vision, GSTS identifies key issues/themes relating to transportation in the GSA that would be potentially addressed by the strategy plan. These include traffic congestion, enforcement and regulation, bus infrastructure and routes, quality of transport infrastructure, road safety, and driver education/awareness. Following this guiding framework, the strategy plan is developed with the following structure:

- Introduces the background of the strategy's development and the study area's existing conditions;
- Reviews the chosen transport framework, which sets out key system objectives and their application to the GSTS;
- Describes challenges faced by the current system including infrastructure, road safety, enforcement, and increased future demand issues;
- Evaluates potential solutions as well as estimates corresponding cost; and
- Summarizes the proposed strategy plan and implementation principles.

Key relevant elements of the GSTS include the following:

- **Framework Linking Objectives to Issues and Outcomes (see Figure 2.8)** – The GSTS has a clear framework linking goals and study objectives to specific identified issues, and desired aims/outcomes of the strategy. This clarity in purpose and linkage is important in the PTMP to show "root cause", but also to help provide direction.

Table 5: Summary of issues and objectives

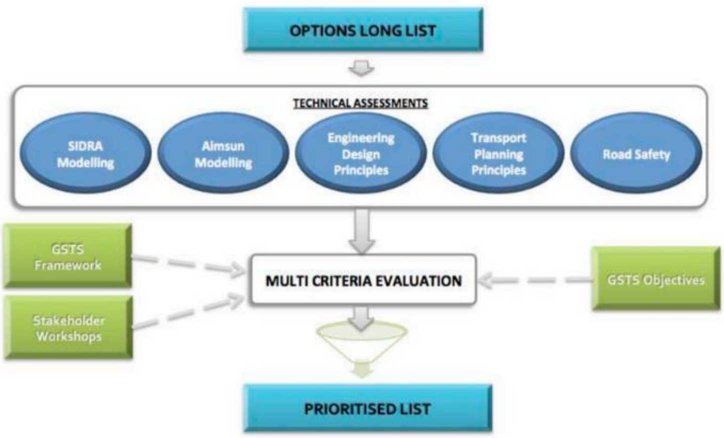
	Transport Framework	GSTS Study Objectives	Key Transport Issues	GSTS Aims / Outcomes
1	**Social and economic inclusion**	A, D	- Access to transport services - Equitable use of road space - Aging infrastructure	- Infrastructure to support mobility impaired - Maintain affordable public transport fares - Provision of transport services in outer-urban settlements
2	**Economic prosperity**	A, B, C, D	- Traffic congestion - Road safety - Aging infrastructure - Regulation and competition	- Effective land use planning - Improve journey times - Keep transport costs affordable - Improve regulation and foster healthy competition
3	**Environmental sustainability**	A, B, C, D, E	- Vehicle emissions - Driver behaviour - Traffic congestion - Aging vehicle fleets - Vehicle dominated transport modes	- Reduce vehicle emissions / encourage alternative fuels - Increase walking and cycling - Reduce congestion and improve transport efficiency - Improve driver behaviour
4	**Integration of transport and land use**	A, D, E, F	- Access to transport services in new growth areas & settlements - Traffic congestion - Poor connectivity - Effective collaboration between Authorities	- Effective land use planning - Promote localised trips - Improved transport network permeability - Improved planning and collaboration between Authorities
5	**Efficiency, coordination and reliability**	A, B, C, D, F	- Driver behaviour - Traffic congestion - Aging infrastructure - Regulation of buses and taxis - Road safety - Regular and reliable data collection	- Improve journey times - Reduce congestion and improve transport efficiency - Improved planning and collaboration between Authorities - Upgrade vehicle fleet and improve regulation - Improve regulation of public transport services - Implement and maintain comprehensive transport data collection
6	**Safety, health and wellbeing**	A, B, C, D, E	- Road safety - Aging infrastructure - Driver behaviour - Vehicle emissions - Equitable use of road space - Vehicle-dominated transport modes	- Renew aging transport infrastructure to meet current safety standards - Provide infrastructure to support safe walking and cycling - Reduce vehicle emissions - Improve road safety awareness across all users

A. An integrated multi-modal strategy
B. Infrastructure and operations for the metropolitan road network
C. Infrastructure and traffic management operations
D. The public transport network and on-street infrastructure
E. Walking and cycling networks and infrastructure
F. Staging plan showing with timeframes

Source: Greater Suva Transport Strategy 2014

Figure 2.8: Transport Framework Linking Objectives to Transport Issues and Outcomes – Fiji (Suva)

- **Evaluation Process from Long List of Potential Interventions to Short List (see Figure 2.9)** – The GSTS delineates a process to shortlist and prioritize the longlist of deliverables through technical assessments that feeds into a multi-criteria assessment (MCA) framework. For Timor-Leste, this is instructive in terms of allocating specific public transport interventions into different periods. Assessment and criteria must be agreed with the key stakeholders, but also provide a justifiable and defendable means of phasing interventions.



Source: Greater Suva Transport Strategy 2014

Figure 2.9: Multi-Criteria Analysis (MCA) Framework to Prioritize Interventions – Fiji (Suva)

- **Final List of Projects Delineated by Magnitude of Costs and Level of Priority (see Figure 2.10)** – To help stakeholders understand potential implications of projects as well as the magnitude of costs to determine implementation focus and phasing, the GSTS also delineates projects into five cost categories and two priority categories. This can allow for easier stakeholder decision-making as well as understanding of tradeoffs.

Table 14: Cost estimate ranges and typical projects

Option Category	Cost ($FJD)				
	Low ($0-$100k)	Low-Med ($100-$250k)	Med ($250-$500k)	Med-High ($500k-$1M)	High ($>1M)
	TYPICAL PROJECT EXAMPLES				
	Zebra crossing with flashing lights	Intersection lighting upgrade	Unsignalised intersection upgrade	New roundabout or traffic signals	Road widening, duplication, Bus Terminals
High Priority	10	10	15	13	25
Medium Priority	1	20	11	7	25

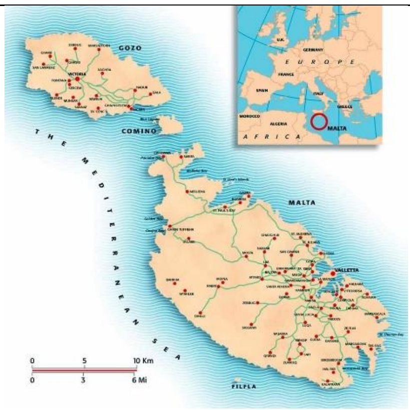
Source: Greater Suva Transport Strategy 2014

Figure 2.10: Delineation of Projects by Magnitude of Costs as well as Level of Priority– Fiji (Suva)

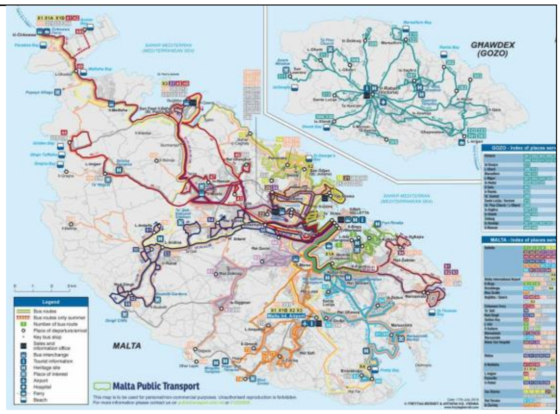
2.2.4 Case Study#3 - Malta

Background

Malta is an island country in the Mediterranean Sea, covering an area of 316 km^2 with a population of around 518,000 in 2021 on two islands (with Malta, the namesake of the country being the larger island with the capital at Valletta, and Gozo, a smaller and less populated island to the north).[36] Malta has several key elements noteworthy for review including its public transport network, particularly on the main island serving Valletta. Private vehicle use is relatively high, accounting for around 83% of trips taken in 2021, while scheduled bus services account for about 6.5% of all trips.[37] Despite its relatively low mode share, Malta's public bus system (branded Malta Public Transport) operates over 100 routes (**Figure 2.11**), with a modern fleet and integrated fare card (the Tallinja Card). As of 2022, rides on the system became free to anyone with a valid personalized transit card in 2022, further increasing the attractiveness of its growing network.[38]



Source: https://www.orangesmile.com/travelguide/malta/country-maps.htm



Source: https://www.mowasalat.com/English/Our-Services/Bus-Routes

Figure 2.11: Map of Malta (Left) and Public Bus Network (Right)

Transport Master Plan (and Relevant Public Transport Elements)

The Malta National Transport Master Plan 2025 is the key planning document to achieve the short-term vision and strategic goals of the "National Transport Strategy 2050" – with the latter 2050 document covering all relevant transport modes (land (including public transport), sea and air) for the short-, medium- and long-term for Malta.[39] The Malta National Transport Master Plan 2025 is structured as follows:

- Provides an overview of the existing situation and issues and challenges faced by the transport sector;
- Defines key operational objectives by specific sectors;
- Assesses suitable options to select for priority project measures;
- Tests different policy scenarios for their contribution to the long-term goals;
- Considers environmental implications of planned action; and
- Sets out the implementation plan, including delivery timeline, cost analysis, and the monitoring process.

While the Master Plan itself contains the detailed analysis and implementation strategies, the separate National Transport Strategy 2050 is dedicated to covering the higher-level guiding vision, goals, and principles. Malta's transport sets a vision to "***provide a sustainable transport system which is efficient, inclusive, safe, integrated and reliable***

[36] Source: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=MT
[37] Source: https://timesofmalta.com/articles/view/Travel-survey-shows-increase-in-car-dependency-in-Malta.679517
[38] Source: https://www.publictransport.com.mt/en/news-details/free-public-transport-announcement
[39] Source: https://www.transport.gov.mt/strategies/strategies-policies-actions/national-transport-strategy-and-transport-master-plan-1343

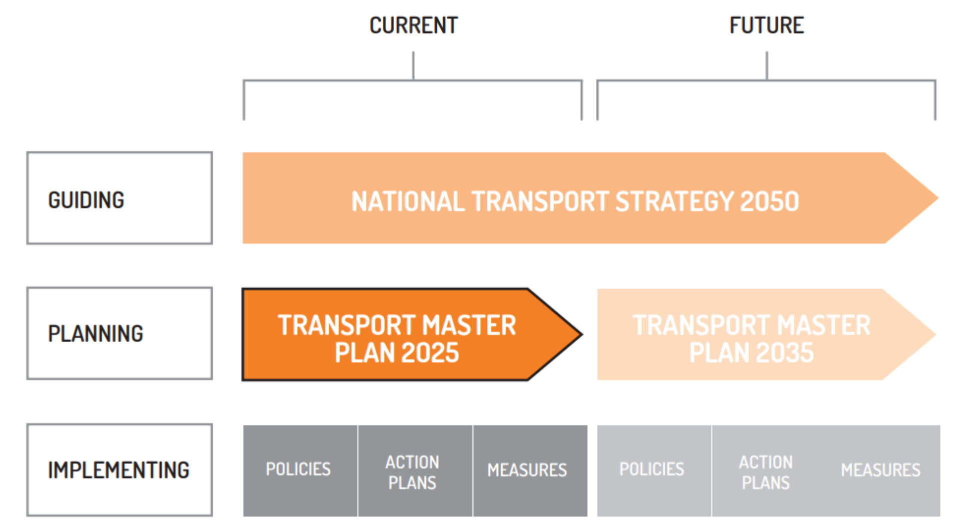
for people and freight, and which supports attractive urban, rural and coastal environments and communities where people want to live and work: now and in the future".

Furthermore, the Policy also lays out eight key principles which guides the Malta National Transport Master Plan 2025:

- Efficient Utilization of the Existing Transport System - Traffic Management, Logistics Planning and Enforcement
- Creating Modal Shift
- Integrated Approach to Planning and Design
- Encouraging use of Greener Fuels and Vehicles
- Modernization, Development and Revitalization of the Strategic Transport Network to improve Territorial Cohesion
- Investment in Education, Information and Human Resources
- Making Room for Innovation and Research
- Sustainable Financing and Fair Competition

Key relevant elements of the Malta National Transport Master Plan 2025 are as follows:

- **Clear Linkage from Overarching Strategy to Planning to Implementation (Figure 2.12)** – The Malta National Transport Master Plan 2025 clearly establishes the linkage between guiding principles (set by the more visionary National Transport Strategy 2050) and planning (Transport Master Plan 2025 and future 2035 update), as well as implementation (i.e., policies, actions plans and measures).



Source: https://www.transport.gov.mt/strategies/ strategies-policies-actions/national-transport-strategy-and-transport-master-plan-1343

Figure 2.12: Linkage between Guiding, Planning, and Implementing - Malta

- **Strength-Weakness-Opportunity-Threat (SWOT) Assessment of Road-Based Public Transport Sector (see Figure 2.13) –** SWOT analysis is performed to lay the groundwork for the vision and subsequent strategies and implementation steps to improve public transport in the country.

01.2
ROAD-BASED PUBLIC TRANSPORT

A high level summary of the SWOT analysis for road-based public transport is presented below. This is then followed by a more detailed explanation of the main points.

STRENGTHS

Concession contract with bus service operator clear and robust, with transparent compensation methodology to facilitate flexibility to modify, remove or add bus routes or adjust service frequencies to adapt to changing travel demands
Good organisation of bus repair, cleaning, maintenance and overnight parking through centralisation of facilities.
Fast boarding and reduction of cash handling through high uptake of pre-paid travel cards
High frequency and close proximity of bus stops within main urban areas
New, modern low emission and full accessible bus fleet
Increased bus patronage levels since 2011
Scheduled bus service ticket prices amongst the lowest in the EU

WEAKNESSESS

Lack of alternative forms of public transport to road-based buses
Inadequate bus shelter provision and inflexibility of contract with bus shelter provider
Poor quality pedestrian infrastructure reducing access to bus stops in urban areas
Low level of bus priority provision to facilitate better reliability and punctuality of bus services
Fare levels for certain unscheduled transport services are set too high to encourage usage by Maltese travellers

Source: https://www.transport.gov.mt/strategies/ strategies-policies-actions/national-transport-strategy-and-transport-master-plan-1343

Figure 2.13: SWOT Analysis by Sector – Malta

- **Multimodal Approach to Improve Public Transport –** Proposed enhancement measures for public transport are also accompanied by complementary active mobility measures, acknowledging the keen synergy all of these have with public transport accessibility and convenience.

- **Indicative Environmental Impacts and Funding Tied to Objective and Measure (see Figure 2.14)** – To provide additional information to decision-makers, the Malta National Transport Master Plan 2025 identifies indicative environmental impact and funding sources in the detailed list of measures proposed for each objective.

Operational Objective.	TMP Ref.	Measure	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Expected Environ. Impact?	Expected State Aid?	Possible Source of Funding
2.3.2	IMPROVE PUBLIC TRANSPORT SERVICE QUALITY TO AND BETWEEN STRATEGIC EMPLOYMENT NODES, SERVICES OUTSIDE THE INNER HARBOUR REGIONS AND PERIPHERAL RESIDENTIAL AREAS														
	2.3.2.1	Optimise use of existing Park and Ride facilities and develop new sites at strategic locations to encourage modal interchange											Poss. +	No	National
2.3.3	EXPLORE OPPORTUNITIES TO MOVE TOWARDS TRANSIT ORIENTED DEVELOPMENT														
	2.3.3.1	Analyse accessibility (PT) index for all transport zones and improve transit provision in relation to current development patterns											No	No	National
2.3.4	IMPROVE PHYSICAL ACCESSIBILITY OF PUBLIC TRANSPORT SERVICE														
	2.3.4.1	Provide more accessible bus infrastructure in residential areas and commercial centres											No	No	National
	2.3.4.2	Increase enforcement of illegal parking and ensure proper use of bus bays											No	No	National

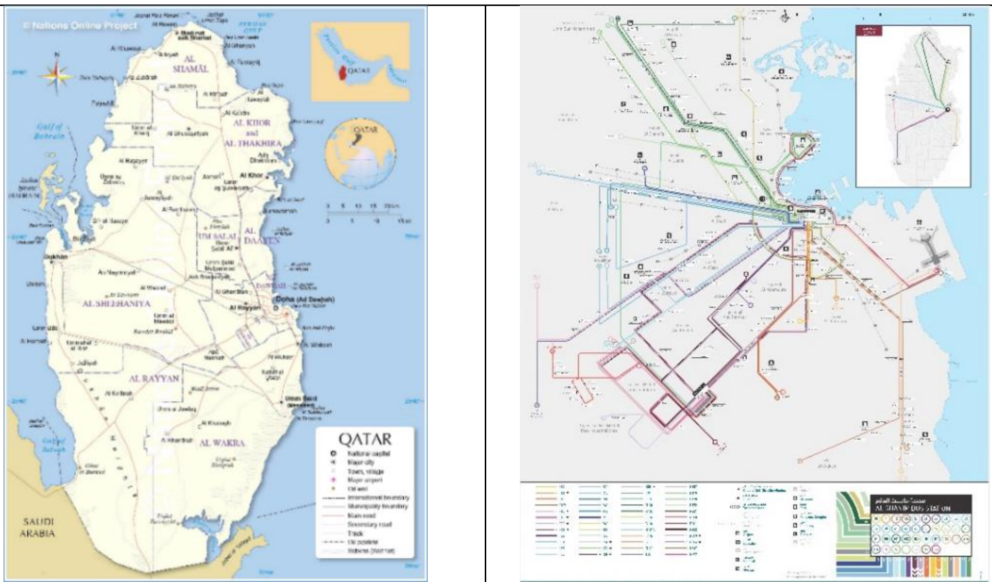
Source: https://www.transport.gov.mt/strategies/ strategies-policies-actions/national-transport-strategy-and-transport-master-plan-1343

Figure 2.14: Indicative Environmental and Funding Assessment for Objective and Measure – Malta

2.2.5 Case Study#4 - Qatar

Background

Qatar sits on a peninsula jutting out into the central Persian Gulf, bounded to the south by Saudia Arabia. Qatar has a comparable land area to Timor-Leste (about 11,610 km^2), but a larger population (about 2.69 million in 2021, with a population density that is about three times higher than that of Timor-Leste). The majority of the population is concentrated at its capital, Doha.[40] According to the Qatar 2050 Transportation Master Plan (published in 2017), private car use is the most frequently used mode, accounting for roughly 57% of weekday trips (including walk, cycle, public transport, etc.). Pedestrian/cycling and privately contracted buses account for another 27% and 14% respectively, while public buses only account for 0.4% of the total trips.[41] The public bus network operates at relatively low frequencies (typically 30-minute headways) and covers only about two-thirds of Doha's population in the metropolitan area. (**Figure 2.15**) Subsequently, the Doha Metro opened in 2019 and now operates with three rail lines.



Source: https://www.nationsonline.org/oneworld/map/qatar-map.htm	Source : https://www.mowasalat.com/English/Our-Services/Bus-Routes

Figure 2.15: Map of Qatar (Left) and Public Transport Network (Right)

Public Transport Master Plan

As a 2017 update to the original 2008 Transport Master Plan, the "Qatar 2050 Transportation Master Plan" (or "Updated TMPQ") was necessary as the socioeconomic conditions of Qatar had changed drastically (with its population doubling), with many of the originally planned improvements already having been implemented or in need of revision. The structure of the 2017 Updated TMPQ is as follows:

- Reviews socioeconomic and infrastructural changes since the 2008 TMPQ and perceived future challenges up till 2050;
- Sets out guiding vision, objectives, and policies of the updated TMPQ;

[40] Source: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=QA
[41] Source: https://mot.gov.qa/sites/default/files/LT/TIP-DBMS/VOLUME%201_%20English.pdf

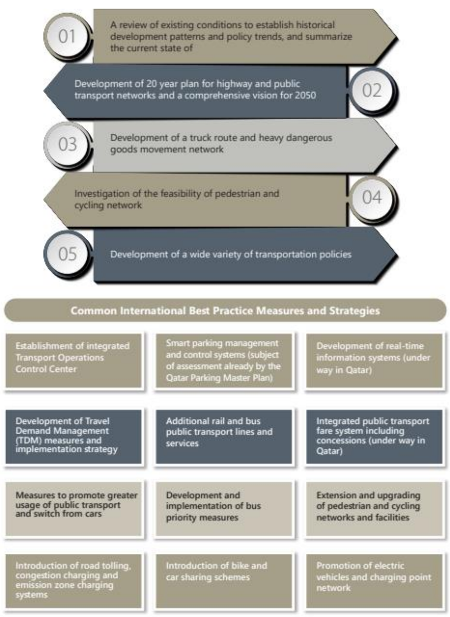
- Discusses key components of the new transport plan by sector, with consideration for regional integration;
- Puts forth expected outcome and key targets of the implementation plan; and
- Establishes a priorities framework and delivery phase plan with supporting funding and monitoring mechanisms.

Coherent to this new vision, the TMPQ also laid out the following six guiding objectives:

- Provide an Efficient Integrated and Sustainable Transportation System;
- Promote Transportation Mobility and Accessibility;
- Ensure a Safe and Secure Transportation System;
- Protect the Environment and Ensure Sustainable Development;
- Support Economic Development; and
- Maximize Quality of Life and Preserve Qatari Values.

Key relevant elements of the TMPQ are as follows:

- **Setting General and Specific Objectives at the Start** – Similar to the other transport master plans reviewed above, the TMPQ sets general and specific objectives at the start.
- **Incorporation of International Best Practice into the Development of the TMPQ (see Figure 2.16) –** The TMPQ purposefully highlights the need to include international best practice and lessons learned into the development of the TMPQ. Beneficial to emerging markets, this sets a precedent for the TMPQ to align with world-class design and best practices, which may lend a more visionary tone to the document instead of a stepwise progression of "business as usual" or BAU.



Source : https ://mot.gov.qa/sites/default/files/ LT/TIP-DBMS/VOLUME%201%20 English.pdf

Figure 2.16: Incorporation of International Best Practices into Plan Development – Qatar

- **Developing Packages of Improvements to Create Synergies (see Figure 2.17) –** Although not solely focused on public transport, the TMPQ packages several different multimodal initiatives together as public transport, active mobility, and other measures may complement one another to create effective synergies.

Combined Schemes into Policy Packages of Studies

Policy/Study	N.	Schemes in each Wider Policy																	Main Stakeholders	Implementation mandate	Department	QNV 2030 Objectives	MOT Strategy
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
Improvements of Overall Safety Related to Road Transport	2	CI-34	CI-35																MOT, MOI, MME, Q-Rail, Ashghal, Mowasalat	MOI	General Administration of Traffic	Achieve security and stability, and maintain public safety	Strive to reduce transport accidents and fatalities
Transport Command Center in Qatar	2	CI-50	TI-17																MME, Ashghal, Q-Rail, Mowasalat, MOI	MOT	Sustainable Transport Department/ Technical Affairs Department	Achieve security and stability, and maintain public safety	Enable state-of-the-art smart transport sector as part of a smart nation
Study on PPP/ Liberalization of the Transport Market	3	CI-51	GV-20	TI-18															MOCI, Ashghal, Q-Rail, MOF, MOT	MOT	Sustainable Transport Department/ Technical Affairs Department	Promote a more competitive, productive and diversified economy and a more dynamic private sector with greater contribution to the national economy	Promote sector liberalization and PSP to drive service levels and performance
TAF Implementation, funding Transportation Projects, and Transport Performance Monitoring	2	GV-03	GV-14																MOF, Ashghal, Q-Rail, Mowasalat, MOI	MOT	Land Transport Planning Department	Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Optimize government spending in the transport sector
Development of Regulations for new Transport Technologies/ Modes (Electric Vehicles, MaaS, Electric Scooter, etc.)	2	GV-04	TI-19																MME, Ashghal, Q-Rail, Mowasalat, MOI	MOT	Legal Affairs Department	Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Enable state-of-the-art smart transport sector as part of a smart nation
Monitoring of Public Transport Improvements	2	GV-08	GV-09																Q-Rail, Mowasalat, Karwa	MOT	Sustainable Transport Department/ Technical Affairs Department	Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Aim for a world-class performance monitoring system
Comprehensive TDM Study	13	DM-18	DM-22	DM-23	DM-25	DM-26	DM-30	DM-31	DM-32	DM-33	DM-34	DM-35	DM-36	DM-37					MOT, MOI, MME, MOE&HE, Q-Rail, Mowasalat	MOT	Traffic Engineering and Road Safety Department	Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Enhance mobility and reduce journey time for passengers and freight
Study for Effectiveness of TDM in Special Events	1	DM-40																	MOT, Mowasalat, SCDL, Q-Rail	Ashghal	Assets Affairs	Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Enhance mobility and reduce journey time for passengers
Feasibility Study for Implementing West Bay Automated People Mover (APM)	1	TI-01																	Q-Rail, Ashghal, Mowasalat, Private Sector	MOT	Sustainable Transport Department/ Technical Affairs Department	Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Enable state-of-the-art smart transport sector as part of a smart nation
AV Transportation Feasibility Study and Demonstration Project	2	TI-11	TI-12																MOT, Ashghal, MOI	Mowasalat		Develop a sustainable and high-quality infrastructure that supports the national economy and keeps abreast of the latest smart technologies	Enable state-of-the-art smart transport sector as part of a smart nation
Total	169																						

Source : https ://mot.gov.qa/sites/default/files/ LT/TIP-DBMS/VOLUME%201%20 English.pdf

Figure 2.17: Creating Investment Packages for Synergy – Qatar

- **Financial Strategy for Schemes (see Figure 2.18) –** To facilitate implementation, a financing strategy is proposed for each scheme, including suitability for public-private partnerships, and project implementation mechanisms (including: (i) Build-Operate-Transfer (BOT); (ii) Design, Build, Finance, Operate & Maintenance (DBFO); and (iii) Operating & Maintenance (O&M) Concession).

Financial Strategy for Updated TMPQ Schemes

Scheme ID	Scheme Name	Type*	Financing**	Suitability for PPP***	Candidate Project Mechanisms****
HW-01a	Sharq crossing	1	4	2 (if combined with DM-17)	1
HW-01b	Sharq crossing – West Bay Connection	1	4	2 (if combined with DM-17)	1
HW-04	Lusail Connection Roads	1	1 (developer contribution)	4	N/A
HW-06a	Al Jamiaa Street (Road/ Interchanges)	1	3	4	N/A
HW-07	Al Markhiya Street upgrade	1	3	4	N/A
HW-09	Al Khafji Street (Road and Intersection, Including Al Markhiya Flyover)	1	3	4	N/A
HW-11	Al Soudan, Midmac & Al Asiri Interchanges	1	3	4	N/A
HW-13	Al Furosiya Street	1	3	4	N/A
HW-15	Upgrade of Haloul Road	1	3	4	N/A
HW-16	Major roads upgrade in the center of Doha City - D-Ring Road	1	3	4	N/A
HW-21	Sea Line Corridor	1	3	4	N/A
HW-22	Sawdat Natheel Road	1	3	4	N/A
HW-24	Mekeines - Umm Bab Road	1	3	4	N/A
HW-25	Al Khor Bypass and Services Roads	1	3	4	N/A
HW-26	Umm Birka Road	1	3	4	N/A
HW-28	Al Zubara Road	1	3	4	N/A
HW-29	Al Karana - Al Khor Highway	1	3	4	N/A
HW-30	Southern Highway	1	3	3	1
HW-33	Al Shamal - Al Dayeen Western Highway	1	3	3	1
HW-34	Al Waab/Al Sayliya Street Upgrade	1	3	4	N/A
HW-35	Conversion of C-Ring Road to Boulevard	1	3	4	N/A
HW-36	Conversion of Al Corniche Road to Boulevard	1	3	4	N/A
HW-38	Conversion of A-Ring Road to Boulevard	1	3	4	N/A
HW-39	Conversion to Boulevards (West Bay Area)	1	3	4	N/A
HW-41	Western Industrial Expressway	1	3	4	N/A
HW-42	Industrial Area Road Extension	1	3	4	N/A

Scheme ID	Scheme Name	Type*	Financing**	Suitability for PPP***	Candidate Project Mechanisms****
HW-44	Al Shahaniya - Al Kharaitiyat Road	1	3	4	N/A
HW-45	Al Dayeen Arterial	1	3	4	N/A
HW-46	Bani Hajer - Lusail Link	1	3	4	N/A
HW-47	Al Riffa Highway	1	3	4	N/A
HW-48	Al Siliya - South Industrial Area Highway	1	3	4	N/A
HW-49	Ain Khaled North - South Connection	1	3	4	N/A
HW-51	Al Wukair Road	1	3	4	N/A
HW-55	Umm Birkat Road - Industrial Area	1	3	4	N/A
HW-56	Al Khor Costal Road - Northern Section	1	3	4	N/A
HW-57	Ras Bu Fontas Interchange & QEZ1 Connection	1	3	4	N/A
HW-60	Tunnel Under C-Ring Road	1	3	4	N/A
HW-83	Encourage the update of traffic management systems with latest technologies (Policy Paper Reference HWY-003)	1,2,4	1,3	2	2
HW-86	West Bay Beautification Project	1	3	4	N/A
TR-06	Implement and enforce the Truck Route Network and associated policies and regulations	1,2,4	1,3	3	2
TR-07	Truck Weigh Stations	2	4	2	2
TR-08	Logistics Parks	1,2,4	4	2	2
TR-13	Truck Parking (from Airport)	1,2,4	4	1	2
TR-14	Truck Parking (from New Doha Port)	1,2,4	4	1	2
TR-15	Truck Parking (QEZ2)	1,2,4	4	1	2
TR-16	Truck Parking (QEZ3)	1,2,4	4	1	2
TR-17	Implement Route Network for Oversized Trucks	1,4	1,3	3	2
BU-01	BRT Doha Expressway	1,2,3,4	4	1	2,3
BU-02	BRT Doha Expressway	1,2,3,4	4	1	2,3
BU-04	Priority Bus Along Corniche	1,2,4	4	2	2,3
BU-08	Renewal of bus stops and waiting facilities	1,2	4	1	2,3
BU-10	Implement trial bus priority routes	1,2,4	4	2	2,3
BU-14	New/Improved bus services between areas of high demand and new urban developments	2,4	4	3	2,3

Source: https ://mot.gov.qa/sites/default/files/ LT/TIP-DBMS/VOLUME%201%20 English.pdf

Figure 2.18: Financing Strategies per Scheme – Qatar

2.2.6 Summary of Case Study Review

After reviewing the four case studies, several common themes are observed across the transport master plans, which can be extracted and applied to updating Timor-Leste's PTMP with a similar structure and level of content. Broadly speaking, the typical transport master plan structure (thus in this case the PTMP structure) consists of:

- **Existing Conditions Review** – Reviewing of the existing conditions, specific transport context and observed challenges to delivering better services.
- **Guiding Vision and Strategic Goals** – Outlining the guiding principles/visions of the master plan as well as broad strategic goals based on the principles/visions;
- **Linked Detailed Strategies** – Proposing detailed strategies which follow from the strategic goals and address the aforementioned challenges;
- **Policy Framework** – Setting up relevant policy framework that supports or implements the proposed strategies based on the existing national regulation landscape; and
- **Implementation Roadmap** – Presenting the cost analysis, delivery timeline, and funding options in support of the master plan.

These core principles of a well-organized transport master plan, and thus, public transport master plan, are compiled in the following at a glance, which will serve as a measuring stick to compare against the 2022 PTMP (in **Section 2.3.2**). The individual elements will also be categorized based on the level of detail, i.e., whether it is applicable to Timor-Leste.

Table 2.1: Summary of National Transport / Public Transport Master Plans Reviewed

#	Element	Description	Level of Detail (Route or System-Level?)	Brunei	Fiji	Malta	Qatar
			Document Name	*National Masterplan for a Sustainable Land Transportation System for Brunei Darussalam*	*Greater Suva Transportation Strategy*	*Malta National Transport Master Plan 2025*	*2050 Transportation Master Plan for Qatar (TMPQ)*
1	Introduction	Purpose, objective of the plan	System-Level	✓	✓	✓	✓
2	Existing Conditions	Overview of existing general socioeconomic situation of the country	System-level	-	✓	-	✓
3	Existing Transport Context	Overview of existing transport situation	System-level	✓	✓	✓	✓
4	Existing Issues	Overview of existing challenges faced by the public transport sector	System-level	-	✓	✓	✓
5	Future Conditions	Analysis of future challenges foreseen at the horizon year of the MP	System-level	✓	-	Covered in separate report	✓
6	Vision & Goals	Guiding vision and strategic goals of the MP	System-level	✓	✓	✓	✓
7	Improvements to Public Transport Services	Proposed actions to be taken vis-a-vis public transport service and operations	Route-level and System-level	✓	-	✓	✓
8	Improvements to Transport Infrastructure	Proposed actions to be taken vis-à-vis supporting public transport infrastructure	Route-level and System-level	-	✓	✓	Covered in separate report
9	Cost Estimates	Cost estimate of the proposed action plan	System-level	✓	✓	✓	✓
10	Policy, Institutional & Legal Framework	Considerations for modifying existing, or creating new, regulations and laws in support of the proposed actions wherever necessary	System-level	✓	-	✓	✓
11	Stakeholder Consultation	Solicitation of feedback and suggestions from relevant stakeholders	System-level	-	✓	-	✓
12	Phasing Plan	Expected implementation timeline based on the priority of the proposed actions	System-level	✓	✓	✓	✓
13	Financial & Funding	Considerations for the financial benefits and risks of the proposed actions as well as potential funding sources	System-level	✓	-	Covered in separate report	✓
14	Conclusion	Final summary of findings	System-level	✓	✓	✓	✓

2.3 Benchmarking of Best Practice vs. the 2022 Timor-Leste Public Transport Master Plan (2022 PTMP)

2.3.1 Current Framework and Contents for 2022 PTMP

The 2022 PTMP was completed in March 2022, updating a prior version from 2016.[42] The current PTMP is structured as follows with a brief summary of contents in **Table 2.2**:

- Sector assessment including review of issues, goals, legal/institutional framework, service/routes, demand analysis;
- Definition of inter-urban routes and identification of potential locations for terminals in Dili and other key district capitals;
- Preliminary architectural designs of terminals;
- Public transport facility plan including locations of intermediate bus stops and related facilities; and
- A project implementation plan including cost estimates and phases.

Table 2.2: Current Framework and Contents of 2022 PTMP

#	Contents	Details
1	Introduction	• Includes a summary of existing transport conditions including the role of public transport and modal share at national level. • Provides linkage to the previous public transport master plan prepared in 2016.
2	Public Transport Sector Assessment	• Provides detailed descriptions of the institutional and legal framework including roles of relevant agencies, relevant laws/regulations governing public transport, recommendations on regulations to provide appropriate public transport facilities (including updating design standards), set routing and schedules, etc. • Includes a review of previous studies and summary of the potential establishment of a Land Transport Authority. • Includes mode split (based on 2009-2010 data) and passenger demand estimates by regional route including assumptions. • Introduces the definition of a terminal, as defined by MOTC, and the concept of the hierarchy of terminals across Timor-Leste. • Highlights issues with terminal design/locations.
3	Inter-Urban Routes	• Includes the locations of existing and proposed terminals, routing of regional bus services, and assesses road network conditions in Timor-Leste.
4	Physical Facilities to Deliver Services	• Provides an overview of existing terminals in Dili (i.e., Becora, Taibessi, and Tasi Tolu) • Includes population forecasts (2020, 2030, and 2040) based on the 2015 Census. • Provides general descriptions on the latest bus technologies including e-bus, payment systems, amenities for person with disabilities (in-vehicle and terminals), etc. • Includes the conceptual layouts for bus parking bays, sizing assumptions for bus terminal facilities (e.g., waiting areas, ticketing booth, passenger facilities) as well as architectural conceptual designs for bus terminals/facilities. • Identifies the locations of potential terminal sites in Dili, Baucau, Maliana, Suai, Viqueque, Batugade, Lospalos, Ainaro, Armera, Same, Aileu, Maubisse, Liquica, Manatuto and Oecusse, including proposed plot sizes and bus terminal typologies.

[42] The 2016 TA Consultant's Report on Timor-Leste Public Transport Project Master Plan is principally desktop-based research, with information/data mainly deriving from the 2015 Asia Foundation Report (or A Political Economy of Public Transportation in Timor-Leste). This 2016 Report was not officially approved by the ADB or the Timor-Leste Government. Thus, the updated 2022 PTMP has been used as the reference for comparison.

#	Contents	Details
5	Options Analysis for Establishment of Physical Facilities	• Presents three options for selecting upgrading existing / proposed terminals: (i) Base Option – upgrading of current terminals in Dili plus new terminals in municipalities outside of Dili; (ii) Option A – Base Option with Dili Central Terminal; and (iii) Option B – Base Option with three new Dili terminals (Hera, Manleuana, and Tibar). • Describes microlet routes and inter-urban services briefly (no maps provided). • Includes an evaluation framework (with questionnaire-based criteria) to assess the viability of the above three options which is evaluated based on a 1-3 scale system.
6	On Route Stop Locations for Implementation	• Highlight regulations and design standards for bus laybys. • Identify proposed locations for intermediate bus stops for the following routes: (i) Dili-Maliana-Suai; (ii) Dili-Gleno-Ermera; (iii) Dili-Ainaro; (iv) Ainaro-Suai; (v) Maubessi-Same; (vi) Dili-Natabora; (vii) Baucau-Viqueque; (viii) Baucau-Lospalos; and (ix) Dili-Baucau.
7	Phasing of Development	• Presents the overall implementation plans including preparation of a project review and feasibility study, Dili terminal implementation plan, requirements for approval and financing, procurement/contracting, and implementation. • Does not specify timeline for the phasing (i.e., year for Phase 1 and Phase 2, respectively).
8	Costing	• Includes preliminary cost estimates – a total of about US$92 million is estimated for the entire project over two phases (no specific years provided). • Describes Phase 1 costs of about US$45 million, including technical studies for improving public transport operation (such as bus stops, bus lanes, off-street parking), institutional/regulation refinement (including planning cost for LTA establishment), and civil construction costs for bus terminals (comprising over 70% of Phase 1 cost or US$32 million) and intermediate bus stops. • Describes Phase 2 costs of about US$48 million including civil construction costs for additional bus terminals and smart features (e.g., e-bus demonstration in Dili, smart car ticket system, hybrid system with prior ticketing, and amenities for disabled people / elderly).
9	Challenges, Limitations and Remaining Gaps	• Summarizes key challenges faced in preparation of the 2022 update and key pending decisions as next steps.

2.3.2 Master Plan Gaps Analysis vs. Best Practice and Proposed Refinements

This section presents the findings for the gaps analyses of the 2022 PTMP versus the best practice frameworks from other master plans noted in **Section 2.2.6** and the necessity of refinements to align the 2022 PTMP with this best practice. Significant refinements are noted in red shading, moderate refinements in yellow shading, and minimal refinements in green shading.

Table 2.3: Master Plan Gap Analysis (2022 PTMP vs. Best Practice)

#	Element	Incorporated in 2022 Timor-Leste Public Transport Master Plan (or 2022 PTMP)?	Sufficiency of Existing PTMP [A]	Proposed Extent of Updates/Refinements
1	Introduction	• Yes – This section includes the objective of the study including linkages to other plans/studies related to public transport in Timor-Leste.	**Moderate Update/ Refinements**	Update section to meet purpose/goals of this study
2	Existing Conditions (i.e., Socioeconomic, Transport Context, and Key Issues)	• No - Existing general socioeconomic conditions of Timor-Leste such as population, socioeconomic, land uses, etc. are absent or minimally provided - such baseline information is essential to formulate the vision, goals, and framework for public transport. • Section 2 includes a summary of existing transport conditions. However, the data is outdated, mainly derived from surveys conducted in 2015. • Existing issues with terminal design/locations are partly highlighted. However, overarching transport issues (e.g., service) are not covered explicitly to set the stage for improving public transport for the country.	**Significant Update/ Refinements**	Update existing conditions using the latest data (where available) and survey results. Articulate key issues in the public transport sector.
3	Future Conditions	• Partially - Future conditions (such as population forecasts and passenger demand estimates) are presented in Section 2 and 4, though these are based on the surveys conducted in 2015, with overarching assumptions on future conditions noted.	**Significant Update/ Refinements**	Update future conditions including demand forecasts based on the latest data and survey results.
4	Vision & Goals	• No – No vision/goals are presented to guide the development/improvement of public transport services and facilities.	**Significant Update/ Refinements**	Formulate the vision and goals for public transport based on policy documents and strategies as well as existing/future conditions.
5	Public Transport Network & Services	• Partially – Current microlet / regional bus networks are included with maps. However, a detailed review of the microlet and regional bus networks is not provided (such as routing profile, performance, existing operation, demand, other issues, etc.).	**Significant Update/ Refinements**	Provide more detailed route information from survey results for microlet and regional buses.
6	Transport Infrastructure	• Yes - Infrastructure is covered extensively in the 2022 PTMP including a review of existing terminals, sizing of potential terminals at each municipality, as well as potential terminal sites (including available plot size, proposed terminal typology, and conceptual design). • Sizing is primarily based on an estimation approach including design year, arrival data and number of peak hour vehicles (only for bus and angguna without specific routes), dwell time (for bus/angguna combined), traffic growth rate, and level of service for passengers.	**Significant Update/ Refinements**	Update sizing of terminals based on a refined operating plan (and set guidelines) and formulate a shortlist of priority sites based on a facility assessment framework (including stakeholder's priorities and feedback).
7	Cost Estimates	• Partially - Preliminary cost estimates for large components are provided as a lump sum (i.e., for terminals and bus stops), but lack detailed quantities or unit costs. No O&M costs ae provided for terminal operations.	**Significant Update/ Refinements**	Update cost estimates including quantities of proposed improvements, unit cost, as well as key assumptions for O&M costs and data sources.
8	Institutional & Legal Framework	• Yes - Detailed descriptions of the institutional and legal framework are provided, including considerations for establishing a Land Transport Authority (LTA).	**Moderate Update/ Refinements**	Update section with a focus on terminal operating framework and leverage on-going institutional refinements for the LTA, etc.
9	Conclusion	• Partially – Challenges faced in preparation of the master plan are discussed along with the next steps, although no summary is provided.	**Moderate Update/ Refinements**	Include a summary, recommendations, and next steps.

Notes: [A] Sufficiency = "Minimal Update/Refinements", "Moderate Update/Refinements", and "Significant Update/Refinements".

2.3.3 Proposed Headings for Updated 2023 PTMP

Based on the review above, the proposed headings for the updated 2023 PTMP are shown in **Table 2.4**.

Table 2.4: Proposed Headings for the Updated 2023 PTMP

Proposed New Numbering	Proposed Section / Sub-Section	Original Numbering (2022 PTMP)	Section to Be Updated in 2023 PTMP?
Section 1	Introduction	Section 1	• Yes, include objectives/purpose.
Section 2	Review of Best Practices in PTMP	-	• Yes, guide the updating of PTMP based on best practices.
Section 3	Existing Conditions	Section 1 and 2	• Yes, update existing conditions (including socioeconomic, transport context) and clarify issues related to public transport.
Section 4	Future Conditions	Partially in Section 4	• Yes, include future population, development framework, transport projects, etc.
Section 5	Vision & Goals	Not included	• Yes, formulate the vision/goals for public transport system.
Section 6	Public Transport Service Enhancements	Section 3	• Yes, detail the route profile, operating plans, route optimization framework, and improvements scenarios
Section 7	Transport Infrastructure	Section 4	• Yes, provide details on facility assessment framework and prioritization of terminal sites.
Section 8	Institutional & Legal Framework	Section 2	• Yes, leverage previous and on-going work (i.e., establishment of Land Transport Authority) and provide details on terminal operation framework.
Section 9	Investment Plan with Cost Estimates	Section 8 (Section 7 Phasing of Development lacks time-bound phases)	• Yes, formulate the phasing plan (in line with improvement scenarios) and include CAPEX and OPEX.
Section 10	Conclusion	Not included	• Yes, summarize findings / recommendations and next steps.

3 Existing Conditions

3.1 Introduction

This section provides a general overview of the study area, demographics, land use and development in Timor-Leste. This section also outlines the overarching transport context in Timor-Leste focusing on existing travel patterns, the roadway network, public transport network, as well as existing conditions of public transport facilities. Where applicable, country-level details are provided, followed by municipality-level details in areas such as Dili, Baucau and other major districts (as information permits).

3.2 Study Area and Extent

The study area for this 2023 PTMP focuses on the eastern part of the island of Timor-Leste (highlighted in grey color in the map below), which is divided into 12 municipalities, including Aileu, Ainaro, Baucau, Bobonaro, Covalima, Dili, Ermera, Lautem, Liquica, Manatuto, Manufahi, and Viqueque. Dili is the capital and the largest municipality located along the northern coast of the island. These municipalities are further broken down into more localized administrative levels called aldeia and suco, which are used for census purposes. It is noted that Atauro Island (the island located north of Dili) and Oecusse (an exclave in the western portion of Timor Island surrounded by Indonesia) are excluded from the study area for this 2023 PMTP.

Source: Arup Study Team

Figure 3.1: Study Area for 2023 PTMP

3.3 Demographics, Socio-Economic, and Land Use

3.3.1 Demographics

According to the 2022 Census, Timor-Leste has a population of 1.34 million residents, equating to a density of 89.8 residents/km^2.[43] The population increased by about 160,000 from the last 2015 Census, with an annual average growth rate of 1.81% between 2015 and 2022. At the municipality level, Dili has the largest population with around 325,000 residents, followed by Ermera (138,000), Baucau (135,000), and Bobonaro (107,000), respectively. Municipalities with more rapid population growth include Dili (2.78%),

[43]Source: Ministry of Finance. 2022. Population and Housing Census 2022 Main Report.

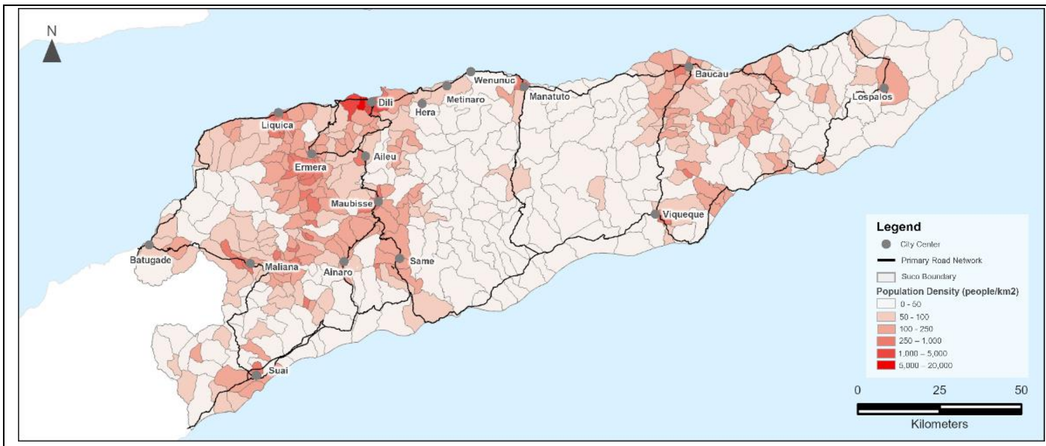
Oecusse (2.28%), and Liquica (2.18%), and Ainaro (2.12%). **Table 3.1** summarizes the population and density by municipality based on the 2015 Census and 2022 Census.

Table 3.1: Population and Density by Municipality (2015 vs. 2022)

Municipality	Area (km^2)	Population		Population (%)		Population Density (Residents/km^2)		Population Growth (%)
		2015	2022	2015	2022	2015	2022	
Aileu	735	48,837	54,324	4.1%	4.0%	66.4	73.9	1.53%
Ainaro	802	63,136	73,115	5.3%	5.4%	78.7	91.2	2.12%
Atauro	141	9,274	10,295	0.8%	0.8%	65.8	73.0	1.50%
Baucau	1,494	123,203	134,878	10.4%	10.1%	82.5	90.3	1.30%
Bobonaro	1,374	97,762	106,639	8.3%	7.9%	71.2	77.6	1.25%
Covalima	1,207	65,301	73,933	5.5%	5.5%	54.1	61.3	1.79%
Dili	228	268,005	324,738	22.6%	24.2%	1,175.5	1,424.3	2.78%
Ermera	759	125,702	137,750	10.6%	10.3%	165.6	181.5	1.32%
Lautem	1,817	65,240	70,022	5.5%	5.2%	35.9	38.5	1.02%
Liquica	562	71,927	83,658	6.1%	6.2%	128.0	148.9	2.18%
Manatuto	1,787	46,619	50,859	3.9%	3.8%	26.1	28.5	1.25%
Manufahi	1,338	53,691	60,665	4.5%	4.5%	40.1	45.3	1.76%
Oecusse	817	68,913	80,685	5.8%	6.0%	84.3	98.8	2.28%
Viqueque	1,888	76,033	80,176	6.4%	6.0%	40.3	42.5	0.76%
Timor-Leste (All Municipalities)	**14,949**	**1,183,643**	**1,341,737**	**100.0%**	**100.0%**	**79.2**	**89.8**	**1.81%**
Timor-Leste (Study Area) [A]	**13,991**	**1,105,456**	**1,250,757**	**93.4%**	**93.2%**	**79.0**	**89.4**	**1.78%**

Source: Timor-Leste 2022 Population and Housing Census, Preliminary Results.
Notes:
[A] The total population for the study area excludes that of Atauro and Oecusse.

The population density by suco level is illustrated in **Figure 3.2**. Areas with higher population densities are concentrated in Dili and other key districts such as Ermera and Baucau (shown in darker red shading). These areas are mostly found along the major road networks built across the country (indicated by the dark black lines). In contrast, areas with low population density are in the central region as well as the eastern portion of the country (illustrated in white shading).



Source: Estatica Municipio (2015)
Note: Population density by suco is based on the 2015 Census as the 2022 Census did not record/provide suco level population.

Figure 3.2: Population Density Map

3.3.2 Socio-Economic Development

According to the World Bank, Timor-Leste's gross domestic product (GDP) exceeded US$2.7 billion in 2021 (based on constant 2015 US$), which translates to around US$2,061 per capita.[44] While this represents a significant increase from previous years (US$1.59 billion in 2018, US$1.96 billion in 2019, and US$2.59 billion in 2020) despite the economic impacts from the COVID-19 pandemic, the per capita GDP remains near the bottom of Southeast Asian countries. For instance, the per capita GDP for Timor-Leste is only above that of Myanmar (US$1,317) and Cambodia (US$1,429), but below that of Papua New Guinea (US$2,413) and Indonesia (US$3,893). GDP is projected to grow by 3.0% in 2023.[45]

GDP contributions originate mainly from industrial, service, and agriculture sectors (as per a 2017 Central Intelligence Agency (CIA) World Factbook finding).[46] The main exports of the country are offshore petroleum and natural gas, which collectively account for around 80% of the country's GDP. [47] In addition, coffee and other agricultural products also serve as major export commodities.

3.3.3 Land Use Plan

Introduction

Land use plans in Timor-Leste are formulated as part of spatial plans at the national / municipal level. The Ministry of Planning and Territory (MPT) is responsible for preparing spatial plans (including land use plans). These planning documents are developed to optimize land use for the country and municipality, while adhering to the national/ municipality's vision for growth and development. The national spatial plan was completed in December 2022 – defining the strategic framework for the organization and intended land use up to 2038. At the municipality level, some municipal spatial plans (including those for Bobonaro and Ermera) have been completed, while others are currently underway.[48] For the Municipality of Dili, the 2023 Dili Urban Master Plan Update was completed in early 2023, serving as a guide to facilitate sustainable development of the Dili Metropolitan Area.

National Land Use & Planning Framework

As shown in **Figure 3.3**, the land use of Timor-Leste is predominantly forest or green areas, which comprise about 43% of the national territory, with mountains in the central part of the country stretching from east to west that slope towards the coast in the north, south and east. Only 2.5% of the national territory is classified as "urbanized built areas" – most of which is concentrated in the capital Dili (colored in red).[49]

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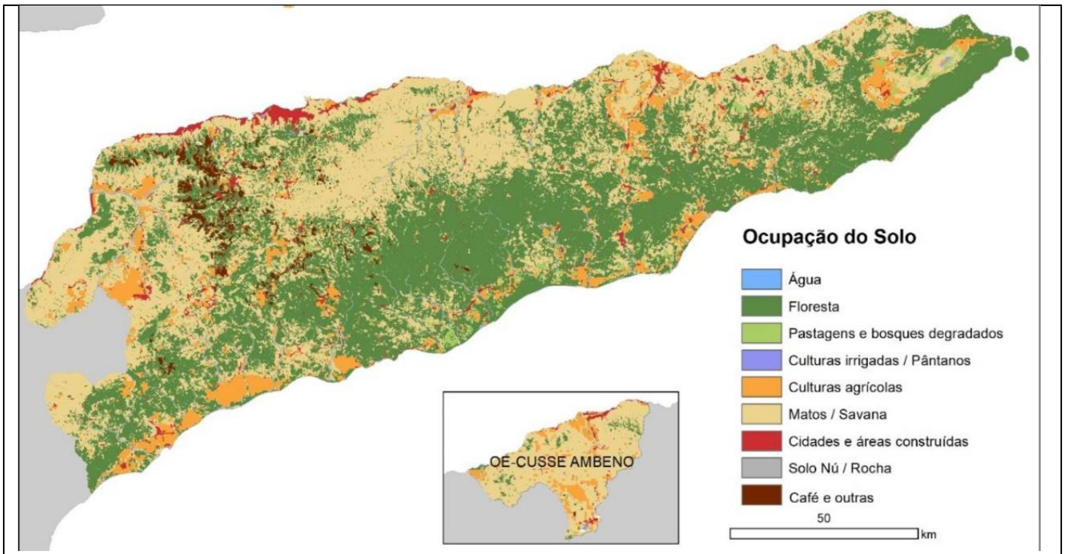
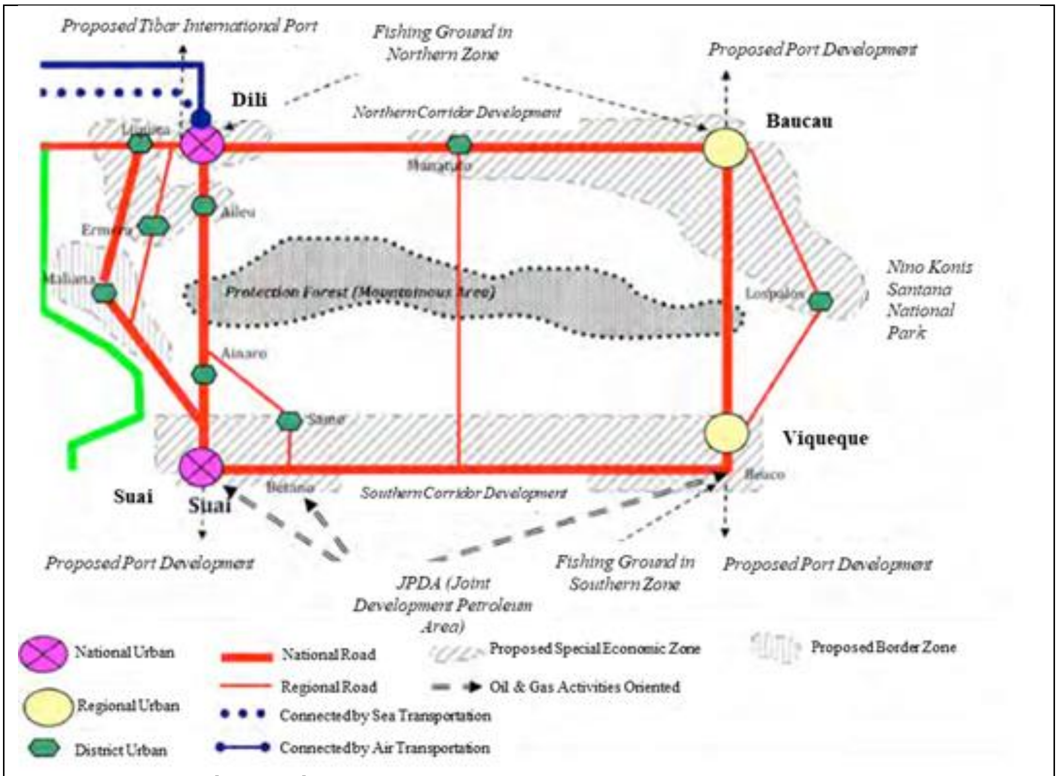
[44] Source: World Bank. 2022. GDP (constant 2015 US$) – Timor-Leste (https://data.worldbank.org/country/timor-leste?view=chart)
[45] Source: https://www.adb.org/countries/timor-leste/economy
[46] Source: https:///www.cia.gov/the-world-factbook/countries/timor-leste/#economy
[47] Source: https://www.timorleste.tl/east-timor/about/economy/
[48] Source: https://en.tatoli.tl/2023/01/26/govt-to-launch-national-land-use-planning-in-the-near-future/15/
[49] Source: Ministry of Planning. 2038. National Land Use Plan.



Source: Ministry of Planning and Territory 2038 National Spatial Plan

Figure 3.3: Existing Land Use of Timor-Leste



Source: Strategic Development Plan 2011-2030

Figure 3.4: Spatial Planning Framework

Prior to development of the 2038 National Spatial Plan (which includes the country's future spatial structure and is further discussed under Future Conditions in **Section 4**), the country's Strategic Development Plan 2011-2030 serves as the planning framework. This framework includes the following major themes for the country's growth priorities:

- **Regional Development Corridors** – Two regional development corridors are designed to guide social and economic development of Timor-Leste including the: (i) Northern Regional Development Corridor stretching westward from Dili to

Batugade and eastward from Dili to Baucau; and (ii) Southern Regional Development Corridor stretching from Suai to Beaco (near Viqueque).

- **National Strategic Zones** – Several national strategic zones are identified within the Northern and Southern Regional Development Corridors, slated to be engines for national economic growth (as shown in **Table 3.2**).

Table 3.2: National Strategic Zones within Regional Development Corridors

National Strategic Zone	Description of Sectors/Opportunities
Dili-Tibar-Hera	• This zone has a variety of potentially significant sectors related to services, trading, and proposed developments such the Tibar Commercial Port, the industrial estate in Hera, large scale housing, new higher education areas, marine tourism, a new central business district and the upgrading of the international airport.
Suai-Betano-Beaco	• This zone is home to the oil and gas industry. • This Special Economic Zone will promote the development of a supply base in Suai, a new central business district in Suai, a new petroleum industry and oil refinery in Betano, as well as an LNG plant development in Beaco.
Liquica-Ermera-Aileu	• This zone is related to agricultural/tourism sectors such as coffee, agriculture, and mountainous tourist destinations.
Manatuto-Baucau-Lautem	• This zone has a variety of potential sectors such as agricultural products, fishing industries, and tourism activities.
Bobonaro-Cova Lima	• This zone has access to potential opportunities arising from international trade (as sharing the border with Indonesia) as well as agricultural products and livestock.

Key findings relevant to country-wide spatial and land use development are as follows:

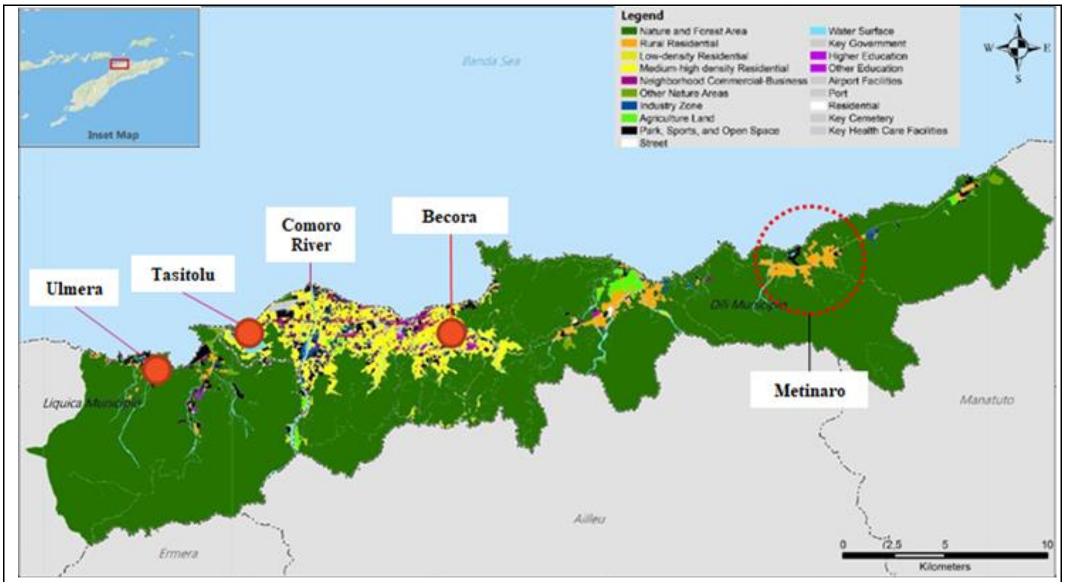
- **Priority Growth Poles Planned Along East-West Corridors on Northern and Southern Regional Corridors** – Two priority growth poles have been developed and are prioritized in the north and south of the country. Major economic hubs such as Dili and Baucau play pivotal roles in accelerating growth of the Northern Regional Corridor, where nearly half of the population resides including Dili (24.2%), Baucau (10.1%), Liquica (6.2%), and Manatuto (3.8%). Improving connectivity along this corridor is key to enhancing the livelihood and economic prospects of local residents. In contrary, cities lying on the Southern Regional Corridor are relatively smaller in terms of the population but have potential to develop their oil/petroleum industries and agricultural sectors to boost the regional economy – both of which would require a strong logistics network and supply chain.

Dili Land Use Plan [50]

Dili is the capital of Timor-Leste, characterized with several flat areas separated by mountainous areas to the east, west and south (with the Banda Sea bordering Dili to the north). The city center of Dili is located between Tasitolu in the west and Becora in the east, with several rivers running through the city such as the Comoro River. The Ministry

[50] As per Government Resolution No.23/2023 issued on 24 May 2023, the Dili Urban Master Plan Update will not be adopted. However, the Resolution notes that that Update may be used as a "supporting document" for: (i) studies for the definition and geographic delimitation of the future Dili Metropolitan Area; (ii) development of the Dili Municipal Spatial Planning Plan; (iii) development of other urban territorial planning instruments; (iv) development of sectoral plans for the city and municipality of Dili; and (v) development of legislation on matters with territorial impact on the city and municipality of Dili.

of Planning and Territory (MPT) prepared the Dili Urban Master Plan Update in early 2023, which updated the previous 2016 Dili Urban Master Plan conducted by the Japan International Cooperation Agency (JICA). The 2023 Dili Urban Master Plan Update covers the Dili Metropolitan Area comprising Dili Municipality as well as emerging satellite towns in the east and west of Dili known as Metinaro and Ulmera. As shown in **Figure 3.5**, most of Dili (some 83% of the land) is covered by natural/forest zones, with built-up areas (comprised of housing, economic centers, and transport facilities) occupy about 10% of the area. The majority of built-up developments are located in the urbanized area of Dili stretching from the west of the Comoro River to Becora Terminal (shaded yellow in the map below).



Source: 2023 Dili Urban Master Plan Update

Figure 3.5: Existing Land Use Plan in Dili (2022)

Dili is facing various urban issues such as rapid population increase due to a high influx of rural population to urbanized Dili, resulting in more dispersed development, largely unregulated on-street parking that may block roads and create congestion, as well as frequent natural disasters (i.e., typhoons, floods).[51] As a response, the 2023 Dili Urban Master Plan Update defines the following vision to guide development of Dili:

> "***Embracing Urban Spaces for Growth with Resilient and Vibrant Metropolitan Capital".***

This vision will be achieved by "*creating a resilient and vibrant metropolitan capital city through responsible use of land and public spaces to generate equal opportunities for economic activities and strengthening community bonds*". [52] The plan also includes specific transport development initiatives including:

- Upgrading road quality and the road network including rehabilitation of all national and district roads to an international standard including Outer South-Ring-Road, road widening;
- Improving the accessibility and reliability of public transport;
- Introducing mass public transit including buses; and

[51] Source: Ministry of Planning and Territory. 2022. Dili Urban Master Plan Update – Draft Final.
[52] Source: IBID.

- Improving road and public transport safety.

Key findings relevant to spatial and land use development in Dili are as follows:

- **Concentric Zone Model with Three Transport Hubs in the East, West, and South Peripheral Zones** – Dili is envisioned to develop radially outward from the current central area to periphery zones in the east, west and south. Each zone is to serve as a gateway between Dili and external cities, handling inbound/outbound trips at three existing public transport terminals (i.e., Becora, Tasitolu, and Taibessi). Becora Terminal in the east is the closest access point to/from eastern municipalities (i.e., Baucau, Lospalos, Viqueque), while Tasitolu Terminal serves the western municipalities (i.e., Liquica, Maliana), and finally Taibessi Terminal connects with southern municipalities (i.e., Aileu, Same, Suai).

- **Well-Connected, Efficient Transport Network Between Dili and Outlying Municipalities Essential to Reducing Inter-Region Imbalances** – Limited regional connectivity imposes mobility challenges for rural residents (which comprises over 68% of the national population). As noted in **Section 3.3.3**, key activity centers attracting trips from residential areas are clustered in markets, commercial and business districts in Dili. Thus, a well-connected, efficient transport network and system between Dili and outlying municipalities is essential to sustaining the development of the country's growth, while reducing inter-region imbalances in terms of access to economic opportunities and services.

Other Municipal Land Use Plans Outside of Dili

The Ministry of Planning and Territory (MPT) is currently developing the municipal spatial plan (which includes the land use plan) to guide land use development at the municipality level.[53] Several municipalities including Bobonaro and Ermera completed their first spatial plans in early 2023. **Table 3.3** summarizes a list of the municipal spatial plans as well as the respective status of each (i.e., expected completion year).

Table 3.3: Status of Municipal Spatial Plans

Municipality	Plan	Status of Municipal Spatial Plan
Aileu	Aileu Municipal Plan	• Preparation is expected to start in 2023.
Ainaro	Ainaro Municipal Plan	• Preparation is expected to start in 2023
Baucau	Baucau Municipal Plan	• Currently in progress (slated for end of 2023 completion).
Bobonaro	Bobonaro Municipal Plan	• A draft was completed in March 2023, although the plan is not yet publicly available (as of June 2023).
Covalima	Covalima Municipal Plan	• Preparation is expected to start in 2023.
Dili	Dili Municipal Plan	• Status of Dili Municipal Plan is unclear (as of August 2023).
Ermera	Ermera Municipal Plan	• A draft was completed in March 2023, although the plan is not yet publicly available (as of June 2023).
Lautem	Lautem Municipal Plan	• Currently in progress (slated for end of 2023 completion).
Liquica	Liquica Municipal Plan	• Preparation is expected to start in 2023.
Manufahi	Manufahi Municipal Plan	• Preparation is expected to start in 2023.
Viqueque	Viqueque Municipal Plan	• Currently in progress (slated for end of 2023 completion).

[53] Source: https://en.tatoli.tl/2023/01/26/govt-to-launch-national-land-use-planning-in-the-near-future/15/

3.3.4 Key Generators

This section illustrates major trip generators (also known as key generators) in each city as those sites/facilities attract and generate large volumes of visitors. These cities are shown in **Figure 3.6**. Key generators include government office buildings, commercial districts, education facilities, markets, hospitals, hotels, parks, stadiums, landmark or historical sites, and transport facilities (including airport, seaport, and bus terminals). Key trip generators in Timor-Leste were identified in March 2023 based on a review of combined datasets including OpenStreetMap (OSM) and Google Earth. Key generators are used as inputs to refine/identify existing public transport routes, as areas with higher density and number of key generators would be expected to generate a higher number of trips (and higher potential for more sustainable public transport demand).

Source: Arup Study Team

Figure 3.6: Locations of Key Cities in Timor-Leste

Key Generators - Dili

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.7**:

- Most government buildings are clustered around the city center (near Dili Stadium) and parallel the coast to the north. Educational institutions are distributed around the city, with most along or linked to major urban roads including Avenida Nicolau Lobato and Avenida Bpo. de Medeiros. Hospitals are located mostly within the city center near Dili Port, as well as in peripheral areas of the city.

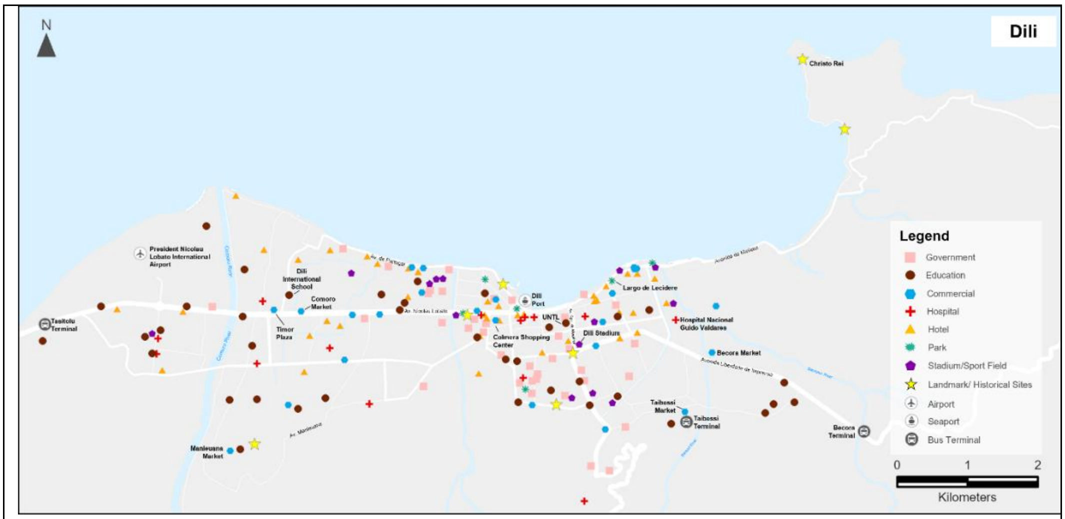
- Three bus terminals are operating today, with Tasitolu Terminal in the west (an on-street interchange with minimum passenger amenities), Taibessi Terminal in the south (adjacent to the Taibessi Market), and Becora Terminal in the east.

- President Nicolau Lobato International Airport is in the northwestern part of the city (west of the Comoro River) with direct access to Avenida Nicolau Lobato, the principal national road through the city, providing east-west access.

- Dili Port is a maritime gateway for regional/domestic passengers. Dili Port is in the heart of the city center, near the intersection between Avenida Nicolau Lobato and Avenida Bpo. de Medeiros.

- Several major markets are found in Dili, with Manleuana Market in the southwest (east of Comoro River), Taibessi Market in the southeast (near Taibessi Terminal), and Becora Market in the east along Avenida Liberdade de Impresa.

- Landmarks and popular tourist attractions (shown as yellow stars in the map) are in the city center as well as at the peninsula on the eastern end of the city (where Christo Rei is located).



Dili Convention Center

Timor Plaza

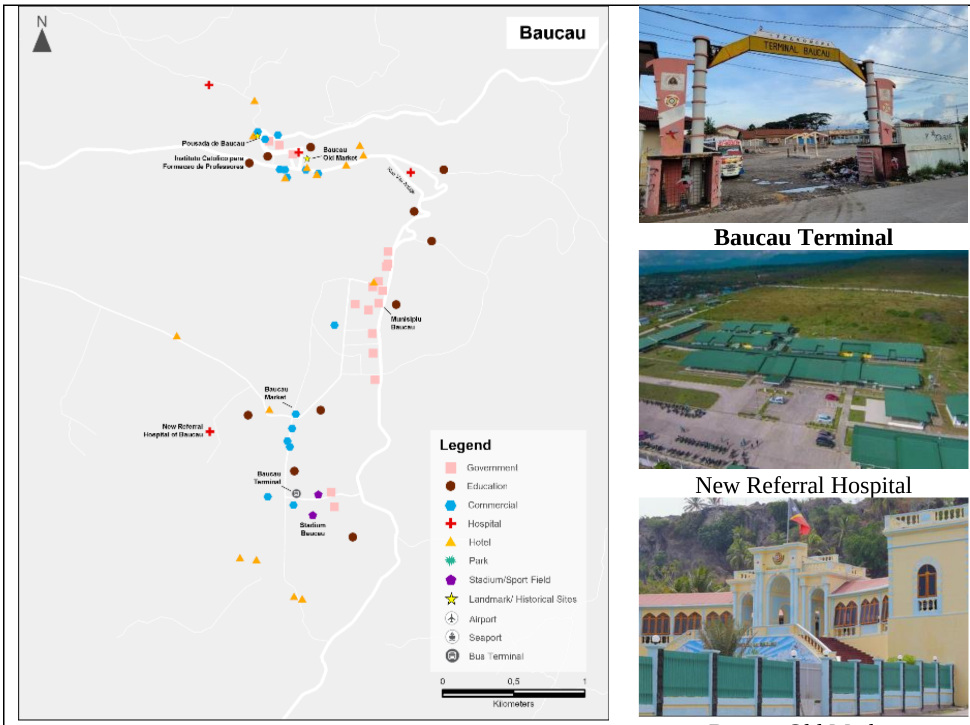
Dili Stadium

Source: Google Map and Open Street Map

Figure 3.7: Map and Images of Key Generators in Dili

Key Generators - Baucau

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.8**:



Baucau Terminal

New Referral Hospital

Baucau Old Market

Source: Google Map and Open Street Map

Figure 3.8: Map and Images of Key Generators in Baucau

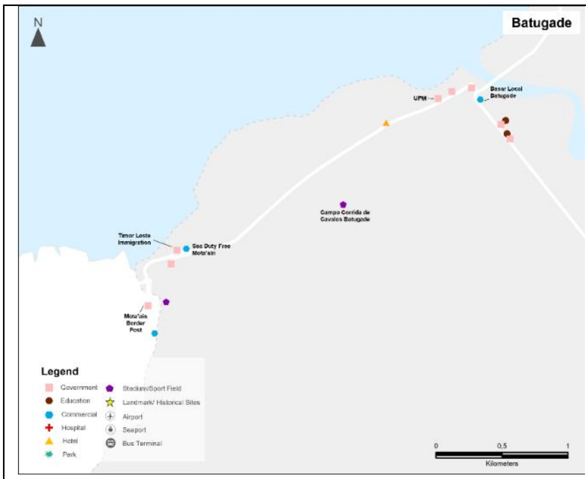
- Baucau is the second largest city in Timor-Leste, located in the north of the country. Activity centers in Baucau are mainly concentrated in two locations (the old town in the north and the urbanized area in the south near the Baucau Terminal). These areas are also home to numerous commercial buildings, with the Baucau Market located south of the city center about 0.5km from Baucau Terminal.

- Hotels are built near the old town area, which also serves as a popular tourist attraction. Government offices are mostly located along the north-south road stretching from Baucau City Center to the south (towards Viqueque). Major hospitals are found on the outskirts of the city center.

- The Baucau Terminal is in the south of the city center next to Baucau Stadium. The city has a domestic airport located around 10 km from the city center.

Key Generators - Batugade

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.9**:



Immigration Office

Mota-Ain Border Control

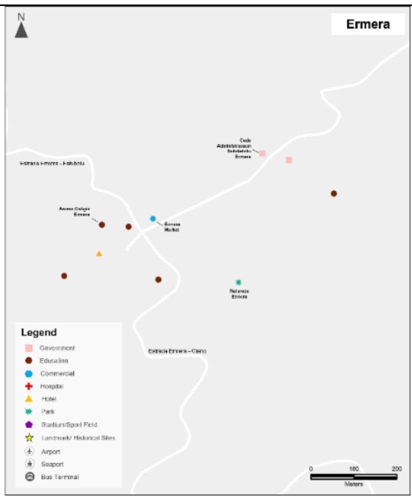
Source: Google Map and Open Street Map

Figure 3.9: Map and Images of Key Generators in Batugade

- Batugade (within the Municipality of Bobonaro) is a border town located adjacent to the international border crossing point between Indonesia and Timor-Leste in the west of the country.
- The major activity center of Batugade is segregated into two areas. On the east side, the activity center is located near the intersection of Dili-Batugade Road and Batugade-Balibo Road. Meanwhile, the activity center on the west side is located close to the border.
- The western side of Batugade primarily contains border control related structures, housing several government offices (including border control offices), duty-free stores and border markets.
- The eastern side of Batugade caters to the needs of the local community, with government offices and the Batugade Local Market. This area also includes several schools along the road that connects Batugade with Maliana and Suai.

Key Generators - Ermera

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.10**:



Ermera Market

Hotalia Church

Source: Google Map and Open Street Map

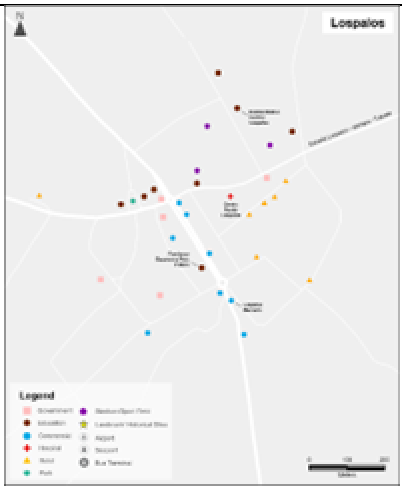
Figure 3.10: Map and Images of Key Generators in Ermera

- Ermera is in a mountainous area about 50km from Dili.
- Ermera city center (including a market) is strategically situated at the intersection of Estrada Ermera-Fatubolu, Estrada Ermera-Gleno, and the road connecting Ermera with Gleno (towards south).
- The market serves as an interchange for regional bus services traveling to/from Dili to Gleno. Several government offices are located on the road connecting Ermera with Gleno.
- Several schools are in the west of the Estrada Ermera- Fatubolu and Estreda Ermera-Gleno roads. A key tourist attraction (Ermera Natureza) is also nearby.

Key Generators - Lospalos

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.11**:

- Lospalos is a key destination in the Municipality of Lautem in the far east of the country. Activity centers in Lospalos are primarily located at the intersection between the Estrada Lospalos-Mehara-Tutuala road and the unnamed north-south corridor.
- Commercial buildings lie along the north-south corridor including Lospalos Mercado. The eastern part of the city houses various hotels, while government offices are located in the western part. Schools and sport stadiums are north of the Estrada Lospalpos-Mehara-Tutuala Road. The Centro Saude Lospalos (a regional hospital) is located in the city center, accessible from all directions.



Uma Lulik Statue

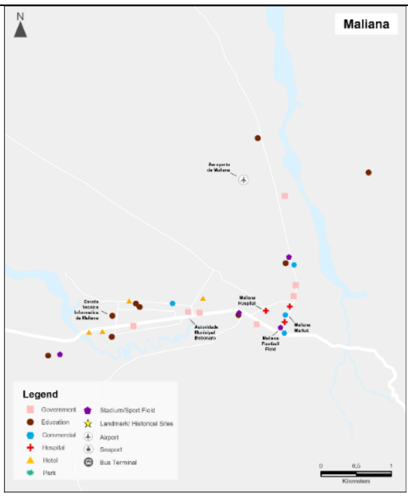
Lospalos Mercado

Source: Google Map and Open Street Map

Figure 3.11: Map and Images of Key Generators in Lospalos

Key Generators - Maliana

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.12**:




Maliana Market


Maliana Referral Hospital

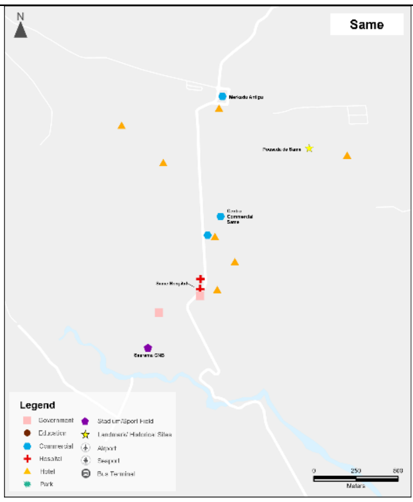
Source: Google Map and Open Street Map

Figure 3.12: Map and Images of Key Generators in Maliana

- Maliana is a major city in the west of Timor-Leste within the Municipality of Bobonaro.
- Maliana Airport is a domestic airport located about 3km to the north of the city center.
- Various key generators (including government offices, commercial buildings, schools) lie along Holsa Street. Several hospitals are located in the city center across Holsa Street.
- Maliana Market is a major trip attractor located at the city center in a mixed-use development area.

Key Generators - Same

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.13**:




Centro Commercial Same


Same Church

Source: Google Map and Open Street Map

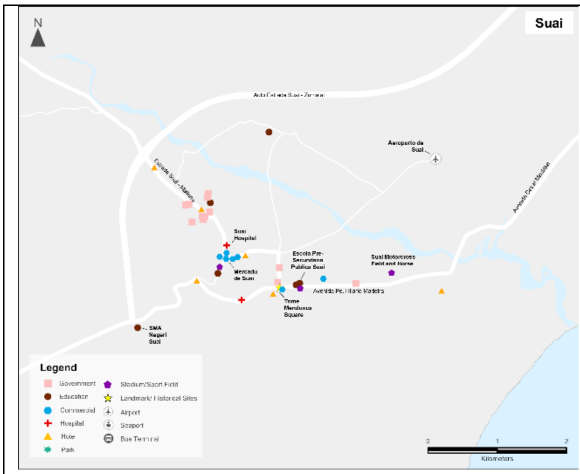
Figure 3.13: Map and Images of Key Generators in Same

- Same sits within the Municipality of Manufahi and forms one of the key north-south corridors connecting the southwest of Timor-Leste to Dili.

- The unnamed north-south road in Same is lined with the majority of key generators in the area including government, commercial buildings, and hospitals (including Same Hospital). Several hotels are found within 1km from the city center. A sports stadium is situated in the southern corner of the city.

Key Generators - Suai

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.14**:



Hospital Referral Suai

Xanana Gusmao International Airport

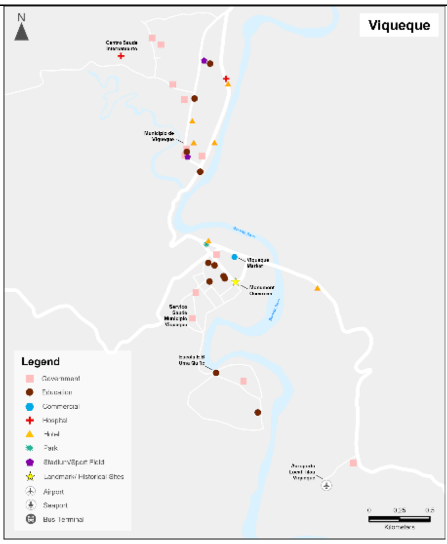
Source: Google Map and Open Street Map

Figure 3.14: Map and Images of Key Generators in Suai

- Suai is a city in the Municipality of Covalima and is served by the only highway in the country (linking Suai with Zumalai).
- Various key generators (including government offices, commercial aeras) are located on the north side of the Estrada Suai-Maliana Road.
- Schools are dispersed throughout the area, with the Escola Pre-Secundaria Publica Suai located on Avenida Pe. Hilario Madeira Road, while Suai Hospital is located on the same street as Mercadu de Suai.
- Suai has an international airport, Xanana Gusmao International Airport, in the northeast of the city, conveniently accessible via access roads that lead directly to the city center.

Key Generators - Viqueque

Key findings are summarized as follows, with a map and images of key generators shown in **Figure 3.15**:



Administracao Municipal Viqueque

Monumento Pancasila

Source: Google Map and Open Street Map

Figure 3.15: Map and Images of Key Generators in Viqueque

- The majority of Viqueque's activity centers are located on the western side of the Bularan River.
- Government offices are scattered throughout the area, mostly concentrated in the northern area, along with hotels. Centro Saude Internamento, a regional hospital, is located outside this vicinity on the side of a minor road.
- Schools are in various areas, with a concentration of educational institutions in the central area.
- This central area also contains a commercial district, where Viqueque Market is located. Viqueque also boasts Aeroporto Local Tilou, a domestic airport located in the southern part of the city, which is accessible from the city center via the Viqueque-Baucau Road.

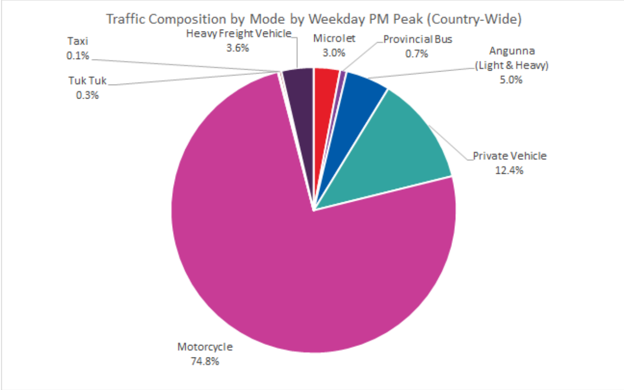
3.4 Transport Context

3.4.1 Existing Transport Demand and Patterns

Traffic Composition on Major Roads to/from Key Cities

Traffic count and vehicle occupancy surveys were conducted in April/May 2023 to understand existing travel patterns at 13 selected screenline locations across Timor-Leste (including three locations on major roads to/from Dili, three locations on major roads to/from Baucau, as well as key locations to/from outlying cities such as Batugade, Ermera, Los Palos, Maliana, Same, Suai, and Viqueque). Surveys were conducted in the AM Peak (7:00AM-9:00AM), the mid-day (11:00AM-1:00PM), and PM Peak (4:00PM-6:00PM).

Around 11,000-12,000 vehicles per peak period were observed in both directions on the weekdays, with the AM Peak having the lowest recorded volumes and the PM Peak having the highest recorded vehicle volumes. Saturday volumes showed significantly reduced traffic volumes (by 50% or more) during the three survey periods – with the PM Peak still experiencing the highest vehicle volumes (with Dili screenlines comprising about 50% of all counted vehicles). As the PM Peak represents the period with the highest traffic volumes, the PM Peak is thus used to illustrate key vehicle and mobility trends and characteristics (also though, similar percentages and trends are observed in the other periods as well).



Source: Arup Survey
Note: The % of traffic composition is estimated based on traffic surveys at major screenline points across the country.

Figure 3.16: Vehicle Use by Type at Key Screenlines Across Country (Weekday PM Peak)

As shown in **Figure 3.16**, looking at the country-wide survey results, motorcycles comprise about three-quarters of all vehicles counted at the screenline in the weekday PM Peak (in both directions). Private vehicles comprise about 12.5% of vehicles, followed by public transport vehicles (i.e., microlet, regional bus, and angguna) at around 8%.[54] At the municipality level, Dili and Baucau comprise nearly 50% and 10% of the total vehicle volumes, respectively. Public transport vehicles (i.e., regional bus, microlet and angguna) collectively account for about 10% of all vehicles in Dili and 15% of all vehicles in Bacau (and accounting for 5-10% of all vehicles in other locales). A summary of vehicle composition at each municipality is shown in **Table 3.4**.

[54] As described in **Section 3.4.2.3**, microlets are small vans with 14 seats, while angguna are medium-sized trucks with two benches for seating in the open back of the vehicle. Microlet and regional bus are the focus of this study.

Table 3.4: Traffic Composition by Screenline Location (Weekday PM Peak – 4:00PM-6:00PM)

Location	Microlet	Regional Bus	Angguna	Private Vehicle	Motor-cycle	Taxi	Tuk-Tuk	Heavy Freight Vehicle	Total
Surveyed Traffic Volumes by Mode									
Dili	212	29	258	671	4,476	16	30	166	5,858
Baucau	65	41	51	164	863	0	0	93	1,277
Batugade	0	0	10	23	215	0	0	19	267
Ermera	22	6	46	61	436	0	0	40	611
Lospalos	1	0	10	48	203	0	0	8	270
Maliana	31	7	63	143	918	0	3	35	1,200
Same	24	3	79	107	825	0	0	27	1,065
Suai	5	3	11	46	428	0	0	16	509
Viqueque	0	0	77	227	635	0	0	33	972
Country-Wide	360	89	605	1,490	8,999	16	33	437	12,029
Traffic Composition by Mode (%)									
Dili	3.6%	0.5%	4.4%	11.5%	76.4%	0.3%	0.5%	2.8%	100.0%
Baucau	5.1%	3.2%	4.0%	12.8%	67.6%	0.0%	0.0%	7.3%	100.0%
Batugade	0.0%	0.0%	3.7%	8.6%	80.5%	0.0%	0.0%	7.1%	100.0%
Ermera	3.6%	1.0%	7.5%	10.0%	71.4%	0.0%	0.0%	6.5%	100.0%
Lospalos	0.4%	0.0%	3.7%	17.8%	75.2%	0.0%	0.0%	3.0%	100.0%
Maliana	2.6%	0.6%	5.3%	11.9%	76.5%	0.0%	0.3%	2.9%	100.0%
Same	2.3%	0.3%	7.4%	10.0%	77.5%	0.0%	0.0%	2.5%	100.0%
Suai	1.0%	0.6%	2.2%	9.0%	84.1%	0.0%	0.0%	3.1%	100.0%
Viqueque	0.0%	0.0%	7.9%	23.4%	65.3%	0.0%	0.0%	3.4%	100.0%
Country-Wide	3.0%	0.7%	5.0%	12.4%	74.8%	0.1%	0.3%	3.6%	100.0%

Trip-Making / Mode Share

In terms of total person trips and mode share, some 23,000 trips were estimated at the screenline locations (accounting for the vehicle counts and an average observed occupancy per vehicle type) in the Weekday PM Peak, with Dili and Baucau accounting for 46% and 14% of total person-trips. The number of person trips and split by mode for Dili and Baucau, as well as other rural cities across the country are shown in **Table 3.5**.

Table 3.5: Number of Trips and Mode Split by Mode (Weekday PM Peak)

Type of Trip	Mode	Estimated # of Person Trips by Mode				Mode Split by Mode					
						Dili		Baucau		Country-Wide (Excluding Dili and Baucau)	
		Dili	Baucau	Country-Wide (Excluding Dili and Baucau)	Total	% of Mode Split	% of Mode Split by Type	% of Mode Split	% of Mode Split by Type	% of Mode Split	% of Mode Split by Type
Public Transport	Microlet	1,025	522	517	2,064	9.7%	23.7%	15.7%	46.4%	5.6%	23.9%
	Regional Bus	456	825	103	1,384	4.3%		24.8%		1.1%	
	Angguna	1,030	193	1,589	2,812	9.7%		5.8%		17.2%	
Non-Public Transport	Private Vehicle	1,712	475	1,554	3,741	16.1%	76.3%	14.3%	53.6%	16.8%	76.1%
	Motor-cycle	6,339	1,305	5,486	13,130	59.7%		39.3%		59.3%	
	Taxi	18	0	0	18	0.2%		0.0%		0.0%	
	Tuk-Tuk	36	0	6	42	0.3%		0.0%		0.1%	
Total		10,616	3,320	9,255	23,191	100.0%		100.0%		100.0%	

Source: Arup Survey

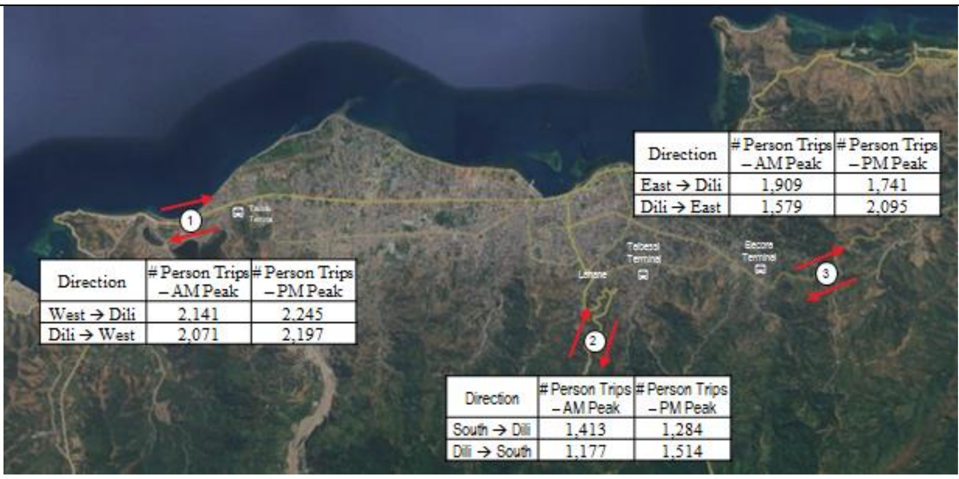
Note: The number of person trips is based on traffic volumes and average observed occupancy by mode surveyed for both directions in PM peak hours (4:00PM-6:00PM).

Key findings are as follows:

- **Limited Use of Public Transport in Dili and Other Rural Areas (Except Baucau)** – On average public transport (i.e., microlet, regional bus, angguna) accounts for about 24% of all screenline trips in Dili, with a similar figure observed in other locations (besides Baucau – which has a much higher portion of public transport use (at around 46%) – possibly due to the location of the screenlines leading into downtown Baucau).

- **Motorcycles as Predominant Travel Mode** – Non-public transport modes comprise about three-quarters of all person trips, with motorcycles comprising about 60% of total person-trips (or about 80% of non-public transport trips) in Dili and the country as a whole (with slightly lower splits in Baucau).

- **Heavier Trip Volumes Towards Dili in AM Peak (Figure 3.17)** – In terms of Dili trips, surveys found that some 2,100 trips from western municipalities headed towards Dili in the two-hour peak period from 7:00AM-9:00AM. At the same time, 1,900 trips and 1,400 trips came from the eastern and southern municipalities, respectively. Outbound trips were about 10-20% lower than inbound flows in the AM Peak period. This seems logical given Dili's importance as an employment and economic hub. In the PM Peak, the trend is reversed towards the east and south municipalities.

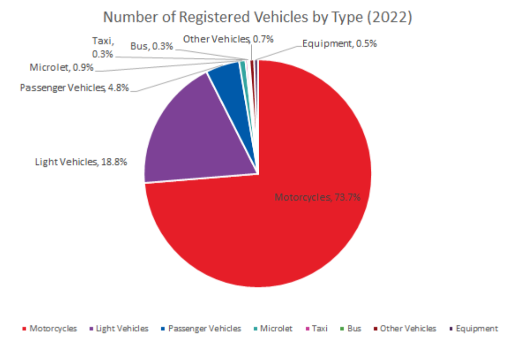


Source: Arup Study Team

Figure 3.17: Trips between Dili and Outlying Areas (Weekday AM/PM Peak)

Motor Vehicle Fleet

According to DNTT 2022 statistics, the total number of registered operating vehicles in the country is around 182,500 as of 2022. Of this, motorcycles represent about 73.7% (or about 134,500) of this total, followed by light vehicles (18.8% or 34,400), passenger vehicles (4.8% of 8,800), microlets (0.9% or 1,600), taxis (0.3% or 600), and buses (0.3% or 480) as shown in **Figure 3.18**.



Source: DNTT 2022

Figure 3.18: % of Registered Vehicles by Type in Timor-Leste (2022)

In addition, **Table 3.6** shows that the number of newly registered vehicles continued to grow from 2015 to 2018 (with slight declines in 2019 and 2020 during COIVD-19). The trend shows most of these are motorcycles (comprising over 80% of all new vehicle registrations), indicating continued and high demand for two-wheelers in the country. Vehicle ownership rate remains relatively low (even in the urbanized Dili municipality at around 208 vehicles/1,000 residents based on the 2016 JICA Dili Urban Master Plan household survey), but this is expected to grow as economic prosperity and population increase.

Table 3.6: # of New Vehicle Registrations by Type in Timor-Leste (2015-2020)

Type	2015	2016	2017	2018	2019	2020
Motorcycles	13,876	16,307	18,125	20,025	15,627	16,816
Passenger Vehicles	2,133	1,766	2,010	2,012	2,815	2,771
Light Cargo Vehicles	1,500	1,128	1,535	1,625	106	48
Heavy Vehicles	292	297	299	312	48	397
Total	17,801	19,498	21,969	23,974	18,596	20,032

Source: 2023 Dili Urban Master Plan Update

3.4.2 Roadway Network, Traffic and Parking

3.4.2.1 Roadway Network

Existing Road Networks and Hierarchy

According to the Directorate of Roads, Bridges and Flood Control (DRBFC), roads in Timor-Leste are classified into five types:

- **Expressways** – Motorways designed for fast-moving traffic on a specific section (i.e., Suai to Zumalai), with physical separation between different directions of travel (with barrier or median), with grade-separated crossing and no direct access to adjoining land uses and properties.
- **National Roads** – Roads that link different municipality centers to Dili, which comprise the main trunk lines of the national road system (serving as the backbone of the regional bus routing network).
- **Municipal Roads** – Roads that connect the municipal centers (or center of subdistricts) to outlying districts and periphery areas.
- **Urban Roads** – Roads within urban areas in different municipal centers; and

- **Rural Roads** – Roads within rural areas (which are often impassable for motorized vehicles as they are often unpaved).

As of 2021, Timor-Leste has a total network of 7,505km of roads including: (i) 30km of expressway (i.e., Suai to Zumalai); (ii) 1,401km of national roads; (iii) 767km of municipal roads; (iv) 605km of urban roads; and (v) 4,702km of rural roads.[55] The existing main road network in Timor-Leste (i.e., expressway, national roads, and municipal roads) is shown in **Figure 3.19**.

Source: Based on ADB 2021 Baucau to Viqueque Highway Project, Road Sector Assessment.

Figure 3.19: Existing Primary Road Network (Including Expressway, National Roads, and Municipal Roads)

The status of current road conditions (and upgrades) for national roads (which serve as the backbone of regional bus network) is shown in **Figure 3.20**.

Source: 2021 ADB Baucau to Viqueque Highway Project

Figure 3.20: Existing Conditions of Primary Road Network (including Expressway, National Roads, and Municipal Roads)

Nearly 70% of the national road network has been completed or is under construction (shown in green/blue shading) along the Northern Regional Corridor (i.e., Liquica-Dili-Baucau) as well as several strategic north-south corridors (i.e., Dili-Same, Baucau-

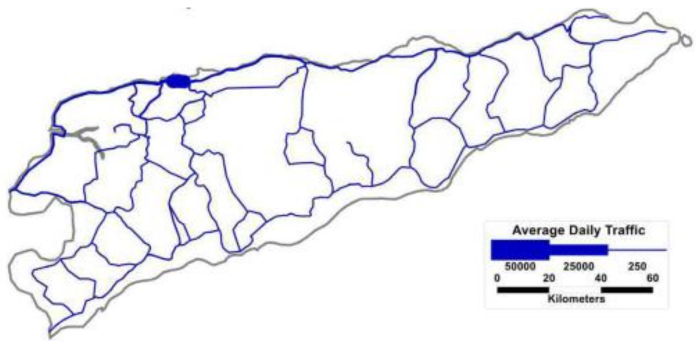
[55] Source: ADB. 2021. TA-9502 TIM: Baucau to Viqueque Highway Project, Road Sector Assessment.

Viqueque). About 10% of national roads are in fair condition with older pavements (indicated in yellow shading). The remaining 20% of national roads are in poor condition (shown in red//black shading), primarily along the Southern Regional Corridor (near Suai and Viqueque). Conditions on these roads force vehicles to reduce operating speeds, extend trip times, elongating the riding experience, and generating higher vehicle operating costs.

3.4.2.2 Traffic Conditions

Existing Traffic Conditions – Country-Wide

The 2018 Timor-Leste Transport Sector Master Plan includes traffic volumes on national roads (in terms of daily average traffic volume) based on 2013-2014 data (**Figure 3.21**). This data is included for reference only as no national-level traffic assessment has been systematically conducted to date. Compared to results from 2013-2014, counts conducted for this study in 2023 show significantly higher volumes on approach roads into/out of Dili for instance. For the 2013-2014 survey, other national roads outside of Dili serve much lower traffic volumes around 250 vehicles per day.



Source: 2018 Timor-Leste Transport Sector Master Plan.
Note: The ADB 2021 Road Sector Assessment contains traffic volume data based on 2009 data. More recent 2013/2014 traffic data is used for reference to understand existing traffic conditions at national level.

Figure 3.21: Traffic Volume in Timor-Leste (2013-2014)

Existing Traffic Conditions – Dili

The 2023 Dili Urban Master Plan Update assessed overall road network performance (in terms of volume to capacity ratio or V/C, travel speed, and travel time) of major roads in the Dili Metropolitan Area (DMA). In overall terms:

- Travel speeds during the AM/PM Peak range from 10-30km/hour on weekdays to 10-40km/hour on weekends.
- Relatively slower speeds are observed on road segments (both weekdays and weekends) depicted with red lines in **Figure 3.22**. Such segments include Ave. President Nicolau Lobato (near Motael), Estrella de Balide (at the intersection with Caicoli) as well as Ave. Liberdade de Imprensa (near Kuluhun).

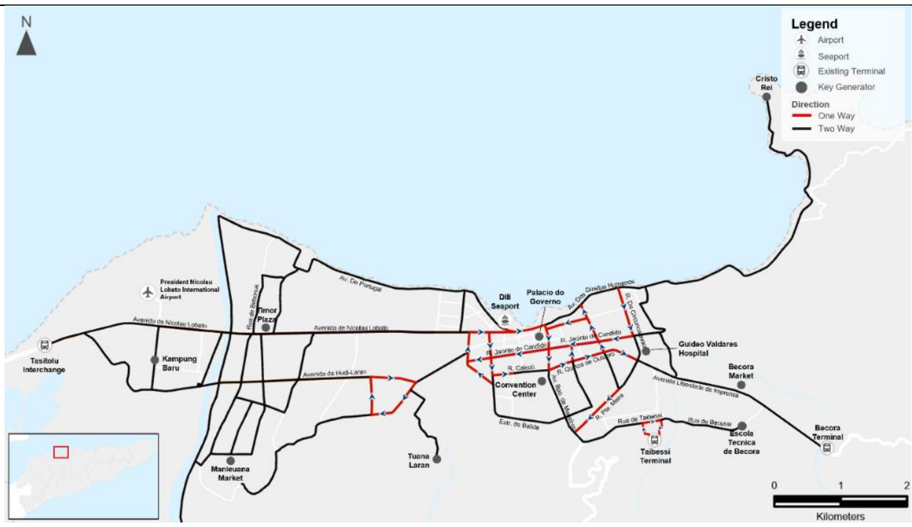
Source: 2023 Dili Urban Master Plan Update.

Figure 3.22: Existing Traffic Condition in Dili Metropolitan Area (2022) – Weekday (Left) and Weekend (Right) Recorded at 8:00AM (Top) and 5:00PM (Bottom)

Road Direction and Configuration – Dili

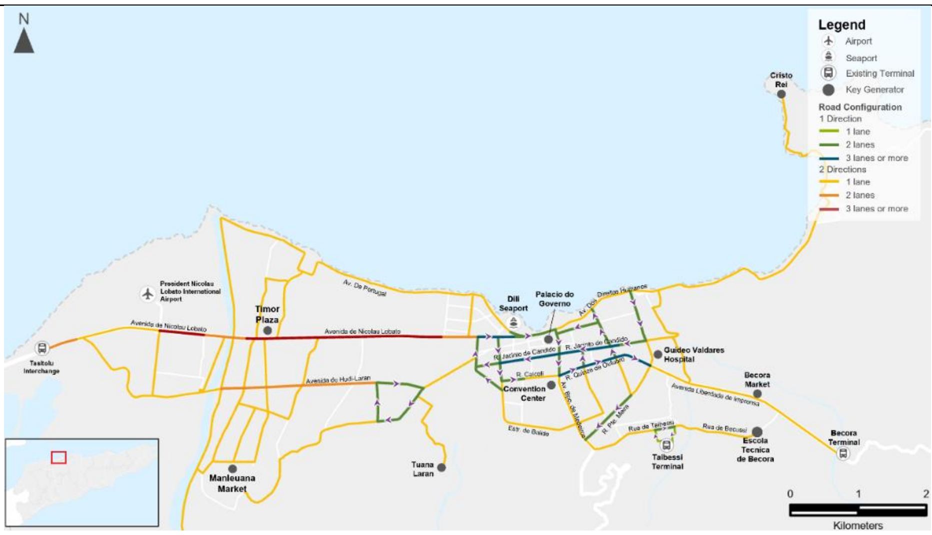
Key findings regarding road direction and configuration in Dili are summarized as below with the maps in **Figure 3.23** and **Figure 3.24**:

- Most roads in the city center (such as R Jacinto de Candido) are designed for one-way flow (with between 2-3 lanes) requiring vehicles to take more circuitous routes to reach specific destinations. For public transport, this could result in longer travel times, higher costs, lack of flexibility with routing, etc.
- In some areas, road configuration and flow changes abruptly, creating bottlenecks. For instance, Rua de Taibessi is primarily a two-way road (with one lane each direction), but abruptly changes to one-way operations for about 250m near the access point to Taibessi Terminal.



Source: Arup Study Team based on local observations and video surveys in April 2023
Note: The road network shown in the map is based on the microlet routes/network.

Figure 3.23: Traffic Circulation on Major Roads in Dili (based on Microlet Route/Network)



Source: Arup Study Team based on local observations and video surveys in April 2023
Note: The road network shown in the map is based on the microlet routes/network.

Figure 3.24: # of Lanes on Major Roads in Dili (based on Microlet Route/Network)

Traffic and Air Quality – Dili

According to the 2023 Dili Urban Master Plan, baseline sampling of ambient air quality was collected at three residential locations in Dili in a 2021 Environmental Impact Assessment (as part of ADB's Presidente Nicolau Lobato International Airport Expansion Project). This sampling revealed that nitric oxide (NO), nitrogen dioxide (NO2), ozone (O3), carbon monoxide (CO), and sulfur dioxide (SO2) were all below the detection limit (<1 $\mu g/m^3$). Furthermore, the concentration of PM2.5 particulate matter was recorded at 8-9 $\mu g/m^3$, which is below the threshold of 25 $\mu g/m^3$ as defined by the World Health Organization (WHO) Air Quality Guidelines. These relatively low rates suggest air pollution is not a major issue in Dili (and around the country, which is far more rural than the capital, Dili).

3.4.2.3 Parking Conditions

General Parking Conditions

Parking is governed by the Highway Code (Decree Law No.6/2003). Different restrictions apply to stopping (i.e., loading, unloading) as well as parking of vehicles at non-designated areas. A summary of these restrictions and fines are presented in **Table 3.7**.

Table 3.7: Restrictions/Fines on Stopping and Parking

#	Restrictions	Fine (US$)
Prohibited Stopping & Parking (as stipulated in Section 49, Highway Code)		
1	At bridges, tunnels, underpasses, or overpasses and at all places with insufficient visibility	$3-$15
2	Within 5m of either side of an intersection or junction	
3	Within 3m or 15m on either side of a stop sign for collective transport passenger vehicles	
4	Within 5m prior to a signalized crossing	
5	Within 20m prior to traffic signals at the entry of an intersection	
6	On traffic medians, the middle of a roundabout, on pavement, and other areas designed for the circulation of pedestrians	
7	On a roadway marked with a continued longitudinal line, where the distance between the latter and the vehicle is less than 3m	
8	Within 50 m of either side of an intersection, junction, curve, or bump with reduced visibility	

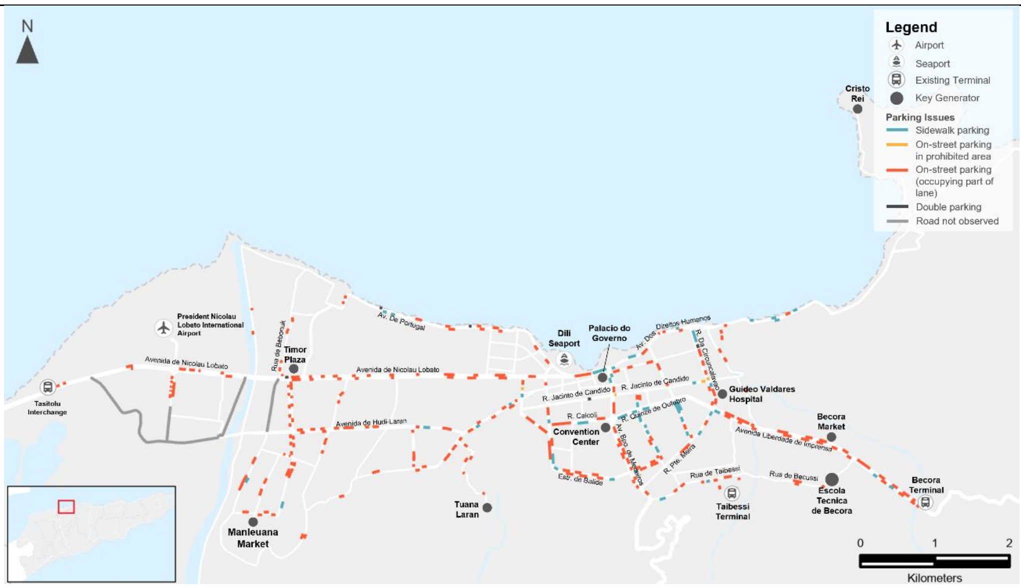
#	Restrictions	Fine (US$)
Prohibited Parking (as stipulated in Section 50, Highway Code)		
1	On a road impeding the flow of one or more lanes of traffic, depending on whether traffic operates in one or both directions	$3-$15
2	Double parking on a roadway as well as at all other places that block access to designated legal on-street parking spaces	
3	At places whereby people or vehicles have access to properties, parking lots or places	$6-$30
4	Within 5m of either side of the access to a gas station	$3-$15
5	At places reserved (via markings or signage) for parking of certain vehicles	$6-$30
6	Street parking of agricultural vehicles, industrial machines, trailers, and semi-trailers when these are not coupled to a tractor vehicle (except in specially designated parking lots)	$3-$15
7	Overstaying in areas/spaces with time limits	
8	At night on a roadway	$24-$120
9	On a roadway signalized with the right of way sign	$6-$30
Stopping of Collective Transport Passenger Vehicles (as stipulated in Section 52, Highway Code)		
1	On roadways, the driver of a vehicle used in the collective transport of passengers may only stop to take or drop off passengers at places especially designed for that purpose	$12-$60
2	Where there is no place referred to in the preceding subsection, a collective transport vehicle must stop as near as possible to the left edge of the roadway	

Within Dili, parking issues can be categorized into four elements as shown in **Table 3.8**. These parking issues are then assessed along the entire Dili microlet network – a map of the color-coded roads by parking issue type is shown in **Figure 3.25**.

Table 3.8: Parking Issues by Type

#	Parking Issue Type	Description	Example
1	**Sidewalk Parking**	Vehicles occupy the sidewalk partially or fully, blocking the safe passage of pedestrians.	 R. Jose Maria Marques
2	**On-Street Parking in Prohibited Areas**	Vehicles park on the side of a road where parking is strictly prohibited with a No Parking Sign (as shown in the image). This type of parking is usually observed near intersections.	 R. Belamino Robo
3	**On-Street Parking (Occupying Part of Lane)**	Vehicles occupy roadside spaces along the road that are not designated for parking, reducing lane capacity, and blocking other vehicles from passing the road.	 Rua de Caicoli
4	**Double Parking**	Two vehicles park side-by-side blocking traffic in one or more lanes (whether the curbside parking is permitted or not)	 Av. Liberdade de Imprensa

Source: April 2023 Video Surveys



Source: Arup Study Team based on video surveys in April 2023

Figure 3.25: Parking Issues – Dili Microlet Network

Key findings of parking issues on the Dili microlet network are as follows:

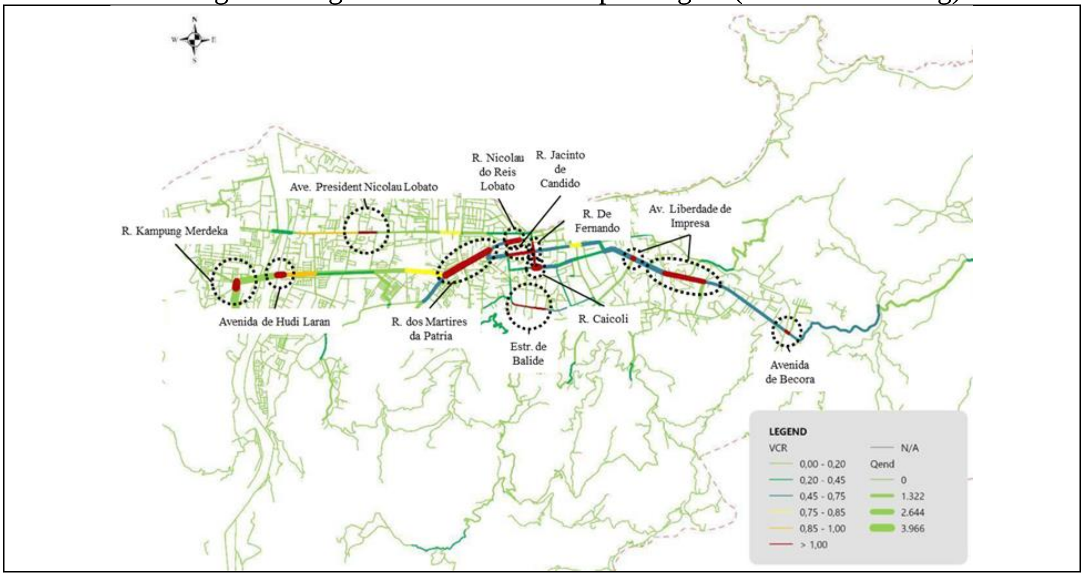
- Sidewalk parking is most prevalent in the city center (such as between Dili Seaport and Largo Lecidere along Av. Dos Direitos Humanos, near key generators along Caicoli and R. Quinez de Outubro).
- On-street parking in prohibited areas (with a No Park Sign on the roadside) is observed at several intersections along Jacinto de Candido.
- The most frequent parking issue observed across the city is on-street parking that occupies part of the traffic lane – this is spotted along major roads (Ave. de Nicolau Lobato) as well as other local streets connecting residential areas.
- Double parking (where two vehicles park side by side on a traffic lane) is observed sporadically near major key generators such as Timor Plaza and UNTL.
- Based on local observations, these parking issues are prevalent throughout the day, with minimal parking monitoring/enforcement to ensure compliance with parking regulations.

3.4.2.4 Congestion

The 2023 Dili Urban Master Plan Update assessed overall road network performance in terms of volume to capacity ratio or V/C (where 1.00 is considered congested and near capacity as indicated in red), which indicates the level of congestion as illustrated in **Figure 3.26**. Key findings on potential causes of congestion on these road segments are summarized as follows:

- **Parking Issues** – As presented in **Figure 3.25**, several parking issues (i.e., on-street parking, double parking) are prevalent in Dili, with minimal parking monitoring/enforcement to ensure compliance with parking regulations. This may result in reduced roadway capacity, and thus affect overall traffic performance. Congested road segments with parking issues include R. dos Martires da Patria, Estr. de Balida, R. Caicoli, Ave. Liberdade de Impresa, and Ave. Presidente Nicolau Lobato.

- **Road Configuration** – Coupled with parking issues, road configuration (i.e., number of lanes and road direction) may also cause congestion. As presented in **Figure 3.24**, a majority of the congested sections as noted above only have 1 lane in each direction. This may result in slower speeds of traffic and increased vehicular queuing due to lack of capacity.
- **Vehicle Activity to/from Key Generators** – Vehicle trips to/from key generators (i.e., markets, schools, and commercial areas) may also create congestion. For example, Becora Market is located along Ave. Liberdade de Impresa, which may attract significant volumes of microlets, anggunas, as well as other private vehicles. A high concentration of key generators is found in the city center, where several roads (such as R. Jacinto de Candido) are considered congested (over V/C 1.00).
- **Driver Behavior** – Lastly, congestion may stem from prevailing microlet driver behavior. This includes suddenly stopping at non-designated areas for passenger loading/unloading (locally known as *konja* or coercive passenger herding), as well as waiting in through traffic lanes to load passengers (known as keliling).



Source: 2023 Dili Urban Master Plan Update

Figure 3.26: Dili Road Network Performance

3.4.3 Public Transport Network & Services

The public transport system in Timor-Leste is served by a variety of public transport modes (both formal and informal), including bus, microlet, and angguna. These are largely operated by individual operators or small associations without fixed service schedule and limited regulation/oversight from the government in terms of safety, security, and service quality.[56] This section gives an overview of public transport network and services with details on routing and service schedules provided in **Section 6** (as part of the review and potential enhancements for the service network of microlet and regional buses).

[56] Source: Asia Foundation. 2015. A Political Economy of Public Transportation in Timor-Leste.

3.4.3.1 Microlet

Overview of Microlets

Figure 3.27: Microlet

Microlets are small vans with 14 seats, accessible via a side door on the left side of the vehicle. Microlets are licensed by the DNTT and renewed annually. Each license includes route information (e.g., origin-destination, names of streets served), a unique vehicle color, as well as route number assigned to each route. This information is affixed or painted/printed on the front and rear of the vehicle as shown in **Figure 3.27**. Microlets are operated by individual owners or small private enterprises (who then hire individual drivers). Microlets serve as the main urban public transport mode (i.e., within Dili) and are used for everyday commuting. Although routes are fixed, there is no fixed departure schedule.

Microlets serve both formalized stops in urban areas (including in Dili) as well as informal loading/unloading locations. Microlets may also be hailed by passengers anywhere along the route. Based on local observations, during the peak period, microlets are sometimes overloaded with vehicles carrying up to 23 passengers (two in the front seat, 7 on the right seat, 5 on the left seat, 3 between the seats, 2 sitting near the doorstep, and 4 hanging onto the door) – equating to a load of around 160% of the stated capacity of 14 seats (see examples of overloaded microlets in **Figure 3.28**).

Figure 3.28: Microlets Overloaded with Passengers

Fares are fixed per ride – US$0.25 for adults and US$0.15 for students and children based on the dispatch No. 226 /V/2015/GVMOPT/MOPTC.[57] In general, no subsidy is provided for their operation. However, to combat the rising fuel costs worldwide in 2022, the Timor-Leste Government provided a one-time US$450.00 voucher through Decree-Law 18/2022 for public transport (including taxis and microlets).[58]

Lastly, the age of existing microlets in Timor-Leste is shown in

Table 3.9. Nearly 41% of the total registered vehicles are over 10 years old, with the average microlet age at 11.8 years.[59] This advanced age may imply many microlets may be in a deteriorated state, impacting reliability and safety as well as emissions.

[57] Source: https://en.tatoli.tl/2022/04/06/to-increase-the-fares-of-public-transportation-must-base-on-the-gvtls-dispatch/16/

[58] Source: TATOLI (Timor-Leste News Agency). 2022. (https://en.tatoli.tl/2022/07/23/filling-stations-begin-to-receive-fuel-subsidies-vouchers-from-public-transport/23/)

[59] The Arup Team received an inventory of public transport vehicles from the DNTT Working Group as part of an institutional baseline questionnaire conducted in April 2023.

Table 3.9: Age of Registered Microlets (Spring 2023)

Fleet Age	# of Registered Vehicles (Country-Wide)	% of Total
Less Than 5 Years	176	11%
6 – 10 Years	775	48%
Over 10 Years	654	41%
Total	1,605	100%

Source: DNTT, 2023.

Dili Microlet

The microlets in Dili provide a comprehensive intra-urban service connecting to key generators as well as providing first/last-mile connections with the major regional terminals on the periphery of the city. In addition, terminals served by regional buses also house microlet routes to encourage and facilitate interchange. As such, it is also important to understand the microlet network and whether potential opportunities exist to restructure or optimize the network, as microlet service/routes serve as inputs to the sizing of public transport facilities throughout the country. In Dili, there are currently 13 licensed microlet routes operating in circular loop routes (with Route 13 starting service in December 2022).[60] As of 2023, a total of 906 microlet vehicles are currently registered in Dili.[61]

As shown in **Table 3.10**, the microlet routes provide a point-to-point service between the city center and peripheral areas of Dili, with the Convention Center serving as a key interchange location (note – many of these routes are circular with the same starting and ending point, therefore the intermediate waypoints / roads are also identified in this table to distinguish routes).

Table 3.10: Overview of Dili Microlet Routes

Route #	Origin	Destination	Via	Direction	Roundtrip Distance (km)	# of Registered Vehicles
M-1	Becora Terminal	Becora Terminal	Ave. Liberdade de Impresa, Estr. De Balide, R. Caicoli	Clockwise	11.8	80
M-2	Becora Terminal	Becora Terminal	Ave. Liberdade de Impresa, Ave. Bpo de Madeiros	Counter-Clockwise	10.1	68
M-3	Manleuana Market	Manleuana Market	Ave. de Nicolau Lobato, R. Jacinto de Candido	Clockwise	16.8	79
M-4	Taibessi Terminal	Taibessi Terminal	Estr. De Balide, Av. Alm Americo Tomas, R. Jacinto de Candido	Clockwise	12.6	43
M-5	Taibessi Terminal	Manleuana Market	Rua de Taibessi, Ave. de Manleuana	Clockwise	17.8	81
M-6	Rua do Fomento	Rua do Fomento	Rua Hudi-Laran, R. Caicoli, R. Jacinto de Candido,	Clockwise	12.2	49
M-7	Taibessi Terminal	Tuana Laran	Rua de Taibessi, Rua de Ai Lok Laran	Clockwise	15.9	39
M-8	Rua de Becussi	Rua de Becussi	Rua de Taibessi, Estr. De Balide	Clockwise	9.5	30
M-9	Kampung Baru	Kampung Baru	Ave. de Nicolau Lobato, Av. De Portugal, Av. Salazar	Clockwise	18.3	54
M-10	Tasitolu Terminal	Tasitolu Terminal	Ave. de Nicolau Lobato, R. Jacinto de Candido	Clockwise	19.9	216
M-11	Tasitolu Terminal	Manleuana Market	Rua de Tali-Laran, Ave. de Nicolau Lobato, Rua de Has Laran	Clockwise	14.6	73
M-12	Rua de Cristo Rei	Rua de Cristo Rei	Ave. dos Direitos Humanos, Ave. de Matiatut	Clockwise	15.9	24
M-13	Kasnafar	Kasnafar	Ave/ Praia dos Conqueiros, Rua de Lesibutak	Clockwise	22.1	70
				Total	**197.4**	**906**

Source: 2023 Dili Urban Master Plan Update.
Note: Distances are verified by Arup surveys and observations and GIS maps. Also, a "M" prefix is added to distinguish these routes from the regional routes.

[60] Source : https://tatoli.tl/2022/12/28/infografia-mtk-halo-abertura-ba-mikrolete-diresaun-013/
[61] Source: DNTT statistics received in early 2023.

The 13-route network is shown in **Figure 3.29**, with detailed route profiles presented in **Section 6**.

Source: Arup Study Team based on local observations in April/May 2023
Note: The faded colors represent regional bus routes to show interchange opportunities between microlet and reginal bus services.

Figure 3.29: Dili Microlet Network

Service hours are from 6:00AM to 6:00PM on both weekdays and weekends (thus 12 hours per day).[62] Based on the surveys/local observations, Dili microlet routes operate about 30-60 trips/hour during the weekday daytime, or 6-12 trips/hour on weekends/holidays.

Based on field observations of various trips departing the terminals, some microlets depart with passengers from the terminal – but when there is no passenger waiting at the terminal, other microlets depart the terminal empty (i.e., without any passengers). On average, 78% of the microlets depart the terminal with passengers, while the remaining 22% departed without passengers. This behavior allows the empty microlets to collect potential passengers at downstream locations (in case those microlets leaving the terminal with passengers are already full). It appears that this maneuver is performed on an ad hoc basis, as drivers know the location of potential passenger "hotspots" on their route. For the purposes of this Study and to allow calculation of peak hour vehicles and other key statistics, we also use the notation of "headway" for microlets or the minutes between arrivals to better comprehend the level of service (which assumes that a consistent gap between vehicles is maintained).

[62] Irregular operation hours are observed on several routes, as current operation is largely driven by passenger demand. Based on the survey results, some microlet drivers cease their operation before 6:00PM and others continue their operation until 8:00PM – which are reflected in route overview in **Section 6.4.**

Table 3.11 shows the number of Dili microlet departures from a terminal (with and without passengers).

Table 3.11: Dili Microlet Routes Departing Terminal With/Without Passengers

		# of Departing Trips/Day			% of Departing Trips by Type		
Microlet Route#	Departing Terminal / Location	With Passengers	Without Passengers	Total	With Passengers	Without Passengers	Total
M-1	Becora Terminal	246	195	441	56%	44%	100%
M-2	Becora Terminal	346	192	538	64%	36%	100%
M-3	Manleuana Market	422	129	551	77%	23%	100%
M-4	Taibessi Terminal	268	56	324	83%	17%	100%
M-5	Taibessi Terminal	220	80	300	73%	27%	100%
M-6	Rua do Fomento	253	71	324	78%	22%	100%
M-7	Taibessi Terminal	150	16	166	90%	10%	100%
M-8	Rua de Becussi	174	33	207	84%	16%	100%
M-9	Kampung Baru	368	47	415	89%	11%	100%
M-10	Tasitolu Terminal	313	303	616	51%	49%	100%
M-11	Tasitolu Terminal	378	146	524	72%	28%	100%
M-12	Rua de Cristo Rei	144	16	160	90%	10%	100%
M-13	Kasnafar	166	28	194	86%	14%	100%
				Average	78%	22%	100%

Notes: Some microlets are observed to depart the terminal without passengers. These microlets are then observed to serve other passengers at downstream stops.

Table 3.12: Summary of Key Service Characteristics of Microlet in Dili

Parameter	Value
Total Route Length (km)	197.4
Number of Routes	13
Carrying Capacity	14
Typical Service Hours	6:00AM – 6:00PM (Some routes operate until 8:00PM)
Average Headway (min)	1~2 (weekdays) (or 30-60 departures per hour)
Number of Registered Vehicles	906
Daily Passenger Demand (Two-Way)	97,100

Source: Arup Study Team

Key network level findings for the Dili microlet services are as follows:

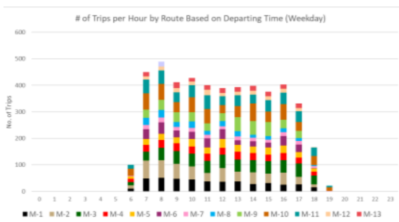
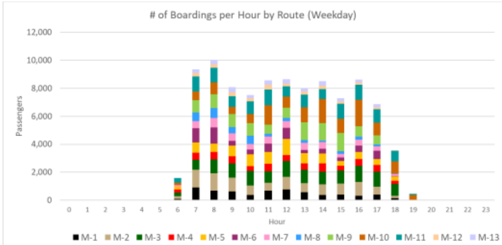
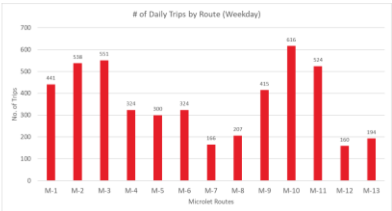
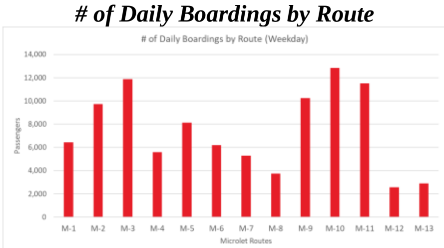
- **# of Trips per Hour –** On the weekdays, the number of trips (observed at the starting point of each trip (i.e., terminal) based on the departure time) for all the microlet routes is highest between 7:00AM-9:00AM with 450-490 trips/hour. In the mid-day period, departures decline slightly to about 400 trips/hour between 12:00PM-5:00PM. After 5:00PM, hourly departures decline quickly from more than 300 from 5:00PM-6:00PM to under 200 from 6:00PM-7:00PM, and around 20 after 7:00PM-8:00PM.

- **# of Boardings per Hour -** On the weekdays, boarding activity (observed at the terminal) for all microlet routes is relatively higher in the morning than other time periods. A peak of 9,000-10,000 boardings/hour is observed from 7:00AM-9:00AM. In the afternoon from 12:00PM-5:00PM, boarding activity is between 7,000-8,500 boardings/hour. In the evening, boarding activity drops to 3,500-7,000 boardings/hour from 5:00PM-7:00PM, then declines further to some 500 boardings/hour from 7:00PM-8:00PM.

- **# of Daily Trips by Route –** On the weekdays, all 13 microlet routes collectively provide 4,760 daily trips within Dili City from 6:00AM-8:00PM, with Microlet Route#10 (Tasitolu Terminal Circular East), Microlet Route#3 (Manleuana Market Circular), Microlet Route#2 (Becora Terminal Circular North) and Microlet Route#11 (Tasitolu Terminal Circular South) operating the most trips (~some 500-600 trips/day). On the other hand, Microlet Route#13 (Kasnafar Circular), Microlet Route#7 (Taibessi Terminal Circular via Tuana Laran) and Microlet Route#12 (Cristo Rei Circular) operate the least number of trips, each with below 200 trips/day.

- **# of Daily Passengers by Route –** On the weekdays, some 97,100 passengers use the 13 microlet routes daily (two-way), with Microlet Route#10 (Tasitolu Terminal Circular East) with 12,800 (13.2% of the total microlet passengers), Microlet Route#3 (Manleuana Market Circular) with 11,900 passengers (12.2%), and Microlet Route#11 (Tasitolu Terminal Circular South) with 11,500 passengers (11.9%) serving the most passengers. In contrary, Microlet Route#12 (Cristo Rei Circular) and Microlet Route#13 (Kasnafar Circular) carry the least passengers with each carrying 2,500-3,000 passengers/day, which is followed by Microlet Route#8 (Rua de Becussi Circular) carrying some 3,800 passengers/day.

Table 3.13: Supply/Demand Profile of Dili Microlet (Network-Level)

Supply/Demand Profile of Dili Microlet (Route-Level) – Weekday	
# of Trips per Hour by Route (Based on Departing Time) 	***# of Boardings per Hour by Route*** 
# of Daily Trips by Route 	***# of Daily Boardings by Route*** 

3.4.3.2 Regional Bus [63]

Long-distance, inter-regional bus services also operate throughout the country (for instance Dili to other municipalities such as Baucau). Referred to in this report as regional buses, these can accommodate up to 30 passengers (including 24 seats and 6 standees). Goods are often placed on the roof of the bus. Each bus is painted with vivid colors, with a unique name printed on the front along with destination(s).

Figure 3.30: Regional Bus

In total, there are 11 regional bus routes linking Dili with outlying municipalities outside (i.e., Baucau, Lospalos, etc.). As of 2021, a total of 290 regional buses are registered in Timor-Leste. It is estimated that regional buses carry approximately 5,200 passengers per

[63] All long-distance, coach-style buses are referred to as "regional bus" to distinguish them from urban operations. Regional bus service may connote long-distance intra-regional services as well as those providing long-distance inter-regional services.

day (two-way) between Dili and other municipalities.[64] No service schedule is published, with departure times varying based on destination. Some overnight routes are also operated. Based on discussions and observations, regional buses may not only serve terminals and formal bus stops, but also directly pick up and drop off passengers at their respective residences and when hailed on the road. Fares range from US$2.00 to US$12.00 depending on the destination.[65] **Table 3.14** shows the regional bus routes in Timor-Leste.

Table 3.14: Overview of Regional Bus Routes

Route #	Origin	Destination	Direction	One-Way Distance (km)	One-Way Travel Time (min)	# of Vehicles Registered (2021)			Terminals Served in Dili	Fares (US$)
						Bus	*Microlet*	*Angguna*		
P-1	Dili	Aileu	NB/SB	44.3	85	-	2	5	Taibessi	$2.00
P-2	Dili	Ainaro	NB/SB	109.3	278	17	-	2	Taibessi	$8.00
P-3	Dili	Baucau	EB/WB	117.7	170	42	-	-	Becora	$4.00
P-4	Dili	Ermera	NB/SB	46.0	86	54	16	-	Tasitolu	$3.00
P-5	Dili	Liquica	EB/WB	23.1	51	-	70	-	Tasitolu	$2.00
P-6	Dili	Lospalos	EB/WB	205.1	445	38	-	-	Becora	$8.00
P-7	Dili	Maliana	EB/WB	132.7	233	26	-	-	Tasitolu	$6.00
P-8	Dili	Manatuto	EB/WB	58.7	134	15	7	-	Becora	$2.00
P-9	Dili	Same	NB/SB	112.1	309	16	-	26	Taibessi	$9.00
P-10	Dili	Suai	NB/SB	171.0	360	41	-	-	Taibessi	$12.00
P-11	Dili	Viqueque	EB/WB	176.6	391	40	2	-	Becora	$8.00
Total				1,196.6	-	290	97	33		

Sources: (i) 2022 ADB Timor-Leste Public Transport Master Plan (DNTT 2021 vehicle registration data included); (ii) 2023 Dili Urban Master Plan Update; and (iii) https://en.tatoli.tl/2022/04/06/to-increase-the-fares-of-public-transportation-must-base-on-the-gvtls-dispatch/16/.
Notes: Distances are verified by Arup using GIS data. Also, a "P" prefix is added to distinguish these routes from the microlet routes.

The overall regional bus network in Timor-Leste comprising 11 routes between Dili and outlying municipalities is shown in **Figure 3.31**, followed by supply/demand profile of the regional bus services. The detailed profile of each route is presented in **Section 6**.

Source: DNTT Regional Bus Maps (2023)

Figure 3.31: Timor-Leste Regional Bus Network

Table 3.15: Summary of Key Service Characteristics of Regional Bus

Parameter	Value
Total Route Length (km) [A]	2,393.3
Number of Routes	11
Carrying Capacity	30 (24 seats + 6 standees)
Service Spans	No defined span of service
Number of Trips per Day (Two-Way)	233
Number of Vehicles Registered	290
Daily Passenger Demand (Two-Way)	5,200

Source: Arup Study Team
Notes:
[A] The total length (two-way) is double the length of one-way distance of 1,196.6km (which is slightly higher due to rounding).

[64] Based on the survey results verified by the Arup Team.
[65] Source: 2023 Dili Urban Master Plan.

Lastly, the route-level supply/demand profile of the regional bus services is provided in **Table 3.16**. Key findings are as follows:

- **# of Trips per Hour by Route –** On the weekdays, trip departures (observed at the terminals) do not have a defined pattern. A maximum of 5 trips/hour are observed from midnight to the early morning (6:00AM). Trip departures then increase from about 15-30 from 7:00AM-9:00AM (with an hourly peak of just over 30 trips from 8:00AM-9:00AM). During the mid-day period from 11:00AM-1:00PM, some 23-28 trips/hour are registered, which then drops to up to 15 trips/hour from 2:00PM-4:00PM). In the evening between 4:00PM-6:00PM, some 5-10 trips/hour are observed. Only 2 trips are recorded in the evening from 7:00PM-8:00PM.

- **# of Boardings per Hour by Route –** On weekdays, boarding activity is higher in the afternoon compared to other periods. Less than 40 boardings/hour are observed overnight. From 7:00AM-9:00AM, boardings/hour range from about 300-550. In the mid-day from 11:00AM-1:00PM, boardings/hour ranges from about 450-650. From 4:00PM-6:00PM, some 200-350 boardings/hour are observed. Less than 50 boardings/hour are registered from 7:00PM-8:00PM.

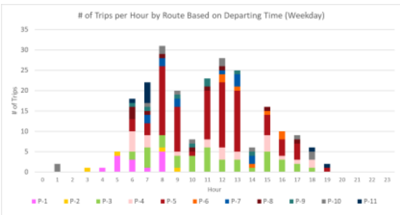
- **# of Daily Trips by Route –** On the weekdays, regional buses collectively operate about 233 daily trips between Dili and other municipalities in the country, with Regional Bus Route#5 (Dili to Liquica), Regional Bus Route#3 (Dili to Baucau), and Regional Bus Route#4 (Dili to Ermera) ranking in the top three with the most trips (~24-92 trips/day). On the other hand, Regional Bus Route#2 (Dili to Ainaro) and Regional Bus Route#6 (Dili to Lospalos) operate the fewest trips, with 4 and 7 trips/day respectively.

- **# of Daily Boardings by Route –** On the weekdays, some 5,200 boardings are registered on the 11 regional bus routes daily, with Regional Bus Route#5 (Dili to Liquica) accounting for 1,969 boardings (or about 38% of the total), followed by Regional Bus Route#3 (Dili to Baucau) with 1,218 boardings (24%) and Regional Bus Route#4 (Dili to Ermera) with 466 boardings (9%). In contrast, Regional Bus Route#2 (Dili to Ainaro) and Regional Bus Route#8 (Dili to Manatuto) register the fewest boardings, having 31 and 126 boardings/hour, respectively.

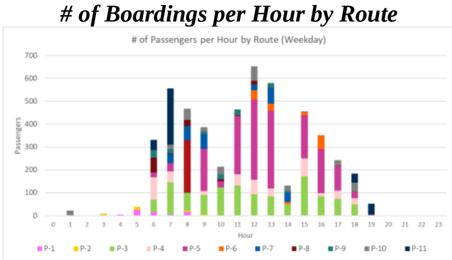
Table 3.16: Supply/Demand Profile of Regional Bus Services (Route-Level)

Supply/Demand Profile of Regional Bus Services (Route-Level)

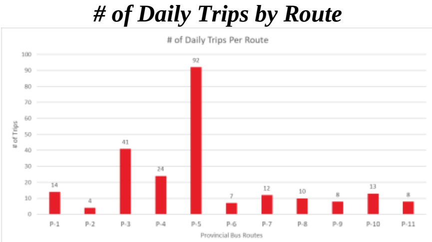
# of Trips per Hour by Route



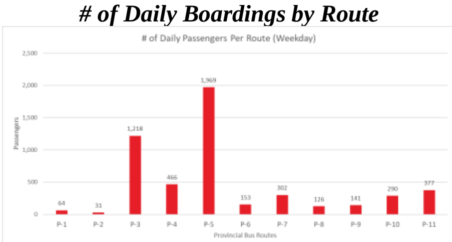
# of Boardings per Hour by Route



# of Daily Trips by Route



# of Daily Boardings by Route



3.4.3.3 Angguna

Anggunas are medium-sized trucks with two benches for seating in the open back of the vehicle. Anggunas can accommodate up to 20 passengers with most people standing. In some cases, anggunas transport passengers and goods at the same time. Anggunas are commonly operated on intra-district routes between sub-district centers (without designated routes). As of 2021, a total of 97 anggunas are currently registered in Timor-Leste, carrying some 1,200 passengers daily.[66]

Figure 3.32: Angguna

Anggunas are important parts of the first/last-mile network, but are informally served at terminals. No fixed routes/maps exist. Thus, anggunas are not a key focus of this study and no detailed assessment of their services is undertaken (although they must be accommodated in terminal designs to allow for seamless interchanges).

3.4.4 Public Transport Facilities

3.4.4.1 Overview of Timor-Leste Terminals

Timor-Leste currently boasts four major bus terminals – three in Dili, the capital and largest city, and one in Baucau, the second largest city in the country. These terminals serve as crucial transport hubs, catering to both inner-city and inter-city travel needs. Based on local observations, the existing terminals serve as the principal boarding/alighting locations for passengers (with more minor activities at intermediate locations).

Source: Arup Study Team

Figure 3.33: Existing Terminal Facilities in Timor-Leste

In Dili, the Tasitolu (in the west), Taibessi (in the south), and Becora (in the east) terminals are bustling hubs where regional buses converge, facilitating travel within the city and connecting to other regions. Microlet routes also serve these terminals allowing interchange between regional buses and microlets. Similarly, the Baucau Terminal in Baucau plays a vital role in connecting the eastern part of Timor-Leste, enabling residents and visitors to access destinations along this east-west corridor on the northern coast. **Figure 3.33** depicts

[66] Source: ADB. 2022. Timor-Leste – Public Transport Master Plan Update.

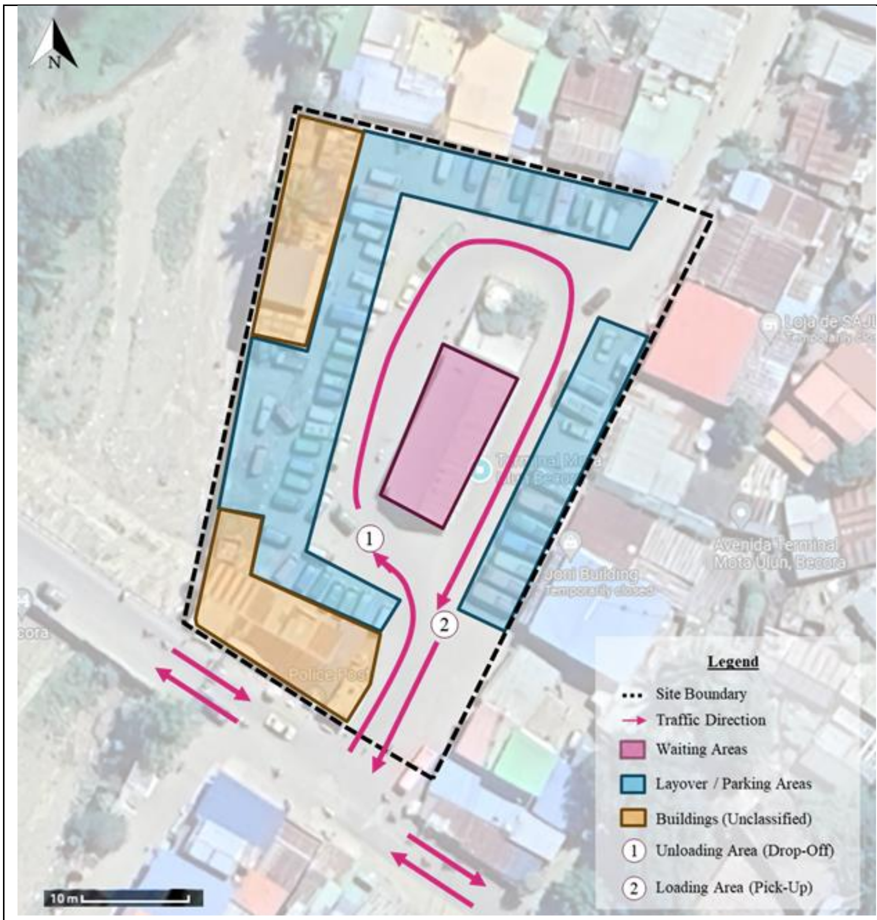
the locations of these terminals in the country. Each of the terminals is described in greater details below.

3.4.4.2 Becora Terminal (Dili)

Overview of Facility

Becora Terminal is located in the east of Dili and houses both microlet and regional bus. The open air terminal includes a sheltered passenger waiting area (with seating and some lighting as well as retail/food kiosks), a ticketing office (although purportedly not used), spaces for loading/unloading and layover, a security post, and buildings adjacent to the terminal. Vehicles circulate in a counterclockwise fashion.

The terminal is about 2,700m² and is served by two microlet and four regional bus routes – principally linking the city with municipalities in the east such as Becora, Lospalos, Viqueque, etc. Key districts of Dili that are connected via Becora Terminal include the Central Market, Cristo Rei, Tasitolu, and other commercial and residential areas. The layout of Becora Terminal is illustrated below, with key elements identified:



Source: Arup Study Team

Figure 3.34: Becora Terminal Layout

Key Issues Observed at the Facility

Key issues observed at the Becora Terminal include the following (delineated into operational (i.e., operating norms/practices) and facility/amenity (i.e., physical issues related to the facility or provision of passenger amenities) although some may be cross-cutting):

Table 3.17: Overview of Key Issues Observed at Becora Terminal (Dili)

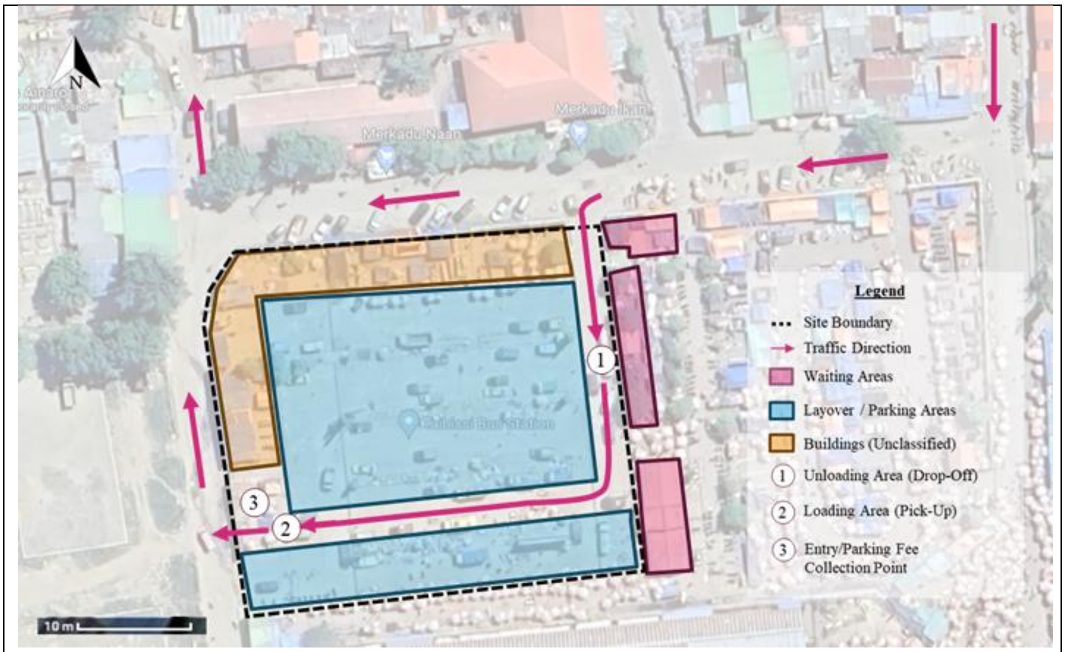
Category	Key Issue	Key Passenger/Operating Impacts from Noted Issues			
		Safety	Waiting & Loading Experience	Operating Efficiency	Facility Capacity
Operational Issues	**Counterclockwise Operations Prevents Passengers from Directly Accessing Vehicles from the Central Waiting Area, Potentially Bringing Passengers into Conflict with Vehicles –** As vehicles board from the left, the counterclockwise operation around the terminal means that any passengers boarding/alighting a vehicle must walk through active vehicle circulation areas. 	✓		✓	
	Most Vehicles Board/Alighting from the Perimeter Parking Spaces Instead of the Main Waiting Area, Requiring Passengers to Cross Active Roadways – Most vehicles are observed to load/unload at the perimeter parking spaces instead of serving the main central passenger waiting area. This makes passengers cross active roadways and imperils passenger safety and impacts operational efficiency. **Photo 1: Passengers walking into circulation area to board**	✓		✓	
	Lack of Designated Space for Each Mode Reserved by Mode Creates Chaotic Situation for Operators and Passengers – Various vehicles use, enter and park in the facility including microlets, regional buses, and two-wheelers. There are no dedicated spaces for such operations by mode, which may be confusing to passengers, but also results in potential conflicts between modes.			✓	✓
	Non-Designated Vehicles Allowed to Enter Site (Possibly due to Lack of Pickup/Dropoff Curb), Impacting Internal Terminal Operations – Taxis and two-wheelers are observed circulating in the facility, which adds to the vehicle trips operating in the facility, potentially resulting in delays to the microlets and the regional buses, while adding more congestion to the site. It is likely that taxis operate in this manner due to the lack of dedicated pickup/dropoff curb along the main road. 			✓	✓
	Limited Enforcement of Operational Rules May Create Unsafe Situations and Reduces Capacity of Facility – Vehicles are observed to park and to drive in the "wrong direction" (i.e., against the prevailing flow), which can result in potential accidents and reduction in capacity of the roadway and facility. **Photo 2: Motorcycles Entering Terminal and Vehicles Parking in the Wrong Direction**			✓	✓
	Limited Maintenance and Upkeep of Facility Creates Unattractive Waiting Environment - The passenger waiting areas, floor, and the facility are not regularly cleaned (with discarded trash and litter observed around the facility) and have limited maintenance based on their deteriorated conditions.		✓		
Facility / Amenity Issues	**Dirt/Unpaved Surfacing Creates Unpleasant Waiting/Circulation Area for Passengers** – As the facility has unpaved parking and circulation areas, vehicles "kick up" dirt and dust into the air, health, cleanliness, and air quality issues locally. In addition, the surfacing can be muddy during rain, soiling passengers' clothes and create an uncomfortable waiting and walking environment.	✓	✓		

Category	Key Issue	Key Passenger/Operating Impacts from Noted Issues			
		Safety	Waiting & Loading Experience	Operating Efficiency	Facility Capacity
	Limited Provision of Pedestrian Signage and Segregation Creates Dangerous Crossing and Circulation Conditions for Passengers - Limited signage and markings exist at the facilities to direct passengers. Thus, passengers cross active roadways to board/alight vehicles, which creates potentially dangerous situations.  **Photo 3: Dirt Surfacing and Lack of Pedestrian Crossing Markings**	✓		✓	
	Minimal Provision of Lighting in Parking Areas Creates Dangerous Crossing Conditions at Night – While there is limited provision of lighting within the waiting area, lighting is dim in the parking lot where the majority of vehicles load/unload. This can cause visibility and safety issues when passengers cross active circulation areas.	✓	✓		
	Limited Designation of Waiting, Loading, and Retail Areas Creates Chaotic Passenger Experience – There is limited integration/cohesion in terms of the passenger experience with waiting areas, boarding areas, and micro-retail operators closely mixed without clear segregation. For instance, retail and food establishments often clutter the passenger waiting area, forming "enclosed" areas that restrict movement of vehicles alongside the facility as well as within the facility.  **Photo 4: Simple Waiting Area Mixed with Vendors and Non-Passengers**		✓	✓	
	Limited Amenities Create Unattractive Waiting Environment – The waiting area has simple concrete seats as well as informal kiosk areas lacking permanent stands, storage, lighting, and electrical connection. Small ceiling lights are provided, with limited luminescence, particularly noticeable at night, which may create perceived safety issues.		✓		
	Limited Provision of Wayfinding and Schedule Information Makes the Experience Challenging for New and Unfamiliar Users – There is a limited provision of information and signs – for instance where a certain route boards or alights or the schedule for departures. For a passenger, particularly a first-time user or child, this complex environment is difficult and potentially unsafe to navigate (due to the absence of clear and direct pedestrian priority crossings, and dedicated bays for vehicle types to load/unload passengers).		✓		

3.4.4.3 Taibessi Terminal (Dili)

Overview of Facility

Located in Dili, the Taibessi Terminal is an existing open area facility. The terminal is about 13,400m^2 and is served by three microlet and four regional bus routes - principally linking Dili with municipalities in the south (such as Suai, Same, Ainaro, etc.). On Sundays, this area turns into an open area market with vendors occupying a majority of the terminal. An overview of the Taibessi Terminal is provided, with key elements shown on the map below:



Source: Arup Study Team

Figure 3.35: Taibessi Terminal

Key Issues Observed at the Facility

Key issues observed at the Taibessi Terminal include the following (delineated into operational (i.e., operating norms/practices) and facility/amenity (i.e., physical issues related to the facility or provision of passenger amenities) although some may be cross-cutting):

Table 3.18: Overview of Key Issues Observed at Taibessi Terminal (Dili)

Category	Key Issue		Key Passenger/Operating Impacts from Noted Issues			
			Safety	Waiting & Loading Experience	Operating Efficiency	Facility Capacity
Operational Issues	**Insufficient Unloading/Unloading Space & Circulation Areas Create Congestion** – Most vehicles are observed to load/unload right after the entrance (near the waiting area). However, limited space for unloading, loading and circulation create congestion and imperils passenger safety and impacts operational efficiency.	 **Photo 1: Congestion Within Terminal**	✓		✓	
	Designated Space for Each Mode Exists Yet Not Utilized by Operators Impacting Operations and Passenger Experience - Various vehicles use, enter and park in the facility including microlets, regional buses, angunna, and taxi. Dedicated spaces for such operations by mode exist – with each area allocated by mode with curbs and signages. However, such spaces are not properly used by operators (e.g., microlets use spaces dedicated for regional buses), thus passengers must walk around the terminal to identify a mode of their choice.	 **Photo 2: Designated Space by Mode Used by Multiple Modes**		✓	✓	
	Dirt/Unpaved Surfacing (Access Road) Impacts Passenger Experience and Operation Efficiency – The facility has unpaved sections (e.g., access roads near the entry gate, potholes within the site) which affect passenger experience and operation efficiency. In addition, the surfacing can be muddy during rain, soiling clothes of pedestrians / users passing by.	 **Photo 3: Dirt/Unpaved Surfacing**	✓	✓		
Facility / Amenity Issues	**Minimal Provision of Lighting in Parking Areas Creates Dangerous Crossing Conditions at Night** – While there is limited provision of lighting within the waiting area, lighting is dim in the parking lot where the majority of vehicles load/unload. This can cause visibility and safety issues when passengers cross active circulation areas.		✓	✓		

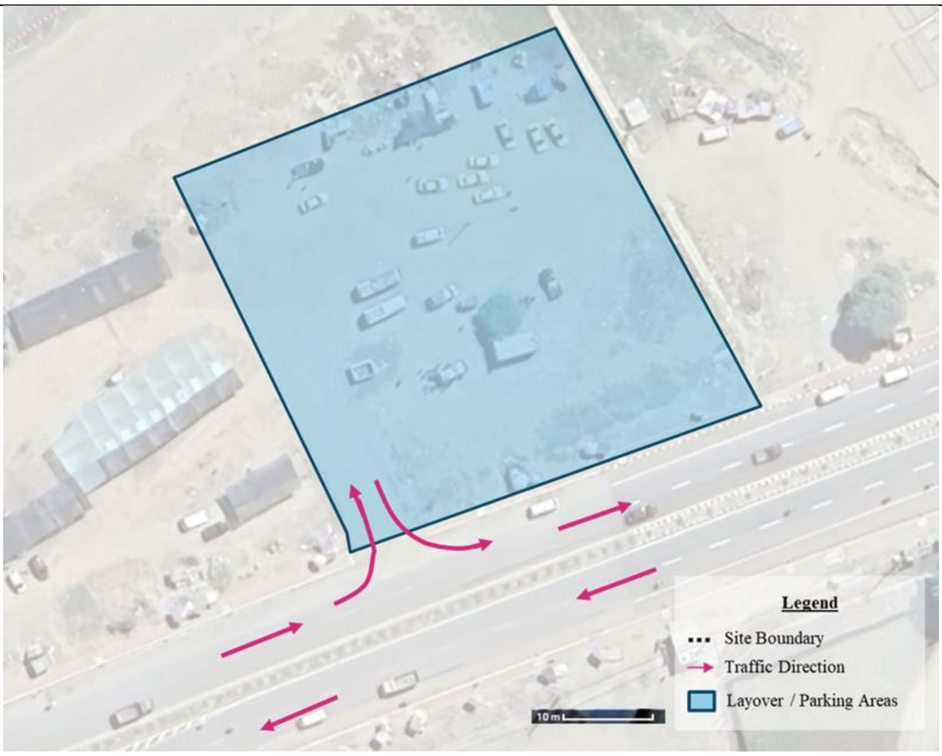
Category	Key Issue		Key Passenger/Operating Impacts from Noted Issues			
			Safety	Waiting & Loading Experience	Operating Efficiency	Facility Capacity
	Limited Amenities Create Unattractive Waiting Environment – The waiting area has covered facilities as well as informal kiosk areas lacking permanent stands, storage, lighting, and electrical connection. However, the waiting area is small forcing passengers standing without any covered facilities. Limited luminescence, particularly noticeable at night, may create perceived safety issues.	 **Photo 1: Passengers Walk Through Circulation Areas to Board/Alight**		✓	✓	
	Terminal Space Occupied by Vendor Activities – The terminal turns into an open market area on weekends with numerous vendors occupying a majority of the terminal. This can cause safety and operation issues when vehicle circulate the areas.	 **Photo 4: Terminal Space Used by Vendors on Sundays**		✓		
	Limited Provision of Wayfinding and Schedule Information Makes the Experience Challenging for New and Unfamiliar Users – There is a limited provision of information and signs – for instance where a certain route boards or alights or the schedule for departures. For a passenger, particularly a first-time user or child, this complex environment is difficult and potentially unsafe to navigate (due to the absence of clear and direct pedestrian priority crossings, and dedicated bays for vehicle types to load/unload passengers).			✓		

3.4.4.4 Tasitolu Terminal (Dili)

Overview of Facility

Located in Dili, the Tasitolu Terminal is an open area facility in the west of Dili. The site has an area of about 9,600m^2, mainly for parking and circulation with no visible passenger waiting facilities. Nearby bus stops for microlets are about 100m away. Tasitolu Terminal is served by regional buses (including those to/from the Indonesia border) and microlets between various districts and communities of the city, as well as other municipalities across Timor-Leste (mostly in the west such as Liquica and

An overview of the Tasitolu Terminal is provided, with key elements shown on the map below:



Source: Arup Study Team

Figure 3.36: Tasitolu Terminal

Key Issues Observed at the Facility

Key issues observed at the Tasitolu Terminal include the following (delineated into operational (i.e., operating norms/practices) and facility/amenity (i.e., physical issues related to the facility or provision of passenger amenities) although some may be cross-cutting):

Table 3.19: Overview of Key Issues Observed at Tasitolu Terminal (Dili)

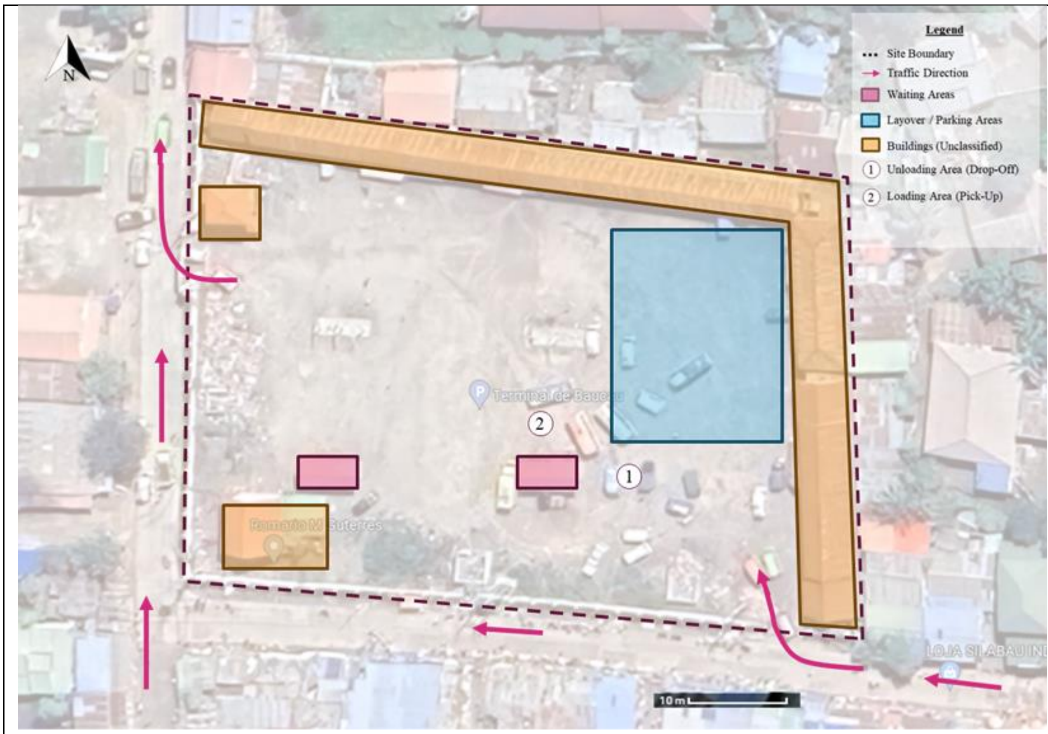
<table>
<tr><th rowspan="2">Category</th><th rowspan="2" colspan="2">Key Issue</th><th colspan="4">Key Passenger/Operating Impacts from Noted Issues</th></tr>
<tr><th>Safety</th><th>Waiting & Loading Experience</th><th>Operating Efficiency</th><th>Facility Capacity</th></tr>
<tr><td rowspan="2">Operational / Facility / Amenity Issues</td><td>No Provision of Dedicated Bays and Passenger Facilities Exists – While there is almost no provision of dedicated bays (loading, unloading, and parking) and passenger amenities (waiting areas, lighting, etc.) create confusion for passengers to access services.</td><td rowspan="2">Photo 1: Open Space Without Proper Operation Facilities and Passenger Amenities
</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>Non-Designated Vehicles Allowed to Enter Site (Possibly due to Lack of Pickup/Dropoff Curb), Impacting Internal Terminal Operations – Taxis and two-wheelers are observed circulating in the facility, which adds to the vehicle trips operating in the facility, potentially resulting in delays to the microlets and the regional buses, while adding more congestion to the site. It is likely that taxis operate in this manner due to the lack of dedicated pickup/dropoff curb along the main road.</td><td></td><td></td><td>✓</td><td>✓</td></tr>
</table>

Note: This site is an open area without proper bus facilities and passenger amenities. Issues are combined into one to cover operational, facility, and amenity aspects.

3.4.4.5 Baucau Terminal

Overview of Facility

Baucau Bus Terminal is a key hub in Baucau, the second largest city in Timor-Leste (east of Dili along the northern corridor). The interchange sits on a site measuring about 5,400m^2 and is served by three regional bus routes (connecting Baucau to other regions in the country, including Dili, Lospalos, and Viqueque) as well as local microlets operating in Baucau. Both regional buses and microlets use the Baucau bus terminal. An overview of the Baucau Terminal is provided, with key elements shown on the map below:



Source: Arup Study Team

Figure 3.37: Baucau Terminal

Key Issues Observed at the Facility

Key issues observed at the Baucau Terminal include the following (delineated into operational (i.e., operating norms/practices) and facility/amenity (i.e., physical issues related to the facility or provision of passenger amenities) although some may be cross-cutting):

Table 3.20: Overview of Key Issues Observed at Baucau Terminal (Baucau)

Category	Key Issue		Key Passenger/Operating Impacts from Noted Issues			
			Safety	Waiting & Loading Experience	Operating Efficiency	Facility Capacity
Operational Issues	**Most Vehicles Board/Alighting from the Perimeter Parking Spaces Instead of the Main Waiting Area, Requiring Passengers to Cross Active Roadways** – Most vehicles are observed to load/unload near the entrance instead of serving the main central passenger waiting area. This makes passengers cross active roadways and imperils passenger safety and impacts operational efficiency.		✓		✓	
	Lack of Designated Space for Each Mode Reserved by Mode Creates Chaotic Situation for Operators and Passengers – Various vehicles use, enter and park in the facility including microlets, regional buses, and two-wheelers. There are no dedicated spaces for such operations by mode, which may be confusing to passengers, but also results in potential conflicts between modes.	**Photo 1: Passengers Walk through Circulations to Board/Alight**		✓	✓	
	Limited Maintenance and Upkeep of Facility Creates Unattractive Waiting Environment - The passenger waiting areas, floor, and the facility are not regularly cleaned (with discarded trash and litter observed around the facility) and have limited maintenance based on their deteriorated conditions.	 **Photo 2: Visible Trash Piles in the Facility**		✓		
Facility / Amenity Issues	**Dirt/Unpaved Surfacing Creates Unpleasant Waiting/Circulation Area for Passengers** – As the facility has unpaved parking and circulation areas, vehicles "kick up" dirt and dust into the air, health, cleanliness, and air quality issues locally. In addition, the surfacing can be muddy during rain, soiling passengers' clothes and create an uncomfortable waiting and walking environment. Potholes are spotted at the entrance and within the site.		✓	✓		

Category	Key Issue	Key Passenger/Operating Impacts from Noted Issues			
		Safety	Waiting & Loading Experience	Operating Efficiency	Facility Capacity
	Limited Provision of Pedestrian Signage and Segregation Creates Dangerous Crossing and Circulation Conditions for Passengers - Limited signage and markings exist at the facilities to direct passengers. Thus, passengers cross active roadways to board/alight vehicles, which creates potentially dangerous situations.  **Photo 3: Lack of Pedestrian Crossing Markings and Potholes Near Exit**	✓		✓	
	Minimal Provision of Lighting in Parking Areas Creates Dangerous Crossing Conditions at Night – While there is limited provision of lighting within the waiting area, lighting is dim in the parking lot where the majority of vehicles load/unload. This can cause visibility and safety issues when passengers cross active circulation areas.	✓	✓		
	Limited Amenities Create Unattractive Waiting Environment – The waiting area has poorly maintained facilities without covered shelters (see Photo 2 above). Limited luminescence, particularly noticeable at night, may create perceived safety issues.		✓		
	Limited Provision of Wayfinding and Schedule Information Makes the Experience Challenging for New and Unfamiliar Users – There is a limited provision of information and signs – for instance where a certain route boards or alights or the schedule for departures. For a passenger, particularly a first-time user or child, this complex environment is difficult and potentially unsafe to navigate (due to the absence of clear and direct pedestrian priority crossings, and dedicated bays for vehicle types to load/unload passengers).		✓		

3.4.4.6 Bus Stops (Dili)

Overview

Bus stops are integral to developing a modern, efficient, and accessible public transport network in Timor-Leste as they are the primary interface location where passengers will board/alight the buses. A review of existing bus stops is provided below to identify design issues and opportunities to inform design guidance.

Of note, bus stops in Dili lack a standardized design, while some are poorly maintained and in deteriorating conditions, while also lacking connecting sidewalks for safe access (except stops along the coast such as Ave. de Portugal, with shelters having seats and connecting sidewalks). **Figure 3.38** depicts examples of bus stops observed in Dili.

Location: Ave de Portugal

Location: Ave de Nicolas Lobato

Location: Ave de Nicolas Lobato

Source: Arup Study Team

Figure 3.38: Example Bus Stops and Amenities in Dili

Key Issues Observed at Bus Stops Throughout the City

Key issues observed at bus stops around the city include the following (delineated into operational (i.e., operating norms/practices) and facility/amenity (i.e., physical issues related to the stop or provision of passenger amenities) although some may be cross-cutting):

Table 3.21: Overview of Key Issues Observed at Becora Terminal (Dili)

Category	Key Issue	Key Passenger/Operating Impacts from Noted Issues			
		Safety	Access, Waiting & Loading Experience	Operating Efficiency	Facility Capacity
Operational Issues	**Non-Public Transport Vehicles Observed to Dwell in Bus Stop Loading Zone** – In some bus stops, trucks and other non-public transport vehicles were observed parking in the designated loading areas, blocking public transport vehicles from directly accessing the stop. This also forces passengers to access the vehicles from outside the bus stop area (and possibly enter the active roadway).			✓	✓
	Limited Regular Upkeep Maintenance of Stops Creating Unattractive Waiting Environment – Based on observations, some stops are relatively poorly maintained with litter and discarded trash, as well as a deteriorated look (furthermore trash cans are absent, which may explain some of the observed litter). In some cases, the bus shelter roof is missing completely, while in other locations seats are missing.		✓		
Facility / Amenity Issues	**Lack of Standardized Designs** – Bus stops appear with different looks, configurations, and amenities. There appears to be a lack of standardized designs (which has been confirmed after a review of relevant guidelines). A uniform branding and configuration can be helpful to promote the system.	✓	✓	✓	✓
	Narrow Shelter Offers Minimal Protection for Passengers – The narrow shelters barely cover passenger and provide minimal protection from the sun or from wind/rain.		✓		
	Some Bus Stops Lack Connecting Sidewalks Forcing Passengers into the Active Roadway – Some stops are observed to lack any (or have narrow) sidewalks for access to/from the stop and nearby land uses. These occurrences force prospective passengers (as well as pedestrians walking on the side of the street) to walk on the active roadway to reach the bus stop. This creates a dangerous situation.	✓	✓		
	Bus Stops and Surrounding Areas Not Conducive for Access-for-All, Creating Impediments for Disadvantaged Groups – The narrow sidewalks (or lack thereof) and/or minimal width of the bus stops prevent persons with disabilities (PWDs), those using wheelchair, as well as other disadvantaged groups from easily accessing the bus stop. In a similar fashion, bus stop waiting areas may be on raised curb, but lack wheelchair access ramps. These configurations may deter such groups from using the system.	✓	✓		
	Limited Provision of Passenger Information – The lack of passenger information (related to routes, schedules, and fares) poses key challengers for new and unfamiliar passengers, making the system more difficult to use.		✓		

3.4.4.7 Key Issues Relevant to Public Transport Facilities

Based on the review of key transport infrastructure and facilities around the country (including the Becora, Taibessi, Tasitolu, and Baucau terminals), a broader look at the strategic role and location in the microlet and regional bus networks, as well as bus stops, an overarching summary of issues are summarized below (with enhancements proposed for the facilities in **Section 6.6.2**):

Key Issues Relevant to Public Transport Facilities
Planning/Locations of Terminals • **Most Municipalities (including Dili) Lack a Central Public Transport Hub:** Many municipalities lack formal terminals, with the general practice by operators being to collect passengers on the street. In Dili, facilities are located on the periphery of the urban area (east, west, and south of Dili City), with some of these (including at Tasitolu) being vacant land used on an ad-hoc basis by operators. • **Minimal Integration with Surrounding Area / Key Generators:** There is minimal integration between terminals and the surrounding urban environment. The location of the facilities is not located near destinations where most passengers want to go (i.e., to/from key generators – such as universities, etc.). This limits attractiveness of facilities, while encouraging passengers to contact drivers directly for pickups. • **Minimal Provision for Economic Activities at Facilities:** Minimal provisions are made for economic activity within existing facilities. While there is some micro-retail within passenger waiting areas (e.g., Becora), these are largely "ad-hoc" vendors without dedicated infrastructure or any coordination by DNTT. • **Facility Prominence:** The existing facilities do not have significant prominence within the community. Some facilities have large gateways however these have not been maintained. • **No Coordinated Planning:** The existing facilities were constructed by the Indonesian Government and as such there is limited strategic coordination in the current operation of bus and microlet services and the placement of facilities (i.e., the facilities may not align with the needs of the current service network in terms of convenient location and interchange). There have been no new bus stops or smaller strategic connection points for passengers implemented in recent times. • **Inconvenient Locations Resulting in Inefficient Operation:** In some locations, such as Taibessi, the terminal is located off the main road on local streets. This has been highlighted as an issue that creates additional travel time for passengers and operators in navigating local roads to reach the terminal, reducing overall efficiency of the network. ***Operation / Spatial Allocation (Within Terminal)*** • **Multitude of Vehicles Using Passenger Facilities:** In some terminals, there is a combination of anggunas (primarily trucks carrying passengers and other belongings on the back) and public transport vehicles (regional buses and microlets) using the same facility, increasing conflict, and impacting safety of passengers within the terminals. • **Smaller Municipalities Lack Facilities:** In some locales, public transport is informal. Passengers lack dedicated facilities, vehicles circle around without dedicated parking or staging areas, and there is a lack of operational coordination among operators (i.e., fixed, and reliable schedules are difficult to enforce). • **Limited Parking Space:** There is limited parking available for dropping and collecting passengers with disabilities at the terminals. • **Lacking Concept of Operations:** There is no clear concept of operations that governs the facilities. For example, there is no clearly marked area for buses and microlets to park when collecting passengers, and no clear layover locations for vehicles with longer dwell periods. • **Minimal Maintenance and Cleaning:** The facilities appear to be minimally maintained and cleaned, resulting in worn and deteriorating infrastructure and appearance, as well as unclean waiting environments. • **No Dedicated Kiss "n" Ride Areas:** There are no dedicated Kiss "n" Ride drop-off areas at terminals for passengers being dropped off by private vehicles, taxis, or two-wheelers.

Key Issues Relevant to Public Transport Facilities
Passenger Amenities at Terminal • **Facilities Perceived as Unsafe:** It has been highlighted by MOTC that passengers perceive the Becora Terminal in Dili (as one example) as unsafe. This may be due to limited amenities (such as lighting) or clear delineation (line markings) between passengers and vehicles. • **Lack of Paved Circulation Areas:** In many instances, circulation areas at terminals are unpaved and uneven, with puddles collecting during wet weather, making the surface slippery. This can create impediments to easy access to vehicles by users of all abilities, including those with disabilities. • **Poorly Lit Facilities:** There is minimal lighting at terminals – Becora has lighting although it appears relatively dim. No lights were observed in the Baucau Terminal. This creates the perception of an unsafe and treacherous environment, particularly for women, girls, and other vulnerable users at night. • **Conflict at Pedestrian Access Points:** Facilities are surrounded by high fences with key access points for pedestrians shared with vehicles. For example, in Baucau and Becora, both facilities are surrounded by high fences, with key entry/exit points shared by passengers and vehicles without safety or segregation measures – both lacking direct and safe connections to surrounding commercial/retail areas. • **Minimal Wayfinding:** There is no wayfinding information within walking catchments around the facilities to assist in navigation between key trip generators and the facilities, and vice versa. • **Minimal Service Information:** Facilities lack passenger information relating to routes, time of day operations, or key connecting destinations. • **Minimal Provision of Trash Bins:** There are no trash bins provided within facilities. This encourages passengers to discard trash on the ground and throughout the facility, resulting in unattractive waiting area. ***Bus Stops in Dili*** • **Lack of Design Standards:** Bus stops come in many different sizes and shapes, and it appears there are no consistent design standards adopted for their construction and level of amenities. • **Unclear Spacing Guidelines:** Most systems adopt a rule-of-thumb for spacing bus stops in urban and less dense areas – those in urban areas may be based on key generator location, while those in lower density areas provide a consistent stop spacing to provide coverage. It is unclear whether such guidelines have been followed in Dili. • **Inconsistent and Minimal Provision of Amenities:** Simple amenities may be provided at bus stops which may include (but not always include) a bus stop sign, shelter, seats/bench, etc. Lights were not observed at all stops, while most stops lack a trash can (resulting in litter and garbage in the stop area). • **Lack of Passenger Information:** Bus stops lack passenger information relating to routes, time of day operations, or key connecting destinations. • **Inaccessible Stops for Disadvantaged Groups:** Pedestrian connections to bus stops are narrow, forcing potential passengers onto the road and further impeding access to those with disabilities and the elderly. Where pedestrian crossings are provided that connect to bus stops, wheelchair drop ramps are not provided, further impeding access. • **Limited Regular Maintenance Regime:** Facilities are not well maintained, creating unattractive waiting environments, potentially dissuading users. For instance, the roof on one bus stop has disappeared and has yet to be replaced.

3.4.5 User Profile and Perception

Public transport service and facility interview surveys were conducted, canvassing about 1,500 residents (including about 1,200 public transport users and about 300 non-users) in Timor-Leste to understand their demographic, travel patterns, as wells as perceptions for potential service/facility improvements.[67] Key findings are summarized below, with survey results presented in detail in **Appendix A**.

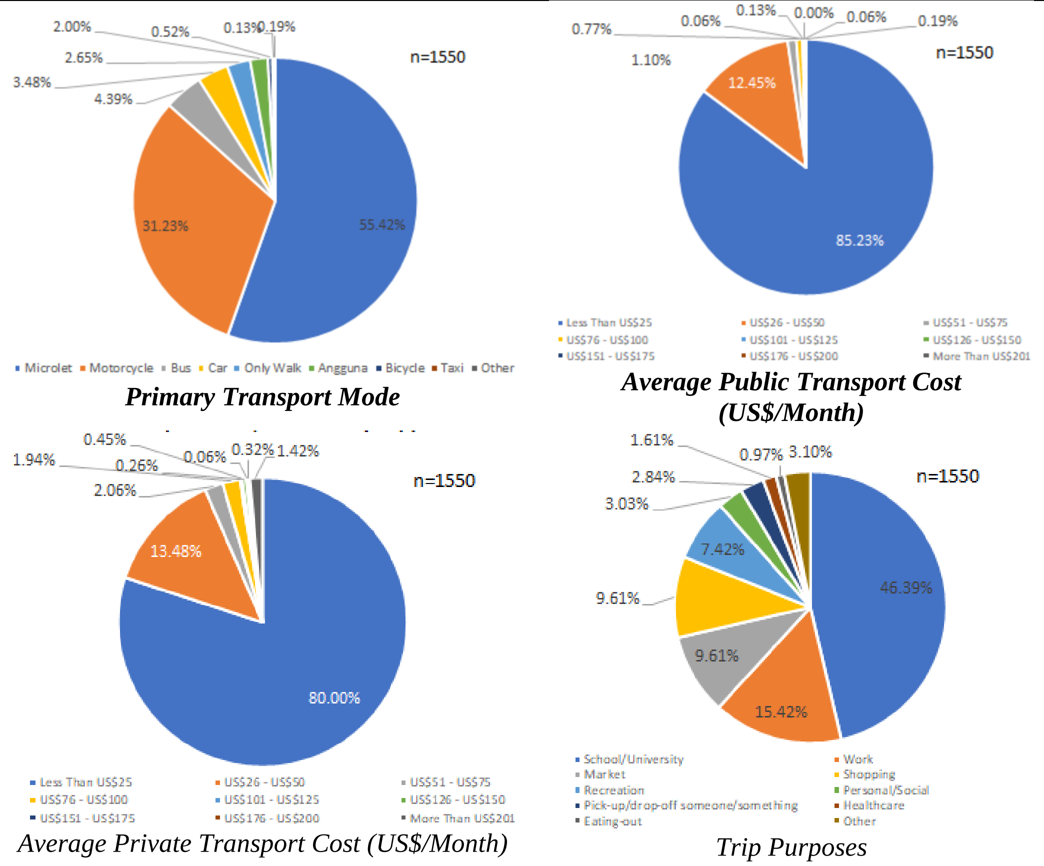
- **Primary Transport Mode** – Nearly 56% of respondents use microlet as the daily mode of transport, followed by motorcycle (31.2%), bus (4.4%), and private vehicle (3.5%). When comparing public transport (microlet and bus) versus private transport (motorcycles and private vehicles) use, public transport accounts for around 59.8% of travel, versus 34.7% for private transport, with the remaining some 5% from angguna, walk, and taxi.[68]

- **Trip Purpose** – Commuting to school/university represents the most common trip purpose of those interviewed (i.e., 46.4% of all), followed by work (15.4%), market (9.6%), shopping (9.6%), and recreation (7.4%) related trips. Other trip purposes include pickup/drop-off of others, social trips, and hospital-related trips (each representing 2-3% of trips).[69]

- **Transport Cost** – In terms of monthly public transport cost, over 85% of the respondents spend less than US$25/month, equating to about less than US$1/day. About 13% of the respondents spend US$26-50/month (or US$1-2/day). Those using private transport expend similar amounts with 80% of respondents spending less than US$25/month, with about 14% spending US$26-50/month. A minority of respondents spend between US$51-100/month (4%).

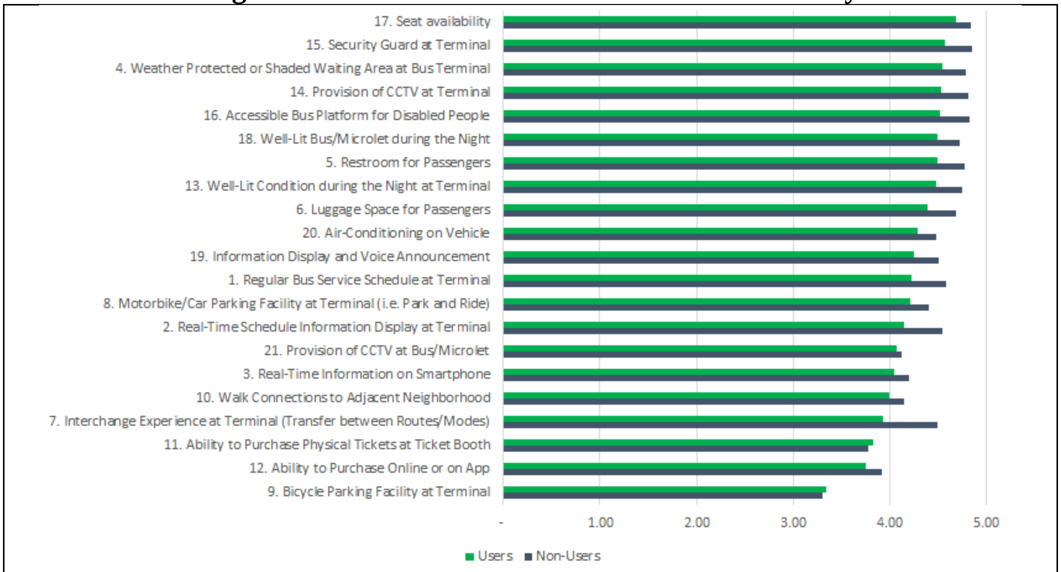
- **Perceptions on Service/Facilities** – The interview survey collected user perceptions on 21 public transport service/facility improvement and ranked them by preference. Of those top 10 improvements, eight elements are related to facility improvements at the terminals and bus stops (such as security guards, weather protected/shaded waiting areas, access-for-all facilities, etc.), while other two are associated with in-vehicle experience such as seat availability and sufficient lighting in the vehicle.

[67] The interview surveys were conducted at existing terminals and other key activity centers (such as markets, malls) in major cities including Dili and Baucau.
[68] This mode split is for reference only, as this is based on 80% of interviewees being public transport users (1,200 out of 1,550 respondents).
[69] A breakdown of the respondents by age is as follows: (i) 20.0% between 11-20 years old; (ii) 64.4% between 21-30 years old; (iii) 8.3% between 31-40 years old; (iv) 5.0% between 41-50 years old; (v) 1.7% between 51-60 years old; and (vi) 0.6% 61 years or older.



Source: Arup Study Team

Figure 3.39: User Profile Based on Interview Survey



Source: Arup Study Team
Notes: Scoring is based on the following scale: (i) 1 – Not Important; (ii) 2 – Slightly Important; (iii) 3 – Moderately Important; (iv) 4 – Important; and (v) 5 – Very Important.

Figure 3.40: User Perception on Importance of Public Transport Improvements

A summary of the top 10 public transport improvements (focusing on facility and in-vehicle experiences) by perceived importance is shown below:

Table 3.22: Top 10 Public Transport Improvements by Importance

Bus Terminal	In-Vehicle Experience
1. Seat availability	1. Security guard at terminal
2. Security guard at terminal	2. Seat availability
3. Weather protected area at bus terminal	3. Accessible bus platform for disabled people
4. Provision of CCTV at terminal	4. Provision of CCTV at terminal
5. Accessible bus platform for disabled people	5. Weather protected area at bus terminal
6. Well-lit bus/microlet during the night	6. Restroom for passengers
7. Restroom for passengers	7. Well-lit condition during the night at terminal
8. Well-lit condition during the night at terminal	8. Well-lit bus/microlet during the night
9. Luggage space for passengers	9. Luggage space for passengers
10. Air conditioning on vehicle	10. Regular bus service schedule at terminal

3.5 Institutional Framework[70]

3.5.1 Background

A robust institutional framework for public transport is a critical element in delivering a modern and inclusive system for the people of Timor-Leste. Without appropriate institutions, investment in modernizing the Timor-Leste's public transport system risks under-delivering on its promise, as services and facilities may not operate as planned, without appropriate operational and maintenance capabilities on the part of the Government and the private sector. Currently in Timor-Leste, public transport is characterized by disorganized, informal, and largely unregulated services owned and/or operated by private individual operators (this includes smaller microlets as well as longer-distance regional buses).

Specific issues related to the existing institutional and operating model of public transport system in Timor-Leste include:

- Vehicles wait, or circulate around town, to fill up with passengers before departing, resulting in journey time delays, poor reliability, and little sense of a predictable schedule.
- Drivers race and compete with one another to capture the same passengers in a day, leading to crashes, as well as risks to pedestrians and cyclists.
- Services may duplicate one another and be over-supplied in some high-demand locations/corridors, such as city centers and main roads, or at peak times of day, and under-supplied in lower-density outer areas and during non-peak periods.
- Services stop or engage in *keliling* on-street, even where terminal facilities are provided, often on main roads, causing congestion, impacting street activity, and raising safety concerns.
- Vehicle crews fail to give adequate consideration (e.g., in assisting boarding, or intervening in abuse by other passengers) to the disabled, children, women or those with special needs.
- Vehicles are old, poorly maintained, dilapidated, polluting, fuel intensive, inaccessible, and generally unfit to provide a modern, safe, reliable public transport service.

[70] Various reports from the on-going, ADB-funded TA-9502 TIM: Promoting Sustainable Land Transport Infrastructure Study are used as references for this section.

- Driver job security and payment are linked directly to the volume of passengers carried, as drivers lease or rent vehicles on an individual basis, encouraging specific driving behavior (thus employees are not salaried, nor do they have legally enforceable rights/protections).

Many of these challenges stem from the underlying institutional and regulatory structures, and business models, that govern the public transport system. Unless these root causes are addressed, limited or ad hoc service and infrastructure initiatives such as providing new terminal facilities or short-term enforcement are unlikely to succeed and live up to their promise and vision.

3.5.2 Existing Institutional and Legal Frameworks

This section provides an overview of the current institutional arrangement relevant to public transport in Timor-Leste, examining the governing framework and the key organizations involved in public transport planning and operations, whether public or private. It emphasizes the responsibilities assigned to these parties as outlined in regulations and policy documents, while also identifying any shortcomings in their execution as well as inherent gaps in the existing framework.

3.5.2.1 Legal, Regulatory and Policy Framework Governing Public Transport

The legal and regulatory framework plays a crucial role in shaping the public transport system, providing consistency and predictability for all stakeholders. It defines clear rules and guidelines for the operation and management of the system, ensuring the safety, security, and environmental sustainability of services and infrastructure – while promoting social usefulness.

The legal framework governing public transport consists of acts or laws, executive orders, and regulations. Acts or laws establish the general intent, while regulations provide more specific guidance and implementation details. These regulations encompass various aspects, including definitions, licensing requirements, implementation guidelines, procedures, performance specifications, exemptions, forms, and other necessary specifics.

A summary of the relevant laws governing public transport is provided in **Table 3.23** below.

Table 3.23: Summary of Laws with Influence on Public Transport

Law	Summary of the Relevant Law	Relevance to Public Transport
Basic Law of the Road Transport System (Basic Law) (Decree Law 2/2003)	• The Basic Law defines the competence, financial capacity, and professional capacity of companies, as well as the regulations of the National Registry of Road Carriers, which have not yet been approved. Article 16 to 20 of Decree-Law 2/2003 outlines different licenses and regulations for various types of public transportation, including passenger transport services, occasional passenger transport, tourist transport, and public cargo transport. • However, these regulations are vague and require additional regulations that have not yet been approved. • The Basic Law stipulates that prices for passenger transport should be established by separate legislation, which has not yet been approved. • Similarly, ancillary, and complementary transport activities, such as transport agents	• This law serves as the foundation of the land transport regulatory framework in Timor-Leste, encompassing a wide range of public transport functions. Key public transport functions are outlined at a high-level in the legislation, encompassing fare structures, infrastructure provision (including passenger facilities and shelters). • While the overarching legislation is in place, the regulations to support their implementation are generally lacking – which contributes to the minimal implementation

Law	Summary of the Relevant Law	Relevance to Public Transport
	and vehicle rentals, should be regulated by specific legislation, which has also not been approved. • There are several key provisions within the Basic Law that relate to the provision of public transport infrastructure, including passenger facilities, passenger shelters and equipment needed for the operation of public transport services. • In practice, there is minimal implementation of these powers by the National Directorate of Land Transport (DNTT).	of these responsibilities and powers by DNTT.

The Highway Code (Decree Law 6/2003)	• The Highway Code includes provisions aimed at promoting safe vehicle operation and responsible driver behavior. Section 19 relates specifically to passenger vehicles.
	• While the laws provide a foundation for transport services, they primarily focus on prescribing regulations without offering practical implementation methods.
	• The lack of appropriate supporting rules, regulations, and effective enforcement measures undermines their effectiveness.
	• Consequently, subsequent regulations are relied upon to define specific measures for achieving control, safety, and management as outlined in the laws.
	• Furthermore, there is a lack of standardized procedures for certifying drivers' physical and mental abilities and assessing their skills.
	• Specific legislation regarding the driver's license registry and renewal is currently absent, exacerbating the existing gaps and challenges in the system.
	• In addition, many provisions remain unenforced due to public unawareness and the absence of necessary procedures and facilities for compliance.
	• Consequently, two relevant regulations have been prepared:
	  o Regulamento do Sistema de Transportes Colectivos Rodoviarios de Passageiros, Diploma Ministerial no.3/MTCOP/2003 (this regulation was prepared and approved by the Minister but was not Gazetted and thus has no legal basis).
	  o Regulation of public transport Activity for Taxis, Diploma Ministerial No. 05/2010, 5 May 2010.
		• The provisions outlined in the Highway Code encompass licensing and registration of vehicles, which is a key lever within the power of DNTT to implement improved quality standards for operators.
		• However, there is limited regulatory translation of this legislation. Applied effectively, these powers provide an additional mechanism for influencing positive public transport outcomes for users by establishing quality-oriented operator license requirements.

Ministerial Diploma 3/MTCOP/2003	• Specifies that route proposals and set embarkation and departure times for such routes are to be submitted to the Directorate of Land Transport and followed. • Furthermore, the department can specify quality and regularity of service particulars by way of public service obligation. • These requirements are not being followed or monitored. • For instance, DNTT only assigns operators to routes without specifying further details on service and operating standards.	• This law demonstrates the authority of the government in guiding the schedule and standards of public transport services. • Although there is no schedule in Timor-Leste, a service schedule is an integral part of a future public transport system.

Law	Summary of the Relevant Law	Relevance to Public Transport
	• Passenger loading/unloading outside of defined terminals for inter-urban transport contravenes this Diploma.	• This law places the powers of those service planning decisions with DNTT.
Ministry of Transport and Communications Decree Law (6/2019)	• Outlines the functions and authorities of the MOTC, with a focus on its sub-units, such as the Directorate-General of Transport and Communications (DGTC) and DNTT. Key points include: o DGTC is responsible for proposing and implementing national transport policies, developing the legal and regulatory framework, and overseeing activities such as licensing and data collection. o DNTT is responsible for implementing and developing ground transportation services, as well as contributing to the development of the legal and regulatory framework.	• This law outlines the key responsibilities of MOTC, through the DGTC and DNTT, for the land transport sector. • This law assigns key public transport functions to DNTT under the category of land transport, as well as the responsibility for contributing the development of an appropriate legal and regulatory framework.
Ministry of Public Works Decree Law (8/2019)	• Article 14 outlines the responsibilities of the National Directorate of Roads, Bridges & Flood Control (DNEPCC), which include elaborating projects for the construction, expansion, maintenance, or refurbishment of roads, bridges, and flood control infrastructure. • Additionally, DNEPCC is tasked with preparing draft acts and standards for the public works sector, with a focus on improving safety conditions for roads and other means of communication. • This relates to roads, bridges or other infrastructure or works intended for flood control.	• On-road public transport infrastructure (such as bus stops and bus priority) lanes are important future elements of a modern public transport system that fall under this law. • The implementation of such measures falls under the responsibility of the Ministry of Public Works (MPW), based on planning by DNTT. In practice this does not occur.
Organic Law of National Police of Timor-Leste (Decree Law 9/2009)	• Article 1 designates the responsibility of the National Police of Timor-Leste (PNTL) to ensure road safety, encompassing activities such as planning, supervising, and regulating road traffic in coordination with the Ministry of Infrastructure. • In addition, Article 19 assigns the Department of Traffic and Road Safety with functions that include defining instructional programs, developing road safety campaigns, educating citizens on road laws, and collaborating with competent authorities on signage and pavement marking initiatives.	• The regulation and enforcement of traffic activities is key to maintaining an efficient network. • As public transport is modernized in Timor-Leste, measures such as bus priority may be implemented, which will require some level of enforcement from PTNL. • Due to PNTL's active role, they may be a key Directorate who can work with DNTT and MPW to identify potential public transport interventions to mitigate traffic impacts.
National Directorate of Road Safety (DNSR) (Decree Law 35/2015)	• Article 1125 states that the DNSR is responsible for the planning, coordination, and implementation of the National Policy Prevention and Road Safety. • The DNSR carries out various missions, including contributing to policy definition in traffic and road safety, developing and monitoring national prevention and road safety documents, promoting civic initiatives and partnerships, proposing legislative measures for traffic planning and discipline, ensuring compliance with road	• Given public transport is a transport mode with active travel (walking and cycling) as a priority last mile connection, safety of the network is important for all road users, but particularly vulnerable road users. • As the public transport system modernizes DNSR should target safety outcomes for the transport system with

Law	Summary of the Relevant Law	Relevance to Public Transport
	safety laws, managing records of traffic offenses, participating in training road inspectors, and standardizing actions of traffic authorities.	specific consideration to public transport as part of this mix, such as near facilities and at on-road stops.
National Directorate of Urban Organization (Decree Law 11/2019)	• Article 32 states that the National Directorate of Urban Organization is responsible for the following tasks: conducting studies and consultations for the development of legislative and regulatory proposals regarding urban mobility plans, promoting the publication and dissemination of technical regulations in urban mobility, providing technical assistance to municipal authorities in the preparation and implementation of mobility plans, organizing traffic studies in major settlements, and offering technical support for the implementation of measures that enhance fluidity and safety in urban traffic and pedestrian movement, in coordination with relevant ministries.	• Under the Ministry of Planning and Territory (MPT), the National Directorate of Urban Organization has a key role in planning. In practice DNTT does the coordination and planning (particularly of routes), however MPO will play a key role in long-term strategies, plans and ongoing strategic initiatives in the public transport sector.

In summary, while there are laws and regulations that specify responsibilities for elements of a successfully functioning public transport system, overall, these are vague, and many are yet to be passed. The primary responsibility falls on DNTT for managing the public transport system, however in practice there is minimal translation of the overarching laws, regulations, and policies into practice – this is relevant across system oversight of operations, operators, and infrastructure.

3.5.2.2 Current Institutional Framework Governing Public Transport

This section highlights key entities/organizations involved with public transport in the country.

Ministry Of Transport and Communications (MOTC)

MOTC holds the primary responsibility for government functions relating to Timor-Leste's transportation sector, fulfilling its duties through an integrated system of direct and indirect state administration entities.

At the direct administration level, the Ministry consists of two core services, namely the Directorate-General of Corporate Services (DGCS) and the Directorate-General of Transport and Communications (DGTC). These services encompass various national departments that operate directly under the Ministry's supervision. For instance, the DGCS includes the National Board of Directors, National Directorate of Budget, Finance and Planning, National Directorate of Human Resources, and National Directorate of Procurement. On the other hand, the DGTC comprises departments such as the DNTT, National Directorate of Sea Transportation, and National Directorate of Meteorology and Geophysics. Section 3 of this document discusses an aspiration to transition MOTC's responsibilities for land transport, currently held by DNTT, into a Land Transport Authority (LTA).

Furthermore, MOTC also holds overarching responsibility for several authorities and administrations that perform transport functions across Timor-Leste. These bodies include the Port Authority of Timor-Leste, Administration of Airports and Air Navigation, Civil Aviation Authority of Timor-Leste, and National Communications Authority. These entities function with their own legal personality, administrative autonomy, and financial independence in accordance with their approved statutes. According to the recently enacted

Decree-Law 30/2020, these authorities/administrations are subject to the State’s supervision or oversight, ensuring the fulfillment of public requirements and impacting public expenditure, among other aspects. The MOTC’s official website also specifies that these four bodies continue to operate under the tutelage and supervision of the Ministry of Transport and Communications.

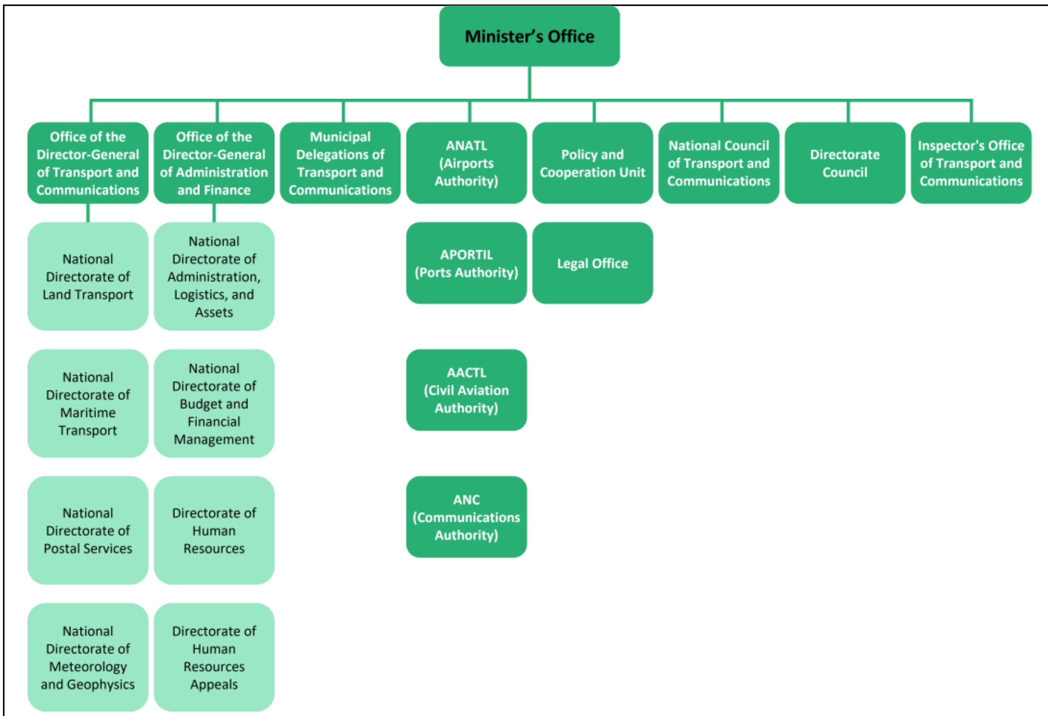
MOTC’s key responsibilities include:

- Develop policies and draft regulations
- Implement and enforce legal and regulatory activities
- Coordinate and promote the management, maintenance, and improvement of airport infrastructure, air navigation, highways, roads, and ports
- Propose and execute policy guidelines for urbanism, infrastructure, road networks, buildings, housing, and public works
- Create and implement the legal and regulatory framework for construction, including licensing and material research
- Conserve and repair bridges, roads, river, and sea with a focus on flood control
- Prepare and develop, in collaboration with other public services, the implementation of the national road plan and national land development plans
- Coordinate transportation and encourage complementarity between different modes of transport, ensuring their competitiveness to better serve users
- Promote and coordinate scientific research and technological development in civil land, air, and sea domains

Prior to the creation of the MPW in 2018, MOTC’s responsibilities also included the design and implementation of transport infrastructure works, which has now been assigned to MPW which is now any independent Ministry from MOTC. Despite various government functions relating to public works being moved from MOTC to MPW, other Directorates such as Land Transport within MOTC have remained largely unchanged.

The DNTT operates under the jurisdiction of MOTC and assumes the role of issuing driver and vehicle licenses, permits, and ensuring compliance with vehicle conditions. It also oversees essential aspects such as line markings, signage, and road furniture to promote safe navigation throughout the national road system. DNTT is further responsible for identifying and establishing intercity bus stops, implementing protective measures, and determining the locations of bus laybys. To execute these measures, DNTT collaborates closely with the National Directorate for Roads Bridges and Flood Control (DRBFC), which falls under the Ministry of Public Works. This coordination facilitates the effective implementation of safety and traffic control measures, with DNTT defining the required road safety protocols and traffic control measures before DRBFC carries out their implementation.

The MOTC organizational structure is shown below:



Source: Government of Timor-Leste

Figure 3.41: Organizational Structure of MOTC

The National Directorate of Land Transport (DNTT)

DNTT plays a critical role within the land transport sector under the MOTC in Timor-Leste. DNTT has prime responsibility for land transport management and operations. The first requirement is for DNTT to comply with the provisions included in the Basic Law on Road Transport (2003) and the Road Code (2003). As outlined in the Organic Law, the main functions of DNTT include ensuring the provision of quality land transportation services, enforcing legal regulations, and providing support to other authorities in facilitating road transport. DNTT is responsible for national and international representation within their areas of competence. The second requirement is to work together with the Ministry of Planning and Territory to implement the National Road Plan.

Currently, except for Dili, there is no decentralized office in each municipality, however there are several regional centers/bodies in key municipalities. The distribution of DNTT across Timor-Leste is as follows:

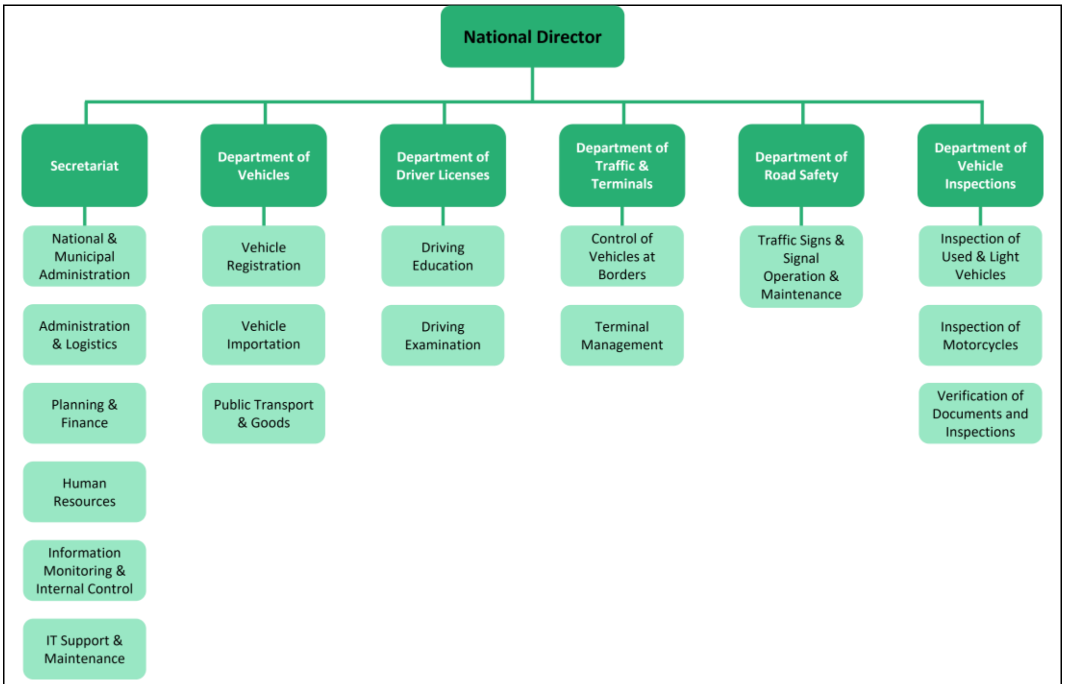
- The main headquarters and Vehicle Registration Center is in Dili;
- The Motor Vehicle Inspection Station is at Comoro;
- The Driver Licensing and Testing Station is at Hera; and
- Regional centers are located in Suai, Maliana, Baucau, Viqueque, Same, and Los Palos.

On a legal level, DNTT complies with and enforces laws, regulations, and other normative sources. DNTT also develops the legal and regulatory framework for activities in the transport sector, including the maintenance of the national system for vehicle registration, driving license types, fines, public transport categories, and related data. In addition, DNTT evaluates and approves licensing procedures for private driving schools, vehicle inspection services, and other relevant services. They practice necessary acts for the supervision of all activities, encompassing public transportation, private driving schools, private inspection centers, and other areas.

The enforcement can take both proactive forms with cooperation with the Timor-Leste National Traffic Police or passive forms in simply refusing to register drivers or vehicles that are not compliant with the requirements as defined in the regulations. Lastly, DNTT provides support to police authorities in the surveillance, implementation, and enforcement of road transport regulations.

Figure 3.42 illustrates the organizational structure of DNTT. The DNTT is entrusted with key roles and responsibilities pertaining to the public transport system, which include the following:

- **National Director -** The Director is responsible for making decisions regarding the planning of microlets and regional buses. With the support of the Technical Secretariat, the Director develops national road safety plans and ensures the implementation of road safety regulations.
- **Secretariat – Planning & Finance -** Currently, the DNTT Secretariat assumes the responsibility of planning land transport, including public transport. They establish routes for microlets in urban centers and specify regional bus routes.
- **Department of Vehicles – Public Transport & Goods -** The Department of Vehicles within DNTT handles the registration of vehicles, including those used for public transport. Owners of public transport vehicles are required to pay a registration fee to operate their vehicles.
- **Department of Traffic & Terminals – Terminal Management -** The Department of Traffic & Terminals oversees terminal management. Presently, this responsibility is primarily fulfilled through public means rather than outsourcing to the private sector.



Source: Government of Timor-Leste

Figure 3.42: Organizational Structure of DNTT

Additional Government Organizations Relevant to Public Transport

In addition to the MOTC, several organizations are involved in the development and implementation of public transport initiatives. These organizations, including DNTT and other essential agencies, have specific responsibilities that all play a role in the overall delivery of a modern public transport system. **Table 3.24** provides an overview of their respective roles and the relevance to public transport.

Table 3.24: Additional Government Organizations Relevant to Public Transport

Organization	Key Responsibilities	Public Transport Relevance
Agência de Desenvolvimento Nacional (ADN) or National Development Agency	• Established under Decree Law 2011, ADN operates under the authority of the Prime Minister, while being supervised by the Minister for Planning and Investment. • Its primary responsibilities encompass the review of capital development projects, assessing their cost benefits through comprehensive analysis. ADN also plays a pivotal role in monitoring project implementation and execution by employing a quality certification system. • These endeavors contribute to the efficient utilization of financial resources, fostering national development, and promoting economic activities at both the national and local levels.	• ADN will be a key stakeholder in the delivery of any major public transport facilities and major infrastructure relating to the public transport system, playing a monitoring and certification role as the projects proceed.
Major Projects Secretariat (MPS)	• Established under Decree Law No. 8/2011, MPS provides technical and administrative support to the Council for the Administration of the Infrastructure Fund (CAFI). • Its key roles include conducting preliminary and formal evaluations of projects for funding from the Infrastructure Fund, considering both technical and financial aspects. MPS also handles project scheduling and returns, performs secretarial duties during CAFI meetings, drafts meeting minutes, and prepares releases on behalf of CAFI. • Additionally, MPS reports its activities to the Council of Ministers monthly, ensuring effective project management and communication.	• MPS will provide support to CAFI for any major public transport facilities or infrastructure projects – including evaluation of projects for their benefits.
Ministry of Finance (MOF)	• MOF is the central government agency responsible for designing, executing, coordinating, and evaluating the planning and monitoring of the annual budget and public finances. • MOF plays a crucial role in controlling the project budget flow, managing public finance, and coordinating development project funding with other line ministries. • Additionally, MOF is involved in negotiating and managing public-private partnerships (PPP), ensuring financial assessments and risk sharing for the sustainability of projects. • Its expertise in financial matters contributes to the effective implementation of transport initiatives.	• MOF will be a key stakeholder in the financing of public transport infrastructure projects and operations and will be a key negotiator if there are any facilities or other initiatives that are to be implemented through PPPs.
Ministry of Interior (MOI)	• MOI is the central government agency entrusted with designing, executing, coordinating, and evaluating policies related to internal security, migration and border control, civil protection, and police cooperation. • The MOI plays a vital role in ensuring the safe operation of road vehicles, with a particular emphasis on enforcement through the national police. • The Government of Timor-Leste has set up the National Directorate of Road Safety (DNSR) under MOI to spearhead its initiatives in improving road safety. • DNSR collaborates closely with DNTT, National Police of Timor-Leste (PNTL), and other government entities responsible for road safety regulations, as well as engaging with a wider group of stakeholders dedicated to reducing road accidents.	• MOI, in conjunction with DNSR coordinate road traffic safety and enforcement – which includes the safe operation of public transport vehicles on the roads and managing traffic concerns or unsafe conditions to maintain a safe public transport system and transport network.
Ministry of Justice (MOJ)	• MOJ is the central government agency entrusted with ensuring the implementation and functioning of justice, law, human rights, and land and property-related matters. • Within the MOJ, the General Directorate of Land and Property (Direção Geral das Terras e Propriedades or DGTP) is responsible for executing, coordinating, and evaluating policies concerning land and property.	• As the regulatory framework and capacity to regulate the public transport system develops in Timor-Leste, MOJ will have a role in evaluating and

Organization	Key Responsibilities	Public Transport Relevance
	• This includes the administration and management of immovable property for both public and private domains, maintaining an information system on state property, and providing geospatial information for effective land control. • The MOJ and DGTP play a crucial role in upholding legal frameworks and safeguarding land and property rights within the transport sector.	upholding legal frameworks. • Additional DGTP within MOJ will coordinate land requirements for public transport facilities.
Ministry of Planning and Territory (MOP)	• MOP is the central government body responsible for the design, management, and evaluation of urban planning policies aimed at promoting economic acceleration and social development through strategic planning, integrated planning, and rationalization of financial resources. • The ministry also oversees the implementation of Strategic Development Plans, with a particular focus on infrastructure, urban planning, mining, and spatial planning. • MOP holds authority over the national planning agency and the Major Projects Secretariat. Collaboration between DNTT and MOP is essential for the successful implementation of the National Road Plan. • Within MOP, the General Directorate of Territorial Planning (GDTP) is responsible for spatial planning and the implementation of national spatial planning policies, encompassing territorial, urban, and coastal planning, as well as geospatial and cartographic information management.	• MOP will coordinate strategic integrated planning that integrates public transport and broader Urban Master Plans – they play a crucial role in ensuring integration between public transport and the urban environment. • MOP also set broader urban policy targets which can be aligned with public transport.
Ministry of Public Works (MPW)	• MPW is the central government agency tasked with the design, implementation, coordination, and evaluation of policies (approved by the Council of Ministers) in various areas, including public works for roads, bridges, flood control, urban planning, housing, water supply distribution/management, sanitation, and electricity. • Within the road sector, MPW serves as the primary agency responsible for studying, planning, and executing construction projects for the protection, conservation, and repair of roads and bridges. • Under MPW, the DRBFC is specifically responsible for the planning and development of the national road network, encompassing national roads, municipal roads, urban roads, and rural roads. • As part of road construction, MPW is also responsible for providing facilities along the roads that can be utilized for public transport services. • Note that DNTT controls the provision of facilities including terminals in Dili and in municipalities outside Dili, on route laybys and waiting areas and appropriate signage. • In addition to terminals, DNTT also holds the responsibility of identifying and designating on-route stops for each route. • Once the need for these stops has been specified, DNTT collaborates with DRBFC to design the on-route stops into new road construction or upgrades or retrofit existing roads that lack adequate public transport facilities with the necessary on-route stops.	• MPW will implement road-based public transport infrastructure initiatives such as bus stops or bus lanes. • They will coordinate closely with DNTT and MOTC who will provide planning input, however MPW will ultimately deliver the initiatives and maintain on-road initiatives. • MPW are also responsible for general road quality, which is an important aspect of public transport reliability.
National Procurement Commission (NPC)	• Established under Decree Law 14/2011, NPC operates under the Minister of Planning and Investment. • Its primary responsibility is to manage all public procurement exceeding a value of US$1 million. • The NPC has a twofold mandate: (i) to provide procurement services to line ministries and other public entities involved in major infrastructure projects, and (ii) to ensure transparency in the state procurement process. • Following a thorough review and approval, the NPC assumes responsibility for overseeing capital procurement activities.	• NPC will be responsible for the procurement of suppliers (both designers and construction contractors) for the delivery of public transport projects, providing a transparent assessment of proposals.
Ministry of State for General Administration	• This ministry focuses on local government affairs and plays a crucial role in decentralization and power de-concentration to district or municipal offices. • Its responsibilities encompass various aspects related to governance and administration at the local level.	• As public transport modernizes and high-quality facilities and services are provided across Timor-Leste, there will likely be increasing institutional strengthening required at the municipal level to

Organization	Key Responsibilities	Public Transport Relevance
		enable local expertise and knowledge to manage these networks – the Ministry for State for General Administration will be central to this municipal devolution of public transport powers.
National Police of Timor-Leste (PNTL)	• The National Command of Operations, under the General Command of PNTL, is responsible for making decisions and executing actions related to public security. • Within the National Command of Operations, there are various units and services, including the Traffic and Road Safety department. • The Traffic and Road Safety Unit has a specific mission to ensure order and public security in various areas such as roads, ports, airports, and transport terminals. • According to Article 17 of the Decree Law No. 8/2004, they are responsible for policing access roads, protecting passengers and goods in different modes of transportation, enforcing laws and regulations related to vehicle and pedestrian movement, organizing traffic flow, preventing road accidents, conducting road surveillance, defining road signage and markings, promoting road safety campaigns, and educating citizens about traffic laws.	• PNTL play an integral role in managing road safety. Public transport is a key mode within the road-based transport system in Timor-Leste and therefore PNTL should be actively involved in policing public transport operators and other road users to ensure passenger safety.

3.5.2.3 Planning of Public Transport Networks

The planning of the network (i.e., routing, stops and terminals) is essential in delivering a high-quality public transport system. DNTT in Timor-Leste is responsible for the planning and development of the public transport system.

Key aspects of the current arrangement related to the planning of public transport networks are:

- **Ultimate Responsibility for the Planning of Public Transport Routes -** According to Ministerial Diploma no.49/2019, it is the Director of DNTT who takes ultimate responsibility for the planning of public transport routes, supported by Technical Secretariat offices, sections, and technical units. The Director of DNTT decides the planning of regional buses and microlets and establishes the routes.

- **Decentralization of Decision-Making -** The Director of DNTT in each municipality takes responsibility and decides the planning of public transport routes in their respective municipality. As highlighted below, Planning and Finance staff are only located in Dili.

- **Public Transport Planning Staff -** The Director’s office has technical staff allocated to them according to article 12 of Ministerial Diploma 49/2019. Specifically, the Planning and Finance section of DNTT under the Secretariat is where public transport planning officers would be employed, however currently this section only focuses on the supply of goods (driver’s license cards, office supplies and other logistics) – rather than the planning of public transport.

- **General DNTT-Wide Knowledge in Public Transport Planning -** Based on the human resources database of DNTT, there is limited expertise relating to public transport network planning. Of the 284 total DNTT employees across Timor-Leste, fewer than 10 staff have automotive-related degrees (4 of these have master’s degrees). There are an additional 20-35 staff who have undergraduate qualifications relating to automotive expertise, and the rest of the employees have senior high school or equivalent qualifications. However, most of this experience is general (such as public administration, law, or economics) rather than relating specifically to transport planning, and even those educated in automotive-related degrees, these are not specifically public transport focused.

- **Location of Planning Officers -** Currently, DNTT staff responsible for planning and finance are only located in Dili, with decentralization of these functions still under discussion with the Ministry of State Administration or ESTATAL for the establishment of a joint Ministerial Diploma for the allocation of necessary resources to each municipality. While there are discussions about allocation of resources to municipalities for planning and finance staff, this will not solve the lack of capacity for public transport planning – evidenced by Dili where these staff already exist – without capacity building.

- **Collaboration Among Ministries -** Mentioned above, the primary inter-Ministerial collaboration in relation to public transport network planning are discussions to define an institutional approach to the decentralization of planning to Municipal administrators.

- **Operator Involvement in Planning Process -** Network reform (changes to the public transport network) is made by DNTT based on requests/proposals from private operators for the expansion or adjustment of existing routes. This is a relatively informal process, where the private operator(s) may propose the expansion or adjustment of a particular route (or creation of a new route), with DNTT assessing these proposals on a case-by-case basis.

- **Community Engagement and Consultation -** Community engagement and consultation in relation to planning of public transport networks is mostly indirect in both Dili and Municipal offices. This engagement occurs through local authorities (via the village chief and sub-village chief). For example, DNTT consults with the local authority directly (who represent the community) on proposals for new public transport routes, rather than with the broader community.

- **Data Collection and Analysis -** DNTT has an established database system managed by the Information Technology (IT) section of the directorate. The database system maintains data of vehicle registrations, vehicle inspections and driver license tests. However, beyond registrations there is no further data collection (such as performance-related data) for public transport that can be leveraged for public transport planning and network improvements. Data analysis is conducted upon request, however not on a regular basis.

Core issues that exist related to planning of public transport networks are:

- Budget limitations result in a lack of personnel on necessary teams (e.g., Planning and Finance) to perform the technical work to plan public transport networks and develop public transport initiative proposals.
- There is a lack of qualified staff who have knowledge, education, and/or training in public transport network planning.
- The combination of lack of resources and capacity means that the DNTT Directors in each municipality decide routes and plan networks without any dedicated staff.

3.5.2.4 Public Transport Service Operations

Introduction

There are several key functions that relate to public transport operations that are summarized in this section. This section divides the discussion of the current public transport service operations into four key sub-sections:

- Public transport vehicle ownership and registration;
- Operational oversight and management;
- Business model of private operators; and
- Service operations.

For each of the above, key aspects of the current arrangement are described.

Public Transport Vehicle Ownership & Registration

Land-based public transport services in Timor-Leste are operated by the private sector, with DNTT's primary responsibility being the licensing and maintenance of vehicles. Key aspects of the current arrangement related to the Ownership and Registration of public transport Vehicles are:

- **Ownership of Public Transport Vehicles -** Public transport vehicles are privately owned. Commonly, a vehicle owner will own just a single vehicle (rather than aggregating ownership of many vehicles) and may have other businesses/work outside of the public transport sector.
- **Registration of Public Transport Vehicles -** Vehicles are registered with DNTT in order to operate. Registration requires - (i) purchasing license plates; (ii) paying a license fee; and (iii) having the vehicle inspected for safety. The following documents are required to be submitted to DNTT to register a public transport vehicle – these are then assessed by DNTT with a public transport license issues (if authorized by the Director of DNTT) -
    1. Public Transport Request Letter from the vehicle owner to DNTT;
    2. STNK - Vehicle Certificate;
    3. KIR – Inspection Certificate;
    4. Personal Identity Card; and
    5. Business License from SERVE.
- **Vehicle Route Assignment -** Through the registration mechanism, DNTT influences the number of vehicles that operate on each route, to encourage operation on less popular routes. Given the market-based nature of the operators" revenue model (discussed further in this section), popular routes are more lucrative and therefore DNTT has a role to play in avoiding oversaturation of providers on popular routes.
- **Registered Vehicles Database -** The DNTT Secretariat maintains a registered vehicle database that comprises vehicles registered across municipalities. Additional information such as year of manufacture is included.

- **Vehicle Registration Costs -** Shown in **Table 3.25**, vehicle registration costs vary depending on the vehicle type. Regional buses are US$70 to register, while microlet/angguna are US$55 to register. This total registration cost comprises three components - License plate, license fee and vehicle inspection. This is a one-off cost to have the vehicle registered for public transport use, with ongoing license renewal required every six months thereafter.

- **License Fees -** public transport vehicles are required to pay license renewal fees every six months. The fees vary by vehicle type, shown again in **Table 3.25**, ranging from US$30 for regional buses, US$20 for microlets and US$15 for anggunas. Vehicles undergo a safety inspection by DNTT in conjunction with license renewal.

- **Fees for Change of Driver** - If the registered driver of a public transport vehicle is to be changed, this change must be registered with DNTT and incurs a cost of US$10 regardless of vehicle type.

- **Maintenance and Inspection -** Vehicle safety inspections by DNTT on public transport vehicles as part of the license renewal process are what drive maintenance and upkeep of vehicles. Maintenance is the responsibility of the operator, who will typically undertake necessary maintenance to a level that satisfies DNTT's safety inspection requirements every six months.

- **Procurement -** As public transport vehicle ownership and operation is a private undertaking, there is no established government procurement framework or capability for the procurement of public transport vehicles. New regional buses cost in the range of US$35,000-US$40,000 depending on whether it is purchased in Timor-Leste, or over the western border in Indonesia where prices are lower. Second-hand buses can be purchased for ~US$15,000, however their life expectancy and reliability are considerably lower.[71] For most Timorese seeking business opportunities, owning public transport vehicles is considered expensive and unfeasible.

Table 3.25: Costs Associated with Registering Public Transport Vehicles

	Regional Bus	Microlet	Angguna
Total Cost of Registration	**US$70**	**US$55**	**US$55**
License Plate	US$25	US$25	US$25
License Fee	US$30	US$20	US$15
Vehicle Inspection	US$15	US$10	US$15
License Renewal Fee (every six months)	US$30	US$20	US$15
Driver Change	US$10	US$10	US$10

Source: DNTT based on Institutional Questionnaire in April 2023.

Operational Oversight and Management

Key aspects of the current arrangement related to government intervention/management of operations are:

- **Level of Service for Operations** - DNTT do not have an explicit level of service standards that drivers must meet. There are some inherent safety standards that are embedded in the registration process, given that vehicle safety inspection is a key component of vehicle registration and license renewal. There are also mode-specific vehicle standards – for example, anggunas are required to have seats for passengers and a roof made of permanent material such as an aluminum or metal

[71] Source: The Asia Foundation. 2015. A Political Economy of Public Transportation in Timor-Leste.

roof. While these standards contribute to customer outcomes, overall, there are very minimal standards that influence the reliability and efficiency of the public transport network.

- **Key Performance Indicators (KPIs) -** There are no KPIs used by DNTT to manage or monitor the performance of the network. Private operators are not held to schedules or punctuality requirements, reducing the reliability of the network and DNTT's ability to understand issues associated with network operation.

- **Digital Technologies -** Beyond the vehicle registration database, there are no digital technologies used in the management or monitoring of public transport operations by DNTT.

- **Disruptions and Emergencies -** DNTT typically receives information from social media or direct communication regarding disruptions or emergencies such as traffic accidents. DNTT will communicate with the police to respond in these instances.

- **Stakeholder Feedback** - There is a customer feedback box at the DNTT offices, however, DNTT have stated that this has never been opened. Stakeholder feedback is received via social media, public protests, or by direct complaint by individuals at DNTT offices. These public concerns are assessed on a case-by-case basis by DNTT.

- **Capacity Building within DNTT -** There are no specific capacity building programs available for staff involved in the management and operation of public transport. However, in 2022, a training plan was submitted to MOTC, which proposed collaborating with the National University of Timor-Leste (UNTL) to deliver training to DNTT staff. The capacity building plan includes vehicle inspection and maintenance training, traffic light maintenance training, and driving license production training. DNTT has a 5-year capacity development plan (2023-2028), which is subject to approval from the Human Capital Development Fund. The proposed areas of training include scholarship for D2 and D3 in the area of management and vehicle inspection, scholarship for a master's degree in public administration, and training for human resources, database, finance and accounting, and basic internal audit.

Business Model of Private Operators

Key aspects of the current arrangement related to the business model of private operators are -

- **Owner -** The public transport vehicles in Timor-Leste are owned by private individuals who typically are separate from the drivers. However, there are also some drivers who are also owners of their vehicles. Given the relatively high cost of purchasing a public transport vehicle, most vehicle owners typically only own one vehicle, although some may have additional businesses such as shops or workshops.

- **Driver -** The common situation is that owners hire drivers, who as mentioned above in some cases may also be the owners themselves. In the case of regional buses, the drivers are hired to operate the buses for a fixed number of trips between Dili and their destinations. Depending on the destination, drivers may in some cases undertake two or three return trips per day (e.g., to Baucau), whereas longer round trips (such as to Suai) will require two days.

- **Konjak -** Konjak's accompany drivers on public transport vehicles. They are seated in the front passenger seat and their primary responsibility is collecting fares from passengers. In recent years, some microlet drivers do not employ konjak for their service as drivers trust passengers pay the fares upon getting of vehicles. On the other hand, all drivers of regional buses employ konjak.

- **Overarching Business Model -** There are two variations of the common public transport operator business model in Timor-Leste:

    - **Business Model Variation #1 -** The most common business model for public transport operators in Timor-Leste is where the driver pays the owner an amount equal to the fare for every seat on the bus, per journey. The income generated from this pre-agreed amount pays the driver's salary, the konja's salary, fuel, repairs, and other costs. In the case that the full fee is not collected (resulting from a shortage in collected fares), the shortfall is deducted from the driver's salary. Conversely, extra income the driver earns from additional fares (either from additional passengers or additional cargo) is retained by the driver.

    - **Business Model Variation #2 -** The second business model variation involves a revenue share between drivers and owners. Under this model, the driver may receive 10-15% of the total earnings, depending on what is negotiated with the owner. Given the driver and konja are collecting fares from passengers on the route, trust is an important part of this model – with drivers often part of the owner's close personal network. Networks and respect are important aspects of the driver-owner relationship.

- **Operator Incentives -** Under both models of operation, the economic responsibility and consequences are worn by the driver. Under Business Model #1 above, the driver is incentivized to fill all seats on the bus or face a deduction on their salary. Similarly, under Business Model #2, the more passengers a driver has, the higher their respective share of revenue is.

Service Operations

The current lack of government oversight or regulation combined with the operator incentives arising from the existing business model leads to the following:

- **Competition -** Because all public transport vehicles are operated on an individual basis, and the economic responsibility falls on the drivers – there is competition "in the market" (i.e., on the street for passengers), rather than "for the market" under a more coordinated approach.

- **Lack of Scheduling -** Drivers are incentivized to carry a full load of passengers – and as such drivers will often wait until the vehicle is full before departing. This creates longer wait times prior to departure and results in complete absence of a meaningful scheduled departure time.

- **Keliling -** To find additional passengers, bus drivers will slowly circle around the streets announcing the destination. This practice is called keliling, and although illegal it is a common method to find passengers and not enforced by traffic police.

- **Use of Terminals -** Drivers are incentivized to circulate and find passengers rather than use terminals if this leads to higher patronage. There is no direct incentive to use terminals, particularly if users do not aggregate there due to low quality amenity.

- **Informal Drop-Off Points -** Arising from the competition for passengers, and late arrival times associated with delays and late departures, drivers will commonly drop passengers at their homes or destination, especially at night. Despite being prohibited, it is still common.

- **Vehicle Overcrowding -** Regional buses have a licensed capacity of 24 passengers and microlets have a licensed capacity of 10 passengers. However, again the economic incentive placed on drivers encourages overcrowding and unsafe practices. Because drivers earn extra money from extra passengers, microlets and regional buses are often over capacity. In some municipalities (particularly outside of Dili), passengers can be observed riding on the roof of buses. In Dili, while police attention has attempted to reduce the prevalence of this practice, passengers (particularly students) can be observed hanging from the side of microlets at the doorway.

- **Students -** Students are offered a discount on their fares. They pay 25c instead of 50c per trip. This discount is imposed by the Government, however there are no subsidies provided to drivers. As a result, drivers are discouraged from collecting students, as they earn a lower fare from students than if they were to collect full-paying customers in their place.

- **Route Pricing -** The department has also set prices for travel on certain routes, although this does not apply to sub-district routes, and konjas often raise fares given the opportunity.

- **Lucrative Routes -** Because driver income is directly correlated with patronage, drivers and bus owners are incentivized on the busiest routes. Some routes are much more lucrative than others.

- **Fuel Costs -** Fuel is a key operating cost for public transport vehicles. Most fuel stations are located in Dili, where the price of fuel is cheaper than in more regional locations (e.g., Baucau, Maliana and Suai). As a result, drivers will prefer to purchase fuel in Dili. Regional drivers in some cases rely on purchasing informal fuel that is smuggled across the border from Indonesia to Maliana. Drivers report mechanical issues from smuggled fuel, as it is not stored adequately and is often diluted.

- **Ticketing -** There is no formal ticketing system in Timor-Leste. Timor-Leste's existing ticketing system for public transport is purely cash-based where passengers pay to the driver/conductor upon alighting the vehicle. No data on cash fare collection and revenues are recorded. As a result, the direct flow of revenue from passengers to driver contributes to broader issues associated with public transport (such as drivers not picking up students due to reduced fares). Ticketing could contribute to solving some of these challenges, however, would be best implemented with scheduled departure times that would allow users to purchase dedicated tickets for regional bus services.

- **Marketing -** Vehicles are often competing for passengers to earn higher revenues. As a result, vehicles are decorated with colorful paint and unique decorations and decals. Vehicles play loud music playing through the speakers, with their routes displayed on the front of the vehicle. While these features are intended to attract riders to their vehicles over their competitors, they do create safety issues due to hindered driver visibility.

- **Coordination of Associated Transport Modes -** There are other modes of transport that provide public transport services, namely Angguna (flat-bed trucks), Taxis and Ojeks (two-wheelers). There is limited coordination or integration of these modes. For example, anggunas are overcrowded and are not policed for safety to the same degree as buses. Ojeks are largely informal, with ojek drivers establishing their own local client base, with prices ranging from 50 centavos (local) to US$10 for longer distance trips with poor road conditions. Taxi safety is a concern, particularly for women, with limited regulation of drivers (i.e., no photo identification required in vehicles).

Public Transport Service Operations – Core Issues

Core issues that exist for service operations are:

- Beyond licensing and route allocation, DNTT plays a limited role in the oversight, monitoring, evaluation, and enforcement of public transport service operations.
- DNTT currently lacks capacity and professional knowledge relating to public transport service operations.
- The economic aspect of bus operations is informal and lacks specific regulations.
- The economic responsibility and incentive fall directly on drivers of vehicles, creating a range of issues for the reliability and safety of the network.
- Equity is disincentivized in service operations (i.e., drivers are not incentivized to pick up students due to reduced fares, or to serve lower patronage routes due to lower passenger revenue).
- To address these capacity shortcomings, there are a lack of up-to-date training programs to improve the skills and capabilities of DNTT staff in this area.
- There is limited use of technology beyond a vehicle licensing database, for real-time management or optimization of the public transport network.

3.5.2.5 Design and Construction of Public Transport Facilities and Infrastructure

The delivery of public transport facilities and infrastructure is an integral part of modernizing the country’s public transport system. In Timor-Leste, this process of transport infrastructure provision involves multiple Ministries and Organizations, namely the Ministry of Transport and Communications (MOTC); the Ministry of Public Works (MPW); and the National Procurement Commission (NPC).

Design and Construction

Key aspects of the current arrangement relating to design and construction of public transport facilities and infrastructure are -

- **MOTC Coordination -** The Ministry coordinates overall project delivery and becomes the ultimate owner of the facilities after completion. Thus, for public transport, MOTC initiates, delivers, and then becomes the ultimate owners of the facility (unless a Public-Private Partnership model is adopted).
- **Establishment of Project Management Unit (PMU) -** The Department that initiates and is the ultimate owner of an asset will (in the case of public transport – MOTC) will establish a PMU to oversee project delivery. Generally, the PMU will include MOTC staff, as well as members from other Ministries (key being MPW), and civil engineering experts from across Timor-Leste (including from the UNTL).
- **Collaboration with MPW -** MPW is an important PMU participant for any infrastructure delivery project (including public transport projects). MPW plays a range of roles in supporting MOTC throughout the design and delivery process –

maintaining building codes, standards, and guidelines for infrastructure assets such as buildings, roads, and bridges. MOTC also provides project management and supervision functions to verify the progress of external consultants and contractors prior to payment milestones.

- **Defining Performance-Based Specifications -** As the initiator of the project and owner of the asset, MOTC will ultimately be responsible for performance-based specifications that define desired outcomes from the project. There are not specific performance-based specifications for public transport – and there is currently a low level of knowledge and skills within MOTC for defining appropriate outcomes for public transport facilities and infrastructure.

- **Defining Technical Specifications -** The Ministry of Public Works have design standards that are used for road construction and building construction, MPW will typically provide the technical specifications for the delivery of assets, however these are primarily road assets or building assets, without specific specifications for public transport.

- **Role of the National Procurement Commission (NPC) -** NPC takes the specifications established by MOTC and MPW and conducts the procurement, returning to the responsible Ministry once a supplier has been selected. NPC runs procurement processes for several major projects, including road projects funded by the ADB in recent years, and the Dili Airport upgrade. There is a potential weakness in this process if NPC are not accustomed to public transport process.

- **Role of the National Development Agency (ADN) -** The ADN reviews capital development projects and monitor projects implementation by employing a quality certification system. ADN will review project implementation and their sign-off will be required (in addition to that from the lead Ministry and MPW) prior to MOF making payments to bidder.

- **Experience in Public Transport -** The public transport facilities and infrastructure that exist in Timor-Leste were constructed over 20 years ago by the Indonesian Government. Since then, there has been minimal enhancement of the public transport infrastructure assets (which has also hindered capacity development of related government staff in this realm).

- **Transferable Knowledge and Skills -** MPW has guidelines and specifications relating to buildings and road assets, however not specifically for public transport facilities or infrastructure. As a result, there is a risk that performance-based outcomes and specifications and design specifications will not be closely aligned to the needs of public transport users specifically.

Design and Construction – Core Issues

Core issues for design and construction of facilities and infrastructure include:

- Existing public transport assets in Timor-Leste were delivered by the Indonesian Government, and as such the Timorese Government does not have a track-record in delivering public transport facilities or infrastructure.
- While there are some base capabilities that exist for transport assets such as roads and buildings (mostly office buildings rather than specific public transport buildings) there are no performance-based specifications specific to public transport or capabilities to assess good practice.
- There is a somewhat permeable relationship between MOTC (who would be the lead Ministry for public transport delivery), MPW (who would form part of the working group and offer technical support) and NPC (who would procure the suppliers). There is a risk that knowledge development and capacity building is inconsistent across the organizations.

3.5.2.6 Public Transport Facility Operations

Introduction

Under Article 23 of the Ministerial Diploma 49/2019 – the Traffic and Terminals Department of DNTT takes responsibility for the management of the existing public transport facilities. This section breaks down the key aspects of the current arrangement in relation to facility ownership and access, and facility management.

Facility Ownership and Access

Key aspects for ownership/access of public transport facilities are:

- **Ownership of Public Transport Facilities -** The Government of Timor-Leste owns all public transport facilities in the country. The existing terminals are owned by MOTC. Most public transport facilities were initially built by the Indonesian Government, and now belong to the government of Timor-Leste. The land upon which the existing facilities are built is owned by the government of Timor-Leste. The legal basis for this is the government land and building attribution laws from the Land and Property office.
- **Operations of Public Transport Facilities -** DNTT under the MOTC manages the existing public transport facilities. The DNTT's Section of Public Transport is responsible for monitoring the terminals and managing the public transport facilities.
- **Operator Access to Facilities -** Any licensed public transport operator in Timor-Leste can use the public transport terminals, without requirement. Licenses are assigned to operators to access specific terminals, called a Guia de Ciculação (Circulation Permit) for the terminal the operator accesses (based on their assigned route). For example, in Dili a circulation permit is assigned for Becora Terminal based on the eastern routes that terminate/circulate through this terminal. If public transport operators wish to access terminals outside of their determined route, they can obtain a cross-route license – and if operators access terminals that they are not licensed for, they can be fined.
- **Facility Access Charges -** There is currently no fee charged by DNTT to use public transport terminals. The primary reason for this (as stated by DNTT) is that the current poor condition of the existing terminals makes it difficult to justify charging operators to enter. DNTT may collect fees in the future if terminal conditions are improved. However, at Taibessi Terminal (which is operated by the Dili Municipality, not DNTT), a time-based parking charge is applied for different vehicle types.

Facility Management

Key aspects of the current arrangement for management of public transport facilities are:

- **Responsibility for Facility Management -** The Department of Traffic and Terminals (a section of DNTT) takes responsibility for the management of facilities, under Article 23 of the Ministerial Diploma on the functioning of Traffic and Terminals Department.
- **Dedicated Facility Management Staff -** There are dedicated staff from the Department of Traffic and Terminals that are assigned to facility management for Becora and Tasitolu. There are three staff dedicated to the management of each terminal, and these are the only two facilities with dedicated staff. The main

responsibility of these staff is monitoring of the terminal, which is conducted both on weekdays and weekends – with management staff receiving overtime salary for work on Saturday and Sundays. These staff undergo training for one month, however as of June 2023 their contracts have not yet been renewed.

- **Maintenance and Cleaning -** There is no dedicated budget for the maintenance or cleaning of public transport facilities, nor are there dedicated staff. As mentioned, the DNTT staff that manage the existing facilities do not focus on maintenance and cleaning. In Dili, municipal garbage collection trucks will collect waste from the facilities – however this is the extent of the cleaning that takes place.

- **Capacity Management -** Current capacity management practices are mostly managed by Traffic Police who manage traffic flows when needed, primarily during morning and evening traffic peaks. The DNTT staff responsible for facility management are instructed to stand by and work together with the traffic police when necessary. There are no systems or mechanisms in place to manage disruptions or emergencies at the facilities.

- **Stakeholder Feedback -** There is no current formal mechanism for the inclusion of stakeholder concerns/feedback into facility management decisions, and this happens more on a case-by-case basis. A complaint/concern box is located at the DNTT offices to take passenger feedback on the operations of public transport facilities and services. However, DNTT advised that this box has never been opened. DNTT is primarily made aware of public concerns via open protests, social media, or direct communication at the offices (such as Balide Central Office, Inspection Office at Comoro, and the Licensing Office at Hera).

- **Monitoring and Evaluation -** There is no current system in place to monitor and evaluate the performance of the public transport facilities.

- **Digital Technologies -** Digital technology is only utilized to maintain the vehicle registry database, rather than specifically for the management or operations of public transport facilities.

- **Procurement -** The existing public transport facilities were constructed by the Indonesian Government, and as such there is no public transport specific precedence for the procurement of goods and services for the operation and maintenance of public transport facilities. However, generally DNTT/MOTC are required to adhere to the goods and service procurement mechanisms from the National Procurement Commission (NPC).

- **Private Sector Involvement -** All management duties are assigned and undertaken by DNTT. There is no private sector involvement in facilities management. Given the poor condition of the existing facilities, DNTT stated there is limited private sector appetite to engage with maintenance and operations.

- **Capacity Building -** As documented in the Service Operations above, there are no specific capacity building programs available for staff involved in the management and operation of public transport facilities. However, in 2022, a training plan was submitted to MOTC, which proposed collaborating with the UNTL to deliver training to DNTT staff. The capacity building plan includes vehicle inspection and maintenance training, traffic light maintenance training, and driving license production training. DNTT has a 5-year capacity development plan (2023-2028), which is subject to approval from the Human Capital Development Fund. The proposed areas of training include scholarship for D2 and D3 in management and vehicle inspection, scholarship for a master’s degree in public administration, and training for human resources, database, finance and accounting, and basic internal audit.

Public Transport Facility – Core Issues

Core issues for the operation of public transport facilities are:

- Beyond general monitoring of public transport facilities, there is no capacity or established framework for the operation, routine maintenance, or cleaning of the public transport facilities.
- Existing public transport facilities were constructed by the Indonesian Government, and since ownership has been transferred to the Government of Timor-Leste, there has been limited maintenance undertaken – resulting in the poor condition of the current facilities.
- There is a lack of current budget allocation and dedicated personnel to support maintenance and cleaning of the public transport facilities.

3.5.2.7 Summary of Current Roles and Responsibilities

Table 3.26 below summarizes the roles and responsibilities for key organizations relating to key public transport functions – using the Responsible, Accountable, Consulted, and Informed framework as follows:

- **Responsible** – Those who do the work to achieve the task (others can be commissioned or delegated to assist or support);
- **Accountable** – Those who approve/sign off, either technical or budgetary terms, on key outputs, performance, or desired outcomes;
- **Consulted** – Opinions are sought throughout the planning and delivery stage or may be involved in implementation/operation. Likely to be two-way communication; and
- **Informed** – Those who are kept up to date on progress, on a specific or general basis on completion of the task or function. Likely to be one-way communication.

Overall, MOTC (and subsequently DNTT) are the key government stakeholders with primary responsibility for the system, with private operators taking responsibility for operational elements. Other Ministries and Authorities are involved to higher degrees for specific functions, for example MOP for planning and MPW for infrastructure/asset delivery.

There are a few instances where roles and responsibilities are not consistently assigned to MOTC or MPW depending on the situation/case, which creates an issue for clear coordination, skills, and capacity building across the public transport system (such as bus stop planning and implementation).

Many of these functions are not actually executed in practice. As such, the first column provides the description of the current status (and whether these functions are actually performed). In cases where these functions are not performed adequately (or at all), the RACI matrix illustrates how it should be done legally, although not translated in practice.

Table 3.26: Responsible, Accountable, Consulted Informed (RACI) Matrix for Envisioned Public Transport Related Functions

Key Functions Related to Public Transport	Current Status	MOTC	DNTT (Under MOTC)	MPW	MOP	AND (Under MOP)	MPS (Under MOP)	MOI	NPC	Private Operators
Vision and Strategy	Public transport is mentioned in different strategic and planning documents, however there is currently no clear standalone vision and strategy for PT.	A	R	C	C	C	C	C	I	I
Route Planning	Routes are assessed on a case-by-case basis by the Director of DNTT, however there are generally low levels of network planning capabilities.	A	R	I	I	-	-	C	-	C
Operator Licensing	There is current licensing of private operators, however licensing conditions are limited and do not contain performance-based specifications.	A	R	-	-	-	-	-	-	C
Route Operation	DNTT define routes for operators to serve, however there is limited overarching or enforcement of route operation.	A	A	-	-	-	-	-	-	R
Fare Collection	Operators collect fares directly and while MOTC/DNTT set/are accountable for overarching fare structures, there is no monitoring or policing.	A	A	-	-	-	-	-	-	R
Vehicle Safety	Vehicles are inspected for safety by DNTT. However, many vehicles across the country are observed to be old, mechanically unsafe, and operated unsafely.	A	A	-	-	-	-	-	-	R
Vehicle Maintenance	As part of licensing inspections, operators take responsibility for maintenance however there is limited enforcement/ accountability taken by DNTT/MOTC.	A	A	-	-	-	-	-	-	R
Traffic Management and Enforcement	DNTT collaborates with MOI and traffic police to monitor traffic conditions, however this is mostly focused on road congestion but in some cases public transport facilities.	I	C	-	-	-	-	A R	-	I
Monitoring and Outcomes	There is no formal established model for monitoring and evaluating outcomes of the public transport network.	A	R	-	C	-	-	-	-	C
Vehicle Procurement	Bus operators procure, own, and operate their own vehicles – taking overall responsibility for the vehicles and their longevity. MOTC and DNTT are consulted in that they do define certain vehicle requirements in order for operators to obtain licenses.	C	C	-	-	-	-	-	I	R
Facility Planning	While DNTT and MOTC take responsibility and accountability – there is no planning of new facilities undertaken.	A	R	C	C	I	I	-	I	I
Facility Design and Construction	There is no experience in public transport facility design or delivery.	A	R	R	C	C	C	-	I	C
Facility Operation and Management	There is minimal operational management applied to facilities.	A	R	I	I	I	-	-	-	I
Highway Planning	MPW undertakes road-based planning with MOP, consulting with MOTC.	C	C	A R	C	I	I	-	I	I
Highway Infrastructure Provision	MPW implements road projects. There have been observations that some of these roads do not retain high quality for long periods of time once constructed.	C	C	A R	C	R	R	-	I	I

Key Functions Related to Public Transport	Current Status	MOTC	DNTT (Under MOTC)	MPW	MOP	AND (Under MOP)	MPS (Under MOP)	MOI	NPC	Private Operators
Highway Infrastructure Maintenance	Depending on the infrastructure, MPW focuses primarily on roads, DNTT and MOTC if public transport infrastructure, however public transport not maintained in practice.	A	R	R	C	I	C	-	-	I
Bus Stop Planning	There is minimal planning of new bus stop infrastructure, nor are there established processes for prioritization. This is not done in practice.	A	R	C	C	-	-	-	I	C
Bus Stop Provision	The new bus stop infrastructure is not delivered.	C	C	A R	I	C	C	-	I	I
Bus Stop Maintenance	Bus stops are not maintained.	C	R	R	C	-	-	-	-	C
Supplier Procurement	No coordinated procurement has been undertaken for public transport assets specifically.	C	C	C	C	C	C	-	A R	-

Note: Abbreviations: R – Responsible; A – Accountable; C – Consulted; and I – Informed.

3.5.2.8 Summary of Core Issues

There are several key issues that emerge from assessment of Timor-Leste current institutional arrangement as related to public transport. However, it should be noted that many of these issues are not uncommon for countries of comparable levels of development – many of the issues evident in Timor-Leste are characteristic of countries at similar levels of development.

The core issues that contribute to a range of broader issues in Timor-Leste's public transport system are:

- **Legal Framework is Unclear and Inconsistent -** The current legal framework governing public transport provides a starting point, with some key elements contained therein, however there is a general lack of specificity around roles and responsibilities for public transport planning and operations. For example, more detailed licensing requirements can be deployed to incorporate operational objectives; further elaboration is necessary for regulations pertaining to vehicle maintenance and safety inspections; and the entire regulatory framework of the public transportation sector should be revised to have a stronger focus on passenger service outcomes.
- **Limited Enforcement of Current Legal Framework -** There is limited enforcement of the legal framework in Timor-Leste, with DNTT being short on resources and not having adequate capacity building programs in place to support the resourcing and skills needed for enforcement of public transport standards. This results in a lack of clarity for stakeholders such as operators, and inconsistent quality and coordination across the network.
- **Policy Framework Lacks Specificity on Public Transport -** The current policy framework lacks appropriate vision and objectives related to public transport, nor are targeted initiatives identified to improve the system. This reduces clarity and certainty for key stakeholders, does not provide DNTT with a clear direction to operate, limits DNTT and MOTC's ability to attract funding for strategic initiatives, and inhibits a clear identity of public transport within the community.
- **Government is Under-Resourced with Limited Expertise in Public Transport (DNTT) -** The lack of budget allocated to DNTT limits the Directorate's ability to coordinate, manage and enforce standards for the public transport system. DNTT currently has inadequate staffing to perform a full suite of public transport functions required to operate a modern public transport network. Not only does DNTT face a shortage of staff to perform all required functions, both in Dili at a centralized level and in the municipalities (where this situation is exacerbated), the existing staff have limited experience in developing and implementing public transport initiatives.
- **Limited Technical Expertise (DNTT) -** Based on the human resource database of DNTT, there is limited direct expertise in public transport planning within the Directorate. Most of the expertise is more general, such as in public administration, law, and economics. Furthermore, qualified high-level policy-making staff who can perform analytical and critical initiatives are limited. Additional staff and capacity to implement public transport projects is needed.
- **No Specific Public Transport Delivery Experience -** Public transport assets in Timor-Leste have not been delivered by existing authorities. While there have been delivery of road projects and buildings projects, there are unique nuances that

require specific public transport capabilities for quality outcomes. This results in risks for the quality of public transport infrastructure that is delivered in the country.

- **Limited Monitoring or Oversight of Public Transport -** Beyond licensing and route allocation, DNTT plays a limited role in the oversight, monitoring, evaluation, and enforcement of public transport service operations. There are limited formally applied mechanisms for understanding passenger and operator feedback on the performance of the system. This results in a network that is not reliable and punctual for passengers.

- **License Conditions -** Current public transport license conditions are basic and do not leverage the opportunity that DNTT has to implement more stringent requirements on operators to deliver a higher-quality public transport system for community benefit. While safety inspections are a component of the licensing renewal process (from a mechanical perspective), many vehicles across the country are observed to operate in an unsafe manner (such as overcrowding). This results in a lack of incentives for operators to deliver passenger outcomes, instead of prioritizing their own business model.

- **Informal Private Sector -** The current network is operated by individual operators rather than a coherent and coordinated operator body. This sector is informal and creates challenges that stem from operator incentives, skills, and capacity. This results in difficulty enforcing scheduling, difficulty in ensuring equitable outcomes (such as for students) and is overall less reliable and punctual for passengers.

- **Economic Incentives Fall on Drivers -** The economic responsibility and incentive falls directly on drivers of vehicles, creating a range of issues for the reliability and safety of the network. Equity is disincentivized in service operations (i.e., drivers are not incentivized to pick up students due to reduced fares, or to serve lower patronage routes due to lower passenger revenue). This results in a mismatch between passenger and public outcomes (which should be the priority for public transport) and operator's financial sustainability.

- **No Service Schedule -** Due to a combination of technical capacity of DNTT for public transport scheduling, and the current operator incentives of the network, there are no functioning schedules for bus or microlet services. Drivers prioritize waiting until vehicles are full before departing (as this directly impacts their revenue). This impacts passengers, such as those who need to use public transport for scheduled appointments and commitments and cannot rely on public transport to deliver them in a timely manner.

- **Limited Private Sector Capacity and Skills -** The informal nature of the private sector leads to a lack of private sector capacity building and skills development activities. Essentially, drivers are licensed to drive vehicles, however, do not have a broader customer-oriented view of the public transport system and principles of good practice for network operation. This results in higher levels of difficulty in reforming the public transport sector and creates barriers to modernization whereby a customer focus is paramount.

- **Facilities in Poor Condition -** Existing public transport facilities were constructed by the Indonesian Government, and since ownership has been transferred to the Government of Timor-Leste, there has been limited maintenance undertaken – resulting in the poor condition of the current facilities. Beyond general monitoring of public transport facilities, there is no capacity or established framework for the operation, routine maintenance, or cleaning of the public transport facilities. This results in facilities that are in many cases unused, or do not provide a high-quality user experience, and are perceived as unsafe.

3.5.3 Recent Context on Institutional Reform

DNTT faces ongoing challenges in regulating and managing the continuously expanding and evolving land transport sector within the civil service setting. Experiences from other countries, notably Fiji, suggest that an autonomous agency, referred to as a Land Transport Authority (LTA), can serve as a more effective regulator and manager for the land transport sector than a government department.

While the Timorese Government has not formally committed to the establishment of an LTA, the key objectives for reform of the public transport sector are:

- Developing capacities that are challenging to cultivate and sustain within the civil service environment;
- Demonstrating greater agility in adapting to changes within the land transport industry;
- Responsively addressing the needs of transport users and operators;
- Streamlining decision-making processes to improve efficiency;
- Enhancing effectiveness in revenue collection; and
- Engaging the private sector to deliver services and develop and operate infrastructure and facilities.

Similarly, the following functions have been proposed which could be undertaken under DNTT or a future autonomous PTA:

- Devise, initiate, and implement measures to coordinate, improve, and ensure the efficient operation of passenger transport and goods transport by road;
- Establish, administer, and enforce regulatory requirements for land transport;
- Monitor the road safety performance of the public road network, develop action plans for improvements in collaboration with other organizations, and implement them;
- Register vehicles, license drivers, and establish standards for registration and licensing in alignment with road safety objectives;
- Ensure, to the extent feasible, the provision of adequate land transport passenger services and facilities to meet public requirements;
- Devise, initiate, and regulate the provision of authorized land transport services;
- Safeguard the security, integrity, and retention of data related to activities within the land transport system, including the maintenance of records, registers, and documents;
- Assist, advise, and collaborate with the National Police, Municipalities, highway authorities, and other organizations on land transport regulatory matters, road safety, and efficient land transport utilization;

- Develop and implement traffic management strategies and practices that align with the needs of road users and road safety objectives, in cooperation with highway authorities;
- Develop and implement enforcement strategies in consultation with the National Police and highway authorities, in line with road safety and road infrastructure protection objectives; and
- Undertake any necessary incidental, consequential, or convenient actions in the exercise of the organizations functions and powers.

4 Future Conditions

4.1 Future Population

This section presents the future population at national level as well as Dili based on projected population data from the 2015 Census. Such population data is a key input to forecast travel demand at route level by mode which is essential to estimate the number of required vehicles to operate services as well as sizing of future public transport facilities.

Country-Level

According to the Census 2015, Timor-Leste's population is projected to grow from about 1.20 million in 2015 to about 1.85 million in 2050.[72] The population is forecasted to increase by about 0.65 million, with an annual average growth rate of 1.25%. A detailed breakdown of projected population by five-year interval from 2015 to 2050 is presented in **Table 4.1**.

Table 4.1: Timor-Leste Population Projection between 2015-2050

Year	2015	2020	2025	2030	2035	2040	2045	2050
Population	1,200,379	1,299,412	1,391,221	1,483,947	1,578,959	1,674,121	1,766,252	1,854,520
Average Annual Growth (%)	-	1.60%	1.49%	1.42%	1.38%	1.34%	1.30%	1.25%

Source: Timor-Leste Population and Housing Census 2015. Vol. 9 Population Projection.

Dili

The 2023 Dili Urban Master Plan Update forecast population for the 2015-2045 for the Dili Metropolitan Area (DMA) based on the 2015 Census.[73,74] Based on this, the population in Dili was forecast to double from 309,000 in 2021 to 717,000 in 2045, representing an average annual growth rate of 3.19% for DMA. Of note, Metinaro located east of Dili is planned as a new administrative city in 2045 with the population forecast to increase from some 7,000 in 2021 to over 146,000 in 2045. A detailed breakdown of projected population by five-year interval from 2015 to 2045 is presented in **Table 4.2**.

Table 4.2: Dili Population Projection (2015-2045)

Municipality	Administrative Post	2015	2021	2025	2030	2035	2040	2045	AAGR (2015-2045)
Liquica	Bazartete	7,738	11,217	N/A	22,466	N/A	N/A	97,271	8.44%
Dili	Dom Aleixo	130,095	146,599	N/A	240,376	N/A	N/A	261,175	2.32%
	Nain Feto	32,834	30,366	N/A	48,541	N/A	N/A	50,185	1.41%
	Vera Cruz	36,574	48,572	N/A	60,601	N/A	N/A	62,333	1.78%
	Cristo Rei	62,848	65,217	N/A	110,968	N/A	N/A	99,705	1.54%
	Metinaro	5,654	7,360	N/A	10,427	N/A	N/A	146,404	10.85%
Total		**275,743**	**309,331**	**399,046**	**493,379**	**596,380**	**N/A**	**717,073**	**3.19%**

Source: 2023 Dili Urban Master Plan Update.

[72] A set of three population forecasts are presented in the 2015 Census based on different fertility rates ranging from high, medium, and low fertility trends. The Census assumed the medium scenario as the most likely projection for future populations given historical fertility trends and population growth rates in Timor-Leste.

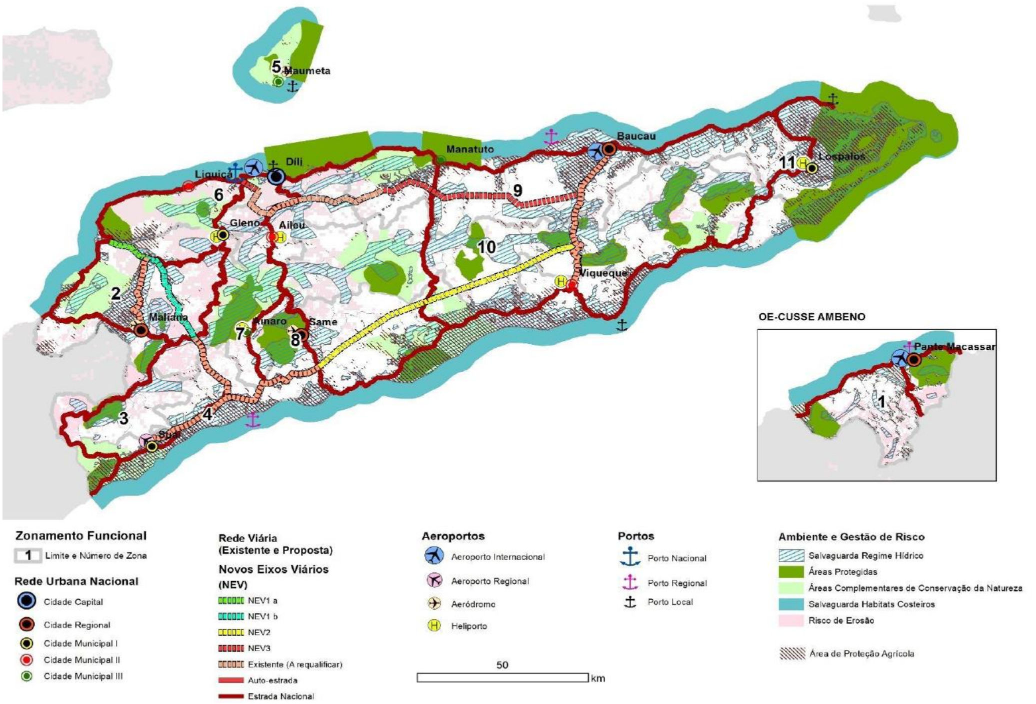
[73] A set of five population forecasts are presented in the Dili Urban Master Plan based on different assumptions in internal migration and birth rates. The Plan assumed the Case 3 "Moderate Migration Scenario" as the most likely scenario for Dili future population (based on net migration increase of 0.5% for 2021-2030 and 0.25% for 2031-2045, birth rate change from 4.5 to 3.2 towards 2045, and morality constant).

[74] Dili Metropolitan Area consists of five sub-districts from Dili Municipality and one sub-district from Liquica Municipality.

4.2 Future Land Use Plans

Country-Level

According to the 2038 National Spatial Plan, the country's spatial strategies for growth and development continue to follow the planning framework proposed in the SDP 2011-2030 but these are further broken down into functional zones based on localized land use plans, zoning, economic activities, etc. The national-level spatial land use plan is shown in **Figure 4.1**.



Source: 2038 National Spatial Plan.

Figure 4.1: 2038 National Spatial Plan

Key findings are as follows:

- **11 Functional Zones Guiding Spatial Development of the Country** – The territory of Timor-Leste is divided into 11 functional zones to guide the spatial development strategies (i.e., municipal land use plans), planning proposals, and development measures. For example, Zone 6 (Dili) will continue to serve as the economic hub of the country (with various road improvement plans in place to improve reginal connectivity), whereas Zone 9 (Baucau) is reserved for industrial activities with adequate infrastructures and environmental protection measures.

Table 4.3: Functional Zones

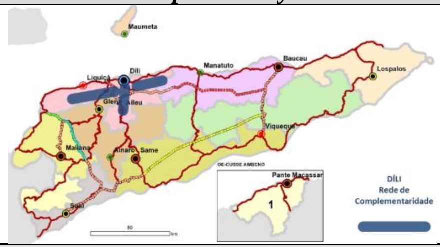
Zone #	Municipality	Description of Functional Zones
1	Oecusse ambeno	Part of the ZEESM[A] with potential developments in the livestock, poultry, and tourism sectors.
2	Agropecuaria norte	An agglomeration of several fishing and agricultural activities around Maliana and Batugadé
3	Fronteira	Less developed area with potential developments in the forestry and poultry sectors
4	Suai	Zone with potential developments in the oil sector, alternatively in agriculture.
5	Ataúro	Part of the ZEESM[A], with the possibility of developing into a tourism zone in conjunction with environmental conservation.
6	Dili	Encompasses a coastal strip of land uses with diversified job opportunities including trade and services, industry, logistics and tourism, as well as ancillary facilities (for food production) and decentralized areas (close to Railaco, Aileu and Laulara).
7	Central	Popular for their production of coffee and spices, as well as the presence of diversified job markets.
8	Agricola sul	Known for their production of rice and mill and other food products
9	Manatuto-baucau	Industrial and mining zone with strong emphasis on environmental protection
10	Agricola do eixo central	Zone specializing in the agro-forestry sector and other related activities.
11	Leste	Specializing in the tourism sector with a thrust on environmental conservation and enhancement.

Source: Plano Nacional de Ordenamento do Território de Timor-Leste (2022)
Note:
[A] ZEESM stands for Zona Especial de Economia Social de Mercado de Oecusse Ambeno e Ataúro, one of Timor-Leste's territorial planning strategies to systematically concentrate investment efforts and economic activities in the territory.

- **Four Growth Corridors Formulated to Prioritize Development Efforts** – The following four corridors are envisioned in the 2038 National Spatial Plan to prioritize development efforts in Timor-Leste. These include:
  - **Dili's Complimentary Network** – This east-west corridor spanning three cities facilitates Dili City's strategic expansion to Liquica to the west, Aileu to the south, and Metinaro to the east. These three zones have different functions. Liquica as a focal point for logistics, industrial and agricultural activities, Aeilu as an educational, sports, technological innovation, and public services center, as well as Dili's supplier of agricultural food products, and Metinaro / Hera as an industrial, agricultural, and future administrative function.
  - **Liquica-Baucau Synergy Network** – The Liquica-Baucau axis encompasses most of the country's logistical, commercial, and industrial activities. Proximity to transport infrastructure is essential to increase the scale and interdependence in value chains, complemented by logistical facilities and concentration of urban developments along the corridor.
  - **Synergy Network for Tourism** – The tourist potential is particularly high on the north coast (as well as Atauro and Oecusse). The promotion of tourism industries requires the establishment of hotels, transport infrastructures, as well as supporting facilities (such as tourist information center) to offer high quality experience for tourists arriving from the airport and seaport. Thus, integration of various transport modes and creating synergy effects is essential to promoting tourism potential.
  - **Agro-Forestry and Livestock Synergy Network** – The integration of Zone 4, 8 and 10 (mostly agricultural lands) via well-connected logistical

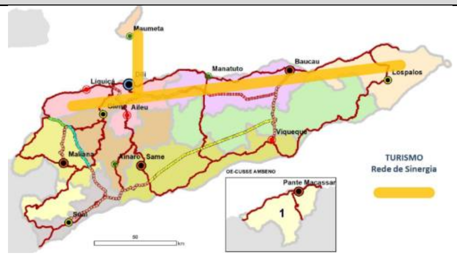
infrastructure is essential to maximizing the production and export of agricultural products to other regions to sustain the growth of the country.

Dili's Complimentary Network



Liquica-Baucau Synergy Network

Synergy Network for Tourism



Agro-Forestry and Livestock Synergy Network

Source: 2038 National Spatial Plan.

Figure 4.2: 2038 National Spatial Plan – Key Growth Corridors

Dili

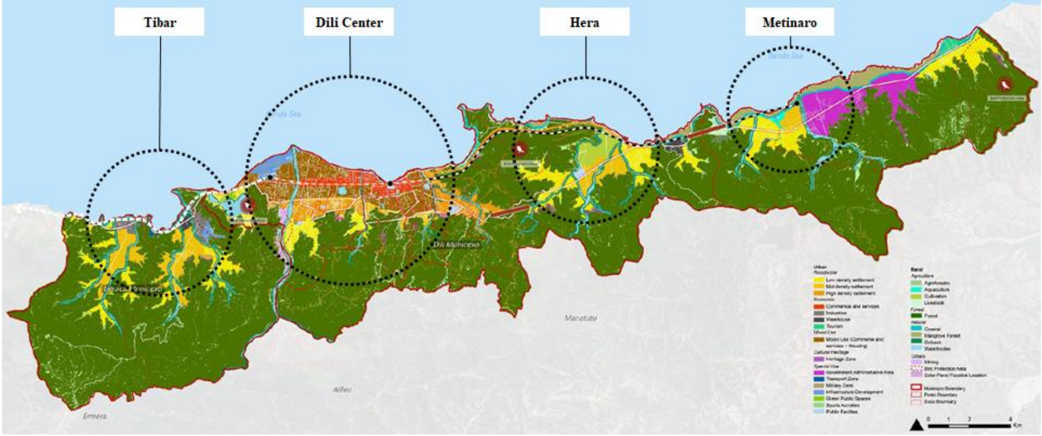
The 2023 Dili Urban Master Plan Update includes a future land use plan as shown in **Figure 4.3** to guide development/growth poles of the Dili Metropolitan Area (DMA) towards 2045. A roadmap for the DMA is developed for the following four zones (which sits on the Northern Regional Development Corridor as presented in **Section 3.3.3**):

- **Dili Center** – The city center of Dili will continue to function as the economic, social, and tourism hub of the city where high density settlement, commercial areas, and mixed used developments are proposed within the urbanized area (as shown in red, brown, and orange polygons).

- **Tibar** – Tibar/Ulmera (west of Dili Center) is planned for port and industrial area on the lowlands, with some residential areas in the hinterland.

- **Hera** – Hera is planned as the education and agriculture hub with research and development facilities. The hilly hinterland of this area is to be developed for sustainable cash crops and forestry to protect the land and conservation areas.

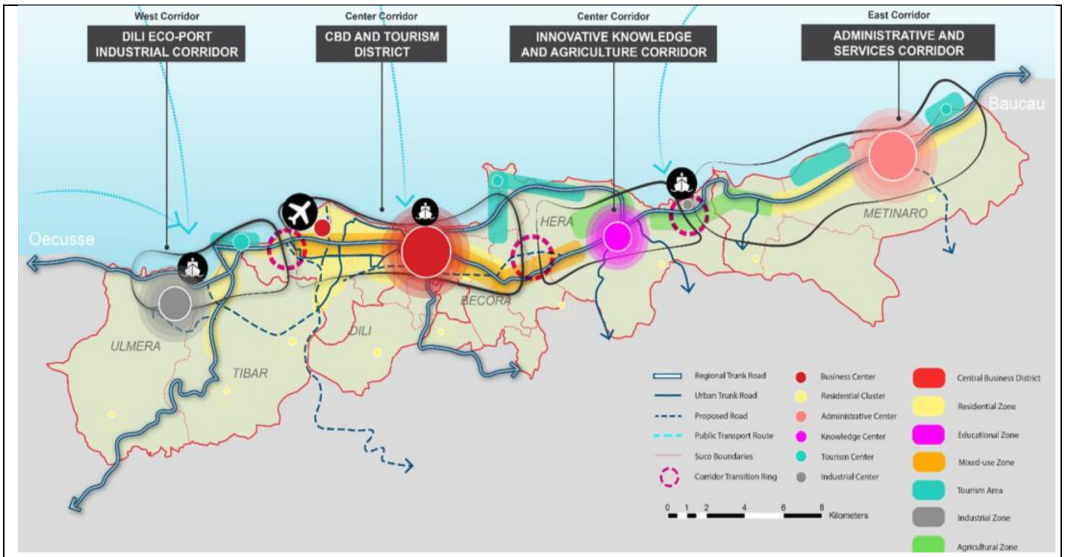
- **Metinaro** – One of the major transformations of Dili would be to establish a new government/administrative district in Metinaro, located about 25km east of Dili city center. This proposed urban center is driven by the potential need to centralize and integrate government offices as these are scattered throughout Dili.



Source: 2023 Dili Urban Master Plan Update.

Figure 4.3: 2045 Proposed Land Use Plan

Based on previous reports and analysis, a series of activity corridors are proposed to link the Dili Metropolitan Area from west to east. Various sucos will shoulder functions related to industrial and logistics port, tourism, knowledge sharing and agricultural, and administrative and services respectively. While these areas are already connected by major roads, public transport connections between them remains insufficient to support the level of potential future growth as foreseen under the Strategic Development Plan. In particular, given the development of the new administration in the Metinaro area, which currently lacks access to any sophisticated form of public transport, it becomes paramount to focus on the expansion and improvement of the existing public transport services to accommodate further establishment in Metinaro.



Source: 2023 Dili Urban Master Plan Update.

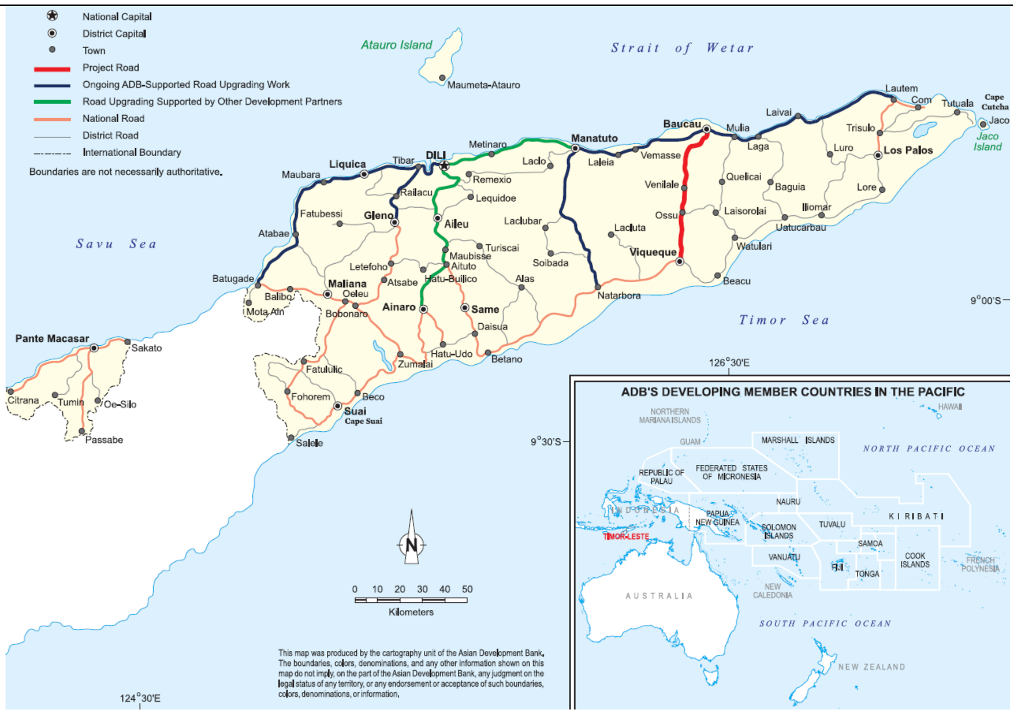
Figure 4.4: 2045 Proposed Spatial Structure

4.3 Planned and Committed Transport Projects

This section highlights various future transport plans and proposals including road, public transport, airport, and seaport enhancements in Timor-Leste – including past proposals and planned/on-going projects to date.

4.3.1 Road Network Development

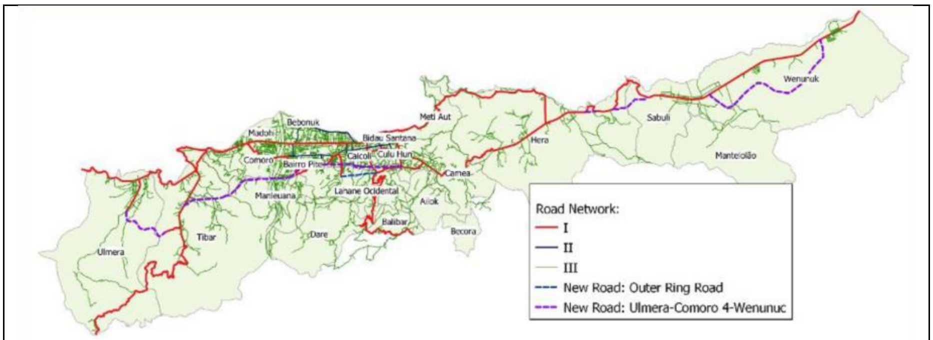
The 2018 ADB Timor-Leste Transport Operations Report presents an inventory of large-scale road infrastructure projects that have been completed or are underway at this time. This includes the Baucau to Viqueque Highway Project and other road segments under the Supported Road Upgrading Work Project as shown in **Figure 4.5**. Other on-going road projects by other development partners such as World Bank and the Japan International Cooperation Agency (JICA) are highlighted in **Table 4.4** including upgrading of a road section between Dili-Metinaro-Manatuto (with Metinaro planned as a new administrative city).



Source: ADB. 2021. Baucau to Viqueque Highway Project.

Figure 4.5: Ongoing and Upgrading Road Projects (2021)

There are plans to construct two ring roads including the Outer Ring Road in Dili and the Ring Road connecting Tibar/Ulmera to Metinaro/Wenunuk, as shown in **Figure 4.6**. These Ring Road projects would separate freight traffic from passenger traffic, thus enhancing efficiency and reliability of transport services. These road upgrading projects will be supported by parking regulations, enforcement, as well as enhanced signage and road safety facilities.



Source: 2023 Dili Urban Master Plan Update.

Figure 4.6: Dili Ring Road Projects

Table 4.4: Planned Road Projects in Timor-Leste

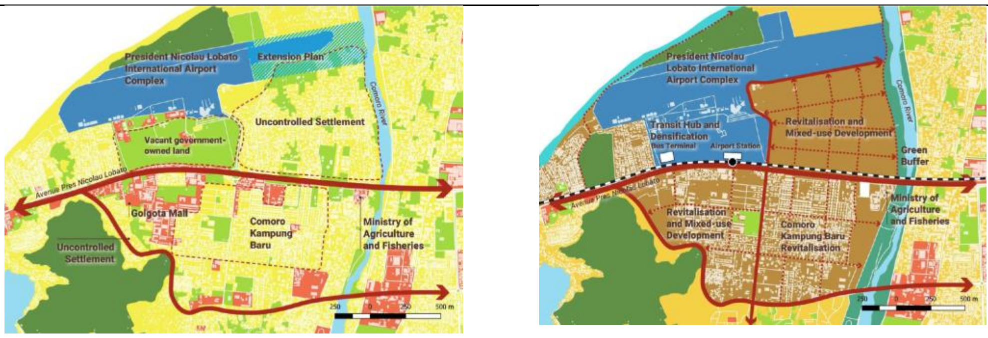
#	Project	Section	Funding (WB, ADB, etc.)	Implementing Agency	Length (km)	Anticipated Timeline	Cost (US$ Millions)
1	Improvement of Ring Road and Traffic Management in CBD	DMA Ring Road	Public	DNEPCC MOP & DNTT MOTC	-	Mid-Term (2029-2034)	225.36
2	Baucau to Viqueque Highway Project	Baucau - Viqueque	ADB	CAFI, MPW, MOTC	58.0	End of 2023 (expected completion)	77.78
3	East to South Coast Road Connectivity Project	Com – Lautem – Lospalos – Iliomar	ADB	MPW	93.9	August 2024 (expected completion)	180.00
4	Ongoing ADB-Supported Road Upgrading Work	Batugade – Atabae – Maubara – Liquica – Tibar	ADB	CAFI, MPW	-	-	-
5	Ongoing ADB-Supported Road Upgrading Work	Gleno – Railacu – Tibar	ADB	CAFI, MPW	31.7	-	
6	Ongoing ADB-Supported Road Upgrading Work	Manatuto – Laclubar	ADB	CAFI, MPW	35.1	-	-
7	Ongoing ADB-Supported Road Upgrading Work	Laclubar – Natarbora	ADB	CAFI, MPW	44.6	-	-
8	Ongoing ADB-Supported Road Upgrading Work	Manatuto – Baucau	ADB	CAFI, MPW	58.0	-	-
9	Ongoing ADB-Supported Road Upgrading Work	Baucau – Mulia – Laga – Laivai – Lautem	ADB	CAFI, MPW	38.2	-	-
10	Timor-Leste Branch Roads Project	Gleno – Maubisse, Gleno – Letofoho and Letofoho – Hatubuilico	WB	MPW	-	December 2025 (expected completion)	59.00
11	Linked Road Corridors Project	Ainaro – Aileu – Dili	WB	MPW	110.0	-	113.00
12	Upgrading Project Road, A-01	Dili – Metinaro – Manatuto	JICA	MOF, MPW	56.4	-	-

Source: (i) 2023 Dili Urban Master Plan Update; (ii) ADB 2021 Baucau to Viqueque Highway Project; (iii) https://www.adb.org/projects/country/timor-leste/sector/transport-1064; (iv) https://projects.worldbank.org/en/projects-operations/project-detail/P155203; (v) ADB. 2020. Timor-Leste: Road Network Upgrading Project, Social Monitoring Report; and (vi) ADB. 2021. Timor-Leste: Road Network Upgrading Project, Environmental Monitoring Report.

4.3.2 Public Transport Improvements

The 2023 Dili Urban Master Plan Update proposes a suite of public transport improvements with the aim of reducing congestion in Dili as well as enhancing public transport in alignment with the Sustainability Vision for Dili Metropolitan Area 2045. Key findings are as follows:

- **Microlet Service Improvements** – Microlet improvements include bus stop enhancements (e.g., roof-covered waiting space, seats at bus stops), improved passenger information (e.g., schedule, maps), as well as route optimization of the existing microlet routes.
- **Establishment of New Public Transport Entity** – A new public transport entity would be required to manage, control, and operate public transport services such as a Public Transport Authority (PTA) or a bus cooperative/company (with participation from existing microlet operators/owners).
- **Bus Terminal Improvements** – Development of new bus terminals or improvement of existing bus terminals (i.e., Becora, Taibessi, Tasitolu) are essential to providing better amenities for inter-city passengers, while coping with expected increased demand for such services. A new terminal named the Dili City Center Terminal is proposed to be constructed in a centralized location to consolidate microlet services and facilitate interchange with longer-distance inter-city bus routes. However, this project currently has no clear implementation timeline.[75] Potential upgrades to the existing terminals include enhanced passenger waiting areas, route information such as schedules and maps, ticket booths, shops and restaurants, and parking areas, among other amenities. Besides terminals, a transit interchange hub (possibly near Dili Port) is proposed to enhance seamless transfer between modes. These plans have implications for shortlisting of potential terminal sites.



Source: 2023 Dili Urban Master Plan Update

Notes: As presented in the existing/future land use plan in Sections 3.3.3 and 4.2, the light green area (vacant government-owned land) in the left map is designated as green public spaces. In the future this site will be re-purposed as transport zone (colored in blue) in the right map. Other land uses shown in the map include residential area (yellow/orange), mixed-use (brown), commercial (red), and forest (green).

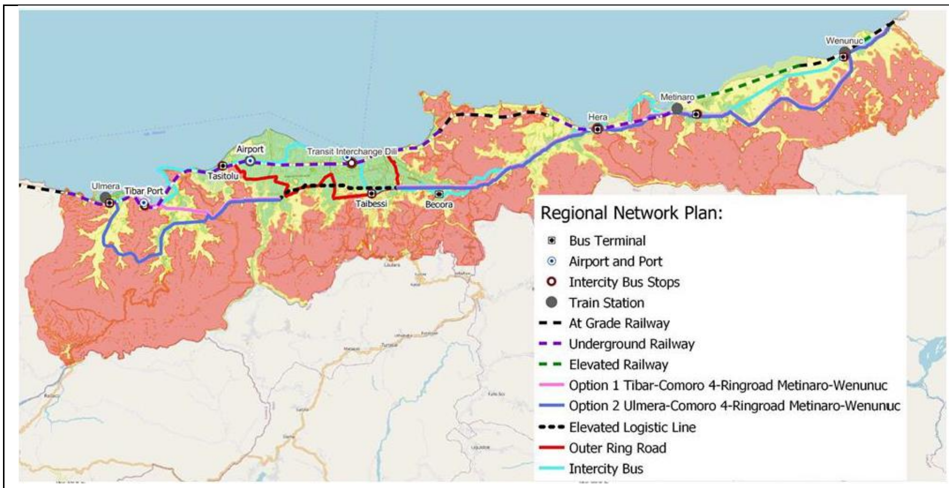
Figure 4.7: Existing Land Use Map in Dili West (Left) and Proposed Airport Transit Hub (Right)

[75] Source: 2023 Dili Urban Master Plan Update.

Source: 2023 Dili Urban Master Plan Update

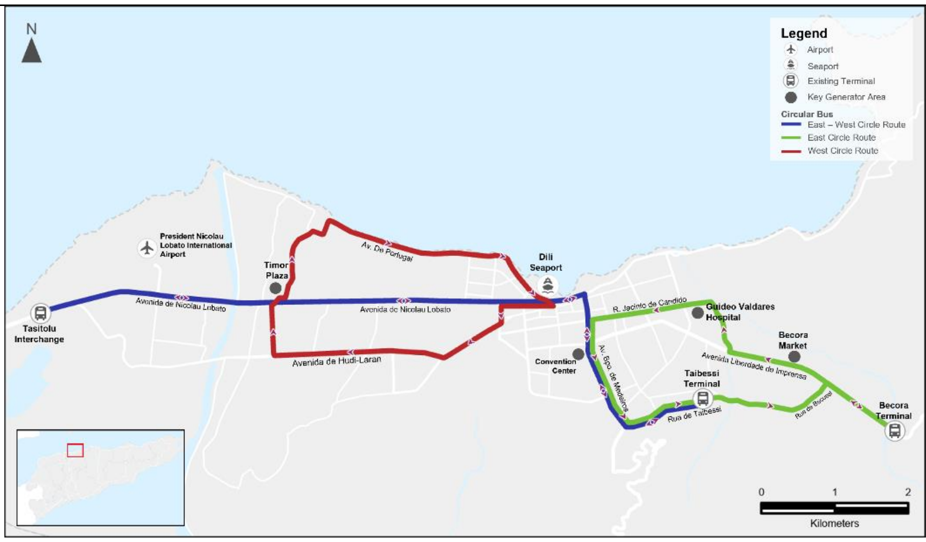
Figure 4.8: Proposed Interchange Hub at Dili Port

- **Introduction of New Intercity and Circular Bus Routes**– A new intercity bus route connecting Dili to Metinaro is proposed to accommodate future demand along this east-west corridor. In addition, there are three circular bus routes planned to connect Dili City Center with peripheral zones including the: (i) East-West Circle BRT (Tasitolu Terminal – Airport – TJD Dili Port – Taibessi Terminal shown in blue); (ii) West Circle Bus (clockwise in the western area of CBD shown in red); and (iii) East Circle Bus (counter-clockwise, Terminal Becora – Terminal Taibessi – Southern / South-Eastern CBD shown in green). No specific service proposals/targets are provided in the plan. These proposals will have implications for route/service enhancements for Dili microlet and regional bus routes.



Source: 2023 Dili Urban Master Plan Update

Figure 4.9: Proposed Regional Public Transport Network



Source: 2023 Dili Urban Master Plan Update

Figure 4.10: Proposed Dili Circular Bus Routes

- **Priority Lanes for Public Transport** – Priority lanes to enhance smooth operation of public transport are suggested in the 2023 Dili Urban Master Plan Update. However, no specific details/locations are presented in the plan.

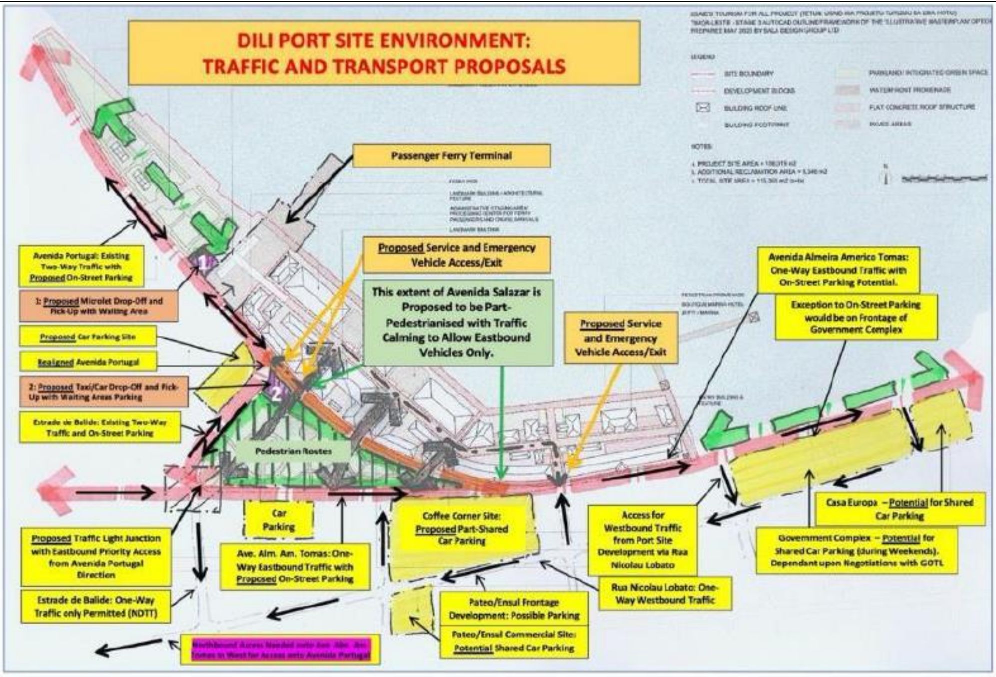
Table 4.5: Planned Public Transport Projects in Timor-Leste (from 2023 Dili Urban Master Plan Update)

#	Project	Location	Type of Improvement	Route	Route Length (km)	Indicative Timeline	Cost (US$)	Relevant to This Study?
1	Creation of Circle Bus	Dili City Center	East-West BRT Circular Line	Tasitolu Terminal – TJD Dili Port – Taibessi Terminal	9.4	~2030	US$7.7 million (10 e-buses for circular routes)	Yes
2	Creation of Circle Bus Improvement (West Circle)	Dili City Center	Circular Bus	Western area of Dili Center	9.7	~2030		Yes
3	Creation of Circle Bus Improvement (East Circle)	Dili City Center	Circular Bus	Terminal Becora – Terminal Taibessi – Southern and South-Eastern of Dili center	9.1	~2030		Yes
4	Intercity Bus	Dili Metropolitan Area	Intercity Bus	Ulmera-Dili-Metinaro-Wenunuc	55.0		US$2.7 million (6 diesel buses for intercity routes)	Yes
5	Improvement of Pedestrian, Bike Lane, Car Free Zone	Dili Center and Dili Port	-	-	-	-	US$1.3 million (multi-use track), US$0.5 million (signage)	No
6	Comprehensive Bus Terminal and Other Related Facilities Project	Dili Seaport	-	-	-	-	US$3.9 million	Yes
7	New Terminal Development	Wenunuc, Ulmera, Hera	Intercity bus service	-	-	-	-	Yes
8	Old Terminal Revitalization	Taibessi, Becora, Tasi Tolu	City bus service (circle bus and microlet)	-	-	-	-	Yes
9	Railway Development	Dili Metropolitan Area	Linear	Ulmera – PNLIA – Motael / Bidau Santana – Hera – Metinaro – Wenunuc	45	2036-2045	-	No
10	Railway Development (Underground)	Dili Metropolitan Area	Linear	Motael – Bidau Santana (TJD Dili)	3	2036-2045	-	No
11	Development of Railway/LRT (tunnel)	Nationwide	Linear	Kupang to Metinaro	-	-	US$8.8-US$9.4 billion	No

Source: 2023 Dili Urban Master Plan Update.

4.3.3 Port Development

After the opening of the Tibar New Port in September 2022 to the west of Dili, the future development of the existing Dili Port will focus on passenger ferry and cruise services.[76] Based on the USAID Dili Port Development Plan from January 2022, there are no dedicated public transport facilities planned within the Passenger Ferry Terminal (PFT) to serve passengers to/from Oé-Cusse and Atauro Island.[77] Instead, there is a microlet loading/unloading areas adjacent to this PFT, with sufficient space about 20 microlets, while another site at the northern corner of the current 5th May Gardens is expected to accommodate 30 taxis/car share.



Source: 2022 Dili Port Development (USAID)

Figure 4.11: Dili Port Traffic and Transport Proposals

Additionally, the plan proposes to partially, if not fully, pedestrianize the segment of Salazar Avenue between the Port and 5th May Gardens, diverting vehicular traffic onto the detour along Estrade de Balide to continue onto Avenida Almeira Americo Tomas. Both the planned pedestrianization and the proposed microlet gathering site, if implemented, will have implications on the arrangement of microlet services, with the former affecting the routing of Microlet Route#9 as it travels on Avenida Salazar and the latter potentially encouraging more microlet routes to connect to the PFT to better utilize the allocated site. Lastly, given the possibility of a proposed BRT system to be implemented along Avenida Almeira Americo Tomas, it is a feasibility that the BRT system may have a stop on or near the junction with Estrade de Balide to facilitate transfer activities with the ferry terminal.

Potential implications on the public transport plan include the following:

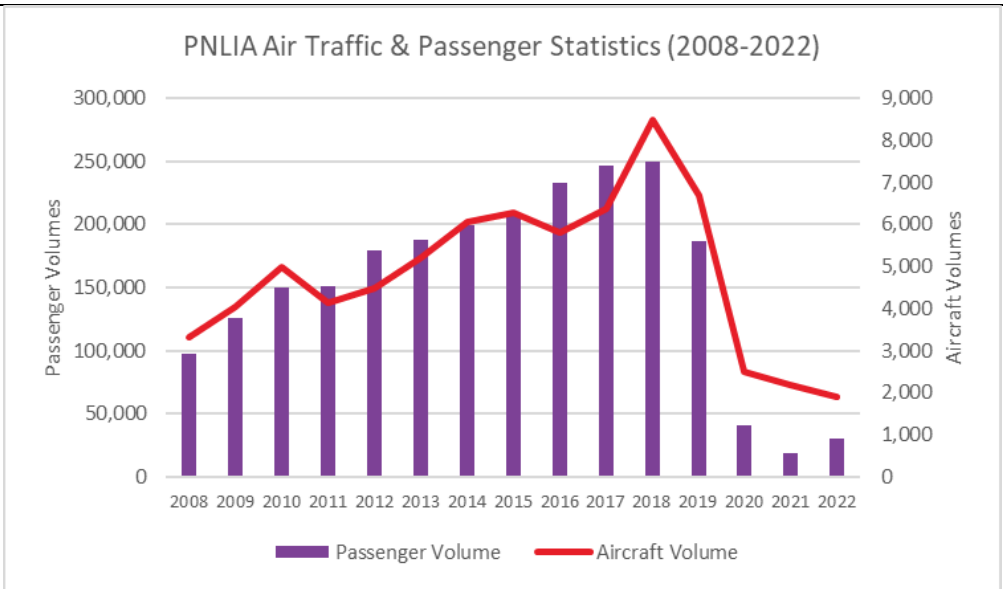
- Comprehensive bus terminal project is integrated with regional railway station, taxi, vehicle parking, pedestrian area, APORTIL office and Transit Joint Development.

[76] Source: Public Transport LAPI ITB. 2023. Dili Urban Master Plan Update
[77] Source: USAID. 2022. Dili Port Development

- A bus stop close to the PFT entrance could be provided as part of the proposed Dili Municipality busway route.
- DNTT has agreed that approximately 20 parking, waiting and drop-off spaces for each site would be acceptable. The taxi/car share Site 2 (with chevron or oblique style parking) could accommodate 30 vehicles. Site 1 could provide spaces for about 20 Microlet spaces.
- Seaside tourism center will be built on a 20-container stacking yard vacant lot. The plan for Dili Port is to become a tourism center in the future.

4.3.4 Airport Development

Presidente Nicolau Lobato International Airport (PNLIA) handles some 1,892 annual aircraft movements and some 30,600 passengers in 2022. The airport registered its highest aircraft movements and passenger volumes in 2018, with some 8,482 annual movements and 250,000 annual passengers – or 2.5 times increase in passenger volumes since 2008. As shown in **Figure 4.12**, the number decreased dramatically during COVID-19, but it is expected to gradually increase onwards.[78]



Source: Dili Urban Master Plan Update (2023)

Figure 4.12: PNLIA Air Traffic & Passenger Statistics (2008-2022)

In terms of passenger forecasts, a variety of forecasts have been developed – all predicting various stages of growth in passengers. For instance, a JICA study in 2019 forecast 494,000 passengers for PNLIA in 2030 and 773,000 in 2040.[79] In comparison, the 2023 Dili Urban Master Plan Update estimates 637,000 in 2030 and more than 1.3 million in 2045.[80] The Minister of Finance, Rui Augusto Gomes, mentioned in December 2022 that the renovated airport will generate some one million passengers by 2050 – a five-fold increase from the 2022 average.[81] To accommodate the foreseeable growth, the development policy for PNLIA is to eventually extend the runway to 2,500m and widen it to 45m to accommodate

[78] Source: 2023 Dili Urban Master Plan Update.
[79] Source: https://openjicareport.jica.go.jp/pdf/12325577_01.pdf
[80] Ibid.
[81] Source: https://en.tatoli.tl/2022/12/15/renovation-of-dili-international-airport-critical-for-economic-growth-and-social-development/17/

larger aircraft such as Airbus A330s. Construction of new modern terminal facilities is also proposed.

Table 4.6: Projected Air Passengers Up to 2045 (JICA vs. Dili Urban Master Plan - Rounded to Nearest Hundred)

Study	2015	2020	2025	2030	2035	2040	2045
2019 JICA Projection	212,000	286,300	384,500	493,600	619,700	773,100	-
2023 Dili Urban Master Plan	210,500	310,500	471,200	636,700	-	-	1,362,500

Source: (i) https://openjicareport.jica.go.jp/pdf/12325577_01.pdf; and (ii) 2023 Dili Urban Master Plan Update.

While there is currently no dedicated public transport service for airport passengers as the demand level is low (averaging about two arrival flights per day in August 2023 from destinations including Darwin, Denpasar, and Singapore), should the forecasted passenger demand growth materialize, there may well be a need to create a form of airport passenger service. This may be achieved either by adjusting existing microlet routes to serve the airport more directly or by creating a new microlet route or a more formalized bus service (e.g., airport express using modern bus fleet) focused on connecting PNLIA with the city's central areas.

5 Vision & Goals

5.1 Vision Statement

This section defines an overarching vision statement and five key pillars to guide modernization of Timor-Leste's public transport system. The following vision and supporting five key pillars were presented to the MOTC at the Visioning Workshop on 13 December 2022 and at the MOTC meeting with the MOTC Director-General Constantino dated 22 February 2022. Based on the feedback received and endorsement by these key stakeholders, this 2023 PTMP embraces this vision and five key pillars to provide a holistic aspiration and drive the country's transformation for the future public transport system. The vision statement is as follows with the five key pillars presented in **Table 5.1**:

"Public transport in Timor-Leste is an attractive, accessible, inclusive, and future-ready transport mode that supports economic growth, urban development, and quality of life across the country."

Table 5.1: Vision and Five Key Pillars for Timor-Leste's Public Transport System

Five Key Pillar	Description
Economic Growth	The public transport system supports economic growth and the growth of urban centers. It connects Dili with other strategic centers and enables the movement of people and goods to support the economy.
Access for All	The public transport system provides the entire community with better access to jobs and services. Affordable, reliable services meet people's needs, are inclusive of marginalized groups like women and the disabled and improve social mobility.
Livable Cities	The public transport network and facilities are integrated with urban activity centers. The system underpins healthy, safe, and connected places that improve livability in urban centers and beyond.
Mode of Choice	The public transport network provides seamless and integrated journeys that encourage sustainable travel choices, attracting more users and reducing private vehicle use and congestion.
Sustainable Future	The public transport system plays a key role in meeting the goals of the Paris Agreement including by encouraging mode shift to reduce the emissions intensity of travel and harnesses new technologies and innovative features to support climate mitigation and resilience.

5.2 Goals for Timor-Leste Public Transport System

In practical terms, the above Vision can be used to define specific goals for Timor-Leste's public transport system to guide the future development of public transport services and facilities across the country. **Table 5.2** shows the linkage between Vision and Goals for Public Transport System.

Table 5.2: Linkage between Vision and Goals for Public Transport System

#	Key Goals from Vision	Implications on Public Transport Services and Facilities
1	Providing Strategic Linkage and Linking Key District Centers / Generators	• Routing of public transport services is planned / determined to ensure strategic relevance to the country-wide public transport network (including interchange opportunities with key district centers) and accommodate future growth and development. • Providing public transport services to higher density and cluster of key generators is key to generate higher sustained ridership (which are more suitable to public transport than locations with fewer or more sparse key generators). • Improving interurban public transport network is essential to strengthen the position of Dili as the transport hub in the country as well as enhance the regional connectivity for inclusive development of the country.
2	Providing Accessible Services	• To attract passengers from all groups (including women, people with disabilities), public transport services must not only be scheduled and reliable but must also have adequate passenger facilities/amenities at terminals (including en-route bus stops along regional routes) to create a safe, inclusive, and comfortable environment for all users.
3	Integrating Transport with Urban Activity Centers	• Terminal locations adjacent to urban activity centers and key generators are more suitable for public transport as they would widen trip-making opportunities connecting passengers to social and economic activities (thus increasing prospective passengers).
4	Ensuring Seamless, High-Quality Journeys	• Improved passenger information (such as route maps, schedule, real-time information) helps passengers plan their trip more efficiently without hassle and enhance their overall journey experience. Provision of in-advance booking or app-based passenger information systems would improve customer service and attract passengers. • Provision of an enhanced in-vehicle experience (such as seat availability, air-conditioning, lighting, CCTV) is essential to ensuring safety, security, and comfort of public transport users, which in effect will improve the perception of overall public transport service quality. • Apart from facility improvements at terminals, a suite of bus priority enhancements (e.g., temporary bus lanes during the peak hours with provision of signage/ markings) and traffic management measures (i.e., monitoring/enforcement of parking) is required to ensure reliable and efficient operation of public transport along the roads connecting the terminals.
5	Building Climate and Disaster Resilience	• Provision of climate resilience measures at public transport facilities (e.g., covered waiting areas at terminals/bus stops, emergency operation plan, terminals in less vulnerable areas) helps to ensure that passengers continue to have access to public transport services in the event of natural disasters with safety provision, while minimizing potential hazard and risks to users throughout their journey.

6 Public Transport Service Enhancements

6.1 Background

This section presents the detailed profile of each microlet route in Dili and regional bus route, lays out key principles to guide the optimization effort based on the vision and goals developed in the preceding section, then proposes route-by-route enhancements. Operating plans for each of the routes are then developed based on forecasted ridership, which in turn is used to estimate the sizing of public transport facilities (including terminals).

6.2 Optimization Framework

Based on the vision and the key elements developed in **Section 5**, an optimization framework is developed focusing on four key principles: (i) Goal#1 – Create Convenient Interchange between Current and Planned Microlet and Regional Bus Network; (ii) Goal#2 – Improve Accessibility to Current and Planned Development and Key Generators; (iii) Goal#3 – Create Efficient Routing with Minimal Duplication; and (iv) Goal#4 – Create Efficient and Productive Service. The description of each goal is explained, with optimization principles presented in **Table 6.1**, with applicability to Dili microlets and regional bus indicated:

Table 6.1: Optimization Framework

#	Principles	Description	Potential Routing Recommendations	Dili Microlet	Regional Bus
1	Convenient Interchange Opportunities	Create a seamless experience between regional bus service and local public transport (i.e., microlet services)	• Modify / extend service to existing/new bus terminal as well as transit interchange. • Detour allowance is based on 10-15% of peak hour travel time and speed (typically) • Connect to the city center of municipalities outside of Dili (for regional bus)	Yes	Yes
2	Improved Accessibility to Current and Planned Developments (Key Generators)	Increase coverage and access to socially desirable areas (e.g., major trip attractors, densely populated areas, future developments)	• Modify / extend sections to cover key generators. • Detour allowance is based on 10-15% of peak hour travel time and speed (typically).	Yes	Yes
3	Efficient Routing with Minimal Duplication	Reduce duplication on urban roads	• Modify / truncate duplicated route sections. • Possibly introduce express service (if applicable).	Yes	No
4	Efficient and Productive Service	Align service with ridership to ensure productive services	• Modify service schedule to add or reduce service to ensure more productive service	Yes	Yes

6.3 Public Transport Assessment Scenarios

This section presents three scenarios each with a different overarching, but each helping to “move the needle” to improve public transport service as well as inform the sizing of public transport facilities for Timor-Leste. The three scenarios are summarized as follows:

- **Scenario 1: 2025 Regional Bus & Microlet Improvement (or Immediate 2025 Scenario**) – The Immediate 2025 Scenario is considered as a short-term plan that responds to key coverage and service gaps identified in the current microlet service, as well as new and expected developments assumed to be in place by 2025.

This scenario imagines that the regional and microlet service adopt service refinements including routing modifications, new routes (i.e., Airport Express), changes to stop locations, and service/schedule refinements to align with the projected demand for 2025. The current transport facilities (i.e., Becora Terminal, Taibessi Terminal, Tasitolu Terminal) would be maintained without facility improvements. There would be no vehicle change in this scenario as microlets routes are assumed to continue operations using existing vehicles.

- **Scenario 2: 2035 Regional Bus & Microlet Improvement (or Upgrade 2035 Scenario)** – The Upgrade 2035 Scenario is considered as a long-term plan that responds to planned growth / future development assumed as well as projected demand up to 2035. Service improvements include changes to headway, service spans, and routing (including a new Airport Express route extended to Metinaro). Public transport facility improvements (such as bus stops and terminals) are considered in this scenario.

- **Scenario 3: 2035 Regional Bus Improvement & Microlet Replacement with Bus (or Visionary 2035 Scenario)** – The Visionary 2035 Scenario is similar to the Upgrade 2035 Scenario in terms of service refinements and facility improvements. In this scenario, replacement of the microlet with modern buses (i.e., 10m or 12m units) is proposed – with an example of a typical 12m conventional bus shown in **Figure 6.1** (Penang, Malaysia). Terminals/depots would be future proofed in case this transition to modern bus fleet is implemented.

Source: https://products.unitedtractors.com/id/product/scania/k250ub-4x2/
Note: The image of the bus is indicative only – identification of suitable vehicle type requires more detailed analysis including road configuration (i.e., width), potential turnaround circulation, as well as required service parameters.

Figure 6.1: Image of 12m Conventional Bus

The sections below present the route-by-route review and recommendations (first microlet, followed by regional buses).

Table 6.2: Summary of Public Transport Assessment Scenarios (both Dili Microlet and Regional Bus)

Key Assumptions	Scenario 1: 2025 Regional Bus & Microlet Improvement – "Immediate 2025 Scenario"	Scenario 2: 2035 Regional Bus & Microlet Improvement – "Upgrade 2035 Scenario"	Scenario 3: 2035 Regional Bus Improvement & Microlet Replacement with Bus – "Visionary 2035 Scenario"	Notes
Timeline (Year of Assessment)	2025	2035	2035	• Scenario 1 is considered an immediate-term plan (i.e., 2025), which responds to future demand for 2025. This scenario only considers service improvements without major facility upgrades (besides bus stops). • Scenarios 2 and 3 are part of a long-term plan to provide a roadmap for the country-wide public transport system, accounting for planned growth and development, along with potential facility refinements.
Service Improvement(s) Proposed in Future Scenarios	Yes	Yes	Yes	• Service improvements including changes to headway, service spans, and routing are assumed in all scenarios (based on the forecast demand).
Demand Assumptions Adopted for Future Scenarios (including Key Generators)	Population growth to 2025 and existing land use	Population growth to 2035 and new development areas		• Demand forecasts for regional bus assumes country-wide projections by different municipalities, while future demand for microlets only focuses on Dili as a whole. • Existing key generators are considered in Scenario 1. • Scenarios 2 and 3 assume that new/planned developments are in place by 2035.
Non-Public Transport Infrastructure Enhancements Assumed in Future Scenarios	Yes (Existing)	Yes (Up to 2035)		• Infrastructure plans include road upgrades, airport expansion, and port development. • Public transport facility improvements (including bus stops, terminals, and depots) are considered in the Bus Infrastructure Improvements.
Bus Infrastructure Improvements Proposed in Future Scenarios	Yes (Bus Stops Locations + Amenities)	Yes (Enhanced/New Terminals & Depots)		• Bus stop improvements (i.e., new stops at key locations in Dili and at interchange points between Dili and other municipalities) are considered in Scenario 1. • Terminal and depot improvements are not considered in Scenario 1. • Enhanced/new terminals and depots are assumed in Scenarios 2 and 3.
Dili Microlets Converted to Conventional Buses in Future Scenarios	No	No	Yes	• Vehicle conversion from microlet to bus in Dili is not assumed in Scenarios 1 and 2. • Scenario 3 assumes microlets are replaced by buses to account for future demand patterns and provide an enhanced passenger experience.

6.4 Dili Microlet Review & Recommendations

6.4.1 Introduction

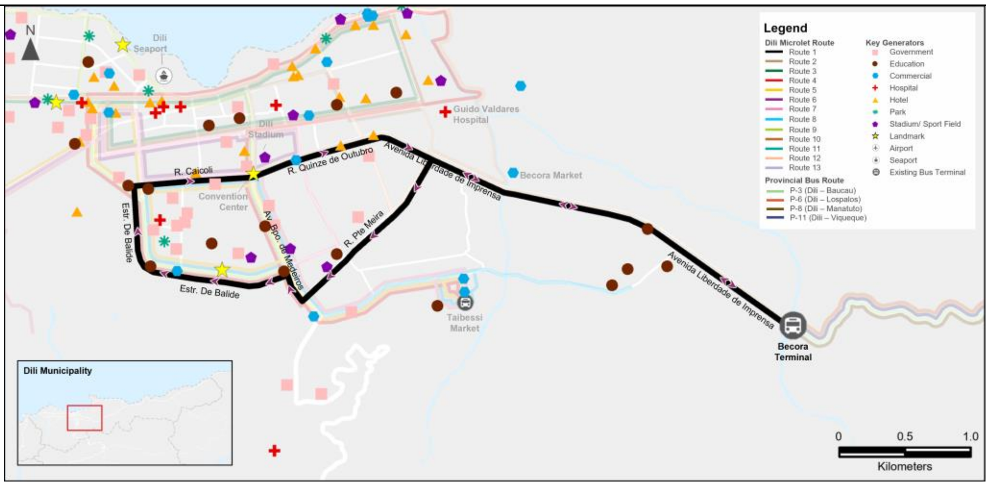
This section presents a route-by-route microlet review as well as proposed routing, service, and other recommendations to optimize service to better align with the vision and goals for public transport in Timor-Leste. The existing 13 microlet routes are reviewed. Two new microlet routes are also proposed (to/from the airport). In addition, the potential implications if the microlet routes are converted to conventional buses is estimated for each route for the 2035 Upgrade Scenario.

6.4.2 Dili Microlet Route#1 – Becora Terminal Circular South

6.4.2.1 Route Overview

Microlet Route#1 (Becora Terminal Circular South) is an east-west one-way circular route linking Becora Terminal to the southern part of the city center and back to Becora Terminal – with a total length of 11.8km. Starting from Becora Terminal, the route operates north along Ave. Liberdade de Impresa, turns left along R. Pta. Mei and Estr. De Baide (passing key generators in the city center including government and educational facilities), then turns right at R. Caicoli and R. Quinze de Outubro (passing more government buildings and the Convention Center), before turning back down Avenida Liberdade de Imprensa and terminating at Becora Terminal (essentially operating in a clockwise fashion around the loop).

Based on field observations of various trips, the route serves around 34 stops along the circular route, with the Convention Center acting as a key microlet interchange location.[82] Microlet Route#1 provides linkage with Microlet Route#2 and four regional bus routes at Becora Terminal (including routes between Dili-Baucau, Dili-Lospalos, Dili-Manatuto, and Dili-Viqueque). **Figure 6.2** presents the Microlet Route#1 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.2: Microlet Route#1 Routing and Key Generators Served

[82] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey as this is subject to passenger preference and hailing.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of peak trips/hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 51, while that in the off-peak (9:00AM-4:00PM) is 48. The maximum number of trips/hour for Saturday service is 36 trips/hour, while that for Sunday is 28 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 43 minutes on the weekdays, equating to an average speed of 17km/hour. On Saturdays and Sundays, travel time is around 43 minutes and 37 minutes respectively.
- **Daily Boardings –** On average, some 6,400 passengers board Microlet Route#1 each day (weekday) based on surveys.

Table 6.3: Microlet Route#1 Existing Service Overview

Item	Microlet Route#1
Route Distance	11.8 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings	6,400
Max Trips/Hour (Weekday)	51
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	43 mins
Travel Speed (Weekday AM Peak Average)	17 km/h
Travel Speed (Weekday PM Peak Average)	17 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.2.2 Performance Review

Daily and Annual Demand

On average, some 6,400 passengers use Microlet Route#1 on the weekdays, with Saturday accounting for about 3,500 passengers and Sunday accounting for about 2,200 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated about 1.9 million as shown in **Table 6.4**.

Table 6.4: Estimated Daily and Annual Boardings – Microlet Route#1

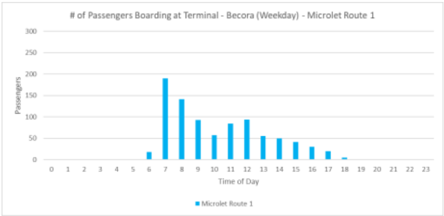
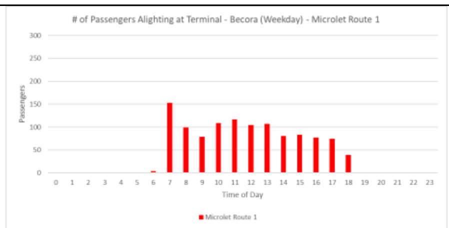
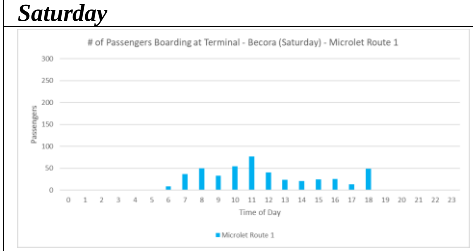
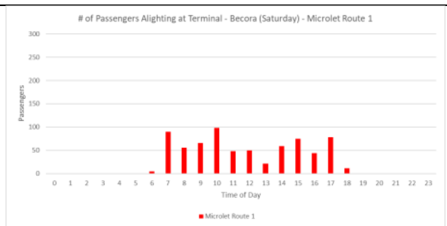
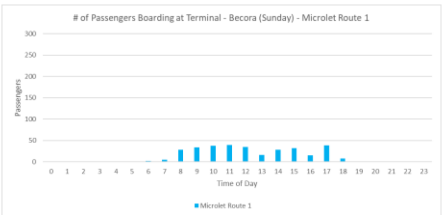
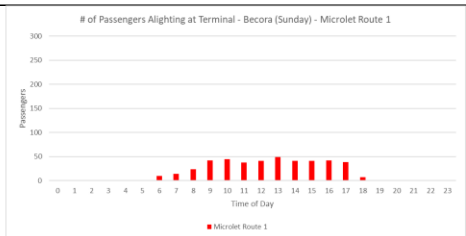
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	6,400	1,592,000
Saturday	3,500	174,000
Sunday	2,200	146,000
Total		1,912,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.5 presents the hourly boarding/alighting profile at Becora Terminal during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.5: Boarding Activity by Time of Day – Microlet Route#1 (Becora Terminal)

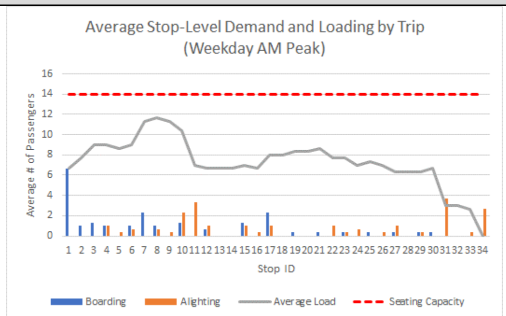
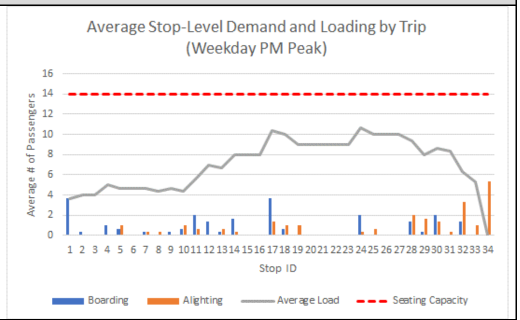
<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Boarding activity is considerably higher in the morning than in the afternoon. In the morning, a peak is observed from 7:00AM-9:00AM, with between 150-200 boardings/hour. In the afternoon, boarding activity ranges from 80-100 boardings/hour in the 11:00AM-12:00PM period. In the afternoon after 5:00PM, only 10-30 boardings/hour are observed.
• Alighting activity is higher in the morning with max 150 alightings/hour from 7:00-8:00AM. In the afternoon, around 100 alightings/day are recorded until 5:00PM. Alighting activity is lowest at 6:00PM less than 50 alightings/hour.</td></tr>
<tr><td colspan="2">Saturday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Boarding activity is higher in the afternoon, with a peak of 80 boardings/hour observed at 12:00PM. Boarding activity is relatively less busy in the morning and evening, ranging between 10-50 boardings/hour.
• Alighting activity is relatively higher in the morning, with a peak of 100 alightings/hour from 11:00AM-12:00PM. In the mid-day afternoon, around 20-50 alightings/day are recorded. Then alighting activity increases slightly in the evening ranging from 10-80 alightings/hour.</td></tr>
<tr><td colspan="2">Sunday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Boarding activity is low throughout the day, ranging from 10-40 boardings/hour.
• Alighting activity is low throughout the day, ranging from 10-50 boardings/hour.</td></tr>
</table>

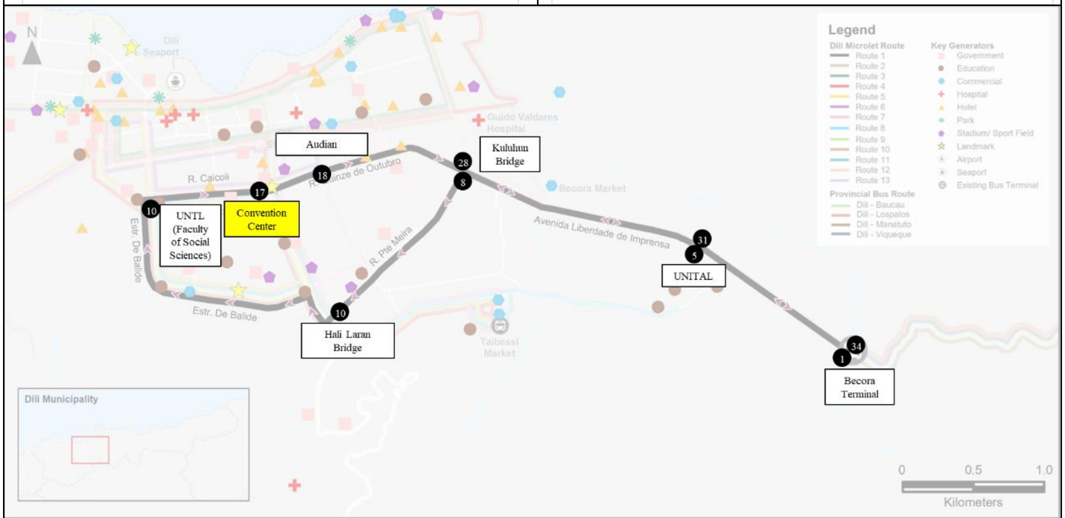
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.6 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely indicates standees or passengers hanging off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#1 operates at 85% of the stated capacity (or over 12 passengers/trip) in the AM Peak around Stop#7-10 (before reaching the end of R. Pte Meira). In the PM Peak, Microlet Route#1 operates at 70% of capacity around Stop#17-28 between Convention Center and Hotel Audian along R. Quinze de Outubro before heading back to Becora Terminal.

Table 6.6: Average Stop-Level Demand and Loading by Trip (Microlet Route#1 - Weekday Peak)

AM Peak	PM Peak
	



6.4.2.3 Service Gaps and Opportunities

Key gaps for Microlet Route#1 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.7: Summary of Microlet Route#1 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route directly serves Becora Terminal (as well as Convention Center). • There is opportunity to directly link the route to Taibessi (a busy terminal located close to the city center) to increase interchange opportunities.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the southern part of city center (i.e., government buildings, education facilities) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route. However, potential diversion of some sections (Ave. Liberdade de Imprensa near Becora Terminal in AM Peak and R. Pte Meira in PM Peak) may generate more ridership to improve productivity.

6.4.2.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Service coverage and routing enhancement measures are proposed as shown in the map below, including applicability to the Scenarios defined in **Section 6.3**:

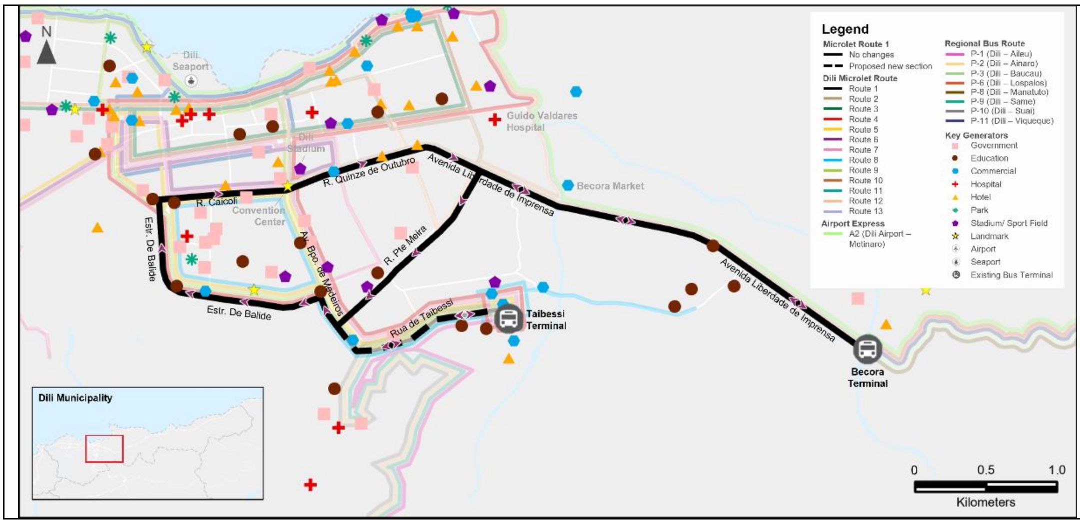


Figure 6.3: Microlet Route#1 – Modified

Table 6.8: Microlet Route#1 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	Extend Route	Extend the route to Taibessi Terminal	• Allows interchange with microlet routes and regional routes at Taibessi Terminal (addressing Gap#1)	✓	✓	✓

Route Restructuring Implications

The proposed scheme extends the route length by 3.0km from 11.8km to 14.8km, thus extending the average peak roundtrip travel time by 11 minutes. Despite this, several benefits will be generated as follows:

- **Enhanced Interchange Opportunities** – Enabled direct and convenient interchange with microlet routes and regional routes at Taibessi Terminal.
- **Direct Becora-Taibessi Corridor** – Improved connectivity between two public transport hubs in Dili.

Table 6.9: Microlet Route#1 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Becora Terminal	Becora Terminal Taibessi Terminal	Becora Terminal Taibessi Terminal	Becora Terminal Taibessi Terminal
Distance (km)	11.8	14.8	14.8	14.8
Avg. Peak Roundtrip Travel Time (mins) [B]	44	53	53	53
# of Connections with Current/Future Public Transport at Terminal	Microlet: 2 Regional Bus: 4	Microlet: 7 (2 – Becora; 5 – Taibessi) Regional Bus: 8 (4 – Becora, 4 – Taibessi)	Microlet: 7 (2 – Becora; 5 – Taibessi) Regional Bus: 8 (4 – Becora, 4 – Taibessi)	Microlet: 7 (2 – Becora; 5 – Taibessi) Regional Bus: 8 (4 – Becora, 4 – Taibessi)

Notes:
[A] The terminal(s) served by this route may change in future scenarios subject to MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in **Table 6.10**. Thus in 2025, if the demand at 12:00PM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2 minute headway (assuming a vehicle load of 12 passengers).

Table 6.10: Microlet Route#1 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)													
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	15	1.5	2	2.5	4	3	2.5	3.5	5	4	5	4	10	-
Saturday	15	5.5	3.5	5.5	4	4.5	10	12	15	5.5	5.5	8.5	4	-
Sunday	60	15	7.5	7.5	6.5	5	3.5	6	6	15	20	12	60	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	12	1.5	2	2.5	4	2.5	2	3	4.5	3.5	4.5	3.5	8.5	-
Saturday	15	5	3	5	3.5	4	8.5	12	12	4.5	5	7.5	3.5	-
Sunday	60	15	6.5	6	5.5	4.5	3	5	5.5	12	15	12	60	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	12	1.5	2	2.5	4	2.5	2	3	4.5	3.5	4.5	3.5	8.5	-
Saturday	15	4.5	3	5	3.5	4	8.5	12	12	4.5	5	7.5	3.5	-
Sunday	30	12	5	5	4.5	3	2	4	4	8.5	12	8.5	60	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	60	6.5	8.5	10	15	10	10	12	20	15	20	15	30	-
Saturday	60	20	12	20	15	15	30	30	30	20	20	30	15	-
Sunday	60	30	20	20	15	12	10	15	15	30	60	30	60	-

Service, Demand, and Productivity Implications

Weekday demand is expected to grow by a little over 10% after the route modification is implemented, with slight growth expected under the 2035 scenarios. While the peak headways will remain the same between scenarios at 2 minutes, the route modifications will lead to a noticeable increase in vehicle kilometers served and number of required vehicles from the current 36 microlets to 46 in the future (or 11 conventional buses in the Visionary 2035 scenario) including spares (10%).

Table 6.11 shows the impacts on weekday service, demand, and productivity of Microlet Route#1.

Table 6.11: Microlet Route#1 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	1.5	1.5	1.5	6.5
# of Round Trips / Day	240	260	260	70
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	32	41	41	10
Fleet Size (with 10% Spares)	36	46	46	11
Vehicle-Km	2,770	3,860	3,860	930
Vehicle-Hour	200	270	270	70
Daily Ridership (Boardings)	6,420	7,200	7,560	7,860
Boardings per Vehicle-Km	2.3	1.9	2.0	8.5
Boardings per Vehicle-Hour	33.5	26.8	28.1	122.6
Annualized Ridership	1,592,000	1,785,000	1,873,000	1,948,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

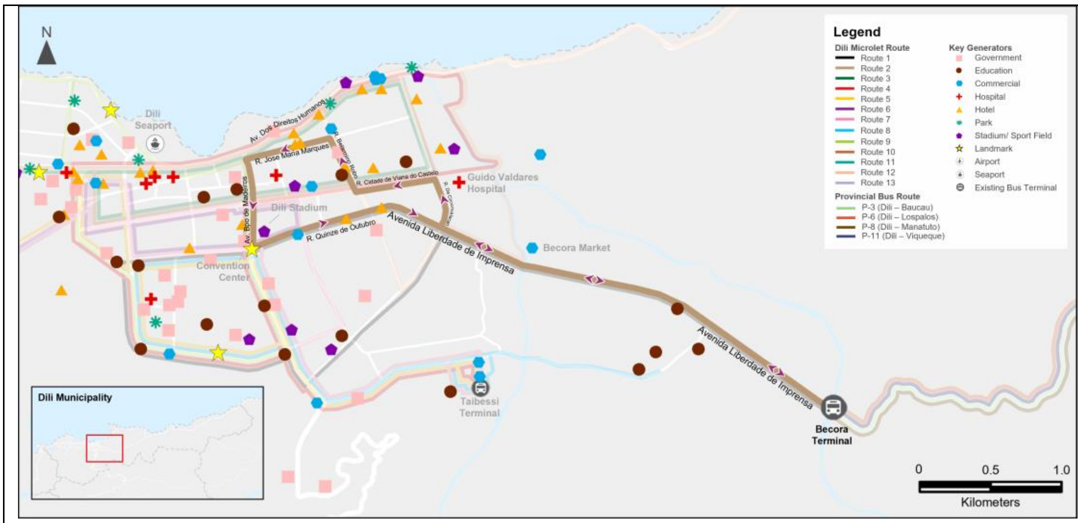
6.4.3 Dili Microlet Route#2 – Becora Terminal Circular North

6.4.3.1 Route Overview

Microlet Route#2 (Becora Terminal Circular North) is an east-west one-way circular route linking Becora Terminal to the northeast part of city center and back to Becora Terminal – with a total length of 10.1m. Starting from Becora Terminal, the route operates counter-clockwise along Ave. Liberdade de Impresa, turns right along R. Da Circunvalacao (near Guido Valdares Hospital), immediately turns left along R. Cidade de Viana do Castelo, then turns right at R. Belamino Robo, then merging into R. Jose Maria Marques before heading southward along Ave. Bpo de Madeiros (passing various commercial facilities). After the Convention Center, the route starts eastward along R. Quinez de Outubro and merging into Avenida Liberdade de Imprensa (going through school zones) before terminating at Becora Terminal.

Based on field observations of various trips, the route serves around 24 stops along the circular route, with the Convention Center serving as a key microlet interchange location.[83] Microlet Route#2 provides linkage with Microlet Route#1 and four regional bus routes at Becora Terminal (including routes between Dili-Baucau, Dili-Lospalos, Dili-Manatuto, and Dili-Viqueque). **Figure 6.4** presents the Microlet Route#2 routing, key generators, as well as interchange points with other public transport services.

[83] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.4: Microlet Route#2 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 67, while that in the off-peak (9:00AM-4:00PM) is 56. The maximum number of vehicles for Saturday service is 55 trips/hour, while that for Sunday is 34 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 45 minutes, equating to an average speed of 14km/hour. On Saturdays and Sundays, travel time is around 33 and 41 respectively.
- **Daily Boardings –** On average, some 9,700 passengers use Microlet Route#2 each day (weekday).

Table 6.12: Microlet Route#2 Existing Service Overview

Item	Microlet Route#2
Route Distance	10.1 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	9,700
Max Trips/Hour (Weekday)	67
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	45 mins
Travel Speed (Weekday AM Peak Average)	14 km/h
Travel Speed (Weekday PM Peak Average)	14 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.3.2 Performance Review

Daily and Annual Demand

On average, some 9,700 passengers use Microlet Route#2 on the weekdays, with Saturday accounting for about 5,200 passengers and Sunday accounting for about 4,700 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 3.0 million – as shown in **Table 6.13**.

Table 6.13: Estimated Daily and Annual Boardings – Microlet Route#2

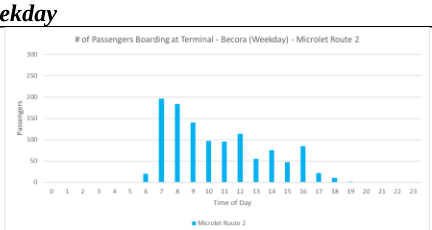
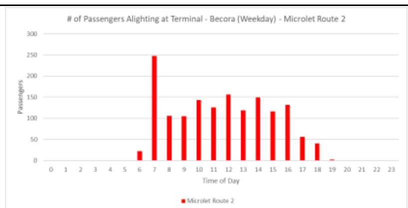
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	9,700	2,410,000
Saturday	5,200	262,000
Sunday	4,700	316,000
Total		2,988,000

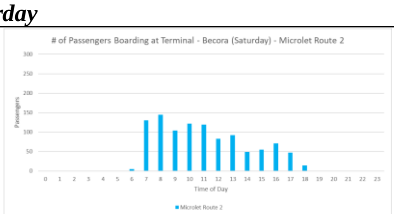
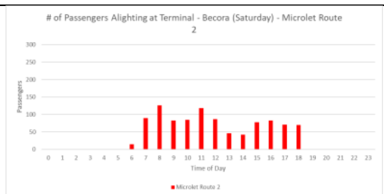
Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

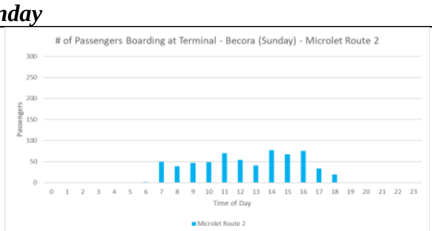
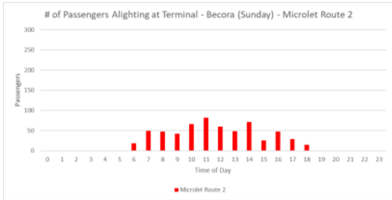
Table 6.14 presents the hourly boarding/alighting profile at Becora Terminal during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.14: Boarding Activity by Time of Day – Microlet Route#2 (Becora Terminal)

<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:

Boarding activity is considerably higher in the morning than in the afternoon. In the morning, a peak is observed from 7:00AM-9:00AM, with between 150-200 boardings/hour. In the afternoon, boarding activity ranges 50-100 boardings/hour. In the night after 5:00PM, only 10-30 boardings/hour are observed.
Alighting activity is higher in the morning with max 250 alightings/hour from 7:00-8:00AM. In the afternoon, around 120-160 alightings/hour are recorded. Alighting activity is lower in the late evening with less than 60 alightings/hour.
</td></tr>
<tr><td colspan="2">Saturday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:

Boarding activity is higher in the morning than in the afternoon. In the morning, a peak is observed from 7:00AM-8:00AM, with between 130-150 boardings/hour. In the afternoon, boarding activity ranges from 50-90 in the 12:00PM-4:00PM period. In the night after 5:00PM, only 10-50 boardings/hour are observed.
</td></tr>
</table>

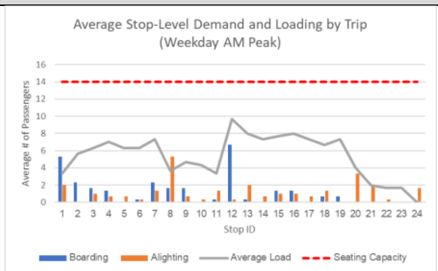
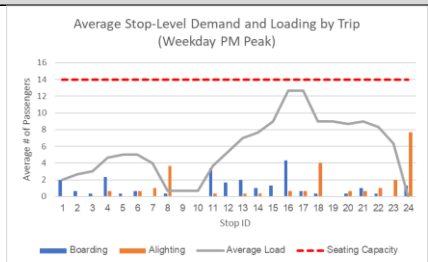
Boarding Activity	Alighting Activity
• Alighting activity is higher in the morning with 120-130 alightings/hour from 8:00-9:00AM as well as from 11:00AM-12:00PM. In the afternoon, around 40-90 alightings/day are recorded. Alighting activity increases slightly in the evening to about 70 alightings/hour.	
Sunday	
	
Key Findings: • Boarding activity is lower in the morning than in the afternoon. In the morning, boarding activity stays around 50 boardings/hour and peak at 10:00-11:00AM with 70 boardings/hour. In the afternoon, boarding activity ranges from 40-80 in the 12:00PM-4:00PM period. In the night after 5:00PM, only 20-40 boardings/hour are observed. • Alighting activity is slightly higher in the morning with max 80 alightings/hour from 11:00AM-12:00PM. In the afternoon, around 50-70 alightings/day are recorded. Alighting activity in the evening ranges between 15-30 alightings/hour.	

Average Stop-Level Demand and Vehicle Loading by Peak Periods

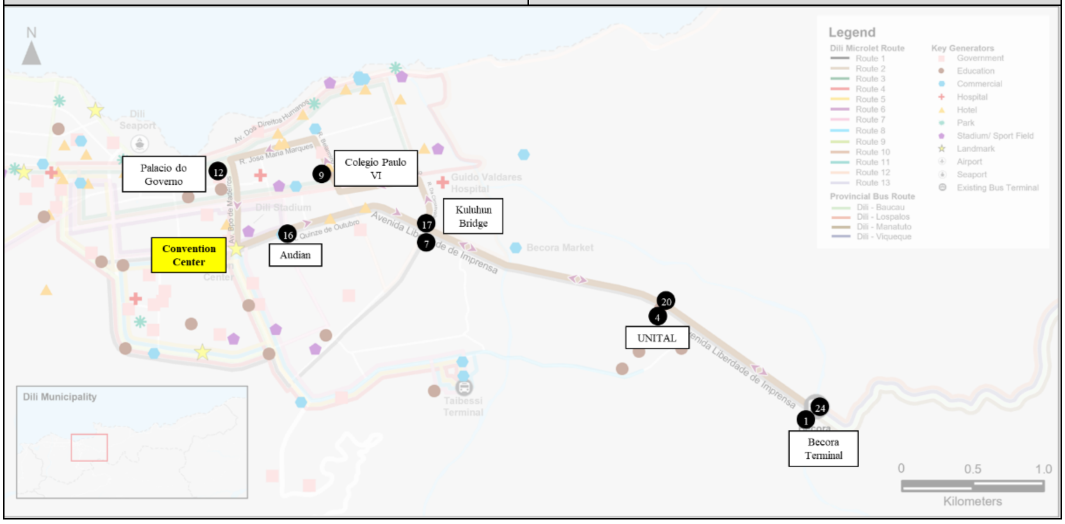
Table 6.15 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#2 operates at 70% of the stated capacity (about 10 passengers/trip) in the AM Peak around Stop#12 (along Bpo de Madeiros near Palacio do Governo). In the PM Peak, Microlet Route#2 operates at 90% of the stated capacity (about 13 passengers/trip) in around Stop#16-17 (between Audian and Kuluhan Bridge).

Table 6.15: Average Stop-Level Demand and Loading by Trip (Microlet Route#2 - Weekday Peak)

AM Peak	PM Peak
	

AM Peak	PM Peak



6.4.3.3 Service Gaps and Opportunities

Key gaps for Microlet Route#2 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.16: Summary of Microlet Route#2 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route directly serves Becora Terminal (as well as Convention Center). There is opportunity to connect to the Dili Passenger Seaport in the north of the route.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the northeast of city center (i.e., hotels, government buildings, education facilities and stadiums) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest in the AM. However, the route is approaching capacity in the PM peak (on R. Quinze de Outubro)

6.4.3.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Based on identified gaps in service coverage, it was initially thought that the service could be re-routed to serve the Dili Seaport. However, the route is one-way operating counterclockwise and would need to detour a long distance to access the seaport, which proved to be impractical for the route (as the road in front of the Dili Seaport is one-way, with traffic running from west to east). Thus, no modification is proposed to this route.

Table 6.17: Microlet Route#2 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	No change	No change	Dili Passenger Seaport (0.6km from the northern section of the route) is a potential key generator. However, the route operates one-way in a counterclockwise fashion, making port access difficult. No modifications are proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.18: Microlet Route#2 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	Loop (Counter-Clockwise)	Loop (Counter-Clockwise)	Loop (Counter-Clockwise)	Loop (Counter-Clockwise)
Terminal Serving [A]	Becora Terminal	Becora Terminal	Becora Terminal	Becora Terminal
Distance (km)	10.1	10.1	10.1	10.1
Avg. Peak Roundtrip Travel Time (mins) [B]	45	45	45	45
# of Connections with Current/Future Public Transport at Terminal	Microlet: 2 Regional Bus: 4	Microlet: 2 Regional Bus: 4	Microlet: 2 Regional Bus: 4	Microlet: 2 Regional Bus: 4

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with service schedules for weekday, Saturday, and Sunday shown in **Table 6.19**. In 2025, if demand at 12:00PM is 360 passengers/hour, this would equate to 30 trips/hour or a 2-minute headway (assuming a 12 passenger load).

Table 6.19: Microlet Route#2 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	8.5	1.5	1.5	2	2.5	3	2	2.5	2.5	1.5	1.5	2	7.5	-
Saturday	15	2	2	2.5	2.5	3.5	4	4	5.5	4.5	4.5	5	8.5	-
Sunday	20	4.5	4.5	5.5	5	4.5	4	5.5	4.5	3	3	4	7.5	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	8.5	1.5	1.5	1.5	2.5	3	2	2.5	2.5	1.5	1.5	2	6.5	-
Saturday	15	2	2	2.5	2.5	3	4	4	5	4.5	4	5	8.5	-
Sunday	20	4.5	4.5	5.5	5	4.5	4	5	4.5	3	3	4	7.5	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	7.5	1.5	1.5	1.5	2.5	3	2	2.5	2	1.5	1	2	6.5	-
Saturday	15	1.5	2	2.5	2	3	4	3.5	5	4	4	4.5	7.5	-
Sunday	20	4.5	4	5.5	4.5	4.5	4	5	4	3	3	3.5	6.5	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	30	5.5	5.5	6.5	10	12	7.5	10	8.5	6.5	5	8.5	30	-
Saturday	60	7.5	7.5	10	10	12	15	15	20	15	15	20	30	-
Sunday	60	15	15	20	20	15	15	20	15	12	12	15	30	-

Service, Demand, and Productivity Implications

Weekday demand is expected to grow very slightly between the existing and the 2025 Immediate scenario, so the corresponding round trips, vehicle kilometers/hours, and fleet size required are also relatively the same. For the 2035 scenarios, the peak headway will decrease from 1.5 minutes to 1.0 minute, which leads to a noticeable increase in the fleet size required (from 38 to 55 microlets, or the equivalent of 11 conventional buses).

Table 6.20 shows the impacts on weekday service, demand, and productivity of Microlet Route#2.

Table 6.20: Microlet Route#2 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	1.5	1.5	1.0	5.0
# of Round Trips / Day	360	370	400	100
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	34	34	50	10
Fleet Size (with 10% Spares)	38	38	55	11
Vehicle-Km	3,630	3,750	4,020	1,010
Vehicle-Hour	300	310	330	90
Daily Ridership (Boardings)	9,720	9,830	10,390	10,810
Boardings per Vehicle-Km	2.7	2.6	2.6	10.8
Boardings per Vehicle-Hour	32.6	31.9	31.5	130.9
Annualized Ridership	2,410,000	2,437,000	2,576,000	2,679,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

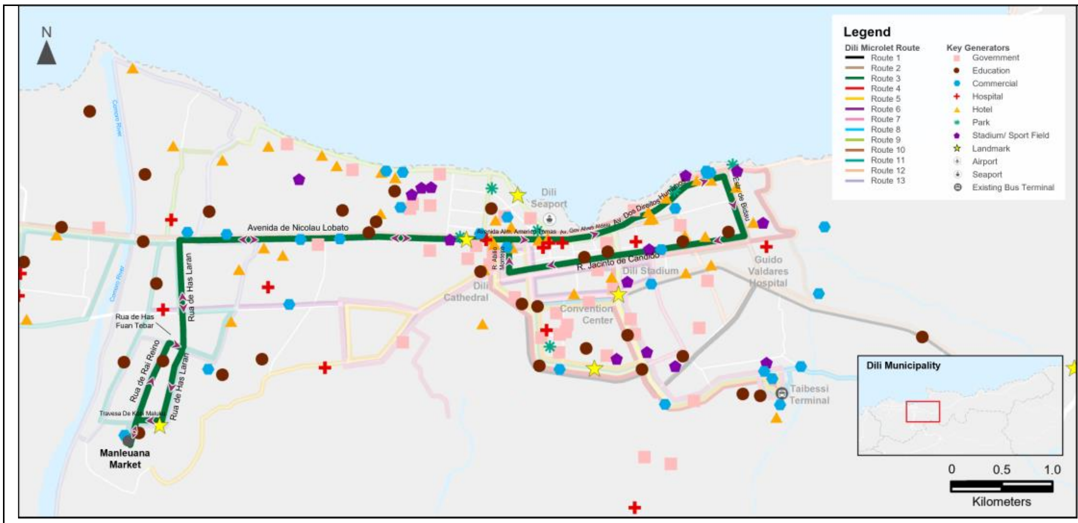
6.4.4 Dili Microlet Route#3 – Manleuana Market Circular

6.4.4.1 Route Overview

Microlet Route#3 (Manleuana Market Circular) is a west-east one-way circular route linking Manleuana Market (in the southwest) to the northern part of the city center and back to Manleuana Market – with a total length of 16.8km. Starting from Manleuana Market, the route operates clockwise along Rua De Rai Reino, turns right along Rua de Has Fuan Tebar, turns left along Rua de Has Laran, then heads northward until the intersection with Avenida de Nicolau Lobato. The route then continues eastward along Avenida Alm Americo Tomas and Av. Dos Direitos Humanos (passing key generators in the city center including Dili Seaport, government buildings, sports fields, commercial establishments, and hotels) then turns right along Estr. De Bidau. The route runs westward along R. Jacinto de Candido (passing more key generators including educational facilities and government buildings), before turning back to Avenida de Nicolau Lobato, and heading back to Manleuana Market (this time, plying Rua de Has Laran near the market).

Based on field observations of various trips, the route serves around 45 stops along the circular route, with the Manleuana Market serving as a key microlet interchange location.[84] Microlet Route#3 provides linkage with Microlet Route#11. The route does not provide interchange opportunity with regional buses. **Figure 6.5** presents the Microlet Route#3 routing, key generators, as well as interchange points with other public transport services.

[84] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.5: Microlet Route#3 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 50, while that in the off-peak (9:00AM-4:00PM) is 48. The maximum number of vehicles for Saturday service is 45 trips/hour, while that for Sunday is 35 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 59 minutes, equating to an average speed of 18km/hour. On Saturdays and Sundays, travel time is around 58 and 62 respectively.
- **Daily Boardings –** On average, some 11,900 passengers use Microlet Route#3 each day.

Table 6.21: Microlet Route#3 Existing Service Overview

Item	Microlet Route#3
Route Distance	16.8 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	11,900
Max Trips/Hour (Weekday)	50
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	59 mins
Travel Speed (Weekday AM Peak Average)	18 km/h
Travel Speed (Weekday PM Peak Average)	17 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.4.2 Performance Review

Daily and Annual Demand

On average, some 11,900 passengers use Microlet Route#3 on the weekdays, with Saturday accounting for about 10,000 passengers and Sunday accounting for about 7,500 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 3,948,000 – as shown in **Table 6.22**.

Table 6.22: Estimated Daily and Annual Boardings – Microlet Route#3

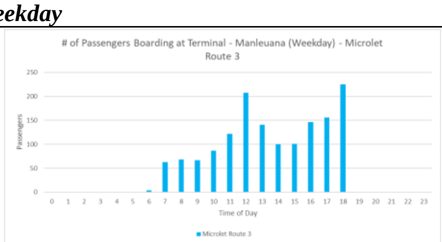
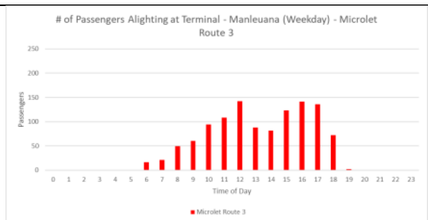
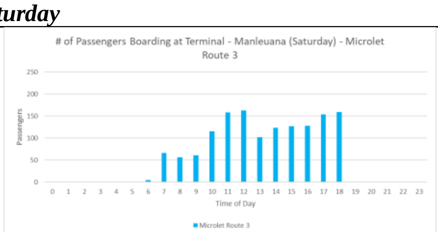
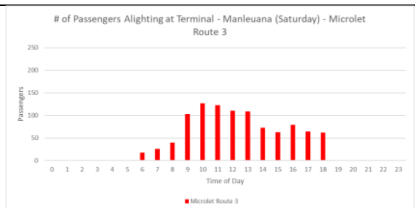
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	11,900	2,945,000
Saturday	10,000	502,000
Sunday	7,500	501,000
Total		3,948,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.23 presents the hourly boarding/alighting profile at Manleuana Market during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.23: Boarding Activity by Time of Day – Microlet Route#3 (Manleuana Market)

<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Boarding activity is significantly higher in the afternoon and evening. In the morning, boarding activity ranges around 60-70 boardings/hour. Mid-day peak boarding activity is observed from 12:00PM-1:00PM with 210 boardings/hour. In the afternoon, boarding activity ranges from 100-150 in the 1:00PM-4:00PM period. In the evening after 5:00PM, boarding activity records the highest at some 230 boardings/hour during 6:00PM-7:00PM.
• Alighting activity is higher in the afternoon than in the morning. In the morning, fewer than 100 boardings are recorded. The mid-day peak is observed from 12:00PM-1:00PM with 140 boardings/hour. Alighting activity reaches its peak again between 3:00PM-5:00PM with 120-140 alightings/hour. In the evening after 5:00PM, alighting activity is less than 80 alightings/hour.</td></tr>
<tr><td colspan="2">Saturday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Boarding activity is higher in the afternoon and evening. In the morning, boarding activity ranges between 50-120 boardings/hour. Mid-day peak is observed from 11:00PM-1:00PM with over 160</td></tr>
</table>

<table>
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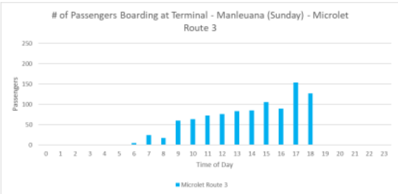
boardings/hour. In the afternoon, boarding activity ranges from 100-130 in the 1:00PM-5:00PM period. In the night after 5:00PM, boarding activity increases to some150 boardings/hour.

- Alighting activity is higher in the morning with max 130 alightings/hour from 10:00-11:00AM is observed. In the afternoon, around 60-110 alightings/hour are recorded. Then, alighting activity declines to between 50-60 alightings/hour in the late evening.

</td></tr>
<tr><td colspan="2">Sunday</td></tr>
<tr><td>



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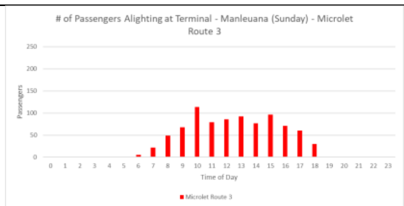

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<tr><td colspan="2">

Key Findings:

- Boarding activity is higher in the late evening than other periods. In the morning, boarding activity ranges between 10-70 boardings/hour. In the afternoon, boarding activity increases gradually ranging from 70-110 in the 1:00PM-5:00PM period. In the night after 5:00PM, boarding activity reaches its peak with some 160 boardings/hour.
- Alighting activity is higher in the morning as well as in the afternoon. In the morning, a peak is observed from 10:00AM-11:00AM with 110 alightings/hour. In the afternoon, alighting activity ranges from 70-100 alightings/hour. In the evening after 5:00PM, alighting activity declines to some 30-60 alightings/hour.

</td></tr>
</table>

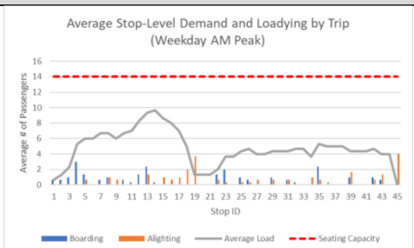
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.24 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

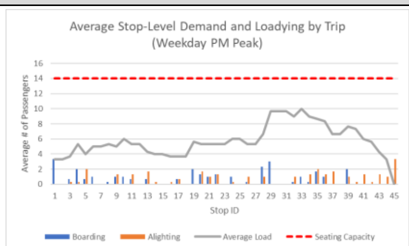
- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#3 operates at close to 70% of the stated capacity (or about 10 passengers/trip) in the AM Peak around Stop#13-15 along Av. Pres Nicolas Lobato before reaching Dili Seaport (Jardim 5 de Maio). In the PM Peak, Microlet Route#3 operates at 70% of capacity around Stop#29-35 between the junction of Av. Alm Americo Tomas-Caicoli Road and Meimart Fatuhada along Av. Pres Nicolas Lobato before heading back to Manleuana Market. However, loading activity at some stops is relatively low in both AM/PM Peak operating about 40% of the capacity (or about 6 passengers/trip).

Table 6.24: Average Stop-Level Demand and Loading by Trip (Microlet Route#3 - Weekday Peak)

<table>
<tr><th>AM Peak</th><th>PM Peak</th></tr>
<tr><td>



</td><td>



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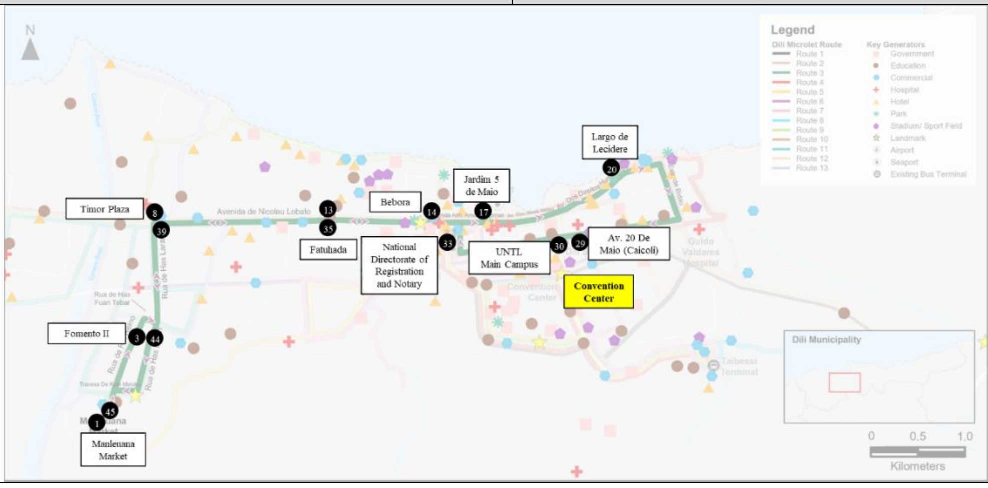
</table>

AM Peak	PM Peak



6.4.4.3 Service Gaps and Opportunities

Key gaps for Microlet Route#3 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.25: Summary of Microlet Route#3 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route directly serves Manleuana Market (as well as Convention Center).
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the city center (i.e., government buildings, hotels, sports fields, commercial establishments, education facilities) as well as near Manleuana Market are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap is observed (except some duplications in the city center).
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route, but some stops show low patronage even during AM/PM Peak.

6.4.4.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Microlet Route#3 aligns well with the optimization goals as noted above, thus no modification to the exiting route is proposed.

Table 6.26: Microlet Route#3 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	No change	No change	The route serves Manleuana Market (interchange), the city center, and Dili Port with minimum overlap with other microlet routes. No modification proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.27: Microlet Route#3 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Manleuana Market	Manleuana Market	Manleuana Market	Manleuana Market
Distance (km)	16.8	16.8	16.8	16.8
Avg. Peak Roundtrip Travel Time (mins) [B]	59	59	59	59
# of Connections with Current/Future Public Transport at Terminal	Microlet: 3 Regional Bus: 0	Microlet: 3 Regional Bus: 0	Microlet: 3 Regional Bus: 0	Microlet: 3 Regional Bus: 0

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in **Table 6.28**. Thus in 2025, if the demand at 12:00PM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2-minute headway (assuming a vehicle load of 12 passengers).

Table 6.28: Microlet Route#3 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)													
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	6.5	2.5	2	2	2	2.5	2	2	2.5	2.5	2	2	2.5	-
Saturday	7.5	2.5	2	2.5	2	2.5	3	2.5	3	2.5	2	2	4	-
Sunday	20	8.5	6.5	4	4	2.5	2.5	3	3	2	2.5	2.5	3.5	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	6.5	2.5	2	1.5	1.5	2.5	2	2	2	2	2	2	2.5	-
Saturday	7.5	2.5	2	2.5	2	2.5	3	2.5	2.5	2.5	2	2	3.5	-
Sunday	20	8.5	6	4	4	2.5	2.5	3	2.5	2	2	2.5	3.5	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	5.5	2	1.5	1.5	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	2	-
Saturday	6	2	1.5	2	2	2	2	2	2	2	1.5	1.5	2.5	-
Sunday	15	7.5	5	3.5	3	2	2	2.5	2	1.5	1.5	2	2.5	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	20	8.5	6.5	6	6	8.5	6	6.5	7.5	6.5	5.5	6	7.5	-
Saturday	20	8.5	6.5	8.5	7.5	8.5	8.5	7.5	8.5	8.5	6.5	7.5	12	-
Sunday	60	30	20	15	12	8.5	8.5	10	8.5	6.5	7.5	7.5	12	-

Service, Demand, and Productivity Implications

Weekday demand is expected to grow slightly under the 2025 Immediate scenario, leading to a decrease in peak headways from 2.0 minutes to 1.5 minutes. Correspondingly, the fleet size required increases from 39 to 49 vehicles. In the 2035 scenarios, the ridership increases by over 25%, which leads to a large increase in the number of round trips, vehicle kilometers and hours operated as well, although the peak headway and vehicles required remains largely unchanged (51 microlets or 15 conventional buses).

Table 6.29 shows the weekday impacts on weekday service, demand, and productivity of Microlet Route#3.

Table 6.29: Microlet Route#3 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	2	1.5	1.5	5.5
# of Round Trips / Day	340	380	470	120
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	35	44	46	13
Fleet Size (with 10% Spares)	39	49	51	15
Vehicle-Km	5,710	6,250	7,740	1,950
Vehicle-Hour	380	420	510	130
Daily Ridership (Boardings)	11,880	12,430	15,760	16,390
Boardings per Vehicle-Km	2.1	2.0	2.0	8.4
Boardings per Vehicle-Hour	31.6	30.3	30.9	127.7
Annualized Ridership	2,945,000	3,081,000	3,907,000	4,063,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

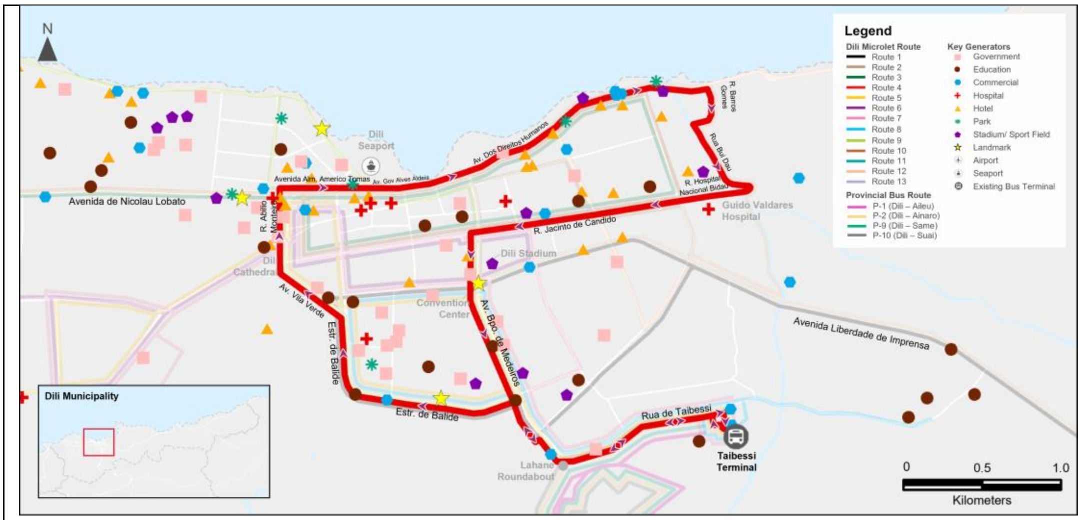
6.4.5 Dili Microlet Route#4 – Taibessi Terminal Circular North

6.4.5.1 Route Overview

Microlet Route#4 (Taibessi Terminal Circular North) is a north-south one-way circular route linking Taibessi Terminal to the city center and back to Taibessi Terminal – with a total length of 12.6km. Starting from Taibessi Terminal, the route operates clockwise along Rua de Taibessi, turns left along Estr. De Balide, Av. Vila Verde and R. Abilio Monteiro (passing key generators in the city center including Centro Nacional Chega, government buildings and educational facilities). At the intersection with Avenida de Nicolau Lobato, the route turns right at Av. Alm Americo Tomas, then continues eastward along Ave. Doreitos Humanos (passing key generators along the coast including hospitals, commercial establishments, hotels and sports fields), then turns right via R. Barros Gomes and R. Hospital Nacional Bidaru, then heads westward R. Jacinto de Candido (passing education facilities, sports fields and hotels and merges to Ave. Bpo de Medeiros (passing through the Convention Center). The route continues eastward along Rua de Taibessi (going through government and educational buildings) and terminates at the Taibessi Terminal.

Based on field observations of various trips, the route serves around 35 stops along the circular route, with the Convention Center serving as a key microlet interchange location.[85] Microlet Route#4 provides linkage with Microlet Route#5, #7 and #8 (through route) and four regional bus routes at Taibessi Terminal (including routes between Dili-Aileu, Dili-Same, Dili-Ainaro, and Dili-Suai). **Figure 6.6** presents the Microlet Route#4 routing, key generators, as well as interchange points with other public transport services.

[85] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.6: Microlet Route#4 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On a weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 30, while that in the off-peak (9:00AM-4:00PM) is 29. The maximum number of vehicles for Saturday service is 28 trips/hour, while that for Sunday is 21 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 54 minutes, equating to an average speed of 15km/hour. On Saturdays and Sundays, travel time is around 54 and 46 respectively.
- **Daily Boardings –** On average, some 5,600 passengers use Microlet Route#4 each day.

Table 6.30: Microlet Route#4 Existing Service Overview

Item	Microlet Route#4
Route Distance	12.6 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	5,600
Max Trips/Hour (Weekday)	30
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	54 mins
Travel Speed (Weekday AM Peak Average)	15 km/h
Travel Speed (Weekday PM Peak Average)	14 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.5.2 Performance Review

Daily and Annual Demand

On average, some 5,600 passengers use Microlet Route#4 on the weekdays, with Saturday accounting for about 5,600 passengers and Sunday accounting for about 4,300 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 1.95 million – as shown in **Table 6.31**.

Table 6.31: Estimated Daily and Annual Boardings – Microlet Route#4

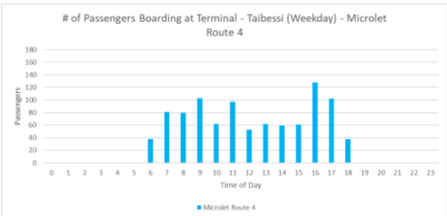
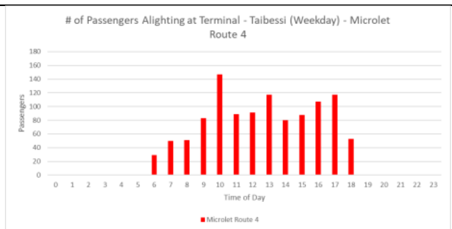
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	5,600	1,386,000
Saturday	5,600	278,000
Sunday	4,300	285,000
Total		1,949,000

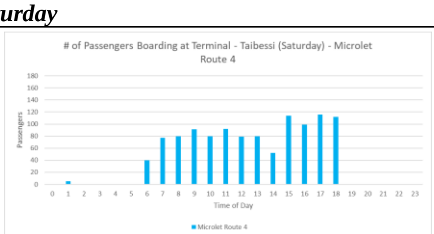
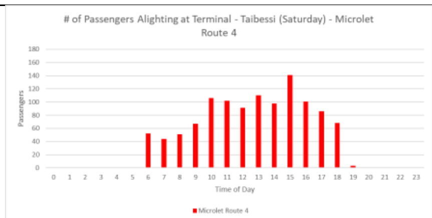
Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.32 presents the hourly boarding/alighting profile at Taibessi Terminal during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.32: Boarding Activity by Time of Day – Microlet Route#4 (Taibessi Terminal)

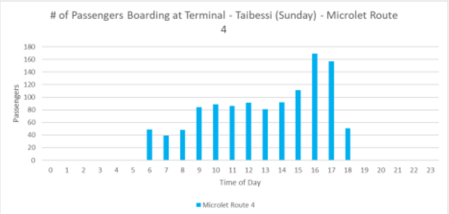
<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:

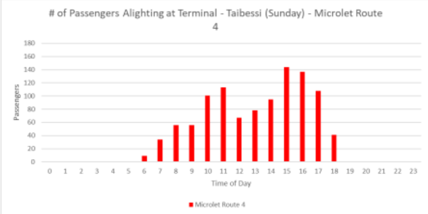
Boarding activity is relatively higher in the morning and afternoon. In the morning, a peak is observed from 9:00AM-10:00AM, with 100 boardings/hour. In the afternoon, boarding activity declines to some 60 boardings/hour. The highest boarding is recorded at 4:00PM with some 130 boardings/hour then boarding activity lowers to some 40-100 boardings/hour in the late evening.
Alighting activity is higher in the morning and late evening. In the morning, a peak of 150 alightings/hour are observed from 10:00-11:00AM. In the afternoon, around 80-110 alightings/day are recorded. Alighting activity in the evening is relatively high around 50-120 alightings/hour.
</td></tr>
<tr><td colspan="2">Saturday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:

Boarding activity is higher in the afternoon than in the morning. In the morning, a peak is observed from 9:00AM-10:00AM, with 90 boardings/hour. In the afternoon, boarding activity ranges from 50-120. In the late evening boarding activity is still high recording some 110-120 boardings/hour.
</td></tr>
</table>

- Alighting activity is higher in the afternoon than in the morning. In the morning, a peak of 110 alightings/hour are observed from 10:00AM-12:00PM. In the afternoon, around 100 alightings/day are recorded, with a peak of 140 alightings/hour at 3:00PM. Alighting activity gradually declines in the evening ranging between 70-90 alightings/hour.

Sunday





Key Findings:

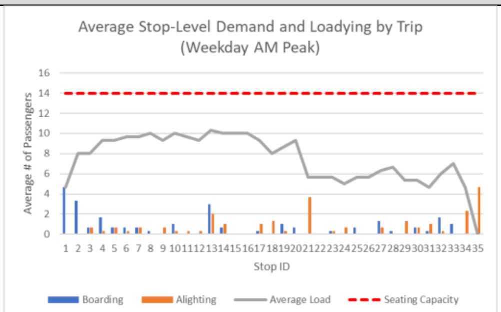
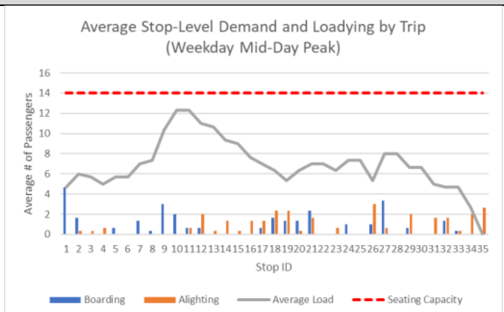
- Boarding activity is higher in the afternoon than in the morning. In the morning, boarding activity is low ranging from 40-90 boardings/hour. In the afternoon, boarding activity ranges around 90 boardings/hour. A peak of 170 boardings/hour are recorded at 4:00PM-5:00PM. After 6:00PM, boarding activity is lower at 50 boardings/hour.
- Alighting activity is higher in the afternoon than in the morning. In the morning, some 100-110 alightings/hour are observed from 10:00AM-12:00PM. In the afternoon, some 70-150 alightings/hour are recorded. Alighting activity in the evening after 5:00PM is about 40 alightings/hour.

Average Stop-Level Demand and Vehicle Loading by Peak Periods

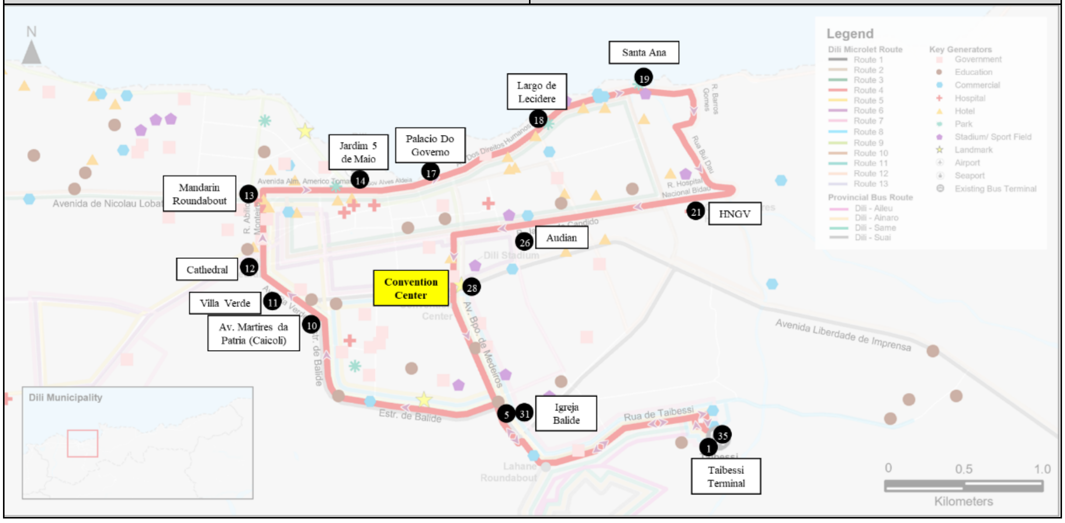
Table 6.33 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#4 operates at 70% of the stated capacity (or over 10 passengers/trip) in the AM Peak around Stop#6-16 (northbound between Estr. De Balide and Av. Dis Doreitos Humanos around Palacio do Governo). In the PM Peak, Microlet Route#4 operates at 80% of capacity around Stop#10-13 (northbound between Caicoli, Cathedral and Mandarin Roundabout). Relatively low loading activity is observed around Stop#20-35 (on average 6-8 passengers/trip) in both AM and PM Peak.

Table 6.33: Average Stop-Level Demand and Loading by Trip (Microlet Route#4 - Weekday Peak)

AM Peak	PM Peak
	

AM Peak	PM Peak



6.4.5.3 Service Gaps and Opportunities

Key gaps for Microlet Route#4 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.34: Summary of Microlet Route#4 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route provides interchange at Taibessi Terminal (with regional bus) as well as Convention Center (with microlet).
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• A wide range of key generators in the of city center (i.e., government buildings, education facilities, commercial establishments, hotels, hospitals, and sports fields) are well served.
3	Minimize Microlet-Microlet Duplication	Moderate	• Most of the southern section overlaps with Microlet Route#8 (except the segment from Taibessi Terminal to Rua de Becussi). However, Microlet Route#8 is used for short-distance trips (mainly by students). Combining these routes will be inconvenient for existing passengers, thus no route modification is made despite extensive duplication.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route.

6.4.5.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

No modification is made to this route (the original route is kept for existing passengers).

Table 6.35: Microlet Route#4 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Taibessi Terminal	Taibessi Terminal	Taibessi Terminal	Taibessi Terminal
Distance (km)	12.6	12.6	12.6	12.6
Avg. Peak Roundtrip Travel Time (mins) [B]	52	52	52	52
# of Connections with Current/Future Public Transport at Terminal	Microlet: 3 Regional Bus: 4	Microlet: 3 Regional Bus: 4	Microlet: 3 Regional Bus: 4	Microlet: 3 Regional Bus: 4

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in **Table 6.36**. Thus in 2035, if the demand at 11:00AM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2-minute headway (assuming a vehicle load of 12 passengers).

Table 6.36: Microlet Route#4 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	7.5	4	3.5	3.5	5	3	4.5	4	3.5	6.5	4.5	5	10	-
Saturday	7.5	4.5	4	4	4.5	4.5	5	4	6.5	3	3.5	3.5	4	-
Sunday	10	12	8.5	6	5	3.5	3.5	4	4	5	3.5	4	12	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	7.5	3.5	3	3.5	4.5	3	4	4	3	6	4.5	4.5	10	-
Saturday	7.5	4.5	4	4	4.5	4	5	4	6	2.5	3.5	3.5	3.5	-
Sunday	10	12	8.5	6	5	3.5	3	3.5	4	5	3.5	3.5	12	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	6	2.5	2.5	2.5	3.5	2	2.5	2.5	2	4.5	3	3.5	6.5	-
Saturday	6	3.5	3	3	3.5	3	3.5	2.5	4.5	2	2.5	2.5	2.5	-
Sunday	10	10	8.5	5.5	5	2.5	2.5	2.5	3	4	3	3	10	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	20	12	10	10	15	8.5	12	12	8.5	20	12	15	30	-
Saturday	20	15	12	12	15	12	15	12	20	8.5	10	10	12	-
Sunday	30	30	30	20	20	10	10	12	12	15	12	12	30	-

Service, Demand, and Productivity Implications

As the route alignment is proposed to be retained in the future, weekday demand is expected to grow slowly up to 5,800 until 2025, then climb to 7,200 in 2035. Correspondingly, peak headway will also decrease from 3 to 2 minutes. The vehicles required will also increase from 22 microlets currently to 32 microlets (or 8 conventional buses) in the 2035 scenarios.

Table 6.37 shows the weekday impacts on existing service, demand, and productivity of Microlet Route#4.

Table 6.37: Microlet Route#4 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	3	3	2	8.5
# of Round Trips / Day	180	200	270	70
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	20	20	29	7
Fleet Size (with 10% Spares)	22	22	32	8
Vehicle-Km	2,270	2,420	3,400	810
Vehicle-Hour	180	190	270	70
Daily Ridership (Boardings)	5,590	5,810	7,200	7,480
Boardings per Vehicle-Km	2.5	2.4	2.1	9.3
Boardings per Vehicle-Hour	31.5	30.7	27.0	118.6
Annualized Ridership	1,386,000	1,440,000	1,784,000	1,855,000

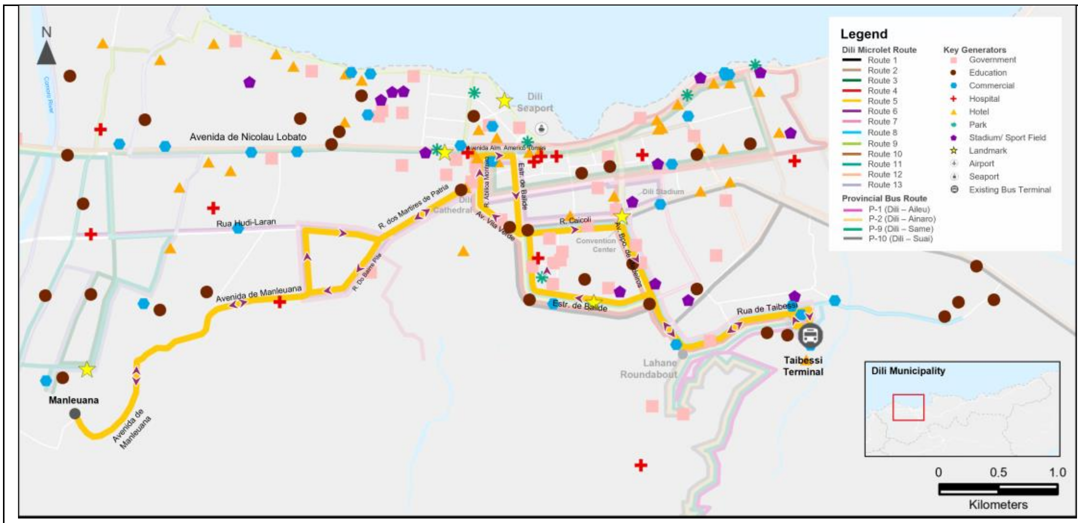
Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.6 Dili Microlet Route#5 – Taibessi Terminal Circular via Manleuana

6.4.6.1 Route Overview

Microlet Route#5, also known as the Taibessi Terminal Circular via Manleuana, is a one-way circular route that runs from Taibessi Terminal to the western part of the city center at Manleuana and back to Taibessi Terminal. The entire route spans a total distance of 17.8km. The route starts from Taibessi Terminal and follows a clockwise path along Rua de Taibessi, before turning left onto Estr. De Balide and Av. Vila Verde. Along this path, the route passes by key generators in the city center, including government and educational facilities. The route then turns left at Rua dos Martires da Patria continue via R. do Bairre Pite and Ave. de Manleuana, passing more medical and educational facilities before reaching Manleuana (not Manleuana Market). The return trip starts eastbound along Ave. de Manleuana and Rua dos Martires da Patria and merges into R. Abilioa Monteiro near the city center. The route then runs a short distance on Ave. Alm. Americo Tomas (passing through government buildings and schools), heads southbound along Estr. de Balida before turning right on R. Caicoli (near Convention Center). Once again, the route operates towards south along Ave/ Bpo. de Medeiros and Rua de Taibessi and terminates at Taibessi Terminal.

After field observations, it was found that Microlet Route#5 stops at approximately 44 locations along its circular route, with the Convention Center being a crucial interchange point for microlets. Taibessi Terminal, the starting and ending point of the route, provides connections to Microlet Route#4, #7, and #8 (through route), as well as four regional bus routes that run between Dili-Aileu, Dili-Ainaro, Dili-Same, and Dili-Suai. **Figure 6.7** presents the Microlet Route#5 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.7: Microlet Route#5 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 34, while that in the off-peak (9:00AM-4:00PM) is 28. The maximum number of vehicles for Saturday service is 24 trips/hour, while that for Sunday is 23 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 70 minutes, equating to an average speed of 16km/hour. On Saturdays and Sundays, travel time is around 76 minutes and 70 minutes respectively.
- **Daily Boardings –** On average, some 8,100 passengers use Microlet Route#5 each day.

Table 6.38: Microlet Route#5 Existing Service Overview

Item	Microlet Route#5
Route Distance	17.8 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	8,100
Max Trips/Hour (Weekday)	34
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	70 mins
Travel Speed (Weekday AM Peak Average)	16 km/h
Travel Speed (Weekday PM Peak Average)	16 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.6.2 Performance Review

Daily and Annual Demand

On average, some 8,100 passengers use Microlet Route#5 on the weekdays, with Saturday accounting for about 7,100 passengers and Sunday accounting for about 6,900 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 2.8 million as shown in **Table 6.39**.

Table 6.39: Estimated Daily and Annual Boardings – Microlet Route#5

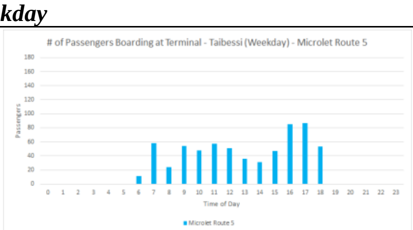
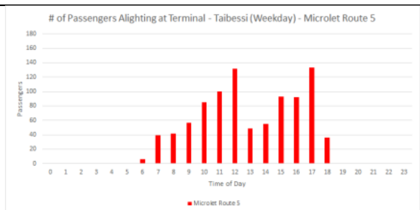
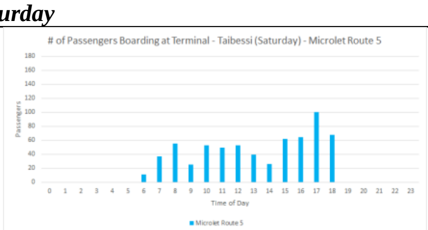
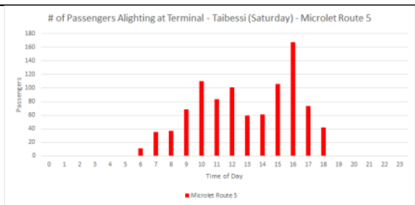
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	8,100	2,019,000
Saturday	7,100	357,000
Sunday	6,900	465,000
Total		2,841,000

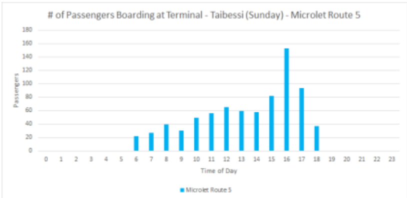
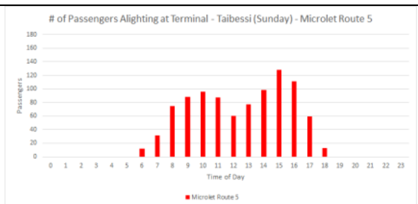
Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.40 presents the hourly boarding/alighting profile at Taibessi Terminal during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.40: Boarding Activity by Time of Day – Microlet Route#5 (Taibessi Terminal)

Boarding Activity	Alighting Activity
Weekday	
	
Key Findings: • Boarding activity is relatively higher in the afternoon/evening than in the morning. In the morning, boarding ranges between 10-60, with a peak of 60 boardings/hour from 7:00-8:00AM. In the afternoon, boarding activity records slightly lower around 30-50 boardings/hour. The peak boarding activity is observed between 4:00PM-6:00PM, with about 90 boardings per hour. • Alighting activity peaks are higher in the mid-day afternoon and evening compared to the morning. Some 40-60 alightings /hour are observed in the morning then gradually increase to 130 alightings/hour at 12:00PM. From 1:00-3:00PM, alighting activity is relatively low ranging around 50 alightings/hour. The afternoon peak is recorded from 5:00-6:00PM with 130 alightings/hour, before dropping to under 40 after 6:00PM.	
Saturday	
	
Key Findings: • Boarding is higher in the evening than other time periods. In the morning, boarding activity ranges between 20-40, with a peak of 40 boardings/hour observed from 9:00-10:00AM. In the afternoon, boarding activity records slightly higher on average 60 boardings/hour. The peak boarding activity is observed between 5:00PM-6:00PM, with about 150 boardings per hour.	

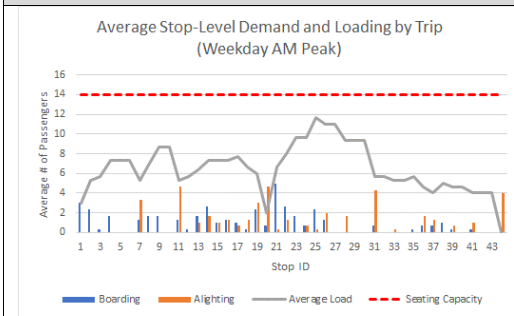
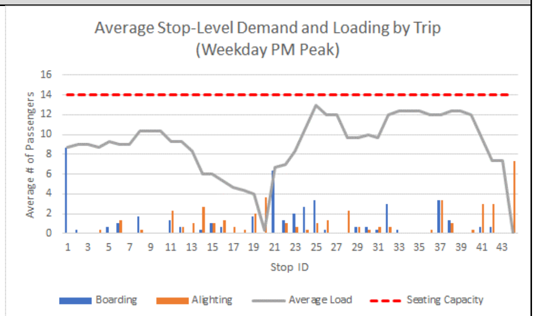
Boarding Activity	Alighting Activity
• Alighting activity peaks are relatively higher in the morning and evening. Some 10-80 alightings /hour are observed in the morning then gradually increase to 100 alightings/hour at 11:00AM. From 1:00-3:00PM, alighting activity is relatively low ranging around 60-80 alightings/hour. The afternoon peak is recorded from 4:00-5:00PM with 130 alightings/hour, before dropping to below 20 after 7:00PM.	
Sunday	
	
Key Findings: • Boarding activity is higher in the evening than other time periods. In the morning, boarding activity ranges between 20-60, with a peak of 60 boardings/hour observed from 11:00-12:00PM. In the afternoon, boarding activity remains the same at an average of 60 boardings/hour. The peak boarding activity is observed between 4:00PM-5:00PM, with about 150 boardings per hour. • Alighting activity peaks are relatively higher in the morning and evening. Some 10-100 alightings /hour are observed in the morning. Alighting activity in the afternoon is relatively low, ranging around 60-80 alightings/hour. The afternoon peak is recorded from 3:00-4:00PM with 130 alightings/hour, then gradually declines to below 20 after 6:00PM.	

Average Stop-Level Demand and Vehicle Loading by Peak Periods

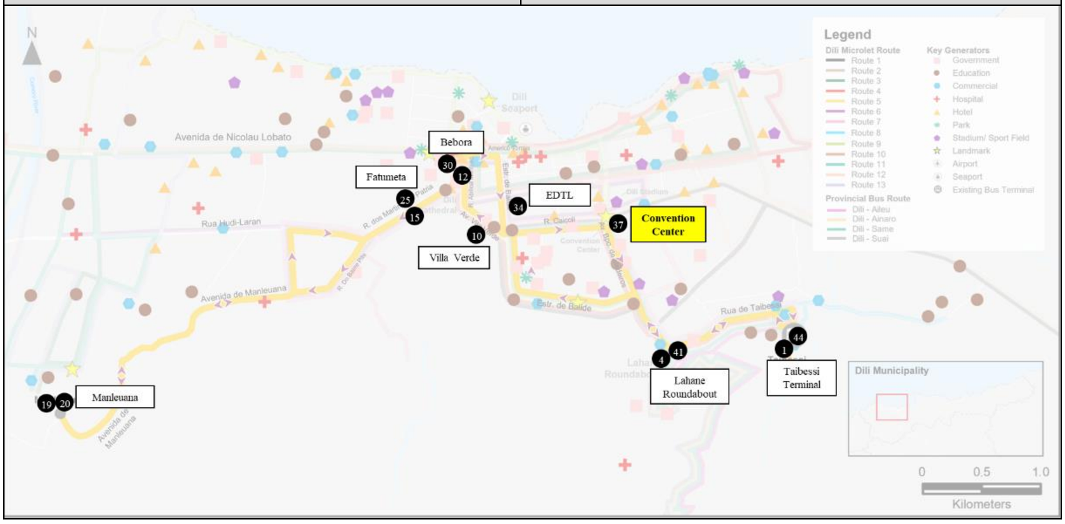
Table 6.41 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#5 operates at 85% of the stated capacity (or over 12 passengers/trip) in the AM Peak around Stop#25 (Fatumeta). In the PM Peak, Microlet Route#5 operates at over 90% of capacity (13 passengers/trip) around Stop#25-39 (from Fatumeta to before Lahane Roundabout) before heading back to Taibessi Terminal.

Table 6.41: Average Stop-Level Demand and Loading by Trip (Microlet Route#5 – Weekday Peak)

AM Peak	PM Peak
	

AM Peak	PM Peak



6.4.6.3 Service Gaps and Opportunities

Key gaps for Microlet Route#5 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.42: Summary of Microlet Route#5 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	Moderate	• The route serves directly to Taibessi Terminal. • There is opportunity to directly link the route to Manleuana Market (to increase interchange opportunities.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the city center (i.e., government buildings, education facilities) as well as the residential area near Manleuana are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route. However, potential extension of the western portion (Ave. de Manleuana near Manleuana Market) may generate more ridership to improve productivity.

6.4.6.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Service coverage and routing enhancement measures are proposed as shown in the map below, including applicability to the Scenarios defined in **Section 6.3**:

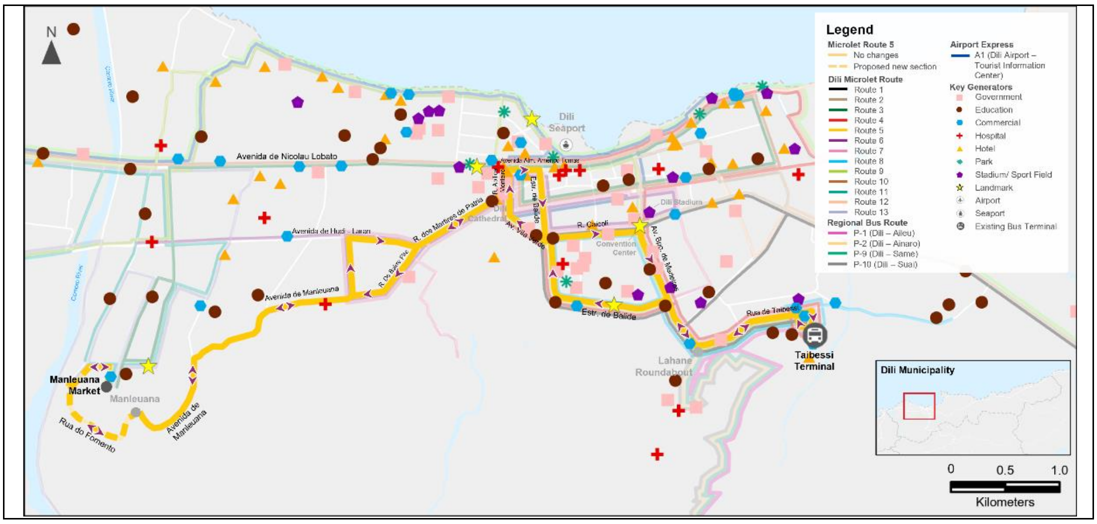


Figure 6.8: Microlet Route#5 – Modified

Table 6.43: Microlet Route#5 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	Extend Route	Extend to Manleuana Market	The western end terminates near Manleuana Market (about 1.8km away). Proposed to extend the route to Manleuana Market to increase interchange opportunities. In addition, a new terminal site is proposed adjacent to Manleuana Market.	✓	✓	✓

Route Restructuring Implications

The proposed scheme extends the route length by 3.8km from 17.8km to 21.6km, thus elongating the average peak roundtrip travel time by 13 minutes. Despite this, several benefits will be generated as follows:

- **Enhanced Interchange Opportunities** – Enabled direct and convenient interchange with microlet routes and regional routes at Manleuana Market.
- **Direct Manleuana Market -Taibessi Corridor** – Improved connectivity between two public transport hubs in Dili.

Table 6.44: Microlet Route#5 Proposed Service Coverage Enhancements

	Existing	**Immediate (2025)**	**Upgrade (2035)**	**Visionary (2035)**
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Tabessi Terminal	Taibessi Terminal Manleuana Market	Taibessi Terminal Manleuana Market	Taibessi Terminal Manleuana Market
Distance (km)	17.8	21.6	21.6	21.6
Avg. Peak Roundtrip Travel Time (mins) [B]	73	86	86	86
# of Connections with Current/Future Public Transport at Terminal	Microlet: 3 Regional Bus: 4	Microlet: 5 (Taibessi – 3; Manleuana – 2) Regional Bus: 4 (Taibessi – 4)	Microlet: 5 (Taibessi – 3; Manleuana – 2) Regional Bus: 4 (Taibessi – 4)	Microlet: 5 (Taibessi – 3; Manleuana – 2) Regional Bus: 4 (Taibessi – 4)

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in **Table 6.45**. Thus in 2025, if the demand at 12:00AM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2-minute headway (assuming a vehicle load of 12 passengers).

Table 6.45: Microlet Route#5 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)													
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	12	3.5	4.5	3.5	3	2.5	2	3	3	6.5	5	5.5	7.5	-
Saturday	20	6.5	5	8.5	4	4	3.5	4	4.5	3.5	4	3	4.5	-
Sunday	12	6.5	3.5	3.5	3.5	2.5	4	3.5	3	5.5	3.5	6	12	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	10	3	4	3	3	2.5	2	3	3	6.5	4.5	5	6.5	-
Saturday	20	6.5	4.5	8.5	4	3.5	3	3.5	4	3	3.5	2.5	4	-
Sunday	12	6.5	3	3.5	3	2.5	3.5	3.5	2.5	5	3.5	6	10	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	8.5	2.5	3.5	2.5	2.5	2	1.5	2.5	2.5	5.5	4	4	5.5	-
Saturday	15	5	3.5	6.5	3	2.5	2.5	2.5	3	2.5	3	2	3.5	-
Sunday	10	5	2.5	2.5	2.5	2	3	2.5	2	4	2.5	4.5	8.5	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	30	12	15	10	10	8.5	6.5	10	10	20	15	15	20	-
Saturday	60	20	15	30	12	12	10	12	12	10	12	8.5	15	-
Sunday	30	20	10	12	12	8.5	12	12	8.5	15	10	20	30	-

Service, Demand, and Productivity Implications

Weekday demand is expected to first grow slightly under the 2025 Immediate scenario and then by over 30% under the 2035 Upgrade scenario as compared to Existing, which leads to steadily increasing service parameters of number of round trips, vehicle kilometers/hours, and fleet size as well. Peak headway decreases from 2 minutes to 1.5 minutes, while the estimated fleet size requirements are 43 microlets in the Existing, to 52 in the 2025 Immediate, to 69 Microlets or 17 conventional buses in the 2035 scenarios.

Table 6.46 shows the existing weekday impacts on service, demand, and productivity of Microlet Route#5.

Table 6.46: Microlet Route#5 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	2	2	1.5	6.5
# of Round Trips / Day	210	230	270	70
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	39	47	62	15
Fleet Size (with 10% Spares)	43	52	69	17
Vehicle-Km	3,740	4,770	5,780	1,450
Vehicle-Hour	280	360	430	110
Daily Ridership (Boardings)	8,140	8,780	11,700	12,170
Boardings per Vehicle-Km	2.2	1.8	2.0	8.4
Boardings per Vehicle-Hour	29.5	24.9	27.4	114.2
Annualized Ridership	2,019,000	2,177,000	2,901,000	3,017,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

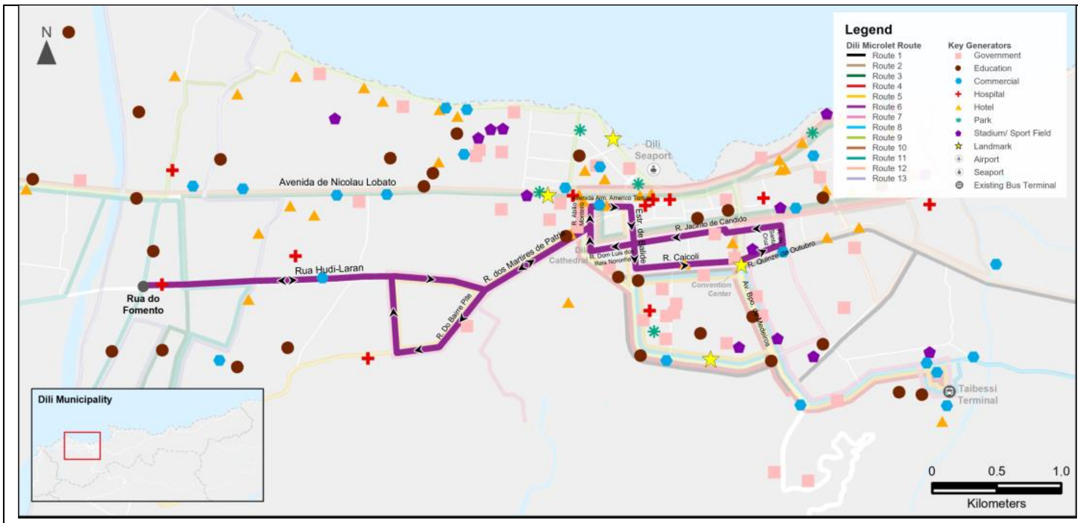
6.4.7 Dili Microlet Route#6 – Rotunda Fomento Circular

6.4.7.1 Route Overview

Microlet Route#6 (Rotunda Fomento Circular) is a one-way circular route linking Rotunda Fomento Circular to the city center and back to Rua do Fomento – with a total length of 12.2km. Starting from Rua do Fomento (on-street stop), the route operates clockwise heading eastbound along Rua Hudi-Laran and R. dos Matires de Patria, runs short distance along Ave Alm. Americo Tomas, then runs southbound along Estr. De Balide before turning right at R. Caicoli (passing through government and medical facilities). After Convention Center, the route runs along R. Jacinto de Candido (passing more government buildings and education centers) and heads westbound along R. Jacinto de Candido, before returning to R. dos Matires de Patria. The route takes a short detour via R. Do Bairre Pite and runs westbound along Rua Hudi-Laran before terminating at Rua do Fomento (on-street stop).

Based on field observations of various trips, the route serves around 30 stops along the circular route, with the Convention Center serving as a key microlet interchange location.[86] Microlet Route#6 does not provide linkage to any routes at existing terminal. **Figure 6.9** presents the Microlet Route#1 routing, key generators, as well as interchange points with other public transport services.

[86] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.9: Microlet Route#6 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 43, while that in the off-peak (9:00AM-4:00PM) is 28. The maximum number of vehicles for Saturday service is 41 trips/hour, while that for Sunday is 27 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 47 minutes, equating to an average speed of 15km/hour. On Saturdays and Sundays, travel time is around 54 minutes and 37 minutes respectively.
- **Daily Boardings –** On average, some 6,200 passengers use Microlet Route#6 each day.

Table 6.47: Microlet Route#6 Existing Service Overview

Item	Microlet Route#6
Route Distance	12.2 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	6,200
Max Trips/Hour (Weekday)	43
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	47 mins
Travel Speed (Weekday AM Peak Average)	15 km/h
Travel Speed (Weekday PM Peak Average)	15 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.7.2 Performance Review

Daily and Annual Demand

On average, some 6,200 passengers use Microlet Route#6 on the weekdays, with Saturday accounting for about 6,000 passengers and Sunday accounting for about 5,400 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 2.2 million as shown in **Table 6.48**.

Table 6.48: Estimated Daily and Annual Boardings – Microlet Route#6

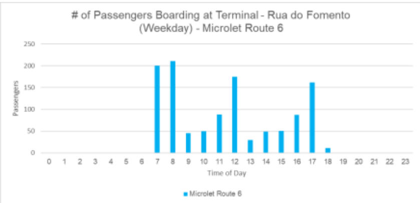
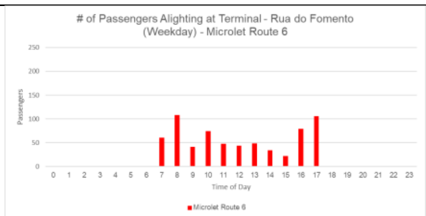
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	6,200	1,537,000
Saturday	6,000	302,000
Sunday	5,400	364,000
Total		2,203,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.49 presents the hourly boarding/alighting profile at Rua do Fomento during the weekday (as surveys for this location were only conducted on the weekday, with starting hour indicated in the table).

Table 6.49: Boarding Activity by Time of Day – Microlet Route#6 (Rua do Fomento)

Boarding Activity	Alighting Activity
Weekday	
	

Key Findings:

- Boarding activity shows high patronage at particular periods in the morning, mid-day, and afternoon. In the morning, the peak boarding activity is observed between 7:00AM-9:00AM, with over 200 boardings/hour (then drops to some 50 boardings/hour). In the afternoon, the boarding activity reaches 175 boardings/hour during the 12:00PM-1:00PM period (then drops to some 50 boardings/hour). In the evening, over 160 boardings/hour are observed from 5:00-6:00PM.
- Alighting activity is relatively higher in the morning and evening. A peak of 108 alightings/hour are recorded between 8:00-9:00AM. In the afternoon, around 50 alightings/hour are recorded without significant peak alighting activity. Alighting activity increases in the late evening, with over 100 alightings/hour recorded from 5:00-6:00PM.

Note: This route does not serve any terminal in Dili. A follow-up survey (separate from terminal surveys) was conducted only on the weekday to collect the profile of boarding/alighting activities by the time of day.

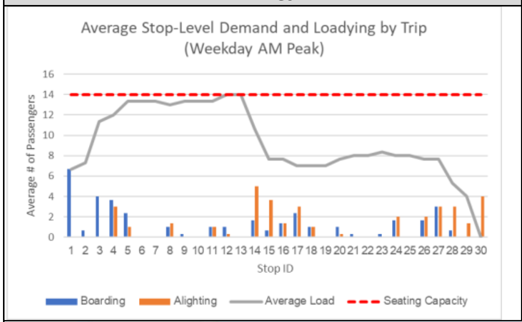
Average Stop-Level Demand and Vehicle Loading by Peak Periods

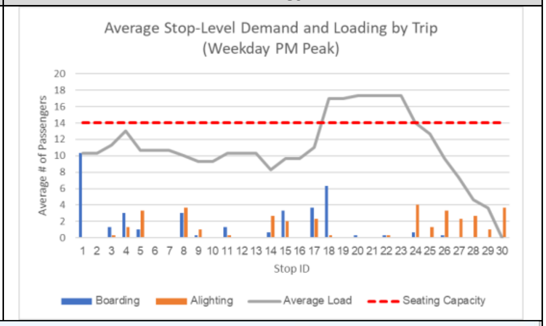
Table 6.50 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

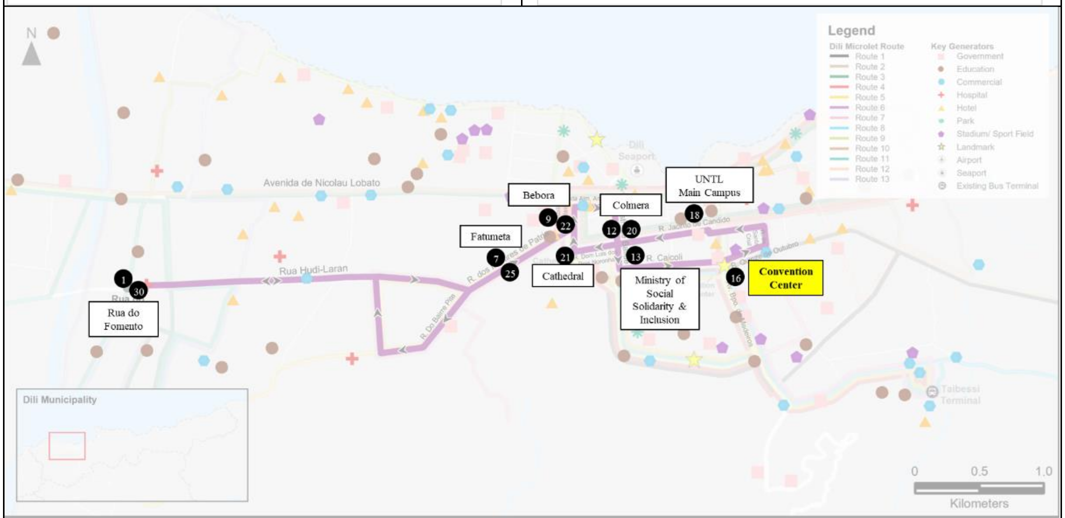
- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#6 operates at nearly 100% of the stated capacity (or 14 passengers/trip) in the AM Peak around Stop#5-13 (near Fatumeta and Colmera). In the PM Peak, Microlet Route#6 operates at 120% of capacity (or about 17 passengers/trip) around Stop#18-23 (between UNTL Main Campus and Bebora) heading back to Rua do Fomento.

Table 6.50: Average Stop-Level Demand and Loading by Trip (Microlet Route#6 - Weekday Peak)

AM Peak	PM Peak







6.4.7.3 Service Gaps and Opportunities

Key gaps for Microlet Route#6 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.51: Summary of Microlet Route#6 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	Low	• No direct connection to existing terminals is observed. • There is opportunity to directly link the route to nearby terminal sites such as Manleuana Market and Taibessi Terminal to increase interchange opportunities.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators the city center (i.e., government buildings, education facilities) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is overloaded on this route during both AM peak and PM peak.

6.4.7.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Microlet Route#6 currently does not serve existing terminals in Dili, instead it starts/ends at Rua do Fomento, which is an on-street stop without passenger facilities. Extension of the route to the nearby terminals/off-street interchange (i.e., Taibessi, Manleuana Market) would result in coverage duplications with other routes. Another alternate location is to use an open space near the east of Comoro River as a potential on-street interchange location – as shown in **Figure 6.10**. However, this space is currently used for logistics purposes (such as collecting/supplying sand from the river). No modification to this route is proposed at this stage, however further assessment to enhance service coverage is necessary in the future.

Source: Google Map

Figure 6.10: Existing On-Street Stop and Potential Off-Street Interchange Location – Microlet Route#6 on Rua do Fomento

Table 6.52: Microlet Route#6 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability Immediate (2025)	Applicability Upgrade (2035)	Applicability Visionary (2035)
1	No Change	No Change	Rua do Fomento starts/ends at an on-street stop (without passenger facilities). Connecting to nearby terminal would result in coverage duplications. Thus, no route modification is proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.53: Microlet Route#6 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Manleuana Market	Manleuana Market	Manleuana Market	Manleuana Market
Distance (km)	16.8	16.8	16.8	16.8
Avg. Peak Roundtrip Travel Time (mins) [B]	59	59	59	59
# of Connections with Current/Future Public Transport at Terminal	None	None	None	None

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in

Table 6.54. Thus in 2025, if the demand at 12:00PM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2 minute headway (assuming a vehicle load of 12 passengers).

Table 6.54: Microlet Route#6 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	7PM
Existing Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	2	1.5	5.5	5.5	3	2	6.5	5	5.5	3	2.5	30	-
Saturday	-	2.5	1.5	10	5.5	1.5	1.5	3.5	2.5	4	3.5	2	30	-
Sunday	-	3.5	1.5	5.5	6	4	5	10	6	6.5	4	4.5	60	-
Immediate (2025) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	2	1.5	5	5.5	2.5	2	6.5	4.5	5.5	3	2.5	30	-
Saturday	-	2.5	1.5	10	5	1.5	1.5	3.5	2.5	3.5	3.5	2	20	-
Sunday	-	3.5	1	5	6	3.5	4.5	10	5.5	6.5	3.5	4.5	60	-
Upgrade (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	1.5	1.5	4	4.5	2	1.5	5	3.5	4	2	2	20	-
Saturday	-	2	1	7.5	4	1	1	2.5	2	3	3	1.5	20	-
Sunday	-	2.5	1	4	4.5	3	4	8.5	4.5	5	2.5	3	60	-
Visionary (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	6	5.5	15	20	8.5	6.5	20	15	15	10	7.5	60	-
Saturday	-	8.5	4.5	30	15	5	4.5	10	8.5	12	12	6.5	60	-
Sunday	-	12	4.5	15	20	12	15	30	20	20	10	12	60	-

Service, Demand, and Productivity Implications

Weekday demand and service parameters remain largely unchanged between the Existing and 2025 Immediate scenario then increase by over 30% under 2035 scenarios. Still, the peak headways remain at 1.5 minutes level for microlet services, which leads to no change in required fleet size of 42 microlets (or 13 conventional buses) despite an increase in round trips and vehicle kilometers/hours. **Table 6.55** shows the weekday impacts on service, demand, and productivity of Microlet Route#6.

Table 6.55: Microlet Route#6 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	1.5	1.5	1.5	5.5
# of Round Trips / Day	230	230	290	80
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	38	38	38	11
Fleet Size (with 10% Spares)	42	42	42	13
Vehicle-Km	2,710	2,800	3,520	890
Vehicle-Hour	210	210	270	70
Daily Ridership (Boardings)	6,200	6,530	8,580	8,920
Boardings per Vehicle-Km	2.3	2.3	2.4	10.1
Boardings per Vehicle-Hour	30.5	31.1	32.5	134.8
Annualized Ridership	1,537,000	1,619,000	2,127,000	2,212,000

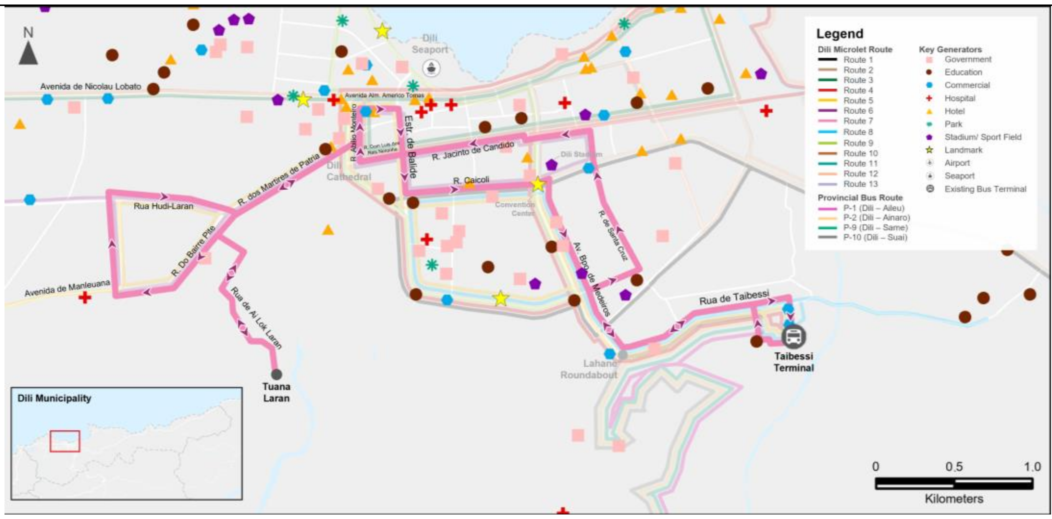
Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.8 Dili Microlet Route#7 – Taibessi Terminal Circular via Tuana Laran

6.4.8.1 Route Overview

Microlet Route#7 (Taibessi Terminal Circular via Tuana Laran) is a one-way circular route linking Taibessi Terminal to the northern part of city center and back to Taibessi Terminal – with a total length of 15.9km. Starting from Taibessi Terminal, the route operates clockwise along Rua de Taibessi, turns right along R. de Santa Cruz and heads to the west along R. Jacinto de Candido (passing educational facilities). The route then takes R. dos Martires de Patria and R. do Bairre Pite, then turning left along Rua de Ai Lok Laran (mostly low-rise residential areas) before reaching Tuana Laran. From Tuana Laran, the route circulates around R Do Bairre Pite and Rua Hudi-Laran, continues east along R. dos Martires de Patria then heads to the south along Estr. de Balide and to the east along R. Caicoli (passing by government buildings, medical facilities). After Convention Center, the route operates southbound along Av. Bpo de Medeiros and terminates at Taibessi Terminal.

Field observations of various trips indicate that Microlet Route#7 serves approximately 61 stops along the circular route, with the Convention Center serving as a key interchange location for microlets. The route provides a linkage with Microlet Route#4, #5, #8 (through route), and four regional bus routes at Taibessi Terminal, including routes between Dili-Aileu, Dili-Ainaro, Dili-Same, and Dili-Suai. **Figure 6.2** presents the Microlet Route#7 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.11: Microlet Route#7 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 19, while that in the off-peak (9:00AM-4:00PM) is 15. The maximum number of vehicles is 14 trips/hour for both Saturday and Sunday service.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 75 minutes, equating to an average speed of 13km/hour. On Saturdays and Sundays, travel time is around 62 minutes and 61 minutes respectively.
- **Daily Boardings –** On average, some 5,300 passengers use Microlet Route#7 each day.

Table 6.56: Microlet Route#7 Existing Service Overview

Item	Microlet Route#7
Route Distance	15.9 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	5,300
Max Trips/Hour (Weekday)	19
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	75 mins
Travel Speed (Weekday AM Peak Average)	13 km/h
Travel Speed (Weekday PM Peak Average)	13 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.8.2 Performance Review

Daily and Annual Demand

On average, some 5,300 passengers use Microlet Route#7 on the weekdays, with Saturday accounting for about 4,400 passengers and Sunday accounting for about 3,000 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 1.7 million as shown in **Table 6.57**.

Table 6.57: Estimated Daily and Annual Boardings – Microlet Route#7

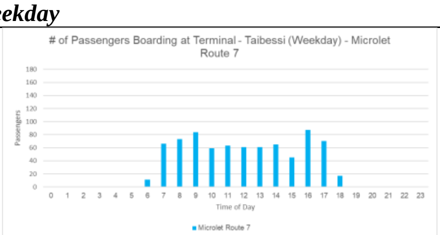
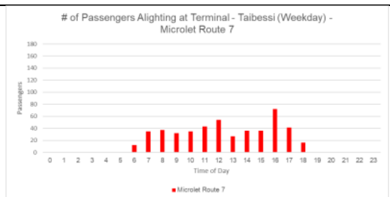
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	5,300	1,312,000
Saturday	4,400	220,000
Sunday	3,000	202,000
Total		1,734,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

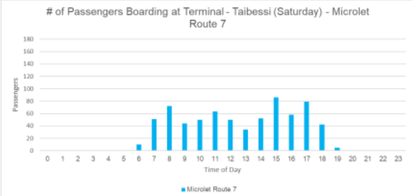
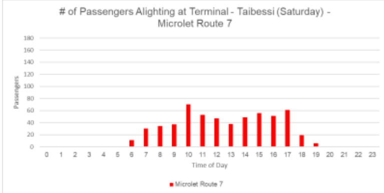
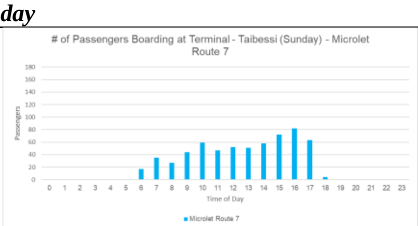
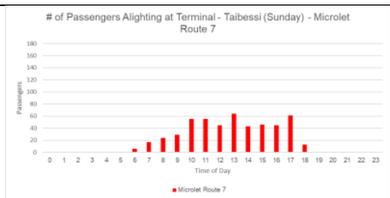
Route-Level Boarding Activity

Table 6.58 presents the hourly boarding/alighting profile at Taibessi Terminal during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.58: Boarding Activity by Time of Day – Microlet Route#7 (Taibessi Terminal)

<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:

Boarding activity patterns range between 60-90 boardings/hour throughout the day, with the exception of early morning from 6:00-7:00AM (with only 10 boardings/hour) and late evening from 6:00-7:00PM (with only 20 boardings/hour). Peak boarding is observed from 4:00-5:00PM with some 90 boardings/hour.
Alighting activity patterns range between 20-60 alightings/hour throughout the day, with the exception of early morning from 6:00-7:00AM (with only 10 alightings/hour) and late evening from 6:00-7:00PM
</td></tr>
</table>

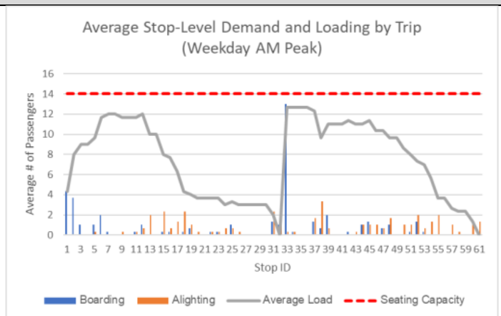
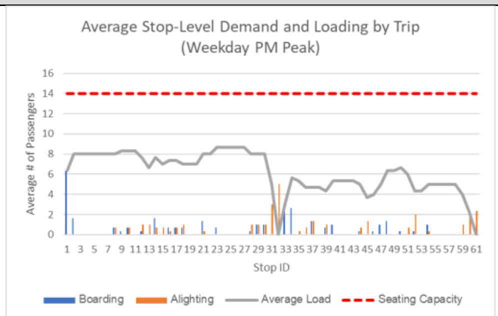
(with only 20 alightings /hour). Peak alighting is observed from 4:00-5:00PM with some 70 boardings/hour.	
Saturday	
	
Key Findings: • Boarding activity is relatively higher in the morning/evening. In the morning, boarding activity ranges between 10-70, with a peak of 70 boardings/hour observed from 8:00-9:00AM. In the afternoon, boarding activity records slightly lower around 30-60 boardings/hour. The peak boarding activity is observed between 3:00PM-6:00PM, with about 80 boardings per hour, before dropping to 10-40 after 6:00PM. • Alighting activity reaches its peak, with a maximum of about 70 alightings/hour from 10:00-11:00AM. During the afternoon hours, the alighting activity is comparatively lower, ranging between 40-60 alightings/hour.	
Sunday	
	
Key Findings: • Boarding activity is relatively higher in the afternoon than in the morning, with some 60-80 boardings per hour during the afternoon period, compared to 40-60 boardings per hour in the morning. Boarding activity shows a gradual increase throughout the day, reaching its peak above 80 boardings per hour during the 4:00PM-5:00PM period. • Alighting activity remains the same throughout the day ranging between 40-60 alightings/hour (except early morning). A peak of some 70 alightings per hour recorded during the 1:00-2:00PM period.	

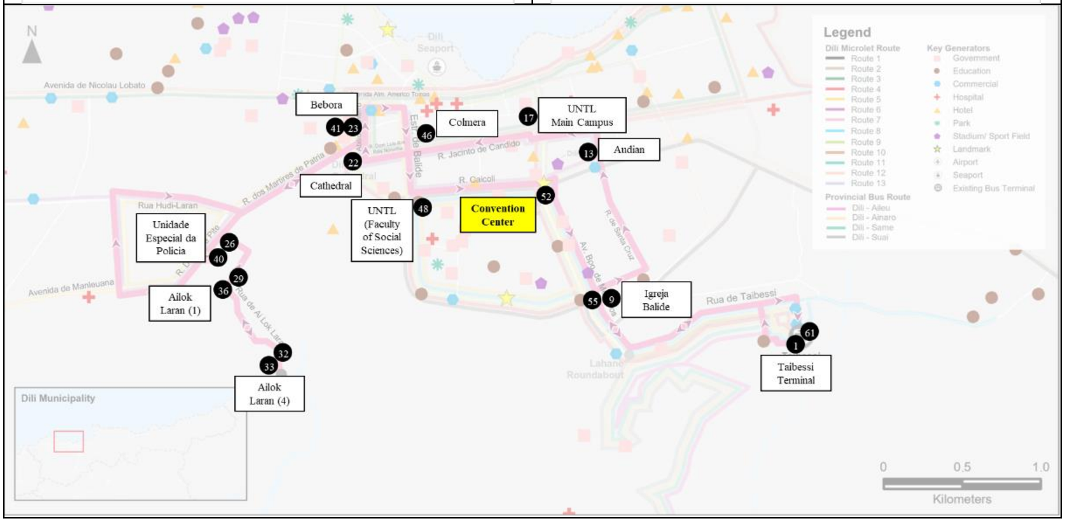
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.59 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#7 operates at around 90% of the stated capacity (or over 13 passengers/trip) in the AM Peak around Stop#33-36 (along Ailok Laran, before reaching Bairre Pite). In the PM Peak, Microlet Route#7 operates at about 60% of capacity around Stop#23-27 between Bebora and Bairre Pite Landu. Average loading indicates that all passengers get off at Stop#32-33 near Ailok Laran (4).

Table 6.59: Average Stop-Level Demand and Loading by Trip (Microlet Route#7 - Weekday Peak)

AM Peak	PM Peak
	



6.4.8.3 Service Gaps and Opportunities

Key gaps for Microlet Route#7 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.60: Summary of Microlet Route#7 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route serves directly Taibessi Terminal, thus creating interchange opportunities.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the city center (i.e., government buildings, education facilities) as well as the low-rise residential areas near Tuana Laran are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route (though average loading in AM Peak is 90% of the capacity).

6.4.8.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

The route serves Taibessi Terminal creating interchange opportunities with regional bus and other microlet routes and connects residents in the west to the city center. No modification is proposed to the exiting route.

Table 6.61: Microlet Route#7 Proposed Service Coverage Enhancements

				Applicability		
#	**Type of Enhancement**	**Enhancement Proposal**	**Rationale/ Relevance to Gaps**	**Immediate (2025)**	**Upgrade (2035)**	**Visionary (2035)**
1	No change	No change	The route serves Taibessi Terminal (interchange) and connects residents in the west to the city center. No modification proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.62: Microlet Route#7 Proposed Service Coverage Enhancements

	Existing	**Immediate (2025)**	**Upgrade (2035)**	**Visionary (2035)**
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Taibessi Terminal	Taibessi Terminal	Taibessi Terminal	Taibessi Terminal
Distance (km)	15.9	15.9	15.9	15.9
Avg. Peak Roundtrip Travel Time (mins) [B]	86	86	86	86
# of Connections with Current/Future Public Transport at Terminal	Microlet: 3 Regional Bus: 4	Microlet: 5 Regional Bus: 4	Microlet: 5 Regional Bus: 4	Microlet: 5 Regional Bus: 4

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in

Table 6.63. Thus in 2025, if the demand at 10:00AM is 120 passengers/hour, then this would equate to 10 trips/hour or a 6 minute headway (assuming a vehicle load of 12 passengers).

Table 6.63: Microlet Route#7 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	20	4.5	3.5	4.5	6	5	5	5	5	8.5	5.5	7.5	15	-
Saturday	-	6.5	5.5	6.5	5	7.5	8.5	8.5	7.5	4.5	6	5.5	7.5	-
Sunday	15	6.5	12	6.5	6.5	8.5	8.5	7.5	8.5	10	8.5	12	60	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	20	4.5	3.5	4.5	6	4.5	5	4.5	4.5	8.5	5.5	6.5	15	-
Saturday	-	6.5	5.5	6.5	4.5	6.5	7.5	7.5	6.5	4.5	5.5	5	7.5	-
Sunday	15	6.5	12	6	6.5	8.5	8.5	7.5	8.5	10	8.5	12	60	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	15	4	3	4	5	4	4.5	4	4	6.5	4.5	5.5	12	-
Saturday	-	5.5	4.5	5	4	6	6.5	6.5	6	3.5	4.5	4	5.5	-
Sunday	12	5.5	8.5	5	5.5	7.5	6.5	6	6.5	10	7.5	10	60	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	60	15	12	15	20	15	15	15	15	30	15	20	30	-
Saturday	-	20	20	20	15	20	30	30	20	15	15	15	20	-
Sunday	30	20	30	20	20	30	30	20	30	30	30	30	60	-

Service, Demand, and Productivity Implications

Weekday demand increases marginally between Existing and 2025 Immediate scenarios and then grows by around 20% under the 2035 Upgrade scenario, which is reflected in the decrease in peak headway from 3.5 minutes to 3.0 minutes. The fleet size also is estimated to expand from 30 to 35 microlets (or 9 conventional vehicles) between the Existing and 2035 Upgrade scenarios and correspondingly the vehicle kilometers/hours and round trips as well.

Table 6.64 shows the impacts on weekday service, demand, and productivity of Microlet Route#2.

Table 6.64: Microlet Route#7 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	3.5	3.5	3	12
# of Round Trips / Day	140	150	170	50
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	27	27	31	8
Fleet Size (with 10% Spares)	30	30	35	9
Vehicle-Km	2,190	2,320	2,620	700
Vehicle-Hour	200	210	240	70
Daily Ridership (Boardings)	5,290	5,500	6,740	7,010
Boardings per Vehicle-Km	2.4	2.4	2.6	10.0
Boardings per Vehicle-Hour	27.2	26.8	29.2	114.2
Annualized Ridership	1,312,000	1,363,000	1,672,000	1,738,000

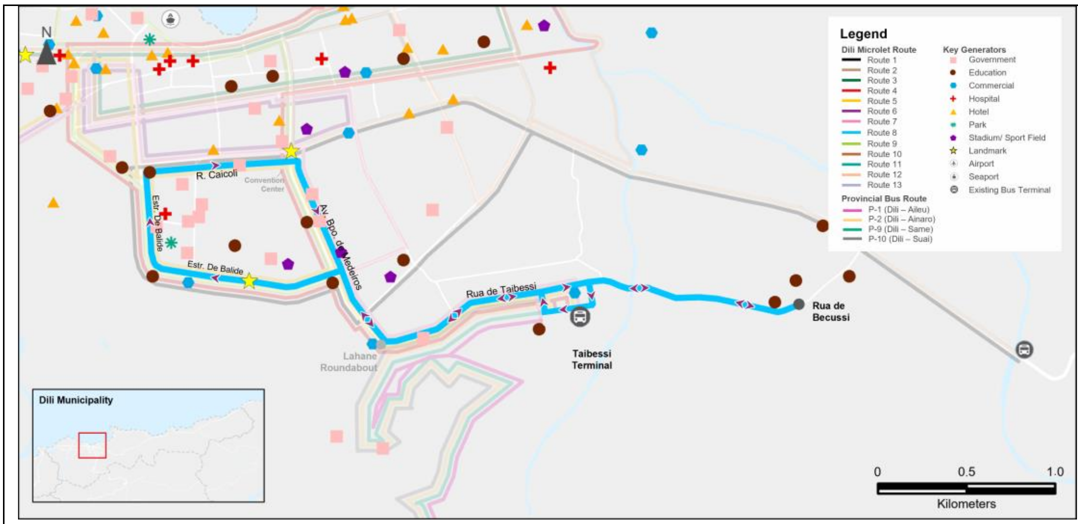
Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.9 Dili Microlet Route#8 – Rua de Becussi Circular

6.4.9.1 Route Overview

Microlet Route#8, also known as the Rua de Becussi Circular, is an east-west one-way circular connecting Rua de Becussi to the western part of the city center (through Taibessi Terminal), with a total length of 9.5km. Starting from Rua de Becussi, the route follows a clockwise direction, passing through Rua de Taibessi (through Taibessi Terminal without entering) and then turning left along Estr. De Balide. Then, the route runs east along R. Caicoli passing through government buildings and education facilities (such as UNTL). After stopping at Convention Center, the route heads to the south along Ave. Bpo. de Medeiros and Rua de Taibessi before ending at Rua de Becussi (without going through Taibessi Terminal).

Based on field observations of various trips, the route serves around 33 stops along the circular route, with the Convention Center serving as a key microlet interchange location.[87] Microlet Route#8 provides linkage with Microlet Route#4, #5, #7 and four regional bus routes by passing the Taibessi Terminal (including routes between Dili-Aileu, Dili-Ainaro, Dili-Same, and Dili-Suai). **Figure 6.12** presents the Microlet Route#8 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.12: Microlet Route#8 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 28, while that in the off-peak (9:00AM-4:00PM) is 25. The maximum number of vehicles for Saturday service is 27 trips/hour, while that for Sunday is 12 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 41 minutes, equating to an average speed of 14km/hour. On Saturdays and Sundays, travel time is around 46 minutes and 35 minutes respectively.
- **Daily Boardings –** On average, some 3,800 passengers use Microlet Route#8 each day.

[87] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.

Table 6.65: Microlet Route#8 Existing Service Overview

Item	Microlet Route#8
Route Distance	9.5 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	3,800
Max Trips/Hour (Weekday)	28
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	41 mins
Travel Speed (Weekday AM Peak Average)	14 km/h
Travel Speed (Weekday PM Peak Average)	14 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.9.2 Performance Review

Daily and Annual Demand

On average, some 3,800 passengers use Microlet Route#8 on the weekdays, with Saturday accounting for about 3,800 passengers and Sunday accounting for about 2,500 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 1.3 million as shown in **Table 6.66**.

Table 6.66: Estimated Daily and Annual Boardings – Microlet Route#8

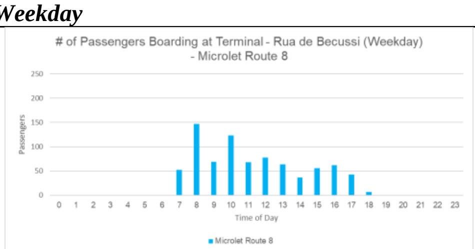
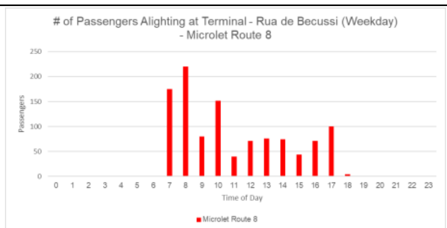
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	3,800	933,000
Saturday	3,800	188,000
Sunday	2,500	168,000
Total		1,289,000

Source: Arup Surveys
Notes:
A Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
B Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.67 presents the hourly boarding/alighting profile at Rua de Becussi during the weekday (with starting hour indicated in the table). Only weekday surveys were conducted for this route.

Table 6.67: Boarding Activity by Time of Day – Microlet Route#8 (Rua de Becussi)

Boarding Activity	Alighting Activity
Weekday	
	
Key Findings:	

Boarding Activity	Alighting Activity
Weekday	
• Boarding activity is relatively higher in the morning than in the afternoon. In the morning, a peak is observed from 8:00AM-9:00AM, with 150 boardings/hour. In the afternoon, boarding activity ranges from 60-80 in the 12:00PM-5:00PM period then drops to around 10-50 boardings/hour after 5:00PM. • Alighting activity shows variations throughout the day. A peak of 220 alightings/hour is observed in the morning hours between 8:00AM and 9:00AM. In the afternoon, alighting activity ranges around 70 alightings/hour. Alighting activity reaches to 100 alightings/hour in the 5:00PM-6:00PM period.	

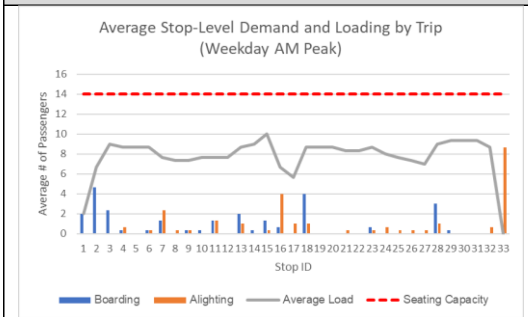
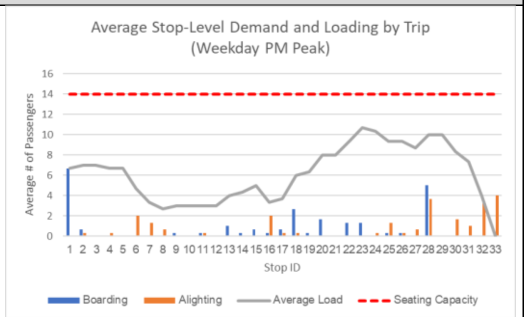
Note: This route does not serve any terminal in Dili. A follow-up survey (separate from terminal surveys) was conducted only on the weekday to collect the profile of boarding/alighting activities by the time of day.

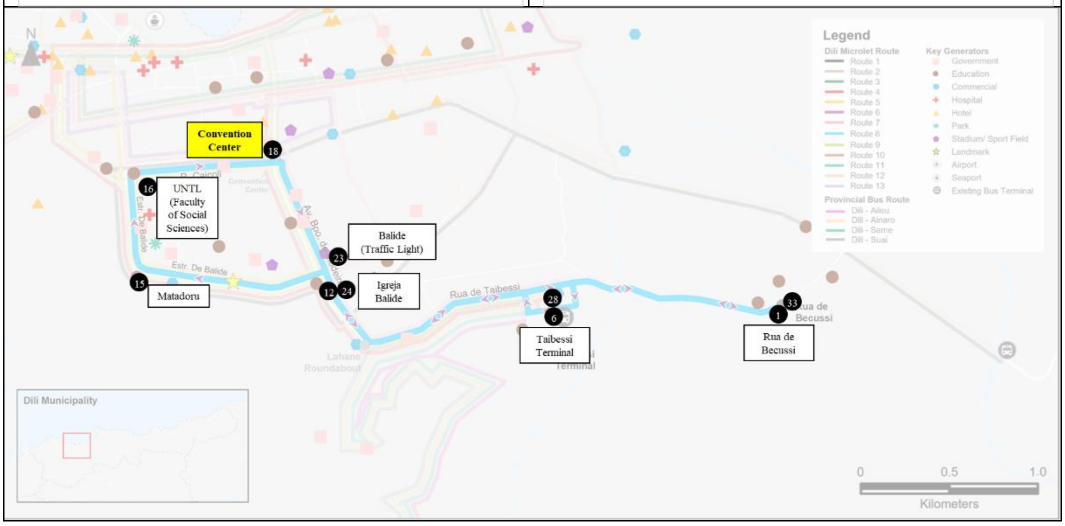
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.68 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#8 operates at/near 70% of the stated capacity (or 10 passengers/trip) in the AM Peak at several stops including Stop#15 (Matadoru) and Stop#29-32 (along Rua de Becussi). In the PM Peak, Microlet Route#8 operates slightly over 70% of capacity around Stop#23 (near Balide at traffic junction) before heading back to Rua de Becussi.

Table 6.68: Average Stop-Level Demand and Loading by Trip (Microlet Route#8 - Weekday Peak)

AM Peak	PM Peak
	



6.4.9.3 Service Gaps and Opportunities

Key gaps for Microlet Route#8 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.69: Summary of Microlet Route#8 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	Low	• This route passes through Taibessi Terminal but is not connected to existing terminals.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	Medium	• This route serves various key generators in the city center and provides access to school areas along Rua de Becussi (mostly used by students).
3	Minimize Microlet-Microlet Duplication	Low	• A majority of the route overlaps with Microlet Route#4 (except a segment from Taibessi Terminal to Rua de Becussi). However, Microlet Route#8 is used for short-distance trips (mainly by students). Combining these routes will inconvenience existing passengers, thus no route modification is made despite extensive duplication.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route.

6.4.9.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

No modification is made to this route (the original route is kept for existing passengers).

Table 6.70: Microlet Route#8 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Taibessi Terminal (through route)	Taibessi Terminal (through route)	Taibessi Terminal (through route)	Taibessi Terminal (through route)
Distance (km)	9.5	9.5	9.5	9.5
Avg. Peak Roundtrip Travel Time (mins) [B]	41	41	41	41
# of Connections with Current/Future Public Transport at Terminal	Microlet: 3 Regional Bus: 4	Microlet: 3 Regional Bus: 4	Microlet: 3 Regional Bus: 4	Microlet: 3 Regional Bus: 4

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in **Table 6.71**. Service headways are expected to slightly intensify with each future scenario alterations.

Table 6.71: Microlet Route#8 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	3	2.5	4	3	8.5	7.5	10	15	7.5	6.5	10	30	-
Saturday	-	3	2.5	4	2	10	8.5	8.5	30	6	8.5	12	30	-
Sunday	-	7.5	5.5	5.5	2.5	20	15	20	60	4	3.5	5	30	-
Immediate (2025) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	3	2.5	4	3	8.5	7.5	10	15	7.5	6	10	30	-
Saturday	-	3	2.5	3.5	2	10	8.5	8.5	30	6	8.5	12	30	-
Sunday	-	7.5	5.5	5.5	2.5	20	15	20	30	4	3	5	30	-
Upgrade (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	2.5	2	3.5	2.5	7.5	6.5	8.5	15	5.5	4.5	7.5	30	-
Saturday	-	2	2	2.5	1.5	8.5	6.5	6.5	20	5	7.5	10	20	-
Sunday	-	7.5	5	5.5	2.5	15	12	15	30	3	2.5	4	30	-
Visionary (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	10	8.5	15	10	30	30	30	60	20	20	30	60	-
Saturday	-	8.5	7.5	12	6.5	30	30	30	60	20	30	30	60	-
Sunday	-	30	20	20	10	60	30	60	60	12	12	15	60	-

Service, Demand, and Productivity Implications

As the service is proposed to be retained as it is, the daily ridership will increase naturally in the future scenarios, growing by roughly one thousand by 2035. The peak headway will also decrease slightly from 2.5 minutes to 2 minutes in the Upgrade scenario as a result, which the daily number of round trips increased from 140 to 170. If switching to conventional buses in Visionary scenario, the headway will become 8.5 minutes using 7 buses rather than 25 microlets.

Table 6.72 shows the existing weekday service, demand, and productivity of Microlet Route#8.

Table 6.72: Microlet Route#8 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	**Existing**	**Immediate (2025)**	**Upgrade (2035)**	**Visionary (2035)**
Peak Headway (Minutes)	2.5	2.5	2	8.5
# of Round Trips / Day	140	140	170	40
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	18	18	22	6
Fleet Size (with 10% Spares)	20	20	25	7
Vehicle-Km	1,240	1,240	1,530	380
Vehicle-Hour	100	100	130	40
Daily Ridership (Boardings)	3,760	3,900	4,780	4,970
Boardings per Vehicle-Km	3.0	3.1	3.1	13.1
Boardings per Vehicle-Hour	38.1	39.5	39.3	164.7
Annualized Ridership	933,000	967,000	1,184,000	1,231,000

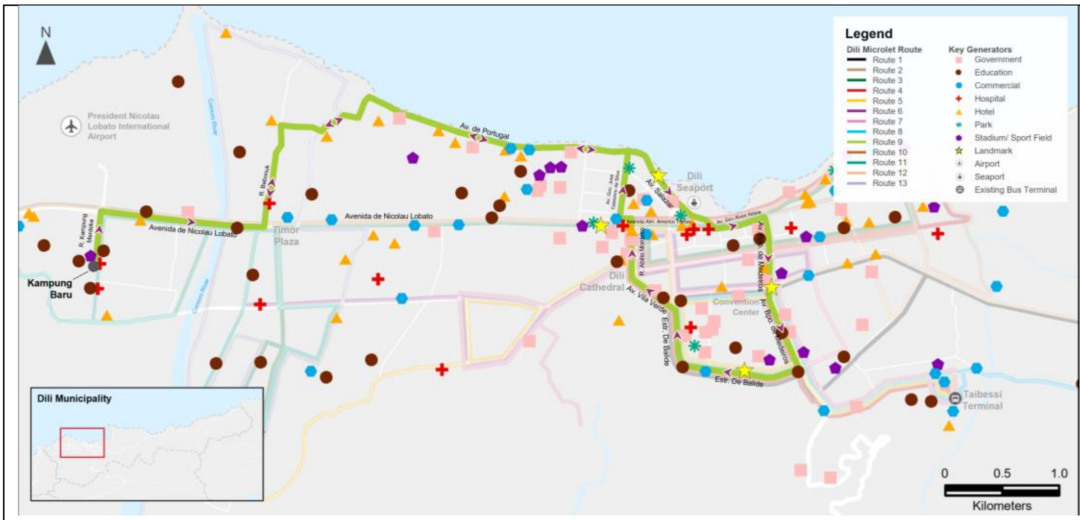
Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.10 Dili Microlet Route#9 – Kampang Baru Circular

6.4.10.1 Route Overview

Microlet Route#9 (Kampung Baru Circular) is an east-west one-way circular route linking Kampung Baru in the western peripheral zone to the city center and back to Kampung Baru – with a total length of 18.3km. Starting from Kampung Baru, the route operates clockwise along R. Kampung Merdeka and Ave. de Nicolau Lobato. After crossing the bridge over Comoro River, the route turns left via R. Bebonuk and continues to the west along the coastal road Av. de Portugal and Av. Salazar (passing through key government facilities, hotels, commercial areas). Then the route heads to the south along Av. Bpo. de Medeiros (passing through government buildings, medical facilities, as well as Convention Center), merges to Estr. de Balide and runs northbound via Av. Vila Verde and R. Gov. Jose Celestino da Silva (passing through government buildings, hospitals, etc.) before returning to Kampung Baru via the same roads (i.e., Ave. de Portugal, R. Bebonuk, Ave. de Nicolau Lobato, and Kampung Merdeka).

Based on field observations of various trips, the route serves around 38 stops along the circular route, with the Convention Center serving as a key microlet interchange location.[88] Microlet Route#9 does not provide linkage to any routes at existing terminal. **Figure 6.13** presents the Microlet Route#9 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.13: Microlet Route#9 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 38, while that in the off-peak

[88] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.

(9:00AM-4:00PM) is 54. The maximum number of vehicles for Saturday service is 51 trips/hour, while that for Sunday is 38 trips/hour.

- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 67 minutes, equating to an average speed of 17km/hour. On Saturdays and Sundays, travel time is around 22km/hour.
- **Daily Boardings –** On average, some 10,300 passengers use Microlet Route#9 each day.

Table 6.73: Microlet Route#9 Existing Service Overview

Item	Microlet Route#9
Route Distance	18.3 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	10,300
Max Trips/Hour (Weekday)	54
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	67 mins
Travel Speed (Weekday AM Peak Average)	19 km/h
Travel Speed (Weekday PM Peak Average)	18 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.10.2 Performance Review

Daily and Annual Demand

On average, some 10,300 passengers use Microlet Route#9 on the weekdays, with Saturday accounting for about 10,500 passengers and Sunday accounting for about 10,000 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 3.7 million as shown in **Table 6.74**.

Table 6.74: Estimated Daily and Annual Boardings – Microlet Route#9

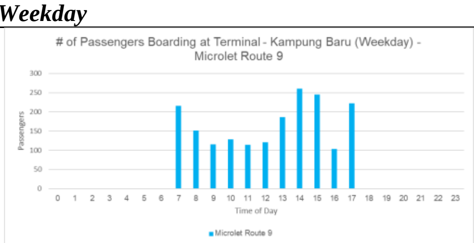
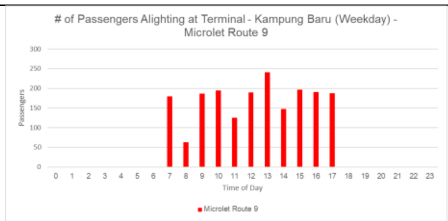
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	10,300	2,543,000
Saturday	10,500	525,000
Sunday	10,000	667,000
Total		3,735,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.75 presents the hourly boarding/alighting profile at Kampung Baru during the weekday (with starting hour indicated in the table) as surveys were only conducted at this time.

Table 6.75: Boarding Activity by Time of Day – Microlet Route#9 (Kampung Baru)

<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
Boarding activity is higher in the morning and late afternoon. In the morning, a peak is observed from 7:00AM-8:00AM, with around 220 boardings/hour. In the afternoon, boarding activity ranges 100-260, with a peak of 260 boardings/hour observed from 2:00PM-4:00PM period. In the evening after 5:00PM, about 220 boardings are observed until the end of service hour.
Alighting activity shows high patronage throughout the day ranging between 150-200 alightings/hour. A peak of 240 alightings/hour are observed from 1:00PM-2:00PM.</td></tr>
</table>

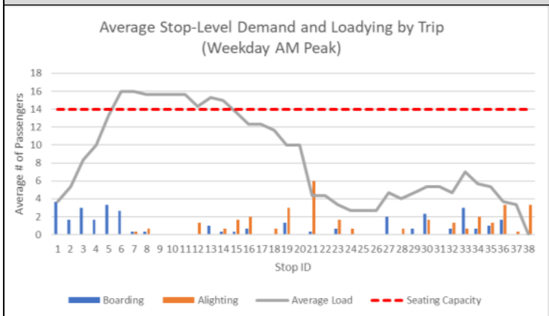
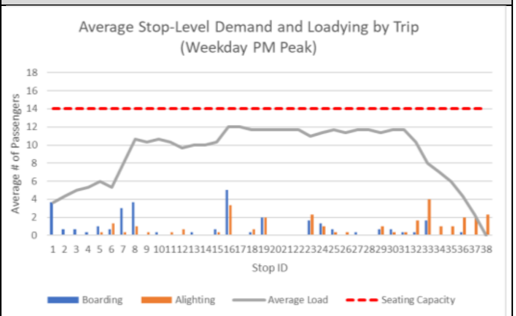
Note: This route does not serve any terminal in Dili. A follow-up survey (separate from terminal surveys) was conducted only on the weekday to collect the profile of boarding/alighting activities by the time of day.

Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.76 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

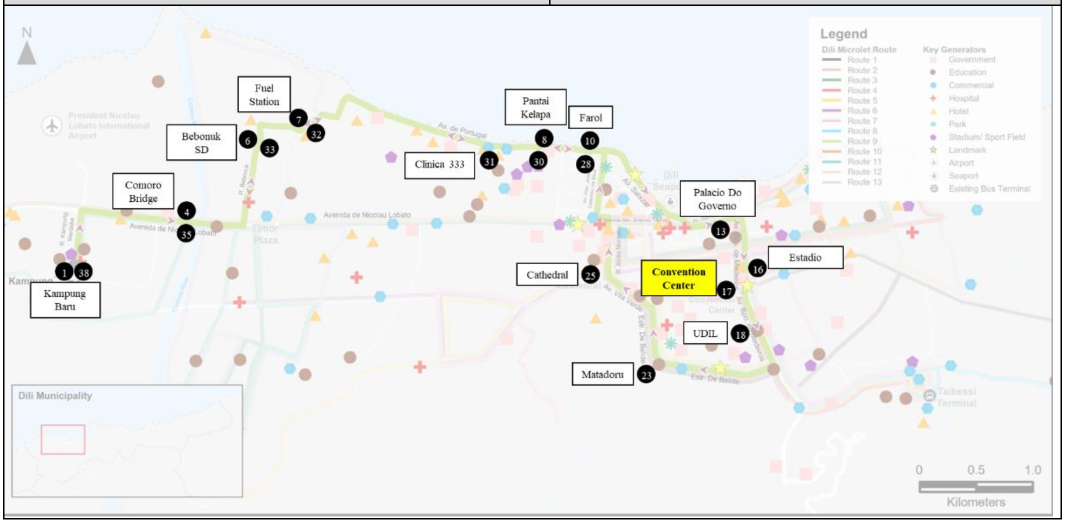
- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#9 operates at 114% of the stated capacity (or about 16 passengers/trip) in the AM Peak around Stop#6-14 (along the coast as well as near Dili Seaport).[89] In the PM Peak, Microlet Route#9 steadily operates at 85% of capacity around Stop#16-31 (from the coast to the city center).

Table 6.76: Average Stop-Level Demand and Loading by Trip (Microlet Route#9 - Weekday Peak)

AM Peak	PM Peak
	

[89] This route (in particular between Kampang Baru and Fuel Station) is overloaded as passengers sit on the floor and hang onto the door as explained in **Section 3.4.3.1**.

AM Peak	PM Peak



6.4.10.3 Service Gaps and Opportunities

Key gaps for Microlet Route#9 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.77: Summary of Microlet Route#9 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	Low	• Currently the route is not connected to exiting terminals. • There is opportunity to directly link the route to Taibessi (a busy terminal located close to the city center) to increase interchange opportunities.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the city center and coastal area (i.e., government buildings, education facilities, hotels) and residential areas in southwest of the city are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is overloaded on this route during AM peak.

6.4.10.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Service coverage and routing enhancement measures are proposed as shown in the map below, including applicability to the Scenarios defined in **Section 6.3**:

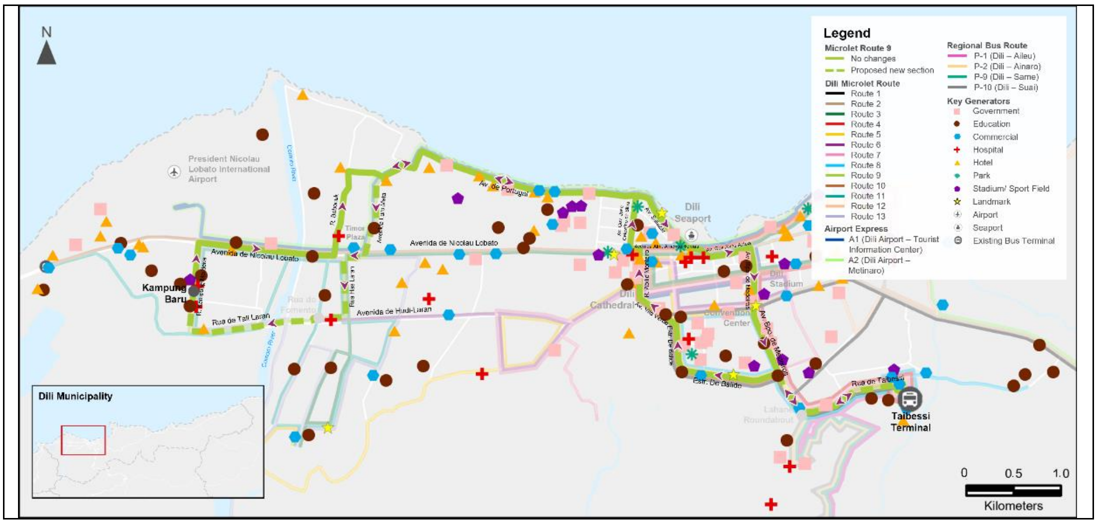


Figure 6.14: Microlet Route#9 – Modified

Table 6.78: Microlet Route#9 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	Extend Route	Extend the route to Taibessi Terminal	This route lacks connections to existing terminals. Extension of the southern segment to Taibessi Terminal will create interchange opportunities with other routes, while providing off-street interchange with passenger amenities.	✓	✓	✓

Route Restructuring Implications

The proposed scheme extends the route length by 4.4km from 18.3km to 22.7km, thus extending the average peak roundtrip travel time by 11 minutes. Despite this, several benefits will be generated as follows:

- **Enhanced Interchange Opportunities** – Enabled direct and convenient interchange with microlet routes and regional routes at Taibessi Terminal.

Table 6.79: Microlet Route#9 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	None	Taibessi Terminal	Taibessi Terminal	Taibessi Terminal
Distance (km)	18.3	22.7	22.7	22.7
Avg. Peak Roundtrip Travel Time (mins) [B]	67	80	80	80
# of Connections with Current/Future Public Transport at Terminal	None	Microlet: 5 Regional Bus: 4	Microlet: 5 Regional Bus: 4	Microlet: 5 Regional Bus: 4

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	Loop (Clockwise)	Loop (Clockwise)	Loop (Clockwise)	Loop (Clockwise)

[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in

Table 6.80. Thus in 2025, if the demand at 11:00AM is 240 passengers/hour, then this would equate to 20 trips/hour or a 3-minute headway (assuming a vehicle load of 12 passengers).

Table 6.80: Microlet Route#9 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	1.5	1.5	1.5	1.5	3	3	1.5	1.5	1.5	2.5	2.5	-	-
Saturday	-	1	1.5	1	1	6.5	2.5	2.5	5	1	3	1.5	-	-
Sunday	-	2	2.5	1.5	1.5	6.5	3	2.5	4.5	1	3	1.5	-	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	1.5	1.5	1.5	1.5	3	2.5	1.5	1.5	1.5	2.5	2.5	-	-
Saturday	-	1	1	0.5	1	6	2.5	2	4.5	1	2.5	1.5	-	-
Sunday	-	2	2.5	1	1.5	6	3	2.5	4.5	1	3	1.5	-	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	1.5	1	1	1.5	2.5	2	1	1	1	2	2	-	-
Saturday	-	0.5	1	0.5	1	4.5	2	1.5	3.5	0.5	2	1	-	-
Sunday	-	1.5	2	1	1.5	5	2.5	2	3.5	0.5	2.5	1	-	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	5.5	5	5	5.5	10	8.5	5	5.5	4.5	7.5	8.5	-	-
Saturday	-	3	4.5	2.5	4	20	7.5	6.5	15	3	8.5	4.5	-	-
Sunday	-	6.5	8.5	4.5	5.5	20	10	8.5	15	3	10	5	-	-

Service, Demand, and Productivity Implications

Demand is expected to grow increasingly from ~10% first in 2025 Immediate scenario, then by over 30% under 2035 Upgrade scenario, which prompts the peak headway to be reduced from 1.5 minutes to 1 minute. Correspondingly, the service parameters and fleet size requirement grow significantly as well, with nearly double the number of vehicles required – from 73 under 2025 Immediate scenario to 109 microlets (or 25 conventional buses) under 2035 scenarios.

Table 6.81 shows the impacts on weekday service, demand, and productivity of Microlet Route#9.

Table 6.81: Microlet Route#9 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	1.5	1.5	1	4.5
# of Round Trips / Day	370	380	500	120
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	54	66	99	22
Fleet Size (with 10% Spares)	60	73	109	25
Vehicle-Km	6,750	8,460	11,240	2,570
Vehicle-Hour	440	550	730	170

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Daily Ridership (Boardings)	10,260	11,210	14,840	15,430
Boardings per Vehicle-Km	1.5	1.3	1.3	6.0
Boardings per Vehicle-Hour	23.4	20.4	20.3	92.2
Annualized Ridership	2,543,000	2,779,000	3,679,000	3,826,000

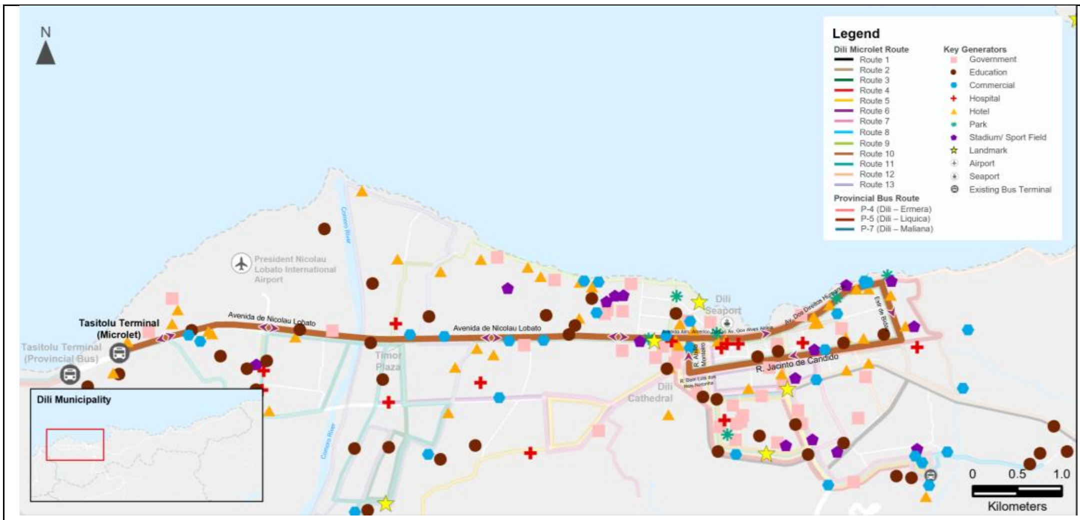
Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.11 Dili Microlet Route#10 – Tasitolu Terminal Circular East

6.4.11.1 Route Overview

Microlet Route#10 (Tasitolu Terminal Circular East) is an east-west one-way circular route linking Tasitolu Terminal to the eastern part of city center and back to Tasitolu Terminal – with a total length of 19.9km. Starting from Tasitolu Terminal, the route operates clockwise along Ave. de Nicolau Lobato and Ave. Dos Direitos Humano (passing through key generators including government, commercial facilities, hotels), turns right along Estr. De Bidau, then heads to the west along R. Jacinto de Candido before turning right at R. Abilio Monteiro (passing more government buildings, medical centers, and education facilities). The route then continues to the west along Ave. de Nicolau Lobato and terminates at Tasitolu Terminal.

Based on field observations of various trips, the route serves around 43 stops along the circular route.[90] Microlet Route#10 provides linkage with Microlet Route#11 and three regional bus routes at Tasitolu Terminal (including routes between Dili-Ermera, Dili-Liquica, and Dili-Maliana). **Figure 6.15** presents the Microlet Route#10 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.15: Microlet Route#10 Routing and Key Generators Served

[90] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 62, while that in the off-peak (9:00AM-4:00PM) is 67. The maximum number of vehicles for Saturday service is 84 trips/hour, while that for Sunday is 66 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 62 minutes, equating to an average speed of 20km/hour. On Saturdays and Sundays, travel time is around 56 and 62 minutes respectively.
- **Daily Boardings –** On average, some 12,800 passengers use Microlet Route#10 each day.

Table 6.82: Microlet Route#10 Existing Service Overview

Item	Microlet Route#10
Route Distance	19.9 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	12,800
Max Trips/Hour (Weekday)	67
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	62 mins
Travel Speed (Weekday AM Peak Average)	20 km/h
Travel Speed (Weekday PM Peak Average)	20 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.11.2 Performance Review

Daily and Annual Demand

On average, some 12,800 passengers use Microlet Route#10 on the weekdays, with Saturday accounting for about 13,700 passengers and Sunday accounting for about 11,500 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 4.5 million – as shown in **Table 6.83**.

Table 6.83: Estimated Daily and Annual Boardings – Microlet Route#10

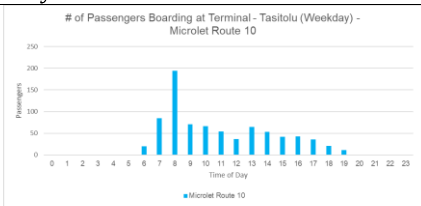
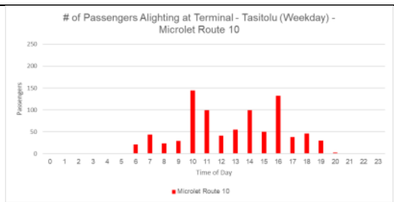
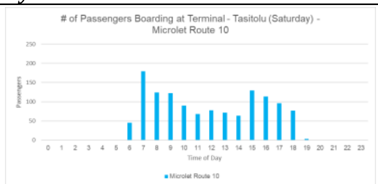
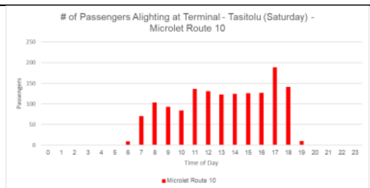
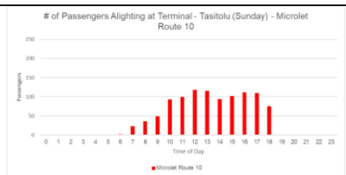
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	12,800	3,087,000
Saturday	13,700	684,000
Sunday	11,500	773,000
Total		4,544,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.84 presents the hourly boarding/alighting profile at Tasitolu Terminal Circular East during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.84: Boarding Activity by Time of Day – Microlet Route#10 (Tasitolu Terminal Circular East)

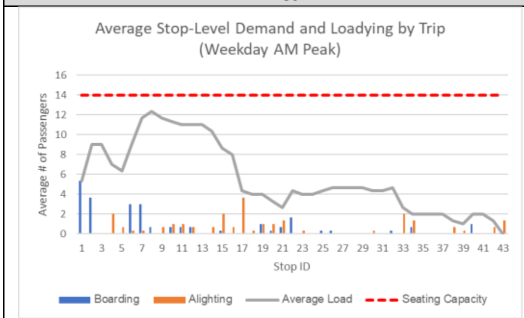
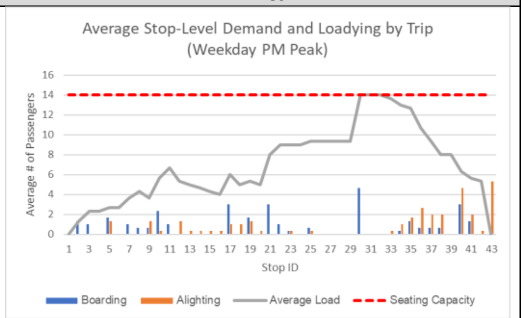
Boarding Activity	Alighting Activity
Weekday	
	
Key Findings: • Boarding activity is considerably higher in the morning than other time periods. In the morning, a peak is observed from 8:00AM-9:00AM, with about 200 boardings/hour. In the afternoon, boarding activity ranges from 30-60 in the 12:00PM-2:00PM period. In the night after 5:00PM, only 10-30 boardings/hour are observed. • Alighting activity is relatively high in the morning and afternoon. In the morning, a peak of 150 alightings/hour observed from 10:00-11:00AM. In the afternoon, a peak of 130 alightings/hour are recorded from 4:00PM-5:00PM. Alighting activity is lower in the early morning and late evening totaling less than 50 alightings/hour.	
Saturday	
	
Key Findings: • Boarding activity is relatively higher in the morning than in the afternoon. In the morning, a peak is observed from 7:00AM-8:00AM, with about 180 boardings/hour. In the afternoon, boarding activity ranges from 60-80 in the 12:00PM-2:00PM period before increasing to some 130 boardings/hour during 3:00PM-4:00PM. In the night after 5:00PM, under 100 boardings/hour are observed and dropped to less than 10 boardings/hour after 7:00PM. • Alighting activity is relatively higher in the late evening compared to other time periods. In the morning, alighting activity ranges from 10-140 alightings/hour, while in the afternoon around 120-130 alightings/hour are observed. In the later evening, a peak of 190 alightings/hour is recorded from 05:00PM-6:00PM.	
Sunday	
	
Key Findings: • Boarding activity is relatively higher in the evening than other time periods. In the morning, boarding activity ranges from 30-100 during 6:00AM-11:00AM period. In the afternoon, a peak is observed from 4:00PM-5:00PM, with about 160 boardings/hour. In the evening after 5:00PM, over 100 boardings/hour are observed then drops to less than 50 boardings/hour at 6:00PM. • Alighting activity is relatively higher in the afternoon/evening than morning. In the morning, less than 50 alightings/hour are observed from 6:00-10:00AM, then increases to some 100 alightings/hour towards noon. A peak of 120 alightings per hour are recorded between 12:00 PM and 2:00 PM. In the late afternoon, alighting activity stays around 100 alightings/hour.	

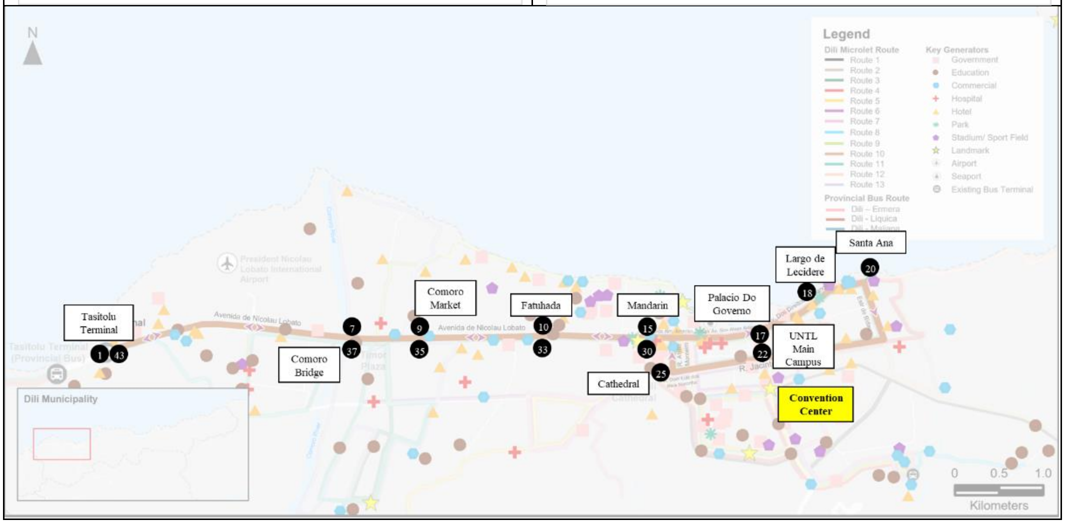
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.85 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#10 operates at 85% of the stated capacity (or over 12 passengers/trip) in the AM Peak around Stop#7-9 (near Comoro Market after crossing Comoro Bridge). In the PM Peak, Microlet Route#10 operates at 100% of capacity around Stop#30-33 (between Madarin and Fatuhada along Av. Alm. Americo Tomas) before heading back to Tasitolu Terminal.

Table 6.85: Average Stop-Level Demand and Loading by Trip (Microlet Route#10 - Weekday Peak)

AM Peak	PM Peak
	



6.4.11.3 Service Gaps and Opportunities

Key gaps for Microlet Route#10 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.86: Summary of Microlet Route#10 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route directly serves Tasitolu Terminal, thus linking the west region to the city center.

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the west of Dili as well as the city center (i.e., government buildings, education facilities, commercial facilities) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is overloaded on particular segments along this route during PM peak.

6.4.11.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

No routing medication is proposed for Microlet Route#10.

Table 6.87: Microlet Route#10 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	No change	No change	The route operates on Ave. Nicolau Lobato which is a main east-west corridor located near the Airport connecting Tasitolu Terminal and city center. No modification proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.88: Microlet Route#10 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Tasitolu	Tasitolu	Tasitolu	Tasitolu
Distance (km)	19.9	19.9	19.9	19.9
Avg. Peak Roundtrip Travel Time (mins) [B]	62	62	62	62
# of Connections with Current/Future Public Transport at Terminal	Microlet: 2 Regional Bus: 3	Microlet: 2 Regional Bus: 3	Microlet: 2 Regional Bus: 3	Microlet: 2 Regional Bus: 3

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in

Table 6.89. Thus in 2025, if the demand at 1:00PM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2-minute headway (assuming a vehicle load of 12 passengers).

Table 6.89: Microlet Route#10 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	8.5	2.5	1.5	3	2.5	1.5	3	2	1.5	1.5	1	2	2	4.5
Saturday	8.5	2.5	3	3	3.5	3	2.5	2.5	3.5	1	1	1	1.5	-
Sunday	10	3	3	2.5	2.5	2.5	2.5	2.5	2.5	1.5	1.5	1.5	2.5	-
Immediate (2025) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	8.5	2.5	1.5	3	2.5	1.5	2.5	2	1.5	1.5	1	1.5	1.5	4
Saturday	8.5	2.5	3	3	3.5	3	2	2.5	3	1	1	1	1	-
Sunday	10	3	3	2.5	2.5	2.5	2	2.5	2.5	1.5	1.5	1.5	2.5	-
Upgrade (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	6.5	2	1.5	2.5	2	1	2	1.5	1	1	0.5	1	1	2
Saturday	6.5	2	2	2	2.5	2.5	2	2	2.5	0.5	0.5	0.5	0.5	-
Sunday	6.5	2	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	-
Visionary (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	30	8.5	6	10	8.5	4.5	8.5	6	4	4.5	2.5	5	5	8.5
Saturday	30	8.5	8.5	8.5	10	10	7.5	8.5	12	3	2.5	3	3	-
Sunday	30	8.5	8.5	6.5	6.5	6.5	6.5	6.5	6.5	5.5	5.5	5.5	7.5	-

Service, Demand, and Productivity Implications

Weekday demand is expected to grow slightly under the 2025 Immediate scenario, then by over 35% in the 2035 Upgrade scenario. This will lead to similar magnitude changes in the service parameters, particularly the peak headway (from 1 minutes to 0.5 minute) and the number of vehicles required from 81 to 161 microlets (or 33 conventional buses).

Table 6.90 shows the existing weekday impacts on service, demand, and productivity of Microlet Route#10.

Table 6.90: Microlet Route#10 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	1	1	0.5	2.5
# of Round Trips / Day	420	450	660	160
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	73	73	146	30
Fleet Size (with 10% Spares)	81	81	161	33
Vehicle-Km	8,340	8,840	12,990	3,000
Vehicle-Hour	510	540	790	190
Daily Ridership (Boardings)	12,830	13,640	18,730	19,470
Boardings per Vehicle-Km	1.5	1.5	1.4	6.5
Boardings per Vehicle-Hour	25.5	25.6	23.8	107.3
Annualized Ridership	3,182,000	3,383,000	4,643,000	4,829,000

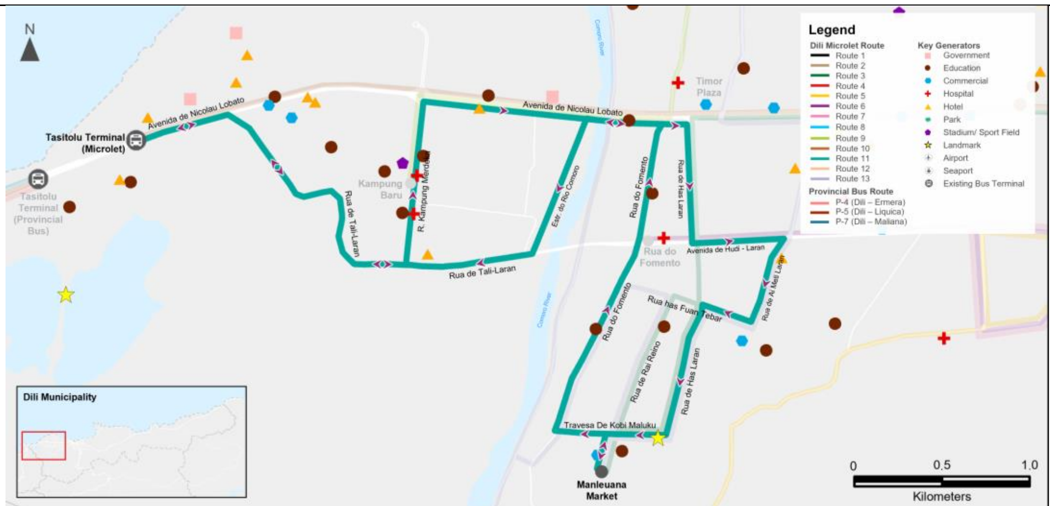
Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.12 Dili Microlet Route#11 – Taisolu Terminal Circular South

6.4.12.1 Route Overview

Microlet Route#11 (Tasitolu Terminal Circular South) is a one-way circular route linking Tasitolu Terminal to Manleuana Market – with a total length of 14.6km. Beginning at Taisolu Terminal, the route follows a clockwise direction, passing through Ave. de Nicolau Lobato and Rua de Tali-Laran, turning left onto R. Kampung Merdeka (passing through education, markets, hospitals in Kampung Baru), then goes back to Ave. de Nicolau Lobato. After crossing Comoro River, the route turns right along Rua de Has Laran and follows several streets (e.g., Rua de Ai Meti Laran, Rua de Has Laran), before reaching Manleuana Market. After the market, the route makes a left turn along Travesa de Kobi Maluku and heads to the north along Rua do Fomento until the intersection with Ave. de Nicolau Lobato. After the river, the route follows Estr. Do Rio Comoro to the south until merging with Rua de Tali-Laran and continues to operate eastbound until terminating at Tasitolu Terminal on Ave. de Nicolau Lobato.

Based on field observations of various trips, the route serves around 29 stops along the circular route.[91] Microlet Route#11 provides linkage with Microlet Route#10 and three regional bus routes at Tasitolu Terminal (including routes between including routes between Dili-Ermera, Dili-Liquica, and Dili-Maliana) – though the regional terminal location is about 0.5km away. **Figure 6.16** presents the Microlet Route#11 routing, key generators, as well as interchange points with other public transport services.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.16: Microlet Route#11 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.

[91] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.

- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 51, while that in the off-peak (9:00AM-4:00PM) is 46. The maximum number of vehicles for Saturday service is 40 trips/hour, while that for Sunday is 26 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 60 minutes, equating to an average speed of 15km/hour. On Saturdays and Sundays, travel time is around 56 minutes and 55 minutes respectively.
- **Daily Boardings –** On average, some 11,500 passengers use Microlet Route#11 each day.

Table 6.91: Microlet Route#11 Existing Service Overview

Item	**Microlet Route#11**
Route Distance	14.6 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	11,500
Max Trips/Hour (Weekday)	51
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	60 mins
Travel Speed (Weekday AM Peak Average)	15 km/h
Travel Speed (Weekday PM Peak Average)	15 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.12.2 Performance Review

Daily and Annual Demand

On average, some 11,500 passengers use Microlet Route#11 on the weekdays, with Saturday accounting for about 7,300 passengers and Sunday accounting for about 3,100 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 3.4 million as shown in **Table 6.92**.

Table 6.92: Estimated Daily and Annual Boardings – Microlet Route#11

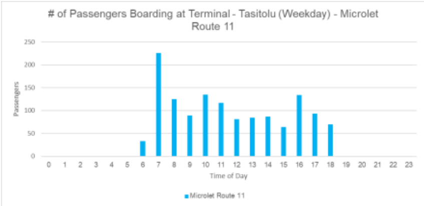
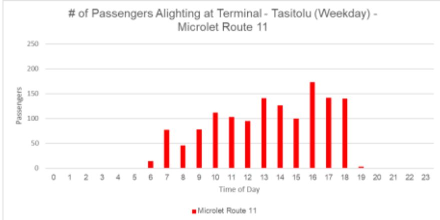
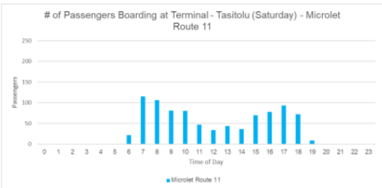
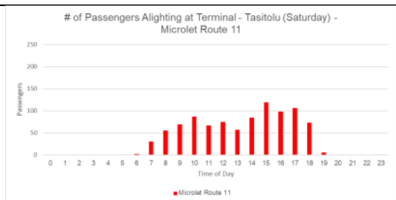
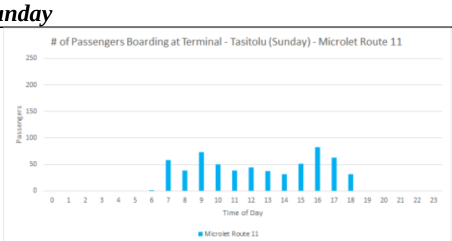
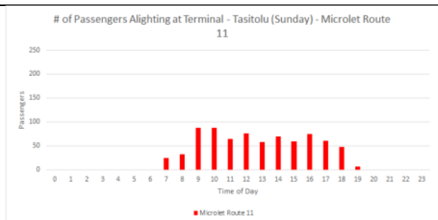
Day	**Daily Boardings (Rounded Up to Nearest Hundred)**	**Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]**
Weekday	11,500	2,838,000
Saturday	7,300	364,000
Sunday	3,100	209,000
Total		3,411,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.93 presents the hourly boarding/alighting profile at Tasitolu Terminal during the weekday, Saturday, and Sunday (with starting hour indicated in the table).

Table 6.93: Boarding Activity by Time of Day – Microlet Route#11 (Tasitolu Terminal)

<table>
<tr><th>Boarding Activity</th><th>Alighting Activity</th></tr>
<tr><td colspan="2">Weekday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
Boarding activity is considerably higher in the morning than in the afternoon. In the morning, a peak is observed from 7:00AM-8:00AM, with over 220 boardings/hour. In the afternoon, boarding activity ranges from 60-90 in the 12:00PM-4:00PM period, then reaches the afternoon peak over 130 boardings/hour during 4:00PM-5:00PM. In the evening after 5:00PM, some 60-90 boardings/hour are observed.
Alighting activity is relatively higher in the afternoon compared to other time periods. In the morning, 20-120 alightings/hour are observed, while in the afternoon alighting activity ranges between 100-150 alightings/hour. A peak of 170 alightings/hour are observed from 4:00-5:00PM. Less than 10 alightings/hour is observed after 7:00PM.</td></tr>
<tr><td colspan="2">Saturday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
Boarding activity is relatively higher in the morning and late evening. In the morning, a peak is observed from 7:00AM-8:00AM, with over 115 boardings/hour. In the afternoon, boarding activity ranges from 35-80 in the 12:00PM-5:00PM period then increases to some 90 boardings/hour during 5:00PM-6:00PM.
Alighting activity is higher in the afternoon than other time periods. In the morning, a peak of 90 alightings/hour are recorded as from 10:00AM-11:00AM. In the afternoon, a peak of120 alightings/hour is observed from 3:00PM-4:00PM. Alighting activity is lower in the late evening less than 100 alightings/hour.</td></tr>
<tr><td colspan="2">Sunday</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
Boarding activity is relatively higher in the morning and late afternoon. In the morning, a peak is observed from 9:00AM-10:00AM, with around 75 boardings/hour. In contrast, the afternoon peak boarding activity exceeds 80 boardings/hour between 4:00PM-5:00PM. In the night after 5:00PM, boarding activity ranges from 30-80.
Alighting activity is relatively higher in the morning and declines towards the afternoon. A peak of 90 alightings/hour is observed in the morning from 9:00AM-11:00AM. In the afternoon, around 50-70 alightings/hour are observed then declines to below 10 alightings/hour After 7:00PM.</td></tr>
</table>

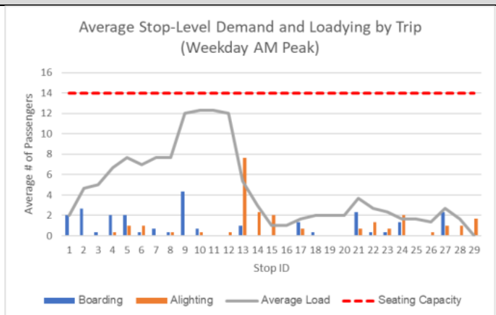
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.94 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

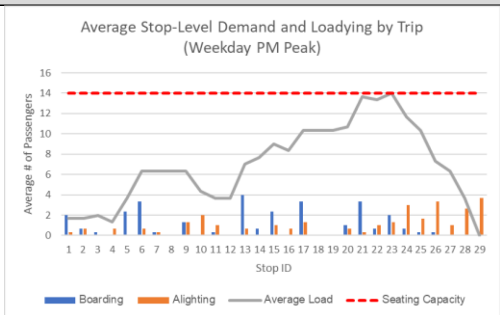
- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#11 operates at 85% of the stated capacity (or over 12 passengers/trip) in the AM Peak around Stop#9-12 (from Academia Policia to Delta 1). In the PM Peak, Microlet Route#11 operates at 100% of capacity around Stop#21-23 (between Fomento Roundabout and Ministry of Agriculture & Fisheries along Rua de Fomento).

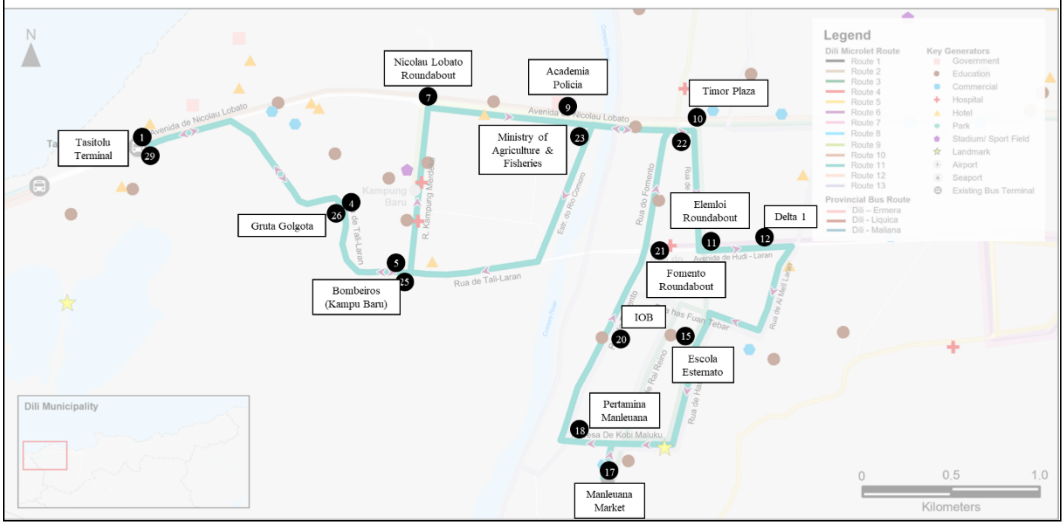
Table 6.94: Average Stop-Level Demand and Loading by Trip (Microlet Route#11 - Weekday Peak)

AM Peak



PM Peak





6.4.12.3 Service Gaps and Opportunities

Key gaps for Microlet Route#11 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.95: Summary of Microlet Route#11 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route directly serves Tasitolu and Manleuana Market.

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the southwest periphery of Dili (i.e., government buildings, education facilities, markets, hospitals) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No major overlap with other microlet routes (except surrounding roads near Manleuana Market) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively overloaded on some segments during PM peak.

6.4.12.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

No routing medication is proposed for Microlet Route#11.

Table 6.96: Microlet Route#11 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability Immediate (2025)	Applicability Upgrade (2035)	Applicability Visionary (2035)
1	No change	No change	The route covers the southwest peripheral area serving residents in the area and connecting two interchange locations (Tasitolu and Manleuana Market). No modification proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.97: Microlet Route#11 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	Manleuana Market	Manleuana Market	Manleuana Market	Manleuana Market
Distance (km)	16.8	16.8	16.8	16.8
Avg. Peak Roundtrip Travel Time (mins) [B]	59	59	59	59
# of Connections with Current/Future Public Transport at Terminal	Microlet: 2	Microlet: 3	Microlet: 3	Microlet: 3

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in

Table 6.98. Thus in 2025, if the demand at 9:00AM is 360 passengers/hour, then this would equate to 30 trips/hour or a 2 minute headway (assuming a vehicle load of 12 passengers).

Table 6.98: Microlet Route#11 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	4	1.5	1.5	2	1.5	1.5	2.5	2	2.5	1.5	1.5	1.5	2	15
Saturday	12	2.5	3	2.5	3	4.5	4.5	4.5	5.5	3	2.5	2.5	2.5	12
Sunday	30	6	7.5	5	5.5	4.5	5	10	6.5	6	5.5	5	6	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	4	1.5	1.5	2	1.5	1.5	2	2	2.5	1.5	1.5	1.5	2	15
Saturday	12	2.5	2.5	2.5	2.5	4.5	4.5	4.5	5.5	2.5	2.5	2	2.5	10
Sunday	30	6	6.5	4.5	5.5	4.5	5	10	6.5	5.5	5	5	6	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	3	1	1	1.5	1.5	1	2	1.5	2	1	1	1	1.5	12
Saturday	10	2	2.5	2	2	3.5	4	3.5	4.5	2	2	2	2	7.5
Sunday	30	4.5	5.5	4	4.5	4	4	7.5	5.5	4.5	4.5	4	5	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	12	4.5	4.5	6.5	5.5	5.5	7.5	6.5	7.5	4.5	4.5	5	6.5	30
Saturday	30	8.5	10	8.5	10	15	15	15	20	10	8.5	7.5	10	30
Sunday	60	20	20	15	20	15	15	30	20	20	15	15	20	-

Service, Demand, and Productivity Implications

Weekday demand is expected to slightly increase in the 2025 Immediate scenario then grow by over 20% in the 2035 Upgrade scenario, leading to a decrease in peak headway from 1.5 minutes to 1 minute. The service parameters similarly scale up by a large amount, particularly fleet size requirement increasing from 53 to 80 microlets (or 18 conventional buses) by 2035.

Table 6.99 shows the impacts on weekday service, demand, and productivity of Microlet Route#11.

Table 6.99: Microlet Route#11 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	1.5	1.5	1	4.5
# of Round Trips / Day	440	450	610	150
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	48	48	72	16
Fleet Size (with 10% Spares)	53	53	80	18
Vehicle-Km	6,370	6,460	8,810	2,090
Vehicle-Hour	480	490	670	160
Daily Ridership (Boardings)	11,520	11,990	14,630	15,210
Boardings per Vehicle-Km	1.8	1.9	1.7	7.3
Boardings per Vehicle-Hour	24.1	24.8	22.1	97.2
Annualized Ridership	2,857,000	2,973,000	3,627,000	3,772,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.13 Dili Microlet Route#12 – Cristo Rei Circular

6.4.13.1 Route Overview

Microlet Route#12, also known as the Cristo Rei Circular, is a one-way circular route that connects the city center to Cristo Rei, with a total length of 16.0km. Starting from Cristo Rei, the route follows a clockwise direction, passing through Ave. de Matiatut and turning left onto R. Barros Gomes, before continuing through Estr. Semore and R. Belarmino Lobo. After Large Lecidere, the route runs eastward along Ave. dos Direitos Humanos (passing through hotels, sports fields, commercial buildings) and continues to the north along Ave. de Matiatut until terminating at Cristo Rei.

From field observations of various trips, it was found that there are approximately 21 stops served along the circular route of Microlet Rave oute#12.[92] This route does not provide any linkage with other microlet or regional bus services. **Figure 6.17** presents the Microlet Route#12 routing, key generators, as well as interchange points with other public transport services.

Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.17: Microlet Route#12 Routing and Key Generators Served

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during the AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 21, while that in the off-peak (9:00AM-4:00PM) is 15. The maximum number of vehicles for Saturday service is 19 trips/hour, while that for Sunday is 15 trips/hour.
- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 52 minutes, equating to an average speed of 19km/hour. On Saturdays and Sundays, travel time is around 35 minutes.
- **Daily Boardings –** On average, some 2,600 passengers use Microlet Route#12 each day.

[92] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.

Table 6.100: Microlet Route#12 Existing Service Overview

Item	Microlet Route#12
Route Distance	16.0 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	2,600
Max Trips/Hour (Weekday)	21
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	52 mins
Travel Speed (Weekday AM Peak Average)	15 km/h
Travel Speed (Weekday PM Peak Average)	19 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.13.2 Performance Review

Daily and Annual Demand

On average, some 2,600 passengers use Microlet Route#12 on the weekdays, with Saturday accounting for about 2,500 passengers and Sunday accounting for about 2,400 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 923,000 – as shown in **Table 6.101**.

Table 6.101: Estimated Daily and Annual Boardings – Microlet Route#12

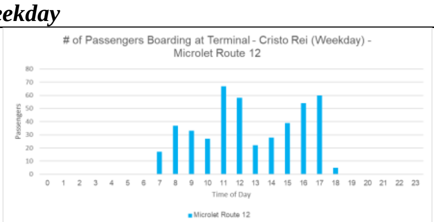
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	2,600	640,000
Saturday	2,500	125,000
Sunday	2,400	158,000
Total		923,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.102 presents the hourly boarding/alighting profile at Cristo Rei during the weekday (with starting hour indicated in the table), as this was the only day surveyed.

Table 6.102: Boarding Activity by Time of Day – Microlet Route#12 (Cristo Rei)

Boarding Activity	Alighting Activity
Weekday	
	
Key Findings: • Boarding activity shows a significant peak during mid-day and late afternoon. In the morning, boarding activity records low around 20-40 boardings/hour. A peak of 60-70 boardings/hour is observed from 11:00AM and 1:00PM. In the afternoon, boarding activity drops to some 20-40 boardings/hour from	

Boarding Activity	Alighting Activity
Weekday	
1:00PM-3:00PM, then increases to some 60 boardings/hour from 5:00PM-6:00PM. Less than 5 passengers boarded the microlet after 6:00PM • Alighting activity is relatively higher in the late afternoon than other time periods. Throughout the day only 10-40 alightings/hour are observed. From 5:00PM-6:00PM, a peak of 65 alightings/hour is observed.	

Note: This route does not serve any terminal in Dili. A follow-up survey (separate from terminal surveys) was conducted only on the weekday to collect the profile of boarding/alighting activities by the time of day.

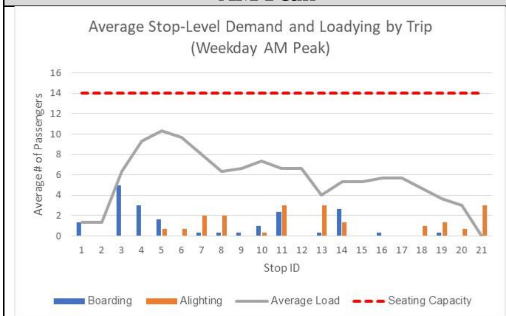
Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.103 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

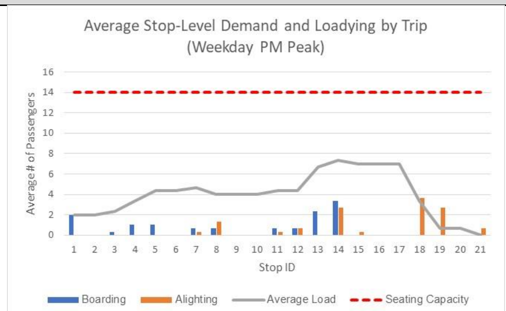
- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#12 operates at 75% of the stated capacity (or over 10 passengers/trip) in the AM Peak around Stop#5-6 (after reaching Bidau Ponte Habibie). In the PM Peak, Microlet Route#12 operates at 50% of capacity around Stop#13-17 between Paulos VI and Santa Ana Bridge (including Largo de Lecidere serving as a key boarding/alighting location).

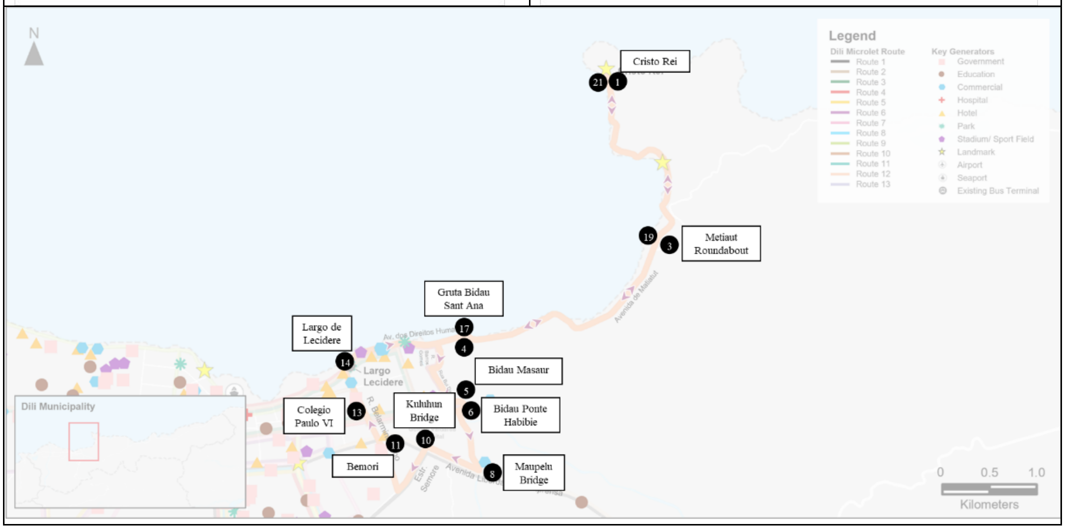
Table 6.103: Average Stop-Level Demand and Loading by Trip (Microlet Route#12 - Weekday Peak)

AM Peak



PM Peak





6.4.13.3 Service Gaps and Opportunities

Key gaps for Microlet Route#12 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.104: Summary of Microlet Route#12 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	Low	• No direct connection to existing terminals.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the city center (i.e., government buildings, education facilities) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No overlap with other microlet routes (except city center) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively modest on this route.

6.4.13.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Microlet Route#12 currently does not serve existing terminals in Dili, instead it starts/ends at Cristo Rei – a popular landmark site in Dili. There is limited opportunity to connect the route to existing terminals as this will require a long detour/extension and may result in coverage duplication with other routes. Based on local observations, this route currently has an on-street stop with bays, thus allowing the microlet vehicles to use this space as pickup/drop-off areas or layover spaces. In addition, this route is mainly used by tourists who visit Cristo Rei and beaches and is observed to have low patronage during peak periods. No modification to this route is proposed at this stage, however further assessment to enhance service coverage may be necessary in the future.

Source: Arup Study Team

Figure 6.18: Existing On-Street Stop with Bays – Microlet Route#12 on Large de Lecidere

Table 6.105: Microlet Route#12 Proposed Service Coverage Enhancements

				Applicability		
#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	No change	No change	This is a leisure route (mainly those who go to the beach) that is connected to a key landmark Cristo Rei and the peninsula. No modification proposed.	✓	✓	✓

Route Restructuring Implications

As noted above, no modification is proposed to this route. An overview of service coverage enhancements by scenarios is presented below:

Table 6.106: Microlet Route#12 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	No Terminal	No Terminal	No Terminal	No Terminal
Distance (km)	15.9	15.9	15.9	15.9
Avg. Peak Roundtrip Travel Time (mins) [B]	53	53	53	53
# of Connections with Current/Future Public Transport at Terminal	None	None	None	None

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in **Table 6.107**. Thus in 2025, if the demand at 8:00AM is 144 passengers/hour, then this would equate to 12 trips/hour or a 5-minute headway (assuming a vehicle load of 12 passengers).

Table 6.107: Microlet Route#12 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	5.5	5	4.5	5.5	2.5	4.5	4	4	6.5	6.5	7.5	60	-
Saturday	-	20	20	8.5	5.5	2	5	5	5	3.5	2.5	2	-	-
Sunday	-	20	20	12	10	3.5	4	5	5	4	2	1.5	-	-
Immediate (2025) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	5.5	5	4.5	5.5	2.5	4.5	4	4	6.5	6.5	7.5	60	-
Saturday	-	20	20	8.5	5.5	2	5	5	5	3.5	2.5	2	-	-
Sunday	-	20	20	12	10	3.5	4	5	5	4	2	1.5	-	-
Upgrade (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	5	4.5	4.5	5	2.5	4.5	4	3.5	6	6	7.5	60	-
Saturday	-	15	15	8.5	5	2	5	5	5	3.5	2.5	1.5	-	-
Sunday	-	20	20	12	8.5	3.5	3.5	4.5	4.5	3.5	2	1.5	-	-
Visionary (2035) Headway														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	20	20	20	20	10	20	15	15	20	20	30	60	-
Saturday	-	60	60	30	20	8.5	20	20	20	15	10	7.5	-	-
Sunday	-	60	60	30	30	15	15	20	20	15	7.5	6	-	-

Service, Demand, and Productivity Implications

Weekday demand is expected to increase by a slight margin between each scenario, resulting in negligible increase in service parameters such as round trips and vehicle kilometers. The fleet size requirement (18 microlets or 5 conventional buses) remains unchanged. **Table 6.108** shows the impacts on weekday service, demand, and productivity of Microlet Route#12.

Table 6.108: Microlet Route#12 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	2.5	2.5	2.5	10
# of Round Trips / Day	150	150	160	40
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	16	16	16	4
Fleet Size (with 10% Spares)	18	18	18	5
Vehicle-Km	2,310	2,310	2,420	610
Vehicle-Hour	130	130	130	40
Daily Ridership (Boardings)	2,580	2,610	2,770	2,880
Boardings per Vehicle-Km	1.1	1.1	1.1	4.8
Boardings per Vehicle-Hour	21.4	21.6	21.8	90.4
Annualized Ridership	640,000	647,000	686,000	713,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.14 Dili Microlet Route#13 – Kasnafar Circular

6.4.14.1 Route Overview

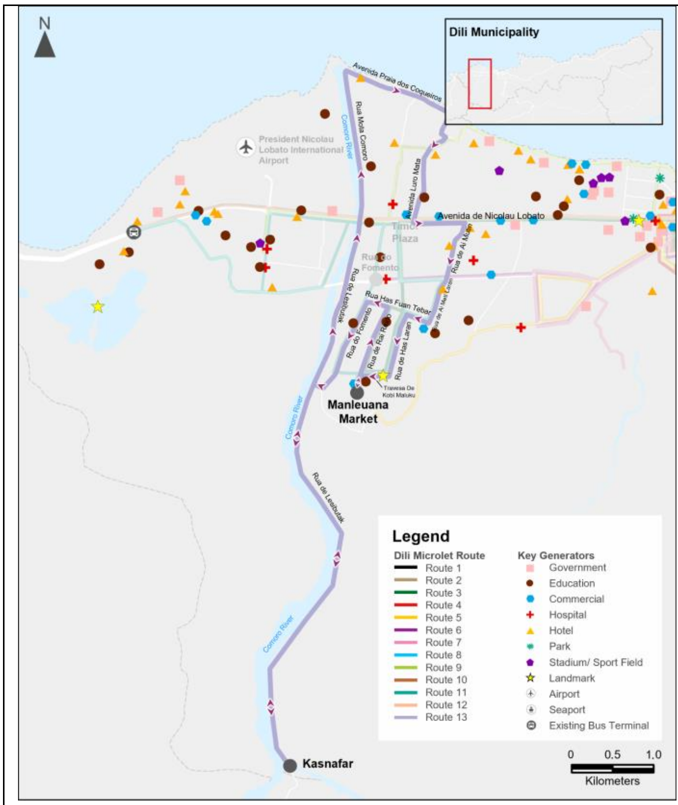
Microlet Route#13 (Kasnafar Circular) is a north-south one-way circular route linking Kasnafar to the northern periphery of Dili – with a total length of 22.1km. Starting from Kasnafar, the route heads to the north along Comoro River then takes right along the coastal road Ave/ Praia dos Conqueiros, then operates southward via Ave. Luro Mata (passing through Timor Plaza). After Ave. de Nicolau Lobato, the route passes through various roads (e.g., Rua de Ai Mutin), passes through Manleuana Market, and merges with Rua de Lesibutak, then continues south until terminating at Kasnafar.

Based on field observations of various trips, the route serves around 30 stops along the circular route.[93] This route does not provide any linkage with other microlet or regional bus services. **Figure 6.19** presents the Microlet Route#13 routing, key generators, as well as interchange points with other public transport services.

[93] By nature, microlets load and unload passengers as requested/hailed along the route, thus the stops served on any given trip may differ. By assessing multiple surveyed trips, a set of unique stop locations was identified, which is represented by the number of stops noted above. It should be noted, however, there may be additional stops served along the route outside of those identified during the survey.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** – The first microlet departs at 6:00AM and the last at 6:00PM on weekdays, Saturday, and Sunday.
- **Trips per Hour** – On the weekday, the number of trips per hour during AM/PM Peak (7:00AM-9:00AM and 4:00PM-6:00PM) is 19, while that in the off-peak (9:00AM-4:00PM) is 23. The maximum number of vehicles for Saturday service is 21 trips/hour, while that for Sunday is 16 trips/hour.



Source: National Directorate of Land Transportation – validated by Arup Study Team through field observations.

Figure 6.19: Microlet Route#13 Routing and Key Generators Served

- **Travel Time** – Vehicle travel times during the AM/PM Peak average around 55 minutes, equating to an average speed of 25km/hour. On Saturdays and Sundays, travel time is around 26 minutes and 24 minutes respectively.
- **Daily Boardings –** On average, some 2,900 passengers use Microlet Route#13 each day.

Table 6.109: Microlet Route#13 Existing Service Overview

Item	Microlet Route#13
Route Distance	22.2 km
Operating Times	6:00AM – 6:00PM
AM Peak Period	7:00AM – 9:00AM
PM Peak Period	4:00PM – 6:00PM
Daily Boardings (Weekday)	2,900
Max Trips/Hour (Weekday)	23
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	55 mins
Travel Speed (Weekday AM Peak Average)	25 km/h
Travel Speed (Weekday PM Peak Average)	25 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.14.2 Performance Review

Daily and Annual Demand

On average, some 2,900 passengers use Microlet Route#13 on the weekdays, with Saturday accounting for about 2,700 passengers and Sunday accounting for about 1,600 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 968,000– as shown in **Table 6.110**.

Table 6.110: Estimated Daily and Annual Boardings – Microlet Route#13

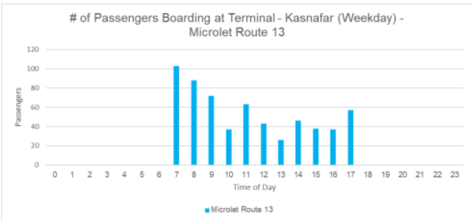
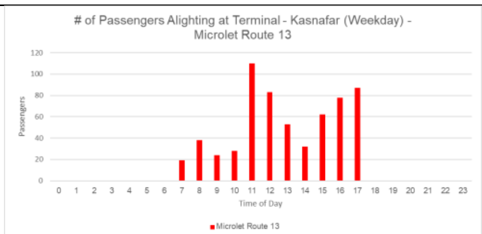
Day	Daily Boardings (Rounded Up to Nearest Hundred)	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	2,900	722,000
Saturday	2,700	137,000
Sunday	1,600	109,000
Total		968,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Route-Level Boarding Activity

Table 6.111 presents the hourly boarding/alighting profile at Kasnafar during the weekday (with starting hour indicated in the table), as this is the only days surveyed for this route.

Table 6.111: Boarding Activity by Time of Day – Microlet Route#13 (Kasnafar)

Boarding Activity	Alighting Activity
Weekday	
	

Key Findings:

- Boarding activity is considerably higher in the morning than in the afternoon. In the morning, a peak is observed from 7:00AM-8:00AM, with over 100 boardings/hour. In the afternoon, boarding activity ranges from 25-45 in the 12:00PM-5:00PM period. During the evening after 5:00 PM, boarding activity reaches some 60 boardings per hour.
- Alighting activity on this route displays various patterns throughout the day. In the morning, 20-40 alightings/hour are recorded, while in the afternoon this ranges from 30 to 80 alightings per hour. A peak of 110 alightings per hour is observed during mid-day between 11:00AM and 12:00PM. Alighting activity in the late evening ranges around 80 alightings per hour after 5:00PM.

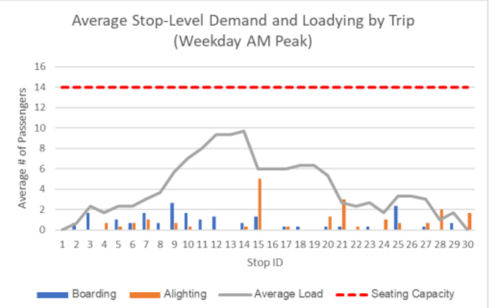
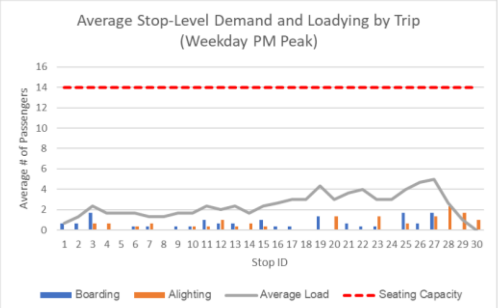
Note: This route does not serve any terminal in Dili. A follow-up survey (separate from terminal surveys) was conducted only on the weekday to collect the profile of boarding/alighting activities by the time of day.

Average Stop-Level Demand and Vehicle Loading by Peak Periods

Table 6.112 presents the average observed boarding and alighting passengers at each stop for the average peak period trip, as well as the calculated on-board vehicle load. This load is then contrasted against the assumed vehicle seating capacity (assumed at 14 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees or allow passengers to hang off the vehicle. Key findings are as follows:

- **Loading vs. Vehicle Capacity** – Assuming a vehicle capacity of 14 passengers for this route, Microlet Route#13 operates at 70% of the stated capacity (or 10 passengers/trip) in the AM Peak around Stop#12-14 (near Timor Plaza). In the PM Peak, Microlet Route#13 operates at 35% of capacity around Stop#26-27 (near Manleuana Market).

Table 6.112: Average Stop-Level Demand and Loading by Trip (Microlet Route#13 - Weekday Peak)

<table>
<tr><th>AM Peak</th><th>PM Peak</th></tr>
<tr><td>
</td><td>
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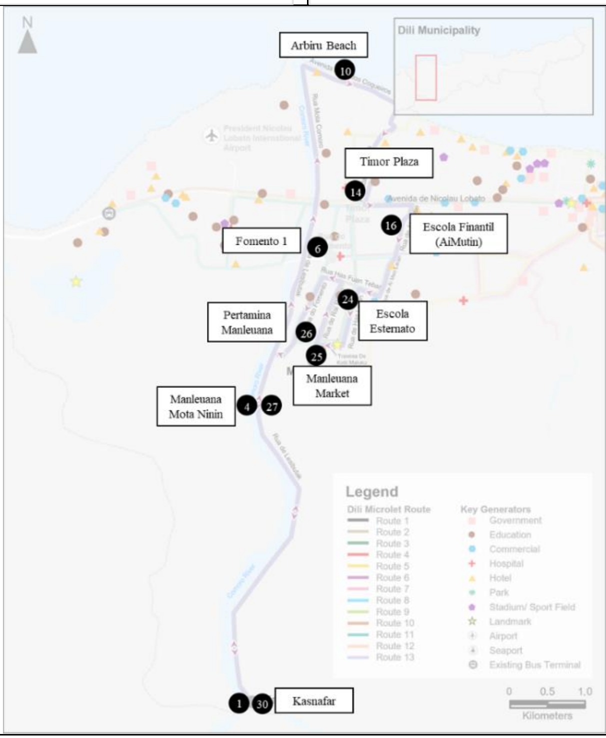
<tr><td colspan="2">
</td></tr>
</table>

6.4.14.3 Service Gaps and Opportunities

Key gaps for Microlet Route#13 vis-à-vis the four goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.113: Summary of Microlet Route#13 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	Moderate	• No direct connection to existing terminals, however this route passes by Manleuana Market (without entering the site). • There is opportunity to directly link the route to Manleuana Market to increase interchange opportunities.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Key generators in the southern periphery of Dili (i.e., mostly residential areas) are well served.
3	Minimize Microlet-Microlet Duplication	High	• No overlap with other microlet routes (except near Manleuana Market) is observed.
4	Efficient and Productive Service	Moderate	• Demand/loading activity is relatively low on this route.

6.4.14.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

Service coverage and routing enhancement measures are proposed as shown in the map below, including applicability to the Scenarios defined in **Section 6.3**:

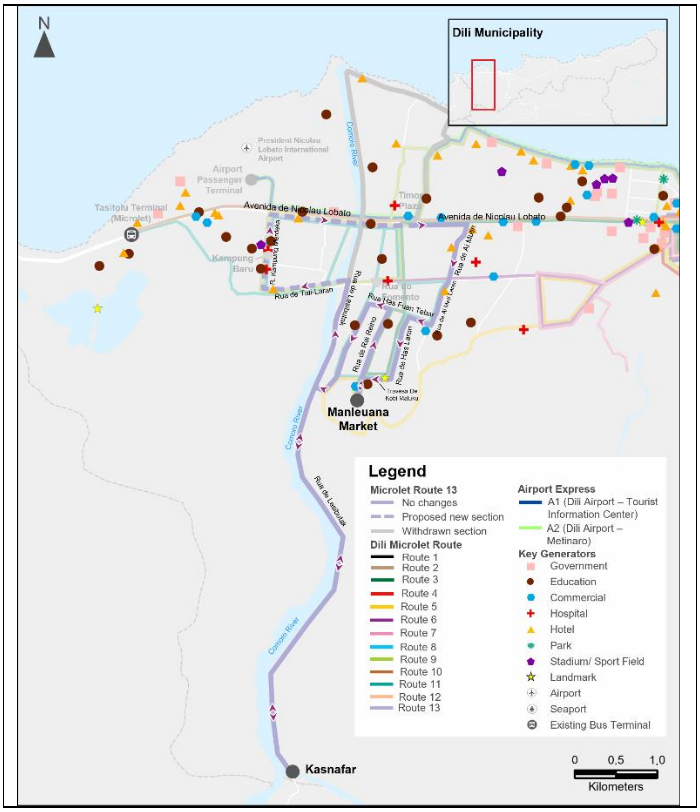


Figure 6.20: Microlet Route#13 – Modified

Table 6.114: Microlet Route#13 Proposed Service Coverage Enhancements

#	Type of Enhancement	Enhancement Proposal	Rationale/ Relevance to Gaps	Applicability		
				Immediate (2025)	Upgrade (2035)	Visionary (2035)
1	Shorten Route	Shorten the route and connect to Manleuana Market	This is the only route that serves the southwest periphery of Dili (which shares the administrative border with neighboring municipalities of Aileu and Liquica).	✓	✓	✓

Route Restructuring Implications

The proposed scheme shortens the route length by 1.5km from 22.1km to 20.6km, thus reducing the average peak roundtrip travel time by 4 minutes. Despite this, several benefits will be generated as follows:

- **Enhanced Interchange Opportunities** – Enabled direct and convenient interchange with microlet routes (and potentially regional routes) at Manleuana Market.

Table 6.115: Microlet Route#13 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**	**Loop (Clockwise)**
Terminal Serving [A]	None (while through Manleuana Market)	Manleuana Market	Manleuana Market	Manleuana Market
Distance (km)	22.1	20.6	20.6	20.6
Avg. Peak Roundtrip Travel Time (mins) [B]	50	46	46	46
# of Connections with Current/Future Public Transport at Terminal	None	None	None	None

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Travel time is based on surveyed travel time during the weekday AM/PM peak. Future travel time is estimated using this survey data for comparison.

Service Schedule

Based on the estimated demand, peak loading, and vehicle capacity (assumed at 12 passengers/vehicle at 85% occupancy), revised headways by period are estimated for each scenario compared to the existing headway, with the service schedule for weekday, Saturday, and Sunday shown in

Table 6.116. Thus in 2025, if the demand at 9:00AM is 180 passengers/hour, then this would equate to 15 trips/hour or a 4-minute headway (assuming a vehicle load of 12 passengers).

Table 6.116: Microlet Route#13 Proposed Headways by Scenario – Weekday, Saturday, and Sunday

Existing Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	5.5	4.5	4	6	4.5	5	6.5	5	10	10	8.5	-	-
Saturday	-	8.5	7.5	6	5.5	6.5	7.5	10	6.5	4.5	8.5	6	-	-
Sunday	-	15	30	10	15	12	10	12	12	12	15	15	-	-
Immediate (2025) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	5	4.5	4	6	4.5	4.5	6	4.5	8.5	10	8.5	-	-
Saturday	-	8.5	7.5	6	5.5	7.5	7.5	12	7.5	4	8.5	5.5	-	-
Sunday	-	15	30	10	15	12	12	12	12	10	15	15	-	-
Upgrade (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	4	3.5	3	5	4	4	5	4	7.5	7.5	6.5	-	-
Saturday	-	6.5	6	4.5	4.5	6	6.5	8.5	6	3	6.5	4	-	-
Sunday	-	10	20	7.5	10	10	8.5	10	8.5	8.5	12	10	-	-
Visionary (2035) Headway (Minutes between Departures)														
	6AM	**7AM**	**8AM**	**9AM**	**10AM**	**11AM**	**12PM**	**1PM**	**2PM**	**3PM**	**4PM**	**5PM**	**6PM**	**7PM**
Weekday	-	15	15	12	20	15	15	20	15	30	30	30	-	-
Saturday	-	30	20	20	20	20	30	30	20	12	30	15	-	-
Sunday	-	30	60	30	30	30	30	30	30	30	30	30	-	-

Service, Demand, and Productivity Implications

Weekday demand increases slightly under the 2025 Immediate scenario, and then by a further ~25% under the 2035 Upgrade scenario, where peak headway (from 4 minutes to 3 minutes) and fleet size requirement (from 16 to 20 microlets, or 6 conventional buses) changes accordingly. The vehicle kilometers and hours also increase by a noticeable amount.

Table 6.117 shows the existing weekday impacts on service, demand, and productivity of Microlet Route#13.

Table 6.117: Microlet Route#13 Weekday Impacts on Service, Demand and Productivity

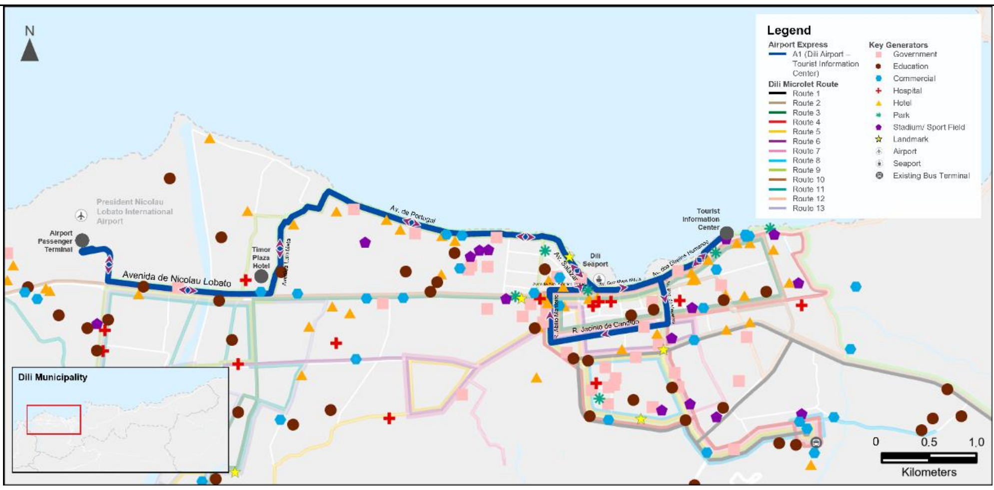
Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	4	4	3	12
# of Round Trips / Day	120	130	150	40
Fleet Type	Microlet	Microlet	Microlet	Conventional
Fleet Size (No Spares)	15	14	18	5
Fleet Size (with 10% Spares)	17	16	20	6
Vehicle-Km	2,620	2,580	3,050	770
Vehicle-Hour	130	130	150	40
Daily Ridership (Boardings)	2,910	3,040	3,780	3,930
Boardings per Vehicle-Km	1.1	1.2	1.2	5.1
Boardings per Vehicle-Hour	23.6	25.0	26.3	109.5
Annualized Ridership	722,000	754,000	936,000	973,000

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.15 Dili Airport Express#1: Airport – Tourist Information Center (Proposed)

6.4.15.1 Route Overview

Airport Express#1 (Airport-Tourist Information Center) is a proposed east-west circular route linking President Nicolau Lobato International Airport to the hotels and tourist sites in the city center and back to the Airport – with a total length of 19.1 km. Starting from the Airport Passenger Terminal, the route operates towards the south to reach the roundabout (near Statua Presidente Nicolau Lobato), immediately turns left and operates eastward along Avenida de Nicolau Lobato until reaching a key commercial zone Timor Plaza. The route then turns left at Avenida Luro Mata and runs along Ave. de Portugal (passing through several hotels along the coastline). Continuing eastward, the route passes Dili Seaport on Ave. Salazar and continues along Avenida dos Direitos Humanos until reaching Tourist Information Center. After that, the route goes back and heads to the west along Av. dos Direitos Humanos, turns left along Avenida Bispo De Medeiros, then operates clockwise along Rua Jacinto Candido, Rua Abilio Monteiro, and Avenida Almirante Americo Tomas (passing through Hotel Timor) before merging back to the coastline Ave. de Portugal then continuing to the Airport via Ave. de Nicolau Lobato.



Source: Arup Study Team

Figure 6.21: Dili Airport Express#1 Routing and Key Generators Served

Key operating parameters for the proposed route based on local observations and airport statistics (i.e., hourly arrival of flights, passenger volumes) are summarized as follows:

- **Service Hours** – This route is proposed to start at 4:00AM and the last at 4:00PM on weekdays, Saturday, and Sunday.[94]
- **Trips per Hour** – On the weekday, the peak number of trips per hour during the weekday is proposed to be 12 trips per hour.
- **Travel Time** – Estimated vehicle travel time is around 49 minutes, with an assumed speed of 25km/h (based on the travel speed assessment conducted in 2023 Dili Urban Master Plan).

Table 6.118: Dili Airport Express#1 Estimated Service Overview

Item	Dili Airport Express #1
Route Distance	19.1 km
Operating Times	4:00AM – 4:00PM
Max Trips/Hour (Weekday)	12
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	49 mins
Travel Speed (Weekday AM Peak Average)	25 km/h
Travel Speed (Weekday PM Peak Average)	25 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

[94] Service hours for the proposed Airport Express bus are based on estimated demand / departure time for bus service which is derived from the 2023 flight schedules of Dili Airport (source: flightaware.com).

6.4.15.2 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

An overview of proposed service coverage enhancements by scenarios is presented below:

Table 6.119: Dili Airport Express#1 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**-**	**EB/WB**	**EB/WB**	**EB/WB**
Terminal Serving [A]	-	Airport	Airport	Airport
Distance (km)	-	19.1	19.1	19.1
Avg. Peak Roundtrip Travel Time (mins) [B]	-	49	49	49
# of Connections with Current/Future Public Transport at Terminal	-	TBD	TBD	TBD

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Based on Dili Urban Master Plan travel speed assessment. Speed of the corresponding segments (along the proposed Airport Express) ranges between 20-30km/h.

Service, Demand, and Productivity Implications

The Airport Express Route#1 will be implemented with a 10-minute peak headway under the 2025 Immediate Scenario, requiring 7 vehicles to operate. The daily ridership is expected to be at around 220 passengers, which equates to around 30 trips per day. Annually, the service is expected to carry around 80,000 to 106,000 passengers (starting from 2025 to the 2035 period).

Table 6.120: Dili Airport Express#1 Weekday Impacts on Service, Demand and Productivity

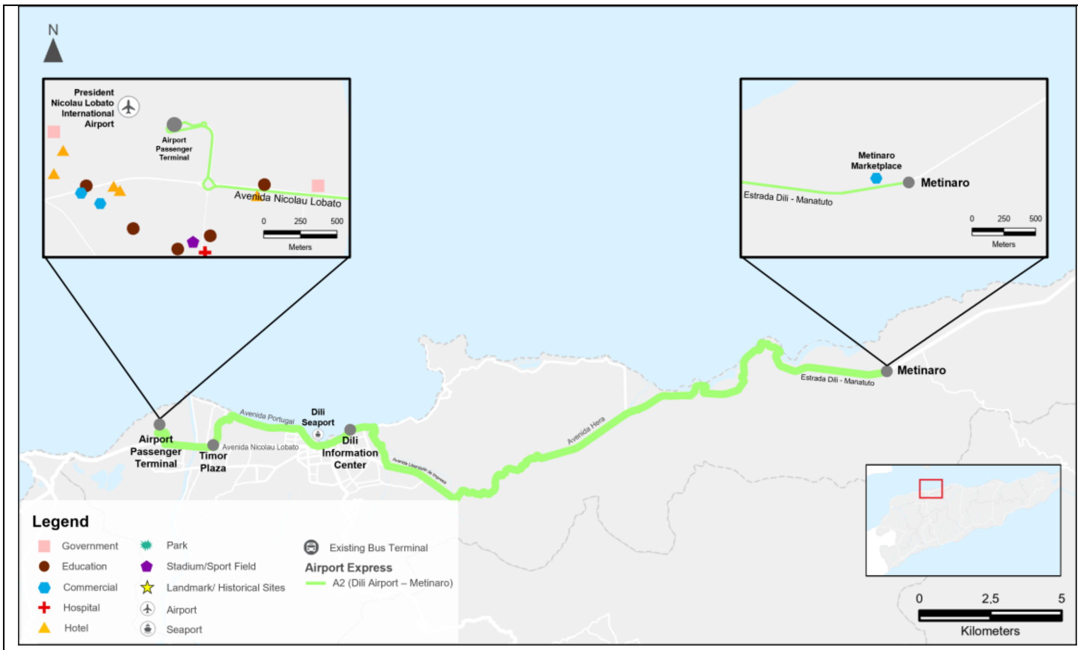
Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	-	10	10	Same as Upgrade
# of Round Trips / Day	-	30	30	
Fleet Type	-	Airport Shuttle Van	Airport Shuttle Van	
Fleet Size (No Spares)	-	6	6	
Fleet Size (with 10% Spares)	-	7	7	
Vehicle-Km	-	460	520	
Vehicle-Hour	-	30	30	
Daily Ridership (Boardings)	-	220	290	
Boardings per Vehicle-Km	-	0.5	0.5	
Boardings per Vehicle-Hour	-	9.9	11.8	
Annualized Ridership	-	80,300	105,850	

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.16 Dili Airport Express#2: Airport to Metinaro (Proposed)

6.4.16.1 Route Overview

Airport Express#2 (Airport-Metinaro) is a proposed east-west route linking President Nicolau Lobato International Airport to Metinaro and then back to the Airport – with a total length of 71.3 km. The route is the extension of Airport Express#1 connecting the Airport to a proposed administrative city Metinaro, about 35km east of Dili, which is planned to be fully established by 2045. Starting from Airport, the route follows a similar routing as Airport Espress#1 along the coastline via Ave. de Portugal. The route then continues along Av. Dos Direitos Humanos and Avenida 28 de Novembro before turning southward onto Rua Bedik-Hera. The route then turns left along Avenida Hera and continues along Estrada Dili-Manatuto until reaching Metinaro (passing through the key tourist spot of Metinaro Marketplace). After reaching Metinaro, the route then returns to the Airport.



Source: Arup Study Team

Figure 6.22: Airport Express#2 Routing and Key Generators Served

Key operating parameters for the proposed route based on local observations and airport statistics (i.e., hourly arrival of flights, passenger volumes) are summarized as follows:

- **Service Hours** – This route is proposed to start at 3:00AM and the last at 4:00PM on the weekday, Saturday, and Sunday.[95]
- **Trips per Hour** – On the weekday, the peak number of trips per hour during the weekday is proposed to be 3 trips per hour.
- **Travel Time** – Vehicle travel times during is around 197 minutes, with the assumed speed of 25km/h (based on travel speed assessment conducted in 2023 Dili Urban Master Plan).

[95] Service hours for the proposed Airport Express bus are based on estimated demand / departure time for bus service which is derived from the 2023 flight schedules of Dili Airport (source: flightaware.com).

Table 6.121: Dili Airport Express#2 Estimated Service Overview

Item	Dili Airport Express #2
Route Distance	71.3 km
Operating Times	3:00AM – 4:00PM
Max Trips/Hour (Weekday)	3
Roundtrip Peak Travel Time (Weekday Peak Average) [A]	197 mins
Travel Speed (Weekday AM Peak Average)	25 km/h
Travel Speed (Weekday PM Peak Average)	25 km/h

Note:
[A] Peak average is the average of select trips surveyed during the AM Peak (7:00AM – 9:00AM) and PM Peak (4:00PM – 6:00PM) on a given weekday.

6.4.16.2 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the four goals for the route optimization framework, various service and routing enhancement measures are proposed below:

Service Coverage

An overview of service coverage enhancements by scenarios is presented below:

Table 6.122: Dili Airport Express#2 Proposed Service Coverage Enhancements

	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Direction	**-**	**-**	**EB/WB**	**EB/WB**
Terminal Serving [A]	-	-	Airport	Airport
Distance (km)	-	-	71.3	71.3
Avg. Peak Roundtrip Travel Time (mins) [B]	-	-	197	197
# of Connections with Current/Future Public Transport at Terminal	-	-	TBD	TBD

Notes:
[A] The terminal(s) serving this route may change in the future scenarios subject to the MOTC's decision on future terminal locations.
[B] Based on Dili Urban Master Plan travel speed assessment. Speed of the corresponding segments (along the proposed Airport Express) ranges between 20-30km/h.

Service, Demand, and Productivity Implications

The Airport Express Route#2 will be implemented with a 30-minute peak headway in 2035 under the Upgrade/Visionary scenarios, requiring 8 vehicles to operate. The daily ridership is expected to be around 60 passengers, which equates to around 20 round trips per day of service. Annually, the service is expected to carry around 22,000 passengers.

Table 6.123: Dili Airport Express#2 Weekday Impacts on Service, Demand and Productivity

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Peak Headway (Minutes)	-	-	30	Same as Upgrade
# of Round Trips / Day	-	-	20	
Fleet Type	-	-	Airport Shuttle Van	
Fleet Size (No Spares)	-	-	7	
Fleet Size (with 10% Spares)	-	-	8	
Vehicle-Km	-	-	790	
Vehicle-Hour	-	-	40	
Daily Ridership (Boardings)	-	-	60	
Boardings per Vehicle-Km	-	-	0.1	

Service Parameters [A]	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
Boardings per Vehicle-Hour	-	-	1.6	
Annualized Ridership	-	-	21,900	

Notes:
[A] While the boardings and veh-km/hour figures presented here are rounded up to the nearest 10, the actual boardings/veh-km and boardings/veh-hour calculations are made based on the actual figures.

6.4.17 Summary of Modified Dili Microlet Network with Proposed Airport Express Routes

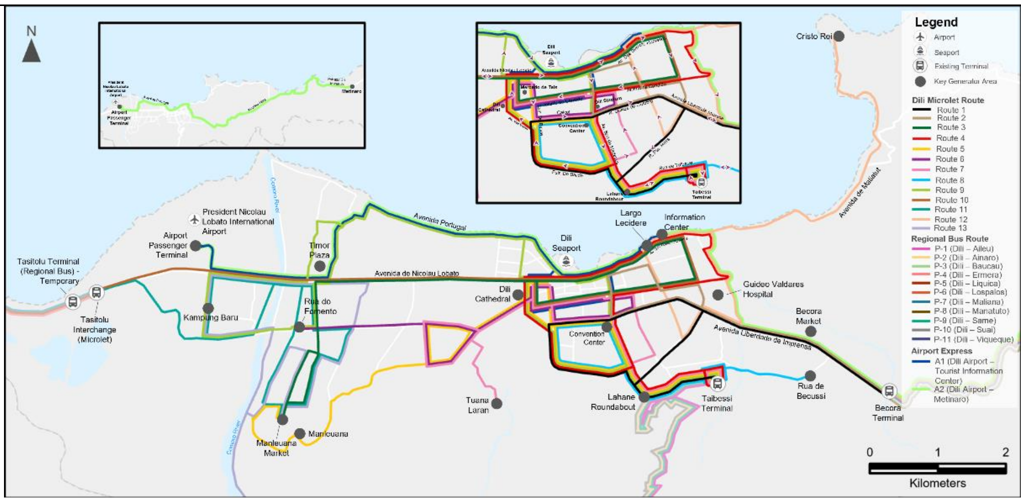
A summary of the modified Dili microlet routes (a total of 13 routes) as well as the two proposed Airport Express routes (between Airport and Tourist Information Center / Metinaro) is shown in

Table 6.124,with the map presented in **Figure 6.23**.

Table 6.124: Overview of Modified Dili Microlet Routes and Proposed Airport Express Routes

Route #	Origin	Destination	Via	Direction	Roundtrip Distance (km)	Terminals Serving [A]
M-1	Becora Terminal	Becora Terminal	Ave. Liberdade de Impresa, Estr. De Balide, R. Caicoli	Clockwise	14.8	Becora Terminal, Taibessi Terminal
M-2	Becora Terminal	Becora Terminal	Ave. Liberdade de Impresa, Ave. Bpo de Madeiros	Counter-Clockwise	10.1	Becora Terminal
M-3	Manleuana Market	Manleuana Market	Ave. de Nicolau Lobato, R. Jacinto de Candido	Clockwise	16.8	Manleuana Market
M-4	Taibessi Terminal	Taibessi Terminal	Estr. De Balide, Av. Alm Americo Tomas, R. Jacinto de Candido	Clockwise	12.6	Taibessi Terminal
M-5	Taibessi Terminal	Manleuana Market	Rua de Taibessi, Ave. de Manleuana	Clockwise	21.6	Taibessi Terminal, Manleuana Market
M-6	Rua do Fomento	Rua do Fomento	Rua Hudi-Laran, R. Caicoli, R. Jacinto de Candido,	Clockwise	12.2	No Terminal (serves Rua do Fomento)
M-7	Taibessi Terminal	Tuana Laran	Rua de Taibessi, Rua de Ai Lok Laran	Clockwise	15.9	Taibessi Terminal
M-8	Rua de Becussi	Rua de Becussi	Rua de Taibessi, Estr. De Balide	Clockwise	9.5	Taibessi Terminal (Thru)
M-9	Kampung Baru	Kampung Baru	Ave. de Nicolau Lobato, Av. de Portugal, Av. Salazar	Clockwise	22.7	Taibessi Terminal
M-10	Tasitolu Terminal	Tasitolu Terminal	Ave. de Nicolau Lobato, R. Jacinto de Candido	Clockwise	19.9	Tasitolu Terminal
M-11	Tasitolu Terminal	Manleuana Market	Rua de Tali-Laran, Ave. de Nicolau Lobato, Rua de Has Laran	Clockwise	14.6	Tasitolu Terminal, Manleuana Market
M-12	Rua de Cristo Rei	Rua de Cristo Rei	Ave. dos Direitos Humanos, Ave. de Matiatut	Clockwise	15.9	No Terminal (serves Cristo Rei)
M-13	Kasnafar	Kasnafar	Ave/ Praia dos Conqueiros, Rua de Lesibutak	Clockwise	20.6	Manleuana Market
				Total for Dili Microlet	**207.2**	
AE-1	Airport	Tourist Information Center	Timor Plaza	EB/WB	19.1	Airport
AE-2	Airport	Metinaro	Timor Plaza, Tourist Information Center	EB/WB	71.3	Airport
				Total for Airport Express	**90.4**	

Notes:
[A] The terminal(s) serving this route may change subject to the MOTC's decision on future terminal locations.



Source: Arup Study Team

Note: The faded colors represent regional bus routes to show interchange opportunities between microlet and reginal bus services.

Figure 6.23: Modified Dili Microlet Network with Proposed Airport Express Routes

6.5 Regional Bus Review & Recommendations

6.5.1 Introduction

This section presents the route-by-route regional bus reviews as well as proposed routing, service, and other recommendations to optimize service to better align with the vision and goals for public transport in Timor-Leste.

6.5.2 Regional Bus Route#1: Dili – Aileu

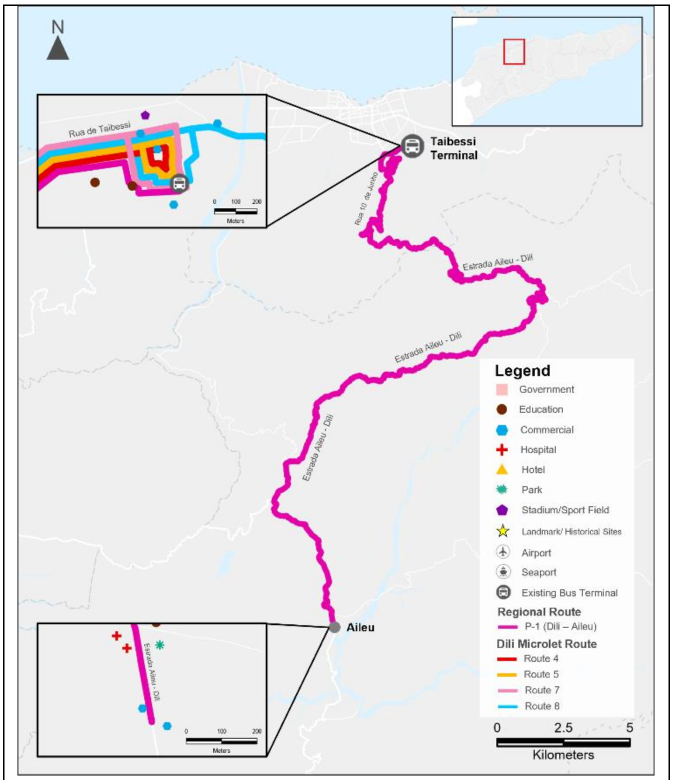
6.5.2.1 Route Overview

Regional Bus Route#1 (Dili – Aileu) operates along a north-south corridor linking Dili (Taibessi Terminal) to Aileu – with a total length of 44.0km (one-way). The southbound route starts at Taibessi Terminal, passes through various local roads through hill terrain (i.e., Estrada Aileu-Dili), before terminating at the city center in Aileu. The northbound route starts at Aileu and runs to the Taibessi Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).

On average, the route makes 4-7 stops depending on the trip. This route connects to Microlet Route#4, #5, #7 and #8 (only passes through without entering Taibessi Terminal) as well as four regional bus routes (including Dili-Ainaro, Dili-Same, and Dili-Suai) at Taibessi Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [96] – The first southbound bus departs Dili around 6:00-7:00AM and the last around 8:00AM-9:00AM. The northbound route departs Aileu around 4:00AM-5:00AM and the last around 6:0AM0-7:00AM.



Source: National Directorate of Land Transportation

Figure 6.24: Regional Bus Route#1: Dili – Aileu

- **Trips per Day** – On average, the number of southbound trips per day is 7, while that of northbound trips is also 7.
- **Travel Time** – On average, vehicle travel time (one-way) is around 83 minutes, with an average speed of 33km/hour.
- **Daily Boardings** [97] **–** On average, some 64 passengers travel on this route, with the southbound carrying some 23 passengers while the northbound about 41 passengers.

Table 6.125: Regional Bus Route#1: Dili-Aileu Existing Service Overview

	Southbound	**Northbound**
	Dili (Taibessi Terminal) - Aileu	**Aileu – Dili (Taibessi Terminal)**
Route Distance	44.0km	44.0km
Operating Times [A]	6:00AM – 8:00AM	4:00AM – 6:00AM
Peak Period	No defined peak period	No defined peak period
Daily Boardings	23	41
Trips/Day	7	7
Average Travel Time (One-Way)	85 mins	80 mins
Average Travel Speed	32km/h	33km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

[96] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.
[97] Daily boardings are estimated based on samples of regional on-board bus survey.

6.5.2.2 Performance Review

Daily and Annual Demand

On average, some 64 passengers use Regional Bus Route#1 on the weekdays, with Saturday accounting for about 27 passengers and Sunday accounting for about 28 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 20,000 – as shown in **Table 6.126**.

Table 6.126: Estimated Daily and Annual Boardings – Regional Bus Route#1

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	64	16,000
Saturday	27	2,000
Sunday	28	2,000
Total		20,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.25 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 7 trips are observed for both directions. Peaks occur with 5 trips in the 8:00AM-9:00AM hour in the southbound direction (Dili – Aileu) and 4 trips in the 5:00AM-6:00AM hour in the northbound direction (Aileu – Dili).

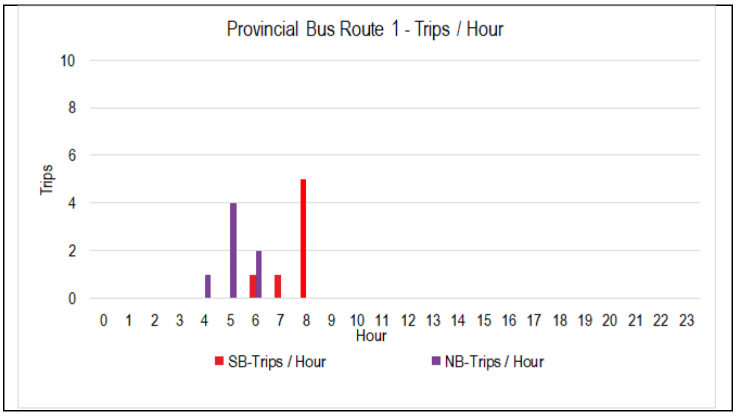
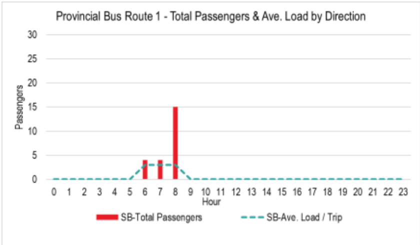
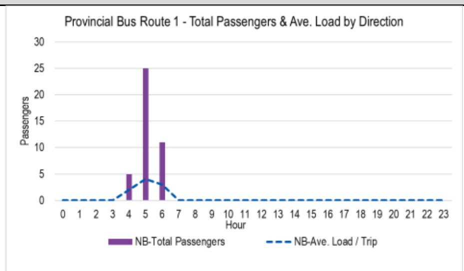


Figure 6.25: Trips by Time of Day – Regional Bus Route#1

Route-Level Demand and Average Loading

Table 6.127 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.127: Route-Level Demand and Average Loading – Regional Bus Route#1

Southbound	Northbound
	
Key Findings: • Passenger activity is observed only in the morning for both directions. For southbound, passenger activity ranges from 4-15 in the 6:00AM-8:00AM period (with a peak of 15 passengers at 8:00AM). For northbound, passenger activity ranges from 5-25 in the 4:00AM-6:00AM period (with a peak of 25 passengers at 5:00AM).	

6.5.2.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#1 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.128: Summary of Regional Bus Route#1 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Taibessi Terminal in Dili as well as the city center in Aileu.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Aileu assumed as the city center which consists of markets, commercial areas, education, etc.)
4	Efficient and Productive Service	Moderate	• Current activity is low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.2.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The daily ridership on Regional Bus Route#1 is expected to be stable across different future scenarios, and thus the vehicle fleet required will be the same as current provision (i.e., 2 small buses), although the number of trips required to run the service would be reduced by 2 per day. **Table 6.129** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#1.

Table 6.129: Regional Bus Route#1 Weekday Impacts on Service, Demand and Productivity

Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	7	5	5	5

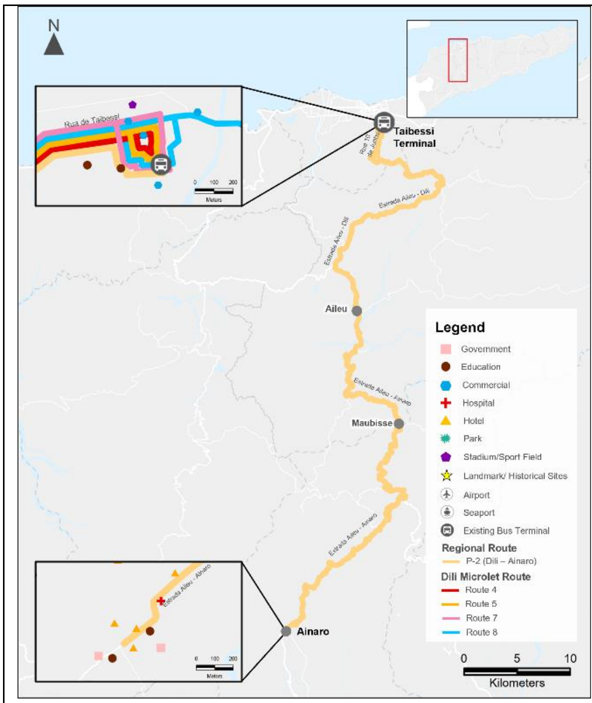
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	1	1	1	1
Fleet Size (with 10% Spares)	2	2	2	2
Daily Ridership (Boardings)	64	66	79	80

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.3 Regional Bus Route#2: Dili – Ainaro

6.5.3.1 Route Overview

Regional Bus Route#2 (Dili – Ainaro) operates along a north-south corridor linking Dili (Taibessi Terminal) to Ainaro – with a total length of 109km (one-way). The southbound route starts at Taibessi Terminal, passes through Aileu township as Route#1 and various local roads through hilly terrain (i.e., Estrada Aileu-Dili, Estrada Aileu-Ainaro), before terminating at the city center in Ainaro. The northbound route starts at Ainaro and runs to the Taibessi Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.26: Regional Bus Route#2: Dili – Ainaro

On average, the route makes 11-15 stops depending on the trip. This route connects to Microlet Route#4, #5, #7 and #8 (only passes through without entering Taibessi Terminal) as well as three regional bus routes (including Dili-Ainaro, Dili-Same, and Dili-Suai) at Taibessi Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours**[98] – The southbound bus departs Dili around 8:00AM-10:00AM. The northbound route departs Ainaro around 3:00AM-6:00AM.

[98] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.

- **Trips per Day** – On average, the number of southbound trips per day is 2, while that of northbound trips is also 2.
- **Travel Time** – On average, vehicle travel time (one-way) is around 278 minutes, with an average speed of 24km/hour.
- **Daily Boardings**[99] **–** On average, some 31 passengers travel on this route, with the southbound carrying some 12 passengers while the northbound about 19 passengers.

Table 6.130: Regional Bus Route#2: Dili-Ainaro Existing Service Overview

	Southbound **Dili (Taibessi Terminal) - Ainaro**	**Northbound** **Ainaro – Dili (Taibessi Terminal)**
Route Distance	109.0km	109.0km
Operating Times [A]	8:00AM – 10:00AM	3:00AM – 6:00AM
Peak Period	No defined peak period	No defined peak period
Daily Boardings	12	19
Trips/Day	2	2
Average Travel Time (One-Way)	278 mins	278 mins
Average Travel Speed	24km/h	24km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.3.2 Performance Review

Daily and Annual Demand

On average, some 31 passengers use Regional Bus Route#2 on the weekdays, with Saturday accounting for about 37 passengers and Sunday accounting for about 30 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 13,000– as shown in **Table 6.131**.

Table 6.131: Estimated Daily and Annual Boardings – Regional Bus Route#2

Day	**Daily Boardings**	**Estimated Annual Boardings (Rounded Up to Nearest 1,000)** [A, B]
Weekday	31	8,000
Saturday	37	2,000
Sunday	30	3,000
Total		13,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.27 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). A total of 2 trips are operated in both directions, with a headway of 150 minutes for southbound (Dili – Ainaro) and 90 minutes for northbound (Ainaro – Dili).

[99] Daily boardings are estimated based on samples of regional on-board bus survey.

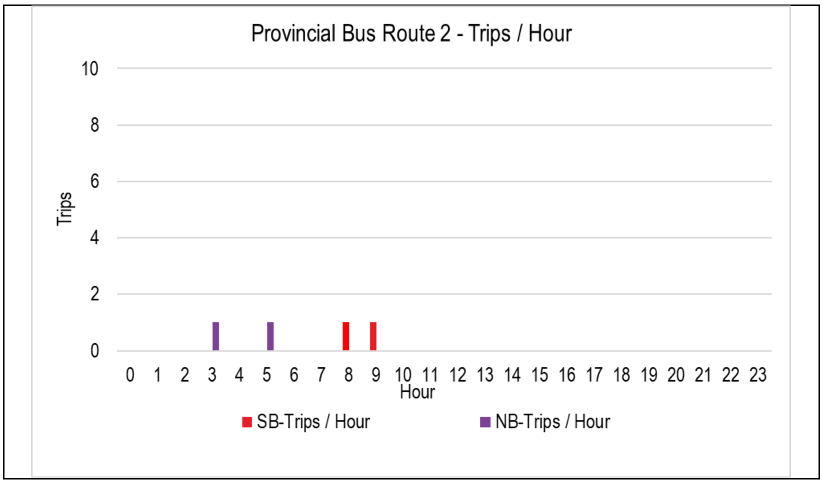
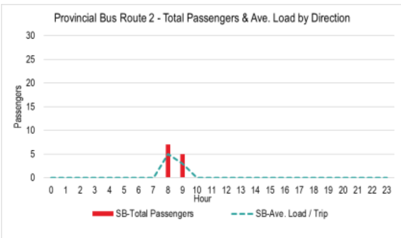
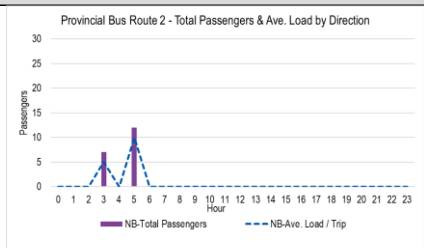


Figure 6.27: Trips by Time of Day – Regional Bus Route#2

Route-Level Demand and Average Loading

Table 6.132 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.132: Route-Level Demand and Average Loading – Regional Bus Route#2

<table>
<tr><th>Southbound</th><th>Northbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is observed only in the morning for both directions. For southbound, passenger activity ranges from 7-12 in the 3:00AM-6:00AM period (with a peak of 12 passengers in the trip departure at 5:00AM). For northbound, passenger activity ranges from 5-7 in the 8:00AM-10:00AM period (with a peak of 7 passengers at 8:00AM).
• Assuming a vehicle capacity of 30 passengers, this route operates at a maximum of 40% of the stated capacity for both directions.</td></tr>
</table>

6.5.3.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#2 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.133: Summary of Regional Bus Route#2 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Taibessi Terminal in Dili as well as the city center in Ainaro.

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Ainaro assumed as the city center which consists of markets, commercial areas, education, etc.)
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.3.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The daily ridership on Regional Bus Route#2 is expected to increase by single digit across different future scenarios, and thus the vehicle required will be the same as well (3 small buses (8m)). **Table 6.129** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#2.

Table 6.134: Regional Bus Route#2 Weekday Impacts on Service, Demand and Productivity

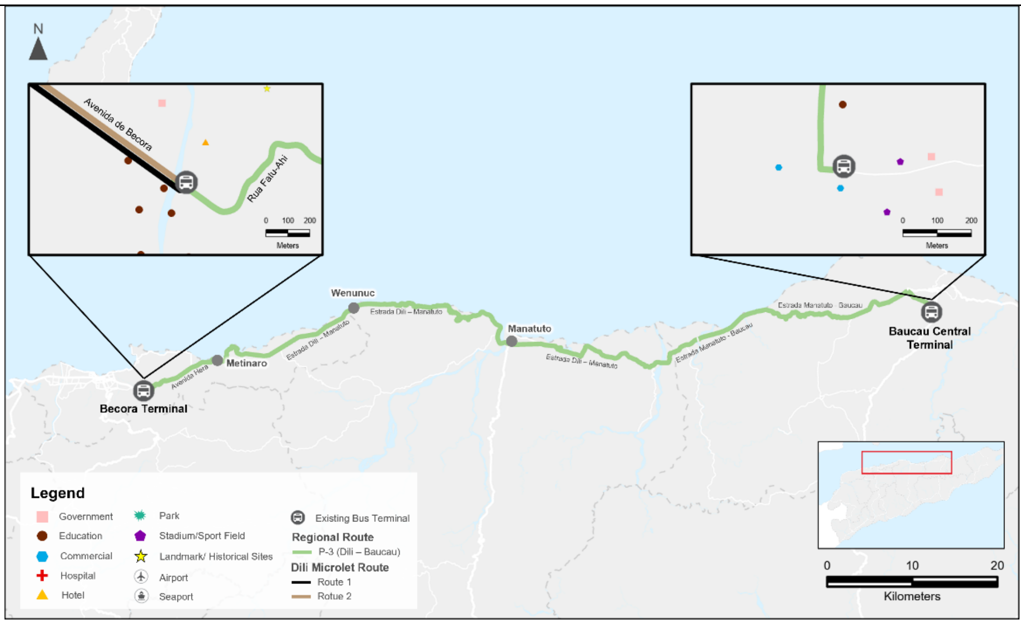
Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	2	2	2	2
Fleet Type	Microlet/ Anggunа	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	2	2	2	2
Fleet Size (with 10% Spares)	3	3	3	3
Daily Ridership (Boardings)	31	32	39	39

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.4 Regional Bus Route#3: Dili – Baucau

6.5.4.1 Route Overview

Regional Bus Route#3 (Dili – Baucau) operates along an east-west corridor linking Dili (Becora Terminal) to Baucau – with a total length of 118km (one-way). The eastbound route starts at Becora Terminal, passes through various local roads along the coast (i.e., Estrada Dili-Manatuto, Estrada Manatuto-Baucau), before terminating at the city center in Baucau. The westbound route starts at Baucau and runs to the Becora Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.28: Regional Bus Route#3: Dili – Baucau

On average, the route makes 13-15 stops depending on the trip. This route connects to Microlet Route#1, #2 as well as three regional bus routes (including Dili-Lospalos, Dili-Manatuto, and Dili-Viqueque) at Becora Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [100] – The first eastbound bus departs Becora around 7:00AM-8:00AM and the last around 6:00PM-7:00PM. The first westbound route departs Baucau around 6:00AM-7:00AM and the last around 4:00PM-5:00PM.
- **Trips per Day** – On average, the number of eastbound trips per day is 19, while that of westbound trips is 22.
- **Travel Time** – On average, vehicle travel time (one-way) is around 165 minutes, with the average speed of 44km/hour.
- **Daily Boardings** [101] – On average, some 1,220 passengers travel on this route, with the eastbound carrying some 680 passengers while the westbound about 540 passengers.

[100] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.
[101] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.135: Regional Bus Route#3: Dili-Baucau Existing Service Overview

	Eastbound Dili (Becora Terminal) - Baucau	Westbound Baucau – Dili (Becora Terminal)
Route Distance	118.0km	118.0km
Operating Times [A]	7:00AM – 7:00PM	6:00AM – 5:00PM
Peak Period	7:00AM – 8:00AM	11:00AM – 12:00AM / 3:00PM – 4:00PM
Daily Boardings	678	540
Trips/Day	19	22
Average Travel Time (One-Way)	170 mins	160 mins
Average Travel Speed	42km/h	45km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.4.2 Performance Review

Daily and Annual Demand

On average, some 1,218 passengers use Regional Bus Route#3 on the weekdays, with Saturday accounting for about 1,042 passengers and Sunday accounting for about 2,105 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 498,000 – as shown in **Table 6.136**.

Table 6.136: Estimated Daily and Annual Boardings – Regional Bus Route#3

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	1,218	303,000
Saturday	1,042	53,000
Sunday	2,105	142,000
Total		498,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.29 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 20 trips are observed for both directions, with peak departures of 3 trips in the 7:00AM-8:00AM hour in the eastbound direction (Dili – Baucau) and 5 trips in the 11:00AM-12:00PM hour in the westbound direction (Baucau – Dili).

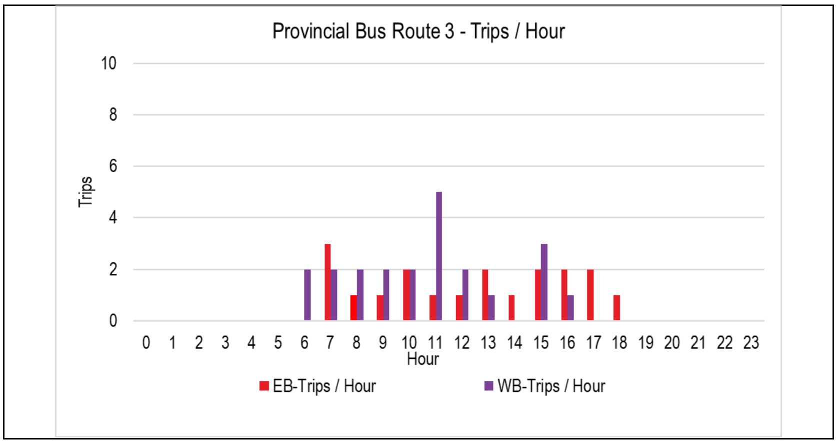
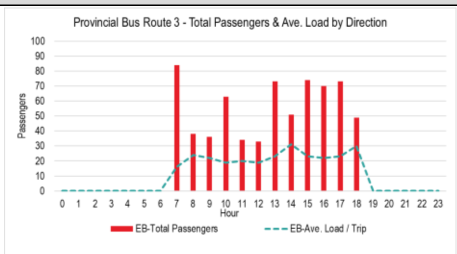
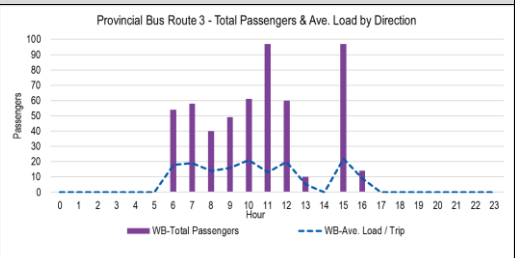


Figure 6.29: Trips by Time of Day – Regional Bus Route#3

Route-Level Demand and Average Loading

Table 6.137 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.137: Route-Level Demand and Average Loading – Regional Bus Route#3

Eastbound	Westbound
	
Key Findings: • Passenger activity is observed in whole day for both directions. For eastbound, passenger activity ranges from 35-85 in the morning, during 6:00AM-12:00AM period (with a peak of 84 passengers at 7:00AM) and ranges from 35-74 in afternoon (with a peak of 74 passengers at 3:00PM). For westbound, passenger activity ranges from 40-100 in the morning (with a peak of 97 passengers at 11:00AM), before dropping below 10 passengers after 1:00PM then jumping to 97 passengers at 3:00PM. • Assuming a vehicle capacity of 30 passengers, this route operates at 100% and 70% of the stated capacity for eastbound and westbound, respectively.	

6.5.4.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#3 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.138: Summary of Regional Bus Route#3 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Becora Terminal in Dili as well as the city center in Baucau.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Aileu assumed as the city center which consists of markets, commercial areas, government, etc.)
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.4.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

Weekday ridership on Regional Bus Route#3 is expected to grow steadily by over 25% between the 2025 Immediate and 2035 Upgrade/Visionary scenarios, with number of trips increasing from the existing 22 to 39 under the 2025 Immediate Scenario, and then to 51 under the 2035 Upgrade/Visionary scenarios. Accordingly, the fleet size required is also expected to increase from 22 small buses (8m) to 29 by 2035. **Table 6.139** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#3.

Table 6.139: Regional Bus Route#3 Weekday Impacts on Service, Demand and Productivity

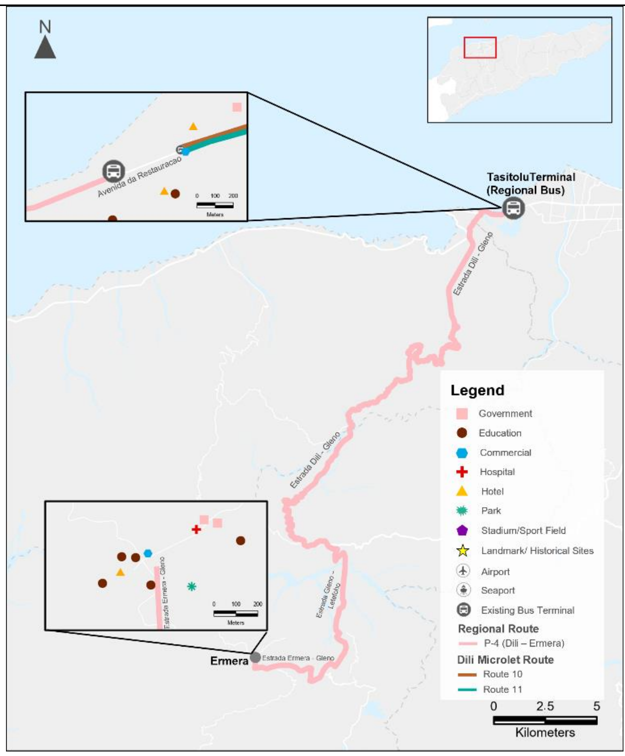
Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	22	39	51	51
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	20	20	26	26
Fleet Size (with 10% Spares)	22	22	29	29
Daily Ridership (Boardings)	1,218	1,280	1,641	1,658

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.5 Regional Bus Route#4: Dili – Ermera

6.5.5.1 Route Overview

Regional Bus Route#4 (Dili – Ermera) operates along a north-south corridor linking Dili (Tasitolu Terminal) to Baucau – with a total length of 46km (one-way). The southbound route starts at Tasitolu Terminal, passes through various local roads through hilly terrain (i.e., Estrada Aileu-Gleno, Gleno-Ermera), before terminating at the city center in Ermera. The northbound route starts at Ermera and runs to the Tasitolu Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.30: Regional Bus Route#4: Dili – Ermera

On average, the route makes 5-12 stops depending on the trip. This route connects to Microlet Route#10, #11 as well as two regional bus routes (including Dili-Liquica, and Dili-Maliana) at Tasitolu Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [102] – The first southbound bus departs Dili around 6:00AM-7:00AM and the last around 6:00PM-7:00PM. The northbound route departs Ermera around 7:00AM-8:00AM and the last around 4:00PM-5:00PM.
- **Trips per Day** – On average, the number of southbound trips per day is 13, while that of northbound trips is 11.
- **Travel Time** – On average, vehicle travel time (one-way) is around 72 minutes, with an average speed of 39km/hour.
- **Daily Boardings** [103] **–** On average, some 466 passengers travel on this route, with the southbound carrying some 265 passengers while the northbound about 201 passengers.

[102] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.
[103] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.140: Regional Bus Route#4: Dili-Ermera Existing Service Overview

	Southbound	Northbound
	Dili (Becora Terminal) - Ermera	Ermera – Dili (Becora Terminal)
Route Distance	46.0km	46.0km
Operating Times [A]	6:00AM – 7:00PM	7:00AM – 5:00PM
Peak Period	6:00AM – 7:00AM	3:00PM – 4:00PM
Daily Boardings	265	201
Trips/Day	13	11
Average Travel Time (One-Way)	86 mins	58 mins
Average Travel Speed	33km/h	48km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.5.2 Performance Review

Daily and Annual Demand

On average, some 466 passengers use Regional Bus Route#4 on the weekdays, with Saturday accounting for about 482 passengers and Sunday accounting for about 359 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 166,000 – as shown in **Table 6.141**.

Table 6.141: Estimated Daily and Annual Boardings – Regional Bus Route#4

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	466	116,000
Saturday	482	25,000
Sunday	359	25,000
Total		166,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.31 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 12 trips are observed for both directions, with peak departures of 5 trips in the 6:00AM-7:00AM hour in the southbound direction (Dili – Ermera) and 3 trips in the 3:00PM-4:00PM hour in the northbound direction (Ermera – Dili).

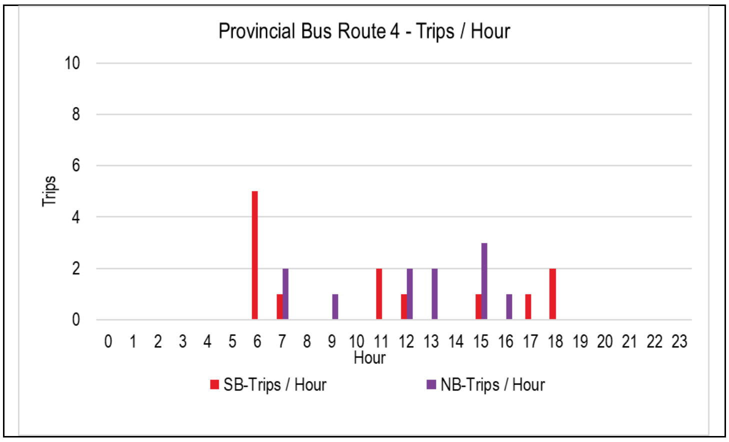
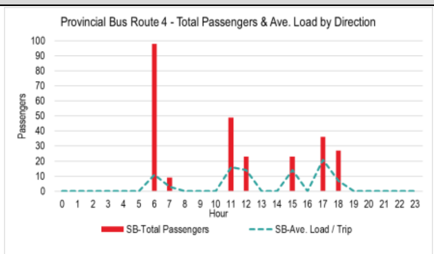
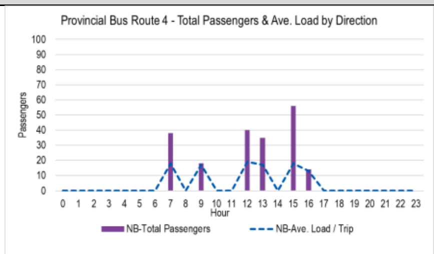


Figure 6.31: Trips by Time of Day – Regional Bus Route#4

Route-Level Demand and Average Loading

Table 6.142 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.142: Route-Level Demand and Average Loading – Regional Bus Route#4

Southbound	Northbound
	

Key Findings:

- Passenger activity is observed throughout the whole day for both directions. For southbound, passenger activity ranges from 10-100 in the morning, during 6:00AM-12:00AM period (with a peak of 98 passengers at 6:00AM) and ranges from 23-36 in afternoon (with a peak of 36 passengers at 5:00PM). For northbound, passenger activity ranges from 18-40 in the morning (with a peak of 38 passengers at 7:00AM) and reaches 56 passengers at 3:00PM in afternoon section.
- Assuming a vehicle capacity of 30 passengers, this route operates at 70% and 60% of the stated capacity for southbound and northbound, respectively.

6.5.5.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#4 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.143: Summary of Regional Bus Route#4 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Tasitolu Terminal in Dili as well as the city center in Ermera.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Ermera assumed as the city center which consists of markets, commercial areas, government, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.5.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

Weekday ridership on Regional Bus Route#4 is expected to grow by ~25% between the 2025 Immediate and 2035 Upgrade/Visionary scenarios, which leads to 2 more daily trips. The vehicle requirement remains unchanged at 6 Small Buses (8m), however. **Table 6.144** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#4.

Table 6.144: Regional Bus Route#4 Weekday Impacts on Service, Demand and Productivity

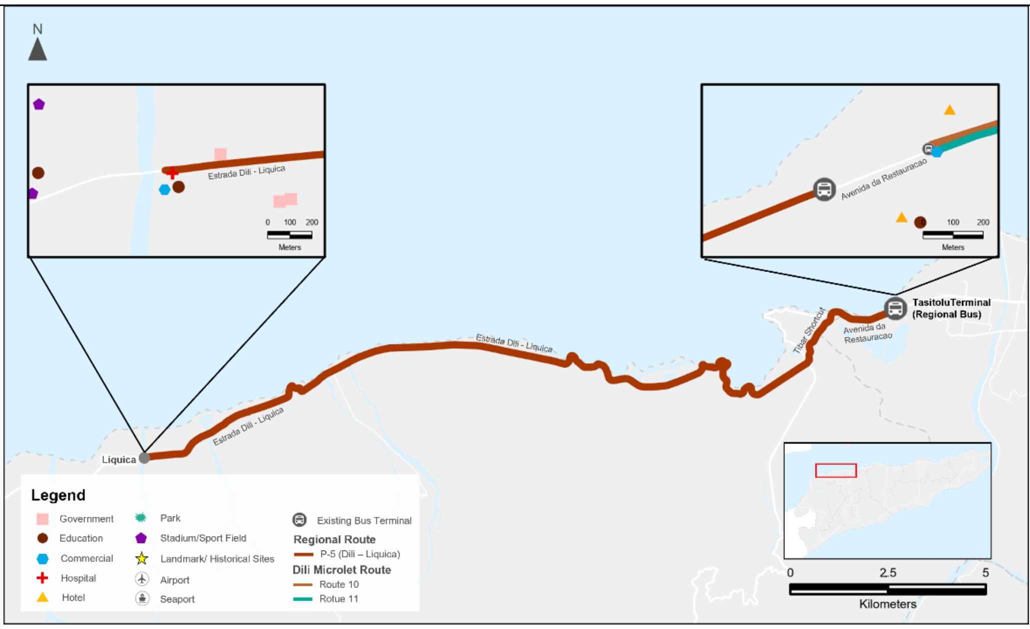
Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	13	19	21	21
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	5	5	5	5
Fleet Size (with 10% Spares)	6	6	6	6
Daily Ridership (Boardings)	466	487	611	617

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.6 Regional Bus Route#5: Dili – Liquica

6.5.6.1 Route Overview

Regional Bus Route#5 (Dili – Liquica) operates along a north-south corridor linking Dili (Tasitolu Terminal) to Liquica – with a total length of 23km (one-way). The westbound route starts at Tasitolu Terminal, passes through various local roads along the coast (i.e., Estrada Dili-Liquica), before terminating at the city center in Liquica. The eastbound route starts at Liquica and runs to the Tasitolu Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.32: Regional Bus Route#5: Dili – Liquica

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [104] – The westbound bus departs Dili around 8:00AM-9:00AM. The eastbound route departs Liquica around 5:00PM-7:00PM.
- **Trips per Day** – On average, the number of westbound trips per day is 3, while that of eastbound trips is also 3.
- **Travel Time** – On average, vehicle travel time (one-way) is around 55 minutes, with the average speed of 26km/hour.
- **Daily Boardings** [105] **–** On average, some 203 passengers travel on this route, with the westbound carrying some 105 passengers while the eastbound about 98 passengers.

[104] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.

[105] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.145: Regional Bus Route#5: Dili-Liquica Existing Service Overview

	Westbound	Eastbound
	Dili (Tasitolu Terminal) - Liquica	**Liquica – Dili (Tasitolu Terminal)**
Route Distance	23.0km	23.0km
Operating Times [A]	8:00AM – 9:00AM	5:00PM – 7:00PM
Peak Period	No defined peak period	5:00PM – 6:00PM
Daily Boardings	483	1,486
Trips/Day	3	3
Average Travel Time (One-Way)	51 mins	58 mins
Average Travel Speed	28km/h	24km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.6.2 Performance Review

Daily and Annual Demand

On average, some 1,969 passengers use Regional Bus Route#5 on the weekdays, with Saturday accounting for about 1,855 passengers and Sunday accounting for about 1,044 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 652,000 – as shown in **Table 6.146**.

Table 6.146: Estimated Daily and Annual Boardings – Regional Bus Route#5

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	1,969	489,000
Saturday	1,855	93,000
Sunday	1,044	70,000
Total		652,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.33 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 3 trips are observed for both directions, with all 3 trips in the 8:00AM-9:00AM hour for the westbound direction (Dili – Liquica) and a peak of 2 trips in the 5:00PM-6:00PM hour for the eastbound direction (Liquica – Dili).

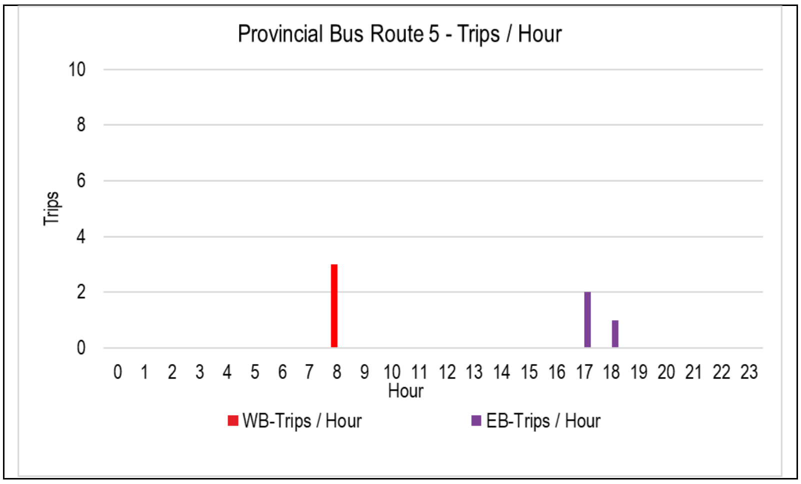
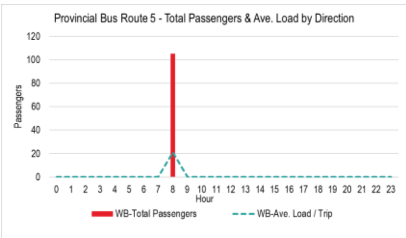
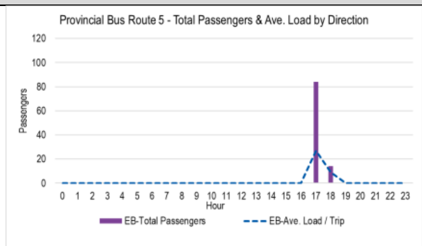


Figure 6.33: Trips by Time of Day – Regional Bus Route#5

Route-Level Demand and Average Loading

Table 6.147 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.147: Route-Level Demand and Average Loading – Regional Bus Route#5

Westbound	Eastbound
	
Key Findings: • Passenger activity is observed only in the morning for both directions. For westbound, passenger activity reaches over 100 at 8:00AM. For eastbound, passenger activity ranges from 10-85 in the 5:00PM-6:00PM period (with a peak of 84 passengers at 5:00PM). • Assuming a vehicle capacity of 30 passengers, this route operates at a maximum of 60% and 90% of the stated capacity for westbound and eastbound, respectively.	

6.5.6.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#5 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.148: Summary of Regional Bus Route#5 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Tasitolu Terminal in Dili as well as the city center in Liquica.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Liquica assumed as the city center which consists of markets, education, commercial areas, government, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.6.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

Weekday ridership on Regional Bus Route#5 is expected to increase by ~30% between the 2025 Immediate and 2035 Upgrade/Visionary scenarios, which leads to an increase in trips offered (from 57 to 70) and the number of vehicles required (from 9 to 11 small buses). **Table 6.149** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#5.

Table 6.149: Regional Bus Route#5 Weekday Impacts on Service, Demand and Productivity

Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	48	57	70	70
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	8	8	10	10
Fleet Size (with 10% Spares)	9	9	11	11
Daily Ridership (Boardings)	1,969	2,073	2,685	2,712

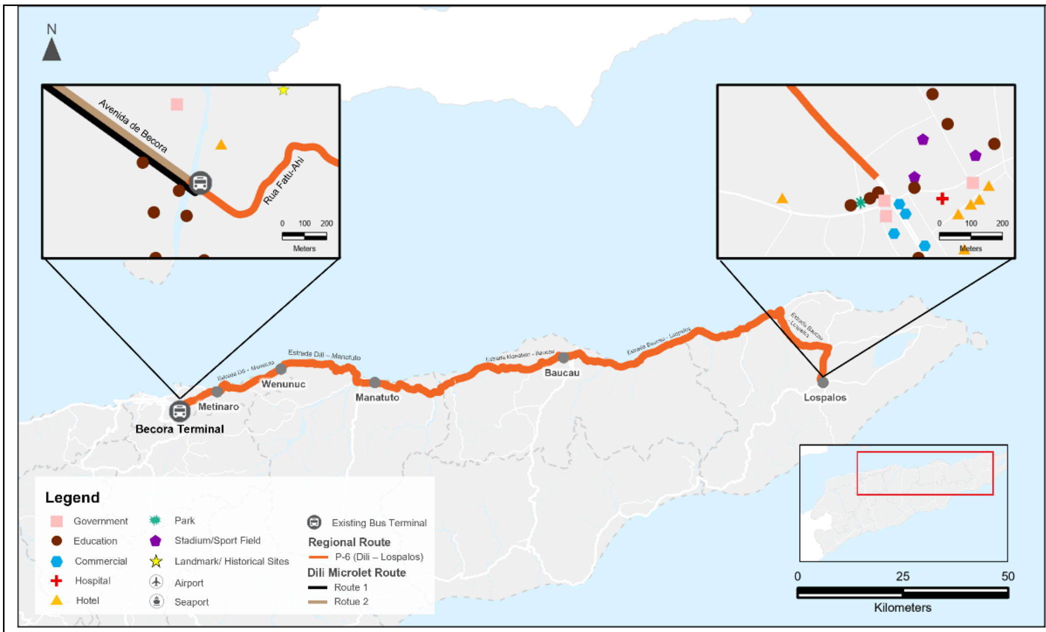
Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.7 Regional Bus Route#6: Dili – Lospalos

6.5.7.1 Route Overview

Regional Bus Route#6 (Dili – Lospalos) operates along an east-west corridor linking Dili (Becora Terminal) to Lospalos – with a total length of 205km (one-way). The eastbound route starts at Becora Terminal, passes through various local roads along the coast (i.e., Estrada Dili-Manatuto, Estrada Baucau-Lospalos), before terminating at the city center in

Lospalos. The westbound route starts at Lospalos and runs to the Becora Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.34: Regional Bus Route#6: Dili – Lospalos

On average, the route makes 7-10 stops depending on the trip. This route connects to Microlet Route#1, #2 as well as three regional bus routes (including Dili-Baucau, Dili-Manatuto, and Dili-Viqueque) at Becora Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [106] – The eastbound bus departs Dili around 10:00AM-2:00PM. The westbound route departs Liquica around 3:00AM-7:00AM.
- **Trips per Day** – On average, the number of eastbound trips per day is 2, while that of westbound trips is also 2.
- **Travel Time** – On average, vehicle travel time (one-way) is around 435 minutes, with an average speed of 29km/hour.
- **Daily Boardings** [107] **–** On average, some 30 passengers travel on this route, with the eastbound carrying some 17 passengers while the westbound about 15 passengers.

[106] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.

[107] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.150: Regional Bus Route#6: Dili-Lospalos Existing Service Overview

	Eastbound	Westbound
	Dili (Becora Terminal) - Lospalos	Lospalos – Dili (Becora Terminal)
Route Distance	205.0km	205.0km
Operating Times [A]	10:00AM – 2:00PM	3:00AM – 7:00AM
Peak Period	No defined peak period	No defined peak period
Daily Boardings	30	123
Trips/Day	2	2
Average Travel Time (One-Way)	445 mins	425 mins
Average Travel Speed	28km/h	29km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.7.2 Performance Review

Daily and Annual Demand

On average, some 153 passengers use Regional Bus Route#6 on the weekdays, with Saturday accounting for about 370 passengers and Sunday accounting for about 412 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 85,000 – as shown in **Table 6.151**.

Table 6.151: Estimated Daily and Annual Boardings – Regional Bus Route#6

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	153	38,000
Saturday	370	19,000
Sunday	412	28,000
Total		85,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays. [B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.35 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 2 trips are observed for both directions, with a headway of 160 minutes for eastbound trips (Dili – Lospalos) and 210 minutes for westbound trips (Lospalos – Dili).

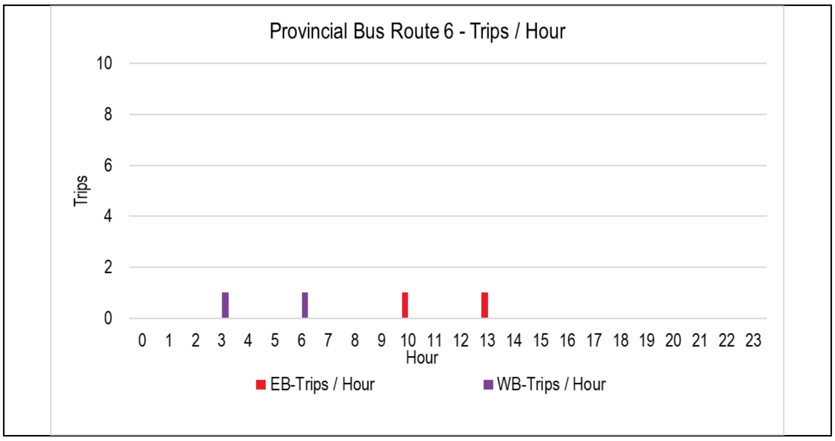
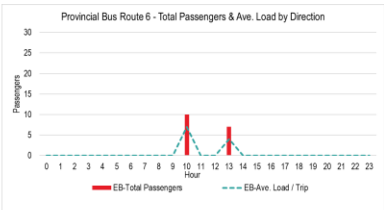
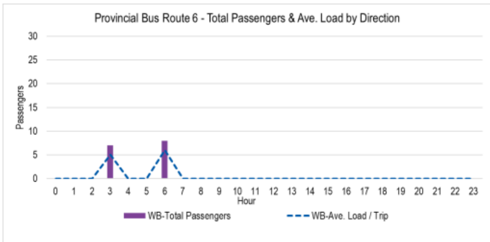
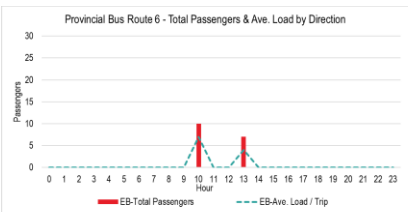
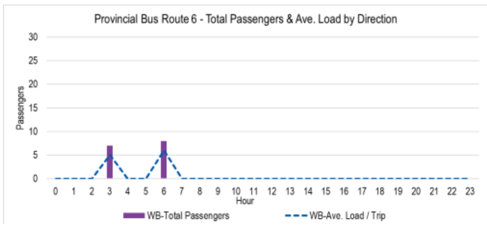


Figure 6.35: Trips by Time of Day – Regional Bus Route#6

Route-Level Demand and Average Loading

Table 6.152 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.152: Route-Level Demand and Average Loading – Regional Bus Route#6

Eastbound	Westbound
	
Key Findings: • Passenger activity is observed only in the morning for westbound and mid-day for eastbound. For eastbound, passenger activity ranges from 7-10 during 10:00AM-2:00PM period. For westbound, passenger activity ranges under 10 in the 3:00AM-7:00AM period. • Assuming a vehicle capacity of 30 passengers, this route operates at 20% of the stated capacity for both directions.	
Eastbound	**Westbound**
	
Key Findings: • Passenger activity is observed only in the morning for westbound and mid-day for eastbound. For eastbound, passenger activity ranges from 7-10 during 10:00AM-2:00PM period. For westbound, passenger activity ranges under 10 in the 3:00AM-7:00AM period. • Assuming a vehicle capacity of 30 passengers, this route operates at 20% of the stated capacity for both directions.	

6.5.7.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#6 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.153: Summary of Regional Bus Route#6 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Becora Terminal in Dili as well as the city center in Lospalos.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Lospalos assumed as the city center which consists of markets, education, commercial areas, government, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest west-east corridor – potential service refinements may be necessary to improve productivity.

6.5.7.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The daily ridership on Regional Bus Route#6 only increases by a small amount between the future scenarios, leading to only a small increase to trips offered (from 4 to 7) and a small change to number of vehicles required (7 to 8 small buses). **Table 6.154** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#6.

Table 6.154: Regional Bus Route#6 Weekday Impacts on Service, Demand and Productivity

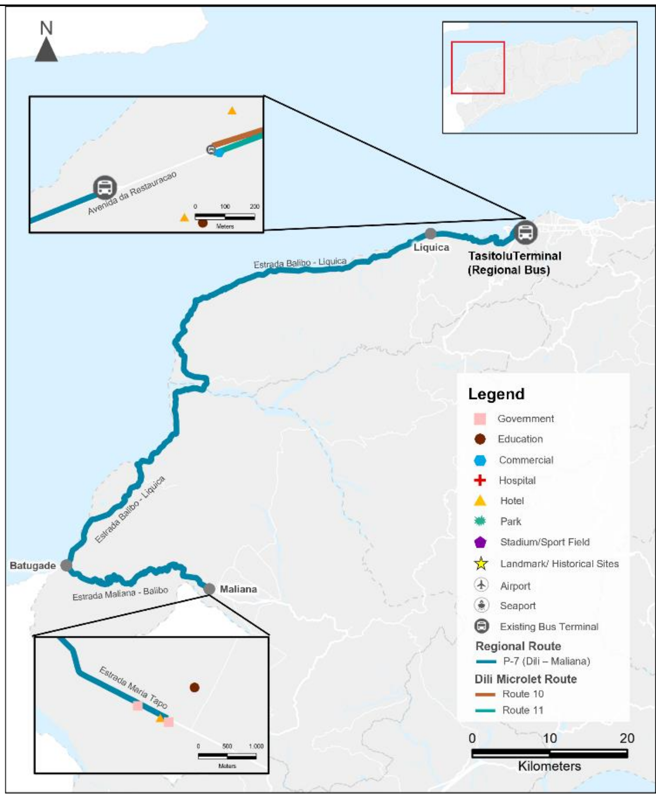
Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	4	7	7	7
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	6	7	7	7
Fleet Size (with 10% Spares)	7	8	8	8
Daily Ridership (Boardings)	153	156	172	174

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.8 Regional Bus Route#7: Dili – Maliana

6.5.8.1 Route Overview

Regional Bus Route#7 (Dili – Maliana) operates along an east-west corridor linking Dili (Tasitolu Terminal) to Maliana – with a total length of 133km (one-way). The westbound route starts at Tasitolu Terminal, passes through various local roads along the coast (i.e., Estrada Balibo-Liquica), before terminating at the city center in Maliana. The eastbound route starts at Maliana and runs to the Tasitolu Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.36: Regional Bus Route#7: Dili – Maliana

On average, the route makes 5-9 stops depending on the trip. This route connects to Microlet Route#10, #11 as well as two regional bus routes (including Dili-Ermera, and Dili-Liquica) at Tasitolu Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours**[108] – The westbound bus departs Dili around 12:00PM-3:00PM. The eastbound route departs Maliana around 7:00AM-10:00AM.
- **Trips per Day** – On average, the number of eastbound trips per day is 6, while that of westbound trips is also 6.
- **Travel Time** – On average, vehicle travel time (one-way) is around 270 minutes, with an average speed of 31km/hour.
- **Daily Boardings** [109] **–** On average, some 302 passengers travel on this route, with the westbound carrying some 136 passengers while the eastbound about 166 passengers.

Table 6.155: Regional Bus Route#7: Dili-Maliana Existing Service Overview

[108] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.

[109] Daily boardings are estimated based on samples of regional on-board bus survey.

	Westbound	Eastbound
	Dili (Tasitolu Terminal) - Maliana	Maliana – Dili (Tasitolu Terminal)
Route Distance	133.0km	133.0km
Operating Times [A]	12:00PM-3:00PM	7:00AM-10:00AM
Peak Period	1:00PM-2:00PM	No defined peak period
Daily Boardings	136	166
Trips/Day	6	6
Average Travel Time (One-Way)	233 mins	306 mins
Average Travel Speed	35km/h	27km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.8.2 Performance Review

Daily and Annual Demand

On average, some 302 passengers use Regional Bus Route#7 on the weekdays, with Saturday accounting for about 407 passengers and Sunday accounting for about 623 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 138,000 – as shown in **Table 6.156**.

Table 6.156: Estimated Daily and Annual Boardings – Regional Bus Route#7

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	302	75,000
Saturday	407	21,000
Sunday	623	42,000
Total		138,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays. [B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.37 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 6 trips are observed for both directions, with a peak trip of 5 trip at the 1:00PM-2:00PM hour for the westbound direction (Dili – Maliana).

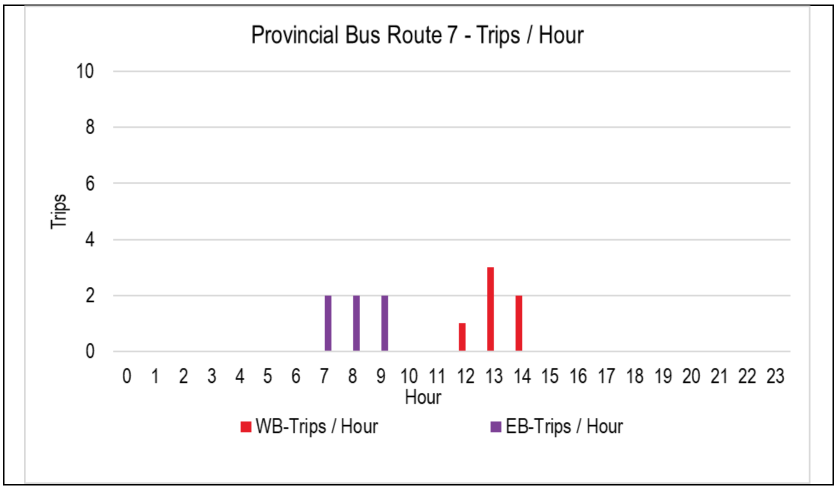
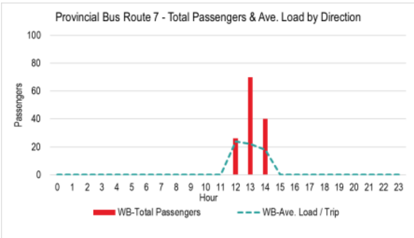
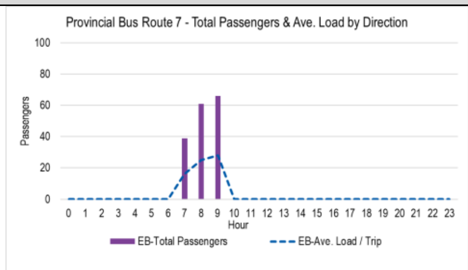
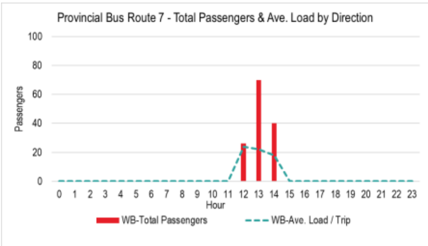
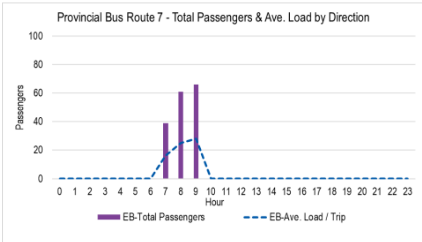


Figure 6.37: Trips by Time of Day – Regional Bus Route#7

Route-Level Demand and Average Loading

Table 6.157 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.157: Route-Level Demand and Average Loading – Regional Bus Route#7

<table>
<tr><th>Westbound</th><th>Eastbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is only observed during the morning for eastbound and only during the afternoon for westbound. For westbound, passenger activity ranges from 26-70 with a peak of 70 passengers at 1:00PM). For eastbound, passenger activity ranges from 39 at 7:00AM and reaches 66 at 10:00AM.
• Assuming a vehicle capacity of 30 passengers, this route operates at a maximum of 80% and over 90% of the stated capacity for westbound and eastbound, respectively.</td></tr>
<tr><th>Westbound</th><th>Eastbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is only observed during the morning for eastbound and only during the afternoon for westbound. For westbound, passenger activity ranges from 26-70 with a peak of 70 passengers at 1:00PM). For eastbound, passenger activity ranges from 39 at 7:00AM and reaches 66 at 10:00AM.
• Assuming a vehicle capacity of 30 passengers, this route operates at a maximum of 80% and over 90% of the stated capacity for westbound and eastbound, respectively.</td></tr>
</table>

6.5.8.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#7 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.158: Summary of Regional Bus Route#7 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Tasitolu Terminal in Dili as well as the city center in Maliana.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Maliana assumed as the city center which consists of markets, education, commercial areas, government, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest east-west corridor – potential service refinements may be necessary to improve productivity.

6.5.8.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The daily ridership on Regional Bus Route#7 is expected to increase by around 25% across different future scenarios, which correspondingly increases the number of trips by 2 as compared to the existing. Up to 9 small buses will be required under the 2035 Upgrade/Visionary Scenario. **Table 6.159** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#7.

Table 6.159: Regional Bus Route#7 Weekday Impacts on Service, Demand and Productivity

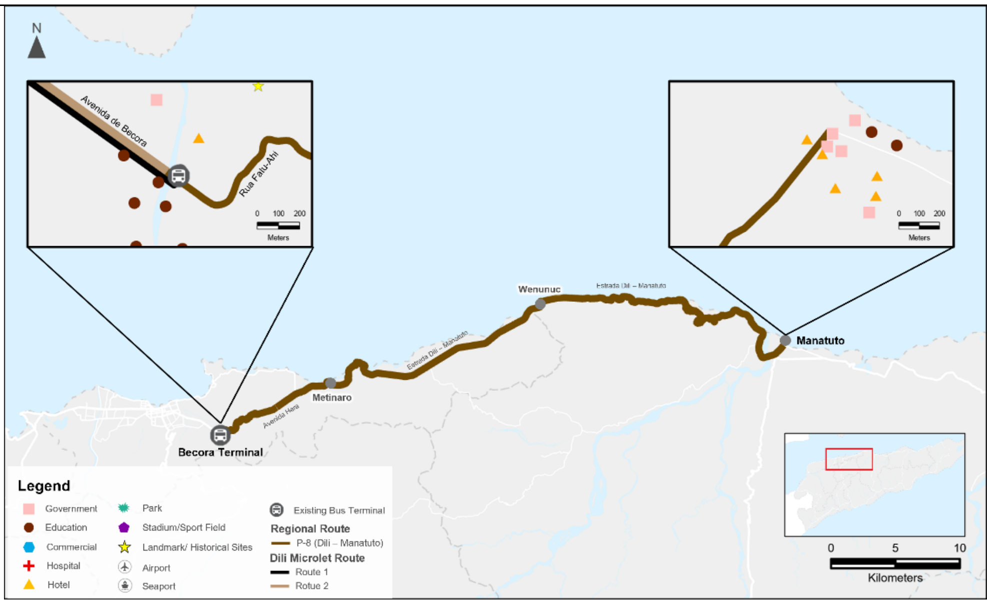
Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	6	6	8	8
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	6	6	8	8
Fleet Size (with 10% Spares)	7	7	9	9
Daily Ridership (Boardings)	302	316	394	398

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated from updated daily trips and number of trips completed by vehicle by day.

6.5.9 Regional Bus Route#8: Dili – Manatuto

6.5.9.1 Route Overview

Regional Bus Route#8 (Dili – Manatuto) operates along an east-west corridor linking Dili (Becora Terminal) to Manatuto – with a total length of 118km (one-way). The eastbound route starts at Becora Terminal, passes through various local roads along the coast (i.e., Estrada Dili-Manatuto), before terminating at the city center in Manatuto. The westbound route starts at Manatuto and runs to the Becora Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.38: Regional Bus Route#8: Dili – Manatuto

On average, the route makes 3 stops depending on the trip. This route connects to Microlet Route#1 and #2, as well as three regional bus routes (including Dili-Baucau, Dili-Liquica, and Dili-Viqueque) at Becora Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [110] – The eastbound bus departs Dili around 6:00AM-9:00AM. The first westbound route departs Manatuto around 7:00AM and the last around 5:00PM.
- **Trips per Day** – On average, the number of eastbound trips per day is 4, while that of westbound trips is also 6.
- **Travel Time** – On average, vehicle travel time (one-way) is around 132 minutes, with the average speed of 28km/hour.
- **Daily Boardings** [111] **–** On average, some 126 passengers travel on this route, with the eastbound carrying some 91 passengers while the westbound about 35 passengers.

[110] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.

[111] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.160: Regional Bus Route#8: Dili-Manatuto Existing Service Overview

	Eastbound	Westbound
	Dili (Becora Terminal) – Manatuto	**Manatuto – Dili (Becora Terminal)**
Route Distance	118.0km	118.0km
Operating Times [A]	6:00AM – 9:00AM	7:00AM – 5:00PM
Peak Period	6:00AM – 7:00AM	No defined peak period
Daily Boardings	91	35
Trips/Day	4	6
Average Travel Time (One-Way)	134 mins	130 mins
Average Travel Speed	27km/h	28km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.9.2 Performance Review

Daily and Annual Demand

On average, some 126 passengers use Regional Bus Route#8 on the weekdays, with Saturday accounting for about 142 passengers and Sunday accounting for about 175 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 52,000 – as shown in

Table 6.161.

Table 6.161: Estimated Daily and Annual Boardings – Regional Bus Route#8

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	126	32,000
Saturday	142	8,000
Sunday	175	12,000
Total		52,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.39 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 4-6 trips are observed for both directions per day, with a peak of 3 departures during the 6:00AM-7:00AM hour in the eastbound direction (Dili – Manatuto).

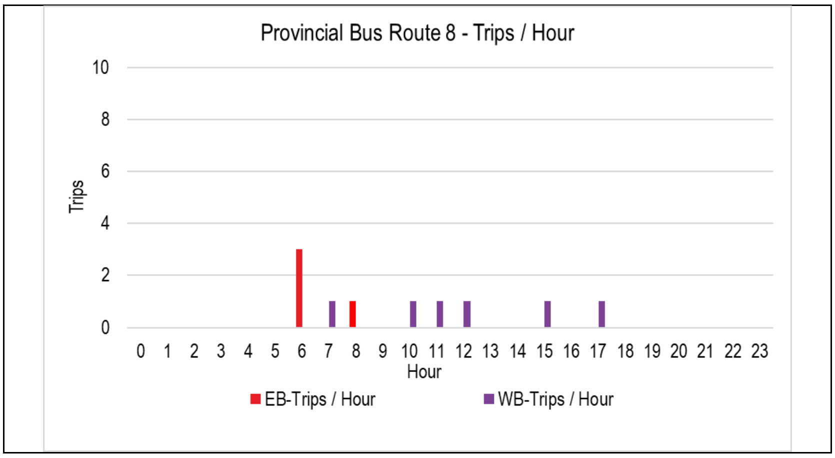
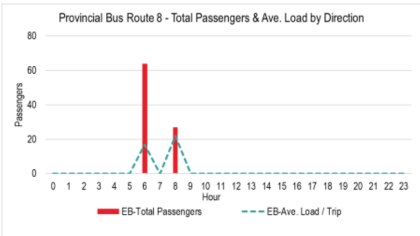
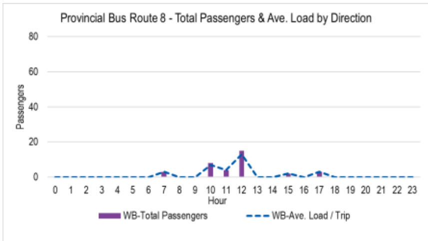
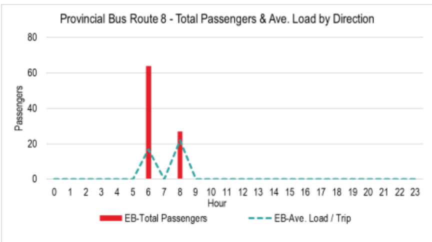
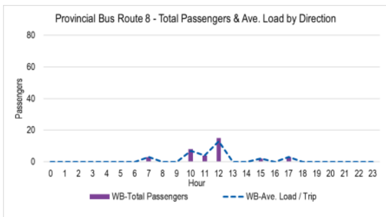


Figure 6.39: Trips by Time of Day – Regional Bus Route#8

Route-Level Demand and Average Loading

Table 6.162 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.162: Route-Level Demand and Average Loading – Regional Bus Route#8

<table>
<tr><th>Eastbound</th><th>Westbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is observed only in the morning for eastbound and the whole day for westbound. For eastbound, passenger activity ranges from 27-65 during 6:00AM-9:00PM period. For westbound, passenger activity ranges under 10 before reaching 15 during 12:00PM-1:00PM period then drops to under 5 until end of service.
• Assuming a vehicle capacity of 30 passengers, this route operates at a maximum of 75% and over 45% of the stated capacity for westbound and eastbound, respectively.</td></tr>
<tr><th>Eastbound</th><th>Westbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is observed only in the morning for eastbound and the whole day for westbound. For eastbound, passenger activity ranges from 27-65 during 6:00AM-9:00PM period. For westbound, passenger activity ranges under 10 before reaching 15 during 12:00PM-1:00PM period then drops to under 5 until end of service.</td></tr>
</table>

Eastbound	Westbound
• Assuming a vehicle capacity of 30 passengers, this route operates at a maximum of 75% and over 45% of the stated capacity for westbound and eastbound, respectively.	

6.5.9.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#8 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.163: Summary of Regional Bus Route#8 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Becora Terminal in Dili as well as the city center in Manatuto.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Manatuto assumed as the city center which consists of markets, education, government, hotels, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest west-east corridor – potential service refinements may be necessary to improve productivity.

6.5.9.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The weekday daily ridership on Regional Bus Route#8 is expected to increase by a small degree from now to the future scenarios, resulting in the same number of daily trips offered in the 2035 Upgrade/Visionary Scenario. The vehicles required will similarly remain the same at 4 small buses as well. **Table 6.164** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#8.

Table 6.164: Regional Bus Route#8 Weekday Impacts on Service, Demand and Productivity

Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	6	6	6	6
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	3	3	3	3
Fleet Size (with 10% Spares)	4	4	4	4
Daily Ridership (Boardings)	126	132	165	167

Notes:
[A] A service threshold to estimate number of trips is established based on the % of occupancy by time of day. If the hourly occupancy is above 100%, trip(s) will be increased based on survey results (number of trips and hourly passengers) and stated bus capacity. If hourly occupancy is below 25%, trip(s) will be reduced.
[B] Vehicle numbers are estimated from updated daily trips and number of trips completed by vehicle by day.

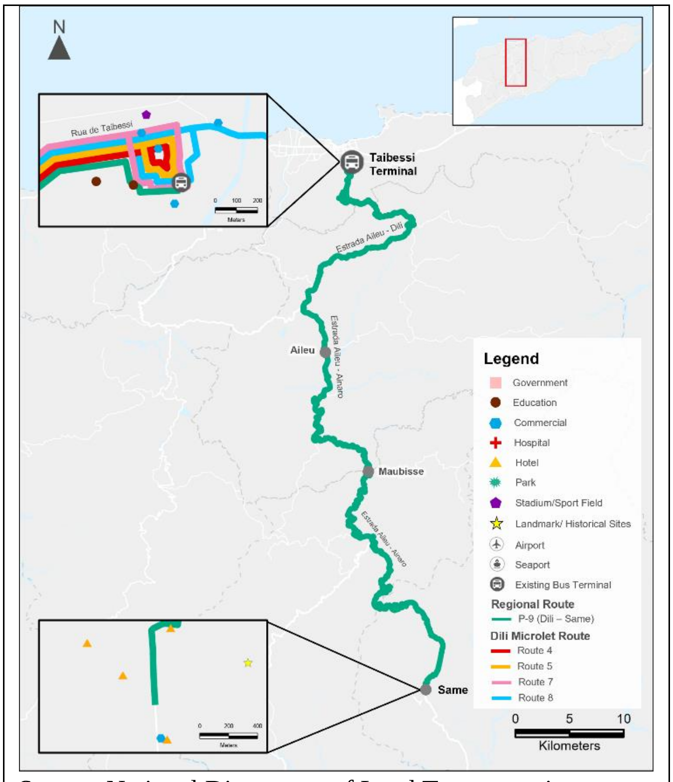
6.5.10 Regional Bus Route#9: Dili – Same

6.5.10.1 Route Overview

Regional Bus Route#9 (Dili – Same) operates along a north-south corridor linking Dili (Taibessi Terminal) to Same – with a total length of 112km (one-way). The southbound route starts at Taibessi Terminal, passes through Aileu township as Route#1 and #2 and various local roads through hill terrain (i.e., Estrada Aileu-Dili, Estrada Aileu-Ainaro), before terminating at the city center in Same. The northbound route starts at Same and runs to the Taibessi Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).

On average, the route makes 5-12 stops depending on the trip. This route connects to Microlet Route#4, #5, #7 and #8 (only passes through without entering Taibessi Terminal) as well as three regional bus routes (including Dili-Aileu, Dili-Ainaro, and Dili-Suai) at Taibessi Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:



Source: National Directorate of Land Transportation

Figure 6.40: Regional Bus Route#9: Dili – Same

- **Service Hours** [112] – The first southbound bus departs Dili around 7:00AM and the last around 2:00PM. The northbound route departs Same around 6:00AM-7:00AM and the last around 1:00PM-2:00PM.
- **Trips per Day** – On average, the number of southbound trips per day is 4, while that of northbound trips is also 4.
- **Travel Time** – On average, vehicle travel time (one-way) is around 303 minutes, with the average speed of 23km/hour.
- **Daily Boardings** [113] **–** On average, some 141 passengers travel on this route, with the southbound carrying some 63 passengers while the northbound about 78 passengers.

[112] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.
[113] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.165: Regional Bus Route#9: Dili-Same Existing Service Overview

	Southbound	Northbound
	Dili (Taibessi Terminal) - Same	Same – Dili (Taibessi Terminal)
Route Distance	112.0km	112.0km
Operating Times [A]	7:00AM – 3:00PM	6:00AM – 2:00PM
Peak Period	No defined peak period	No defined peak period
Daily Boardings	63	78
Trips/Day	4	4
Average Travel Time (One-Way)	309 mins	297 mins
Average Travel Speed	22km/h	23km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.10.1.1 Performance Review

Daily and Annual Demand

On average, some 141 passengers use Regional Bus Route#9 on the weekdays, with Saturday accounting for about 63 passengers and Sunday accounting for about 86 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 45,000 – as shown in **Table 6.166**.

Table 6.166: Estimated Daily and Annual Boardings – Regional Bus Route#9

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	141	35,000
Saturday	63	4,000
Sunday	86	6,000
Total		45,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.41 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 4 trips are observed for both southbound and northbound directions for the entire day.

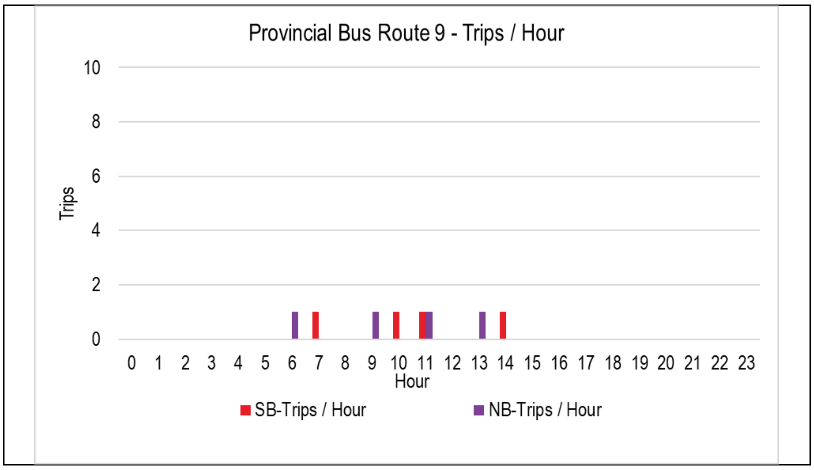
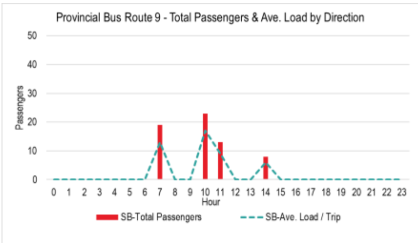
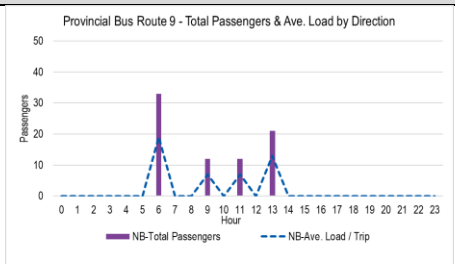


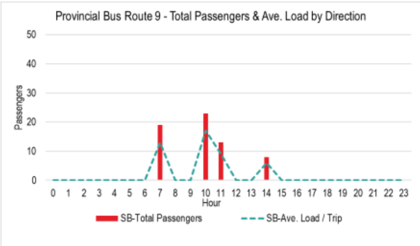
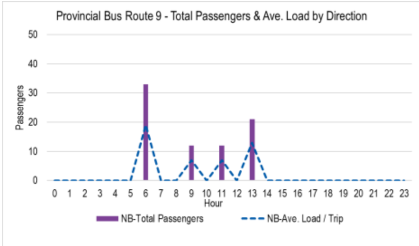
Figure 6.41: Trips by Time of Day – Regional Bus Route#9

Route-Level Demand and Average Loading

Table 6.167 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.167: Route-Level Demand and Average Loading – Regional Bus Route#9

<table>
<tr><th>Southbound</th><th>Northbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is observed in both morning and afternoon for both directions. For southbound, passenger activity ranges from 6-23 with a peak of 23 passengers in the trip depart at 10:00AM. For northbound, passenger activity reaches a peak at 6:00AM with 33 and ranges from 12-21 passengers in the remaining period.
• Assuming a vehicle capacity of 30 passengers, this route operates at below 65% of the stated capacity for both directions.</td></tr>
</table>

Southbound	Northbound
	

Key Findings:

- Passenger activity is observed in both morning and afternoon for both directions. For southbound, passenger activity ranges from 6-23 with a peak of 23 passengers in the trip depart at 10:00AM. For northbound, passenger activity reaches a peak at 6:00AM with 33 and ranges from 12-21 passengers in the remaining period.
- Assuming a vehicle capacity of 30 passengers, this route operates at below 65% of the stated capacity for both directions.

6.5.10.2 Service Gaps and Opportunities

Key gaps for Regional Bus Route#9 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.168: Summary of Regional Bus Route#9 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Taibessi Terminal in Dili as well as the city center in Same.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Same assumed as the city center which consists of markets, commercial areas, hotels, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.10.3 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The weekday daily ridership on Regional Bus Route#9 is expected to increase by a small degree from now to the future scenarios, resulting in only 2 more daily trips offered. The vehicles required will similarly be increased by 2 (between 5 and 7 small buses).

Table 6.169 shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#9.

Table 6.169: Regional Bus Route#9 Weekday Impacts on Service, Demand and Productivity

Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	4	4	6	6
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	4	4	6	6
Fleet Size (with 10% Spares)	5	5	7	7
Daily Ridership (Boardings)	141	147	185	186

Notes:

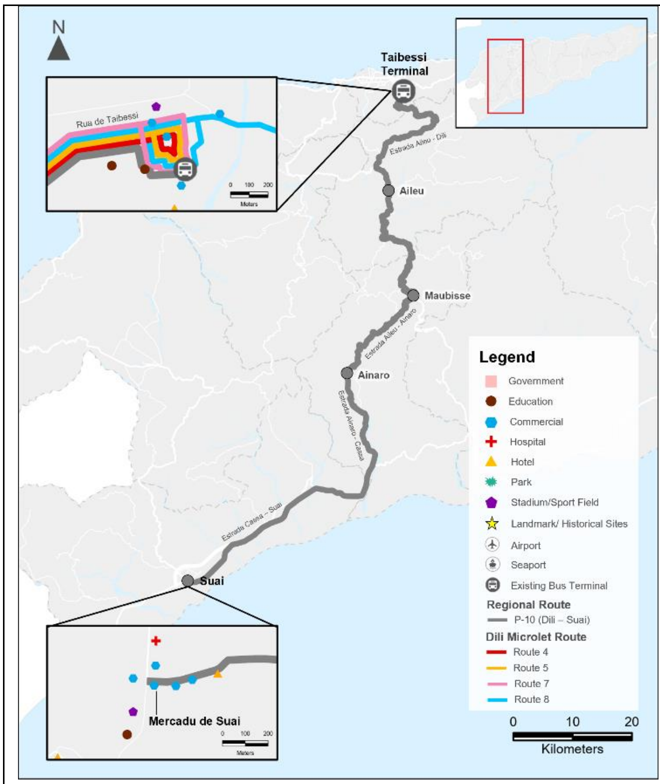
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.

[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.11 Regional Bus Route#10: Dili – Suai

6.5.11.1 Route Overview

Regional Bus Route#10 (Dili – Suai) operates along a north-south corridor linking Dili (Taibessi Terminal) to Suai – with a total length of 171km (one-way). The southbound route starts at Taibessi Terminal, passes through various local roads through hill terrain (i.e., Estrada Aileu-Dili, Estrada Cassa-Suai), before terminating at the city center in Suai. The northbound route starts at Suai and runs to the Taibessi Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.42: Regional Bus Route#10: Dili – Suai

On average, the route makes 14-15 stops depending on the trip. This route connects to Microlet Route#4, #5, #7 and #8 (only passes through without entering Taibessi Terminal) as well as three regional bus routes (including Dili-Aileu, Dili-Ainaro, and Dili-Same) at Taibessi Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [114] – The first southbound bus departs Dili around 7:00AM-8:00Am and the last around 6:00PM-7:00PM. The northbound route departs Suai around 1:00AM-2:00AM and the last around 12:00PM-1:00PM.
- **Trips per Day** – On average, the number of southbound trips per day is 6, while that of northbound trips is also 7.
- **Travel Time** – On average, vehicle travel time (one-way) is around 380 minutes, with an average speed of 28km/hour.
- **Daily Boardings** [115] **–** On average, some 290 passengers travel on this route, with the southbound carrying some 128 passengers while the northbound about 162 passengers.

Table 6.170: Regional Bus Route#10: Dili-Suai Existing Service Overview

	Southbound	Northbound
	Dili (Taibessi Terminal) - Suai	Suai – Dili (Taibessi Terminal)
Route Distance	171.0km	171.0km
Operating Times [A]	7:00AM – 7:00PM	1:00AM – 1:00PM
Peak Period	6:00PM – 7:00PM	12:00PM-1:00PM
Daily Boardings	128	162
Trips/Day	6	7
Average Travel Time (One-Way)	360 mins	400 mins
Average Travel Speed	29km/h	26km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.11.2 Performance Review

Daily and Annual Demand

On average, some 290 passengers use Regional Bus Route#10 on the weekdays, with Saturday accounting for about 136 passengers and Sunday accounting for about 159 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 90,000 – as shown in **Table 6.171**.

Table 6.171: Estimated Daily and Annual Boardings – Regional Bus Route#10

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	290	72,000
Saturday	136	7,000
Sunday	159	11,000
Total		90,000

Source: Arup Surveys
Notes:
[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.
[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

[114] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.
[115] Daily boardings are estimated based on samples of regional on-board bus survey.

Trips by Time of Day

Figure 6.43 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 6-7 trips are observed for both southbound and northbound directions for the entire day.

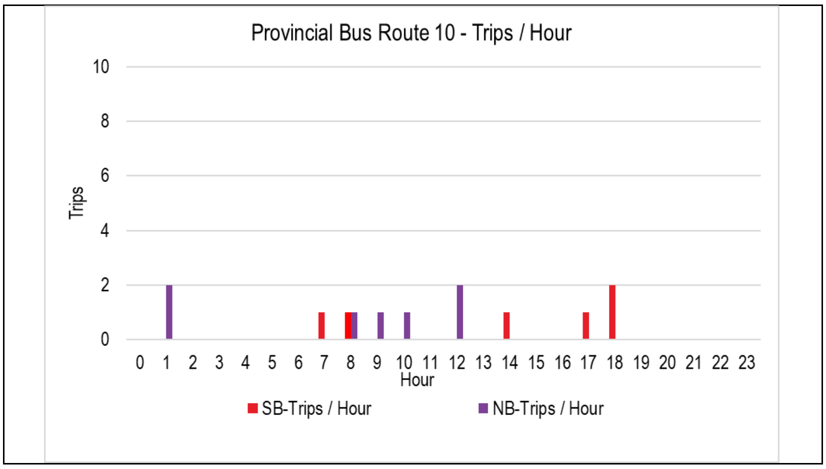
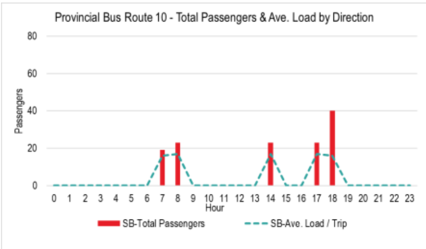
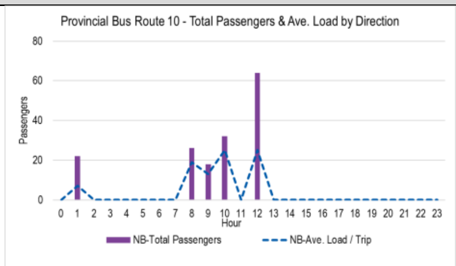
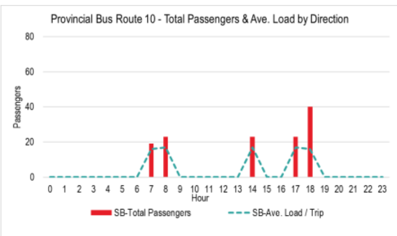
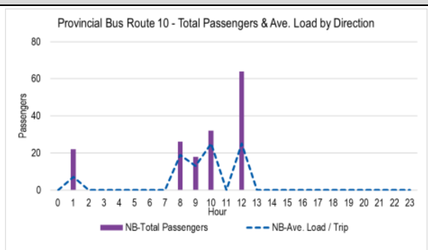


Figure 6.43: Trips by Time of Day – Regional Bus Route#10

Route-Level Demand and Average Loading

Table 6.172 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.172: Route-Level Demand and Average Loading – Regional Bus Route#10

<table>
<tr><th>Southbound</th><th>Northbound</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Key Findings:
• Passenger activity is observed in the whole day for southbound and only in morning for northbound. For southbound, passenger activity ranges from 19-40 with a peak of 40 passengers in the trip depart during 6:00PM-7:00PM. For northbound, passenger activity starts from 22 at 1:00AM and reaches a peak during 12:00PM-1:00PM with 64 passengers.
• Assuming a vehicle capacity of 30 passengers, this route operates at below 85% of the stated capacity for both directions.</td></tr>
<tr><th>Southbound</th><th>Northbound</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Key Findings:

- Passenger activity is observed in the whole day for southbound and only in morning for northbound. For southbound, passenger activity ranges from 19-40 with a peak of 40 passengers in the trip depart during 6:00PM-7:00PM. For northbound, passenger activity starts from 22 at 1:00AM and reaches a peak during 12:00PM-1:00PM with 64 passengers.
- Assuming a vehicle capacity of 30 passengers, this route operates at below 85% of the stated capacity for both directions.

6.5.11.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#10 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.173: Summary of Regional Bus Route#10 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Taibessi Terminal in Dili as well as the city center in Suai.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Suai assumed as the city center which consists of markets, commercial areas, hospitals, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.11.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The weekday daily ridership on Route 10 is expected to increase minimally from now to the future scenarios. However, due to the long travel time of each trip, this will result in between 2 to 4 more daily trips offered. The vehicles required will similarly be increased by 2 (between 11 and 13 small buses).

Table 6.174 shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#10.

Table 6.174: Regional Bus Route#10 Weekday Impacts on Service, Demand and Productivity

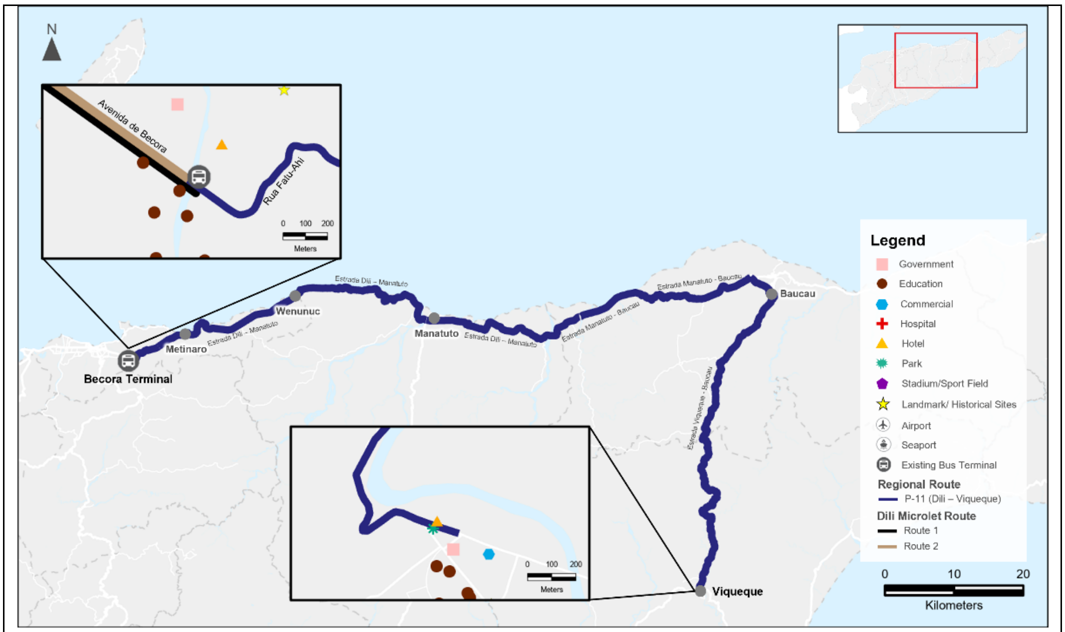
Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	7	10	10	11
Fleet Type	Microlet/ Anggunа	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	10	10	10	11
Fleet Size (with 10% Spares)	11	11	11	13
Daily Ridership (Boardings)	290	299	349	352

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.12 Regional Bus Route#11: Dili – Viqueque

6.5.12.1 Route Overview

Regional Bus Route#11 (Dili – Viqueque) operates along an east-west corridor linking Dili (Becora Terminal) to Viqueque – with a total length of 177km (one-way). The eastbound route starts at Becora Terminal, passes through various local roads along the coast (i.e., Estrada Dili-Manatuto, Estrada Manatuto-Viqueque) and hill terrain (i.e., Estrada Viqueque-Baucau), before terminating at the city center in Viqueque. The westbound route starts at Viqueque and runs to the Becora Terminal. Passengers are observed to board at the terminals, as well as at some intermediate stops (including the houses of passengers).



Source: National Directorate of Land Transportation

Figure 6.44: Regional Bus Route#11: Dili – Viqueque

On average, the route makes 14-19 stops depending on the trip. This route connects to Microlet Route#1, #2 as well as three regional bus routes (including Dili-Lospalos, Dili-Manatuto, and Dili-Baucau) at Becora Terminal.

Key operating statistics for the route based on observations and surveys in April/May 2023 are summarized as follows:

- **Service Hours** [116] – The first eastbound bus departs Becora around 7:00-8:00AM and the last around 7:00PM-8:00PM. The first westbound route departs Viqueque around 6:00AM-7:00AM and the last around 7:00AM -8:00AM.
- **Trips per Day** – On average, the number of eastbound trips per day is 4, while that of westbound trips is also 4.
- **Travel Time** – On average, vehicle travel time (one-way) is around 391 minutes, with the average speed of 28km/hour.
- **Daily Boardings** [117] **–** On average, some 377 passengers travel on this route, with the eastbound carrying some 166 passengers while the westbound about 211 passengers.

Table 6.175: Regional Bus Route#11: Dili-Viqueque Existing Service Overview

	Eastbound	**Westbound**
	Dili (Becora Terminal) - Viqueque	**Viqueque – Dili (Becora Terminal)**
Route Distance	177.0km	177.0km
Operating Times [A]	7:00AM – 8:00PM	6:00AM – 7:00AM
Peak Period	No defined peak period	7:00AM-8:00AM
Daily Boardings	166	211
Trips/Day	4	4
Average Travel Time (One-Way)	391 mins	391 mins
Average Travel Speed	28km/h	28km/h

Notes:
[A] Operating times are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. The number of departures by time of day is presented in the following section.

6.5.12.2 Performance Review

Daily and Annual Demand

On average, some 377 passengers use Regional Bus Route#11 on the weekdays, with Saturday accounting for about 201 passengers and Sunday accounting for about 109 passengers. When annualized (assuming 248 weekdays, 50 Saturdays, and 67 Sundays (including public holidays), annual ridership is estimated at about 113,000 – as shown in

[116] Service hours are based on the terminal survey (6:00AM-8:00PM) and samples of regional on-board bus survey. Some regional buses may depart (or arrive) early or later after picking up (or dropping off) passengers at home without stopping at the terminal. Such irregular operations (i.e., home-to-home direct service) are not considered in this study.
[117] Daily boardings are estimated based on samples of regional on-board bus survey.

Table 6.176.

Table 6.176: Estimated Daily and Annual Boardings – Regional Bus Route#11

Day	Daily Boardings	Estimated Annual Boardings (Rounded Up to Nearest 1,000) [A, B]
Weekday	377	94,000
Saturday	201	11,000
Sunday	109	8,000
Total		113,000

Source: Arup Surveys

Notes:

[A] Annualized boardings estimated by multiplying by 248 weekdays, 50 Saturdays, and 67 Sundays/Holidays.

[B] Estimated annual boardings may not match with the multiplier of daily boardings and above annualization factors due to rounding.

Trips by Time of Day

Figure 6.45 presents the number of trips by time of day by direction based on departure time (with starting hours indicated in the table). On average, a total of 4 trips are observed for both directions.

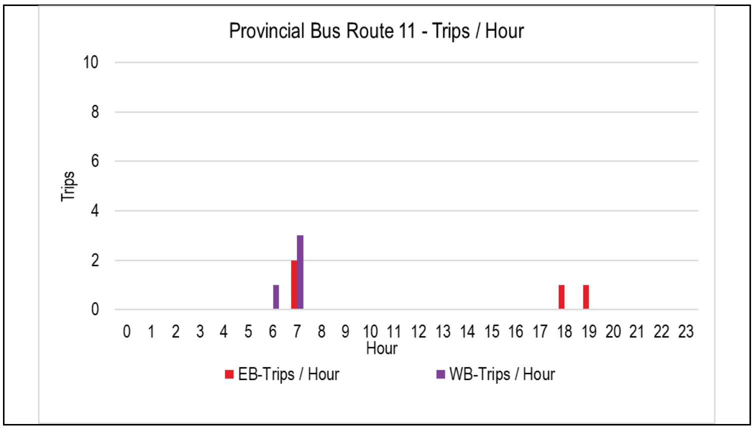
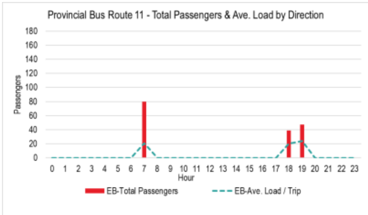
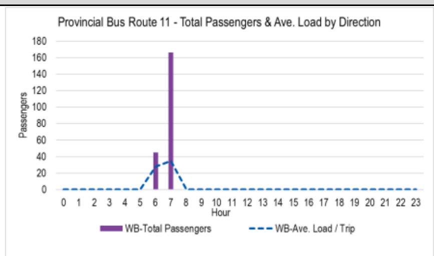
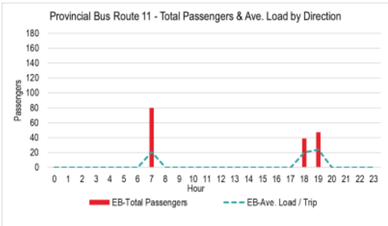
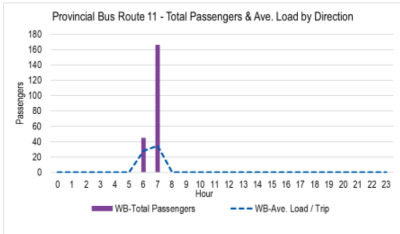


Figure 6.45: Trips by Time of Day – Regional Bus Route#11

Route-Level Demand and Average Loading

Table 6.177 presents the route-level demand and average loading by direction (based on passengers riding the route that departed at hours indicated in the table). This load is then contrasted against the assumed vehicle seating capacity (assumed at 30 passengers) to determine if vehicles carry more passengers than the stated capacity during the peak period and the overall utilization of the vehicle capacity. Vehicles carrying loads over capacity likely carry standees.

Table 6.177: Route-Level Demand and Average Loading – Regional Bus Route#11

Eastbound	Westbound
	
Key Findings: • Passenger activity is observed throughout the whole day for both directions. For eastbound, passenger activity ranges from 40-80 during operating time. For westbound, passenger activity ranges from 45 and reaches over 160 at 7:00 in the morning. • Assuming a vehicle capacity of 30 passengers, this route operates at 80% of the stated capacity for eastbound, while operates over 115% for westbound.	
Eastbound	**Westbound**
	
Key Findings: • Passenger activity is observed throughout the whole day for both directions. For eastbound, passenger activity ranges from 40-80 during operating time. For westbound, passenger activity ranges from 45 and reaches over 160 at 7:00 in the morning. • Assuming a vehicle capacity of 30 passengers, this route operates at 80% of the stated capacity for eastbound, while operates over 115% for westbound.	

6.5.12.3 Service Gaps and Opportunities

Key gaps for Regional Bus Route#11 vis-à-vis the three goals from the route optimization framework in **Section 6.2** are summarized in the table below:

Table 6.178: Summary of Regional Bus Route#11 Optimization Goals and Key Gaps

#	Optimization Goal	Alignment with Goal	Key Gaps / Details
1	Create Convenient Interchange Opportunities	High	• The route is connected to Becora Terminal in Dili as well as the city center in Viqueque.
2	Improve Accessibility to Current and Planned Developments (Key Generators)	High	• Terminal locations at both ends are located adjacent to key generators with good accessibility (with the starting/ending point of Viqueque assumed as the city center which consists of markets, education, commercial areas, government, etc.).
4	Efficient and Productive Service	Moderate	• Current activity is significantly low on this shortest north-south corridor – potential service refinements may be necessary to improve productivity.

6.5.12.4 Proposed Service Enhancements

Based on identified gaps noted above vis-à-vis the three goals for the route optimization framework, no route enhancement is proposed. Various service enhancement measures are proposed below:

Service, Demand, and Productivity Implications

The number of trips offered under existing conditions is deemed insufficient, which would be tripled under the 2025 Immediate Scenario. The weekday daily ridership on Regional Bus Route#11 is then expected to increase by ~20% between the 2035 Immediate and 2035 Upgrade/Visionary scenarios, resulting in 3 more daily trips offered. The vehicles required will similarly be increased by 3 from 15 to 18 small buses. **Table 6.179** shows the impacts on weekday service, demand, and vehicles required for Regional Bus Route#11.

Table 6.179: Regional Bus Route#11 Weekday Impacts on Service, Demand and Productivity

Service Parameters	Existing	Immediate (2025)	Upgrade (2035)	Visionary (2035)
# of Trips/Day (NB+SB)	4	13	16	16
Fleet Type	Microlet/ Angguna	Small Bus (8m)	Small Bus (8m)	Small Bus (8m)
Fleet Size (No Spares)	13	13	16	16
Fleet Size (with 10% Spares)	15	15	18	18
Daily Ridership (Boardings)	377	392	480	484

Notes:
[A] A service threshold to estimate the number of trips (whether increase, reduce or retain) is established based on the % of occupancy by time of the day. If the hourly occupancy is above 100%, trip(s) will be increased based on the survey results (number of trips and hourly passengers) and stated bus capacity. If the hourly occupancy is below 25%, trip(s) will be reduced accordingly.
[B] Vehicle numbers are estimated based on the updated daily trips and the number of trips completed by vehicle by day.

6.5.13 Summary of Regional Bus Route Recommendations

A summary of the regional route recommendations (no change to the existing 11-route network) is shown in **Table** 6.180, with the map presented in **Figure 6.46**.

Table 6.180: Overview of Regional Route Recommendations

					# of Total Trips / Day					
Route #	**Origin**	**Destination**	**Direction**	**One-Way Distance (km)**	**Existing (from Survey)**	**Immediate (2025)**	**Upgrade (2035)**	**Visionary (2035)**	**Terminals Serving [A]**	**Region Covered by Route**
P-1	Dili	Aileu	NB/SB	44.3	7	5	5	5	Taibessi	South
P-2	Dili	Ainaro	NB/SB	109.3	2	2	2	2	Taibessi	South
P-3	Dili	Baucau	EB/WB	117.7	22	39	51	51	Becora	East
P-4	Dili	Ermera	NB/SB	46.0	13	19	21	21	Tasitolu	West
P-5	Dili	Liquica	EB/WB	23.1	48	57	70	70	Tasitolu	West
P-6	Dili	Lospalos	EB/WB	205.1	4	7	7	7	Becora	East
P-7	Dili	Maliana	EB/WB	132.7	6	6	8	8	Tasitolu	West
P-8	Dili	Manatuto	EB/WB	58.7	6	6	6	6	Becora	East
P-9	Dili	Same	NB/SB	112.1	4	4	6	6	Taibessi	South
P-10	Dili	Suai	NB/SB	171.0	7	10	10	11	Taibessi	South
P-11	Dili	Viqueque	EB/WB	176.6	4	13	16	16	Becora	East
Total				1,196.6	**123**	**168**	**202**	**203**		

Notes:
[A] The terminal(s) serving this route may change subject to the MOTC's decision on future terminal locations.

Source: Arup Study Team

Figure 6.46: Timor-Leste Regional Bus Network

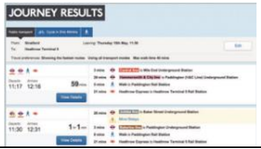
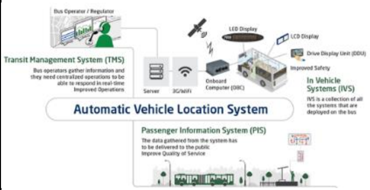
6.6 Suggestions for Innovative Solutions

6.6.1 Potential Innovative Solutions

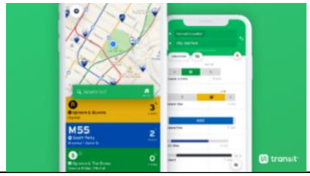
Potential ideas and innovative solutions to make public transport more attractive, efficient, and inclusive to transport users are explored in this section. Key themes include intelligent transport systems, app-based on demand transport services, fleet modernization (including zero emission vehicles), micro-mobility, and data application in planning, operation, and management of transport services. These are concepts to be further explored as the public transport system in Timor-Leste and Dili continues to evolve and mature, and more people are drawn to the services.

Some potential innovative solutions to consider include the following:

Table 6.181: Suggestions for Innovative Solutions for Public Transport

Innovative Solutions	Example	Description	Operator Benefits	Passenger Benefits	Indicative Timeline [A]
Intelligent Transportation Systems (ITS)					
Public Transport Mobile App and Centralized Public Transport Website Portal	TfL Journey Planner 	• With the proliferation of mobile devices, many public transport operators/agencies maintain a dedicated mobile app. • Such an app can be used to search routing, travel time, as well as next bus arrival and fares. • A similar functionality can be provided on a centralized website portal as well	• Creates more attractive service	• Reduces waiting times • Provides more certainty over the ride • Allows for more convenient connections and trip-planning	• **Phase 2 (2026-2030)** – This involves establishment of cooperation between government, operators, and telecom/IT infrastructure provider, development of service schedules, installment of on-board devices (such as GPS) and launching of apps and web-based portal.
Automatic Vehicle Location (AVL)	Example of the AVL scheme 	• AVL is a location-based system that can give the operators as well as the passengers information on the exact location of the bus. For the operators this is advantageous for fleet management as well as headway and timetable management. • For the passengers, AVL is the direct conduit to providing real-time arrival information (to let passengers know when the next arriving bus is at a specific location).	• Enables better fleet management and more reliable service • Enables in-line operating decisions to be made • Enables real-time passenger information	• Enables real-time information panels and systems to improve the passenger experience	• **Phase 2 (2026-2030)** – This involves establishment of cooperation between government, operators, and telecom/IT infrastructure provider, development of service schedules, installment of AVL devices on public transport fleet, and design of a back-end system for fleet and operation management.
Real-Time Arrival Signs	On-board arrival sign on a Hong Kong bus 	• Variable message signs displaying real-time arrivals and routing information, as well as system updates are common in many public bus systems around the world. • In the case of Timor-Leste, a phased roll-out seems sensible at terminals first, and later at specific heavy demand bus stops with sufficient infrastructure.	• Creates more attractive service	• Reduced anxiety over next stop • Updated system information for decision-making	• **Phase 2 (2026-2030)** – This can be installed at terminals but requires development of service schedules (with authority closely monitoring/ tracking performance of operators as per service contract), installment of on-board devices (such as GPS) and real-time displays, as well as design of a back-end system.
Automatic Passenger Counters (APCs)	Typical APC on bus 	• APCs are devices on board the vehicles that count the number of passengers that are currently on the vehicle. • This is beneficial to operators to understand the loading and the location of the peak loads (to determine if there are any capacity issues or if additional or reduced trips are needed). APCs may also be used to determine the level of fare evasion by comparing this to the fare collection results. • For passengers, APCs can also be linked to systems relaying the occupancy of a bus to passengers, allowing passengers to choose	• Tracks loading inside buses for operating decisions • Allows operators to determine where peak on/off points are • Improves monitoring of fare evasion	• Enables loading information to be passed to passengers for decision-making	• **Phase 3 (2031-2035)** – This will likely be developed together with a roll-out of new buses when microlets are converted into bigger buses. This also would involve cooperation of various entities from public and private sector and establishment of a back-end system.

Innovative Solutions	Example	Description	Operator Benefits	Passenger Benefits	Indicative Timeline A
		departures or departure times with lower overall loading.			
Automatic Fare Collection System (AFCS)	Oyster Card (London, United Kingdom) 	• An AFCS can connote different technologies, including accepting various payment media including cash, smartcards, mobile payment (such as Alipay, GooglePay, ApplePay, etc.), and touchless credit cards (via PayWave or other similar technology). • The AFCS will require readers to be installed on vehicles and allow for more complex fare regimes to be implemented (including distance-based fares, zonal fares, discount fares for youth and elderly, etc.), although multiple readers may be necessary in the vehicle or at the wayside.	• Provides for automated system to count passengers and removes cash handling from drivers • Reduces potential theft from cashbox by drivers or others • Increases conveniences with multiple payment media for passengers	• Provides multiple methods to pay making riding public transport more convenient and easier	• **Phase 2 (2026-2030)** – A new ticketing system can be introduced to existing public transport comprising microlets. A phased roll-out of fares and ticketing is further explored in **Section 6.6.2**.
Innovative Services and New Vehicle Technologies					
On-Demand Services in Lower-Density Areas	On-demand Public Transport Service in Singapore 	• On-demand public transport services have been operated throughout the world including in Singapore and elsewhere. • Various types of on-demand service may be applicable to Timor-Leste including systems where passenger pre-book and reserve rides and show up to "virtual" bus stop in an agreed location. • Other types of on-demand services can include crowdsourced routes, whereby interested parties can suggest routes and if a sufficient threshold of passengers is met, then the route will be operated, and passenger spaces reserved each day.	• Provides attractive and convenient service in lower-density areas, traditionally better served by motorcycles or two-three wheelers	• Provides more convenient public transport service that operates near door-to-door service to better match current motorcycle and other use	• **Phase 2 (2026-2030)** – Technology-based on-demand transport services (such as apps) requires development of apps and real-time tracking. Establishment of institutional arrangements, service contracts, and refinements to regulatory framework would be essential.
Replacement of Microlets with Newer Models and/or Modern Buses	Example 20 seat bus 	• Current microlets are relatively old, may be safety hazards on the road, and generate significant emissions. • One potential strategy could be to replace these microlets with newer, more environmentally friendly microlets, or with smaller, modern buses.	• Creates more attractive service and allows for rebranding of service • Provides higher carrying capacity for routes	• Provides more attractive and comfortable public transport journey that is air conditioned	• **Phase 3 (2031-2035)** – It is assumed that existing microlets will still operate in Phase 1 and Phase 2 (thus up to 2030). Conversion of existing microlets into modern buses is assumed to take place in Phase 3 (2031-2035) depending on decisions of the government.

Innovative Solutions	Example	Description	Operator Benefits	Passenger Benefits	Indicative Timeline [A]
Introduction of Zero-Emission Vehicles	Example of electric minibus 	• Likewise, introduction of zero-emission vehicles is a key consideration to reduce emissions and emission-related issues. • Although zero-emission vehicles currently cost more to manufacture and procure than their diesel or hybrid counterparts, operating costs are typically lower due to reduced maintenance on moving parts and fuel consumption (not to mention environmental benefits from clean vehicles).	• Reduces O&M costs for fuel and creates "clean" brand image for public transport	• Provides more attractive journey that is environmentally-friendly and conscious	• **Phase 2 (2026-2030)** – Piloting of a new bus route using e-buses is explored in Section 6.7.2. A further study is required to assess feasibility of the e-bus pilot program.
Multimodal Convenience					
All-Inclusive Transport App	Example of app incorporating multiple public transport modes 	• Cities around the world have been developing all-inclusive mobility apps that integrate public transport with micro-mobility and shared services – providing a one-stop portal to determine the mode(s) required to complete the journey. • The vision for such modes is to enable a journey using various modes including public transport that is seamless integrated across modes and operators – with a single ride paid for via the touch of a button.	• Reduces the need to drive and makes public transport an easier and more convenient mode	• Creates more convenient public transport and integrated journey with other modes	• **Phase 3 (2031-2035)** – All-inclusive mobility apps can be considered as a long-term vision given that other prerequisites (i.e., fares and ticketing, real-time apps, enabling institutional arrangements) must be realized before integrating various modes.
Mobility Hubs Placed at Key Stops and Terminals	Example of a mobility hub in Vienna, Austria 	• Mobility hubs provide convenient access to all forms of first/last-mile connectivity including bicycle rental/parking, scooter rental, shared car/vehicles, as well as public bus, etc. • Installation of mobility hubs at key bus stops and terminals will create an additional means of accessing the facility and the public transport network without driving.	• Provides well-rounded options for first/last-mile connectivity, making public transport one cog in the overall journey	• Provides more convenient means of accessing public transport system and facilities	• **Phase 2 (2026-2030)** –Infrastructure enhancements (such as bicycle stands) at terminals and bus stops can be considered in the same timeframe as bus terminal development to increase accessibility of potential users to public transport.
Dynamic Wayfinding at Bus Stops	Wayfinding totem at a bus stop in Birmingham, UK	• Wayfinding maps at bus stops are helpful for passengers to navigate and identify major destinations (including for tourists). • Wayfinding signs traditionally may be static signs but can also connote digital wayfinding by	• Makes public transport more attractive for users by creating easy linkage to attraction points	• Creates more convenient journeys to/from the bus stop	• **Phase 2 (2026-2030)** – Similar to mobility hubs, signage and wayfinding enhancements at terminals and bus stops can be considered in the same timeframe as bus terminal development

Innovative Solutions	Example	Description	Operator Benefits	Passenger Benefits	Indicative Timeline [A]
		scanning a QR code to provide digital and virtual reality wayfinding.			
Data and Digital for Planning and Operations					
Big Data and Mobile Data	Analysis of taxi trip using Big Data in New York City 	• In the case of Timor-Leste, mobile or other geo-located tracking data may be used to understand demand patterns for specific market segments, not to mention patterns for passengers using the public transport system to better align the network to these temporal and geographic demands. • Further segmentation of markets can be conducted to tailor specific service and fare products for such users.	• Allows operators greater knowledge on how people use the system (and why some do not use public transport) • Allows operators to tailor services and fare products to different market segments	• Minimize gaps between social groups, urban-rural locations	• **Phase 2 (2026-2030)** – Application of mobile data can be considered in Phase 2 given a high penetration of mobile phone usage in the country (at least 1 mobile phone per user – total subscriptions estimated at 1.4 million). [118]
Citizen-Centric Planning	Digital citizen participation in city governance in Vienna, Austria 	• Some cities use data and digital technologies to involve citizen in planning. • For instance, when developing transport master plan, some cities ask for support and feedback from citizens digitally – this input is then integrated into the master plan to reflect local opinions and create buy-in (in the case of public transport, this could be public opinion on a specific service, or improvement of a particular stop, etc.)	• Better understands passenger perspectives and opinions to improve service	• Makes passengers feel they are being listened to and their voices heard when developing services or routing	• **Phase 1 (up to 2025)** – A roll-out of digital platforms (i.e., government website) can be done relatively quickly leveraging existing government websites. Design of mobile-based digital platforms may require robust IT and infrastructure system (thus likely in Phase 2).

Sources: (i) https://tfl.gov.uk/plan-a-journey/; (ii) https://ph.nec.com/en_PH/solutions/transportation/avl.html; (iii) https://www.nec.com/en/case/citybus-nwfb/index.html;(iv) https://www.researchgate.net/figure/Left-image-Two-automatic-passenger-counting-systems-mounted-above-doors-a-permanently_fig1_358974396; (v) https://contactless.tfl.gov.uk/; (vi) https://selangorjournal.my/2023/06/on-demand-transit-van-service-to-roll-out-in-densely-populated-areas-exco/; (vii) https://www.eichertrucksandbuses.com/buses/staff-bus/starline; (ix) https://www.king-long.com/king-long-k06-xmq6601-full-electric-mini-bus_p45.html; (x) https://techcrunch.com/2018/11/05/automakers-invest-in-transit-the-app-that-helps-people-get-around-without-a-car/; (xi) https://www.uitp.org/news/mobility-hubs-steering-the-shift-towards-integrated-sustainable-mobility/; (xii) https://www.futuresystems-inc.com/products/centro-bus-stop-totem/?cat=33#0; (xiii) https://senseable.mit.edu/hubcab/press/hubcab01.png; and (xiv) https://www.spectos.com/en/news/data4city-solution-digital-citizen-participation-vienna-platform-citycode/.

Notes: [A] Selected phases are based on indicative timelines for system/technology implementation. This is subject to change in the future depending on various factors including budget, readiness of technologies in Timor-Leste, institutional arrangements, establishment of enabling legal/regulatory framework, capacity building and training activities of technical/management staff, public acceptance, etc.

[118] Source: https://idea.usaid.gov/cd/timor-leste/information-and-communications-technology-ict

6.6.2 Fare & Ticketing System

As noted in **Section 3.5.2.4**, there is no formal ticketing system in Timor-Leste. The existing ticketing system for public transport is solely cash-based where passengers pay the driver/conductor upon alighting the vehicle. No data on cash fare collection and revenues are recorded for the routes. As a result, the direct flow of revenue from passengers to driver contributes to broader issues associated with public transport (such as drivers not picking up students due to reduced fares, and competition for the same riders on the street). Based on the review of existing conditions, a gradual transition of the ticketing system is necessary together with implementation of standardized scheduling of public transport services and an enhanced passenger information system. Key components of such a transition plan to modernize the ticketing system is outlined in **Table 6.182**, with indicative timelines shown on the right:

Table 6.182: Components of Fare & Ticketing System for Public Transport

		Indicative Timeline		
Component	**Description**	**Phase 1 (up to 2025)**	**Phase 2 (2026-2030)**	**Phase 3 (2031-2035)**
Fare Scheme	• Fare scheme options include flat, distance-based, or zonal-based fares. • Such fare schemes can attract potential users from various social and geographical groups, while contributing to the revenue stream that public transport operators can rely on and receive on a regular basis from customers.	X		
Discounts	• Discount schemes include interchange between modes/routes, frequent user pass, fixed-term pass (such as monthly, seasonal, yearly), and special discounts for youth, elderly, disabled, etc. • Similar to the above fare schemes, such discount travel options make public transport convenient and attract passengers from different market segments.	X		
Payment Validation	• Establishment of a robust payment validation mechanism is key to ensuring secure and reliable fare collection flows. • Options include manual fare collection (i.e., the current practice in Timor-Leste) and/or machine-based collection using farebox or handheld validators which require procurement and installment of payment media and related technologies.		X	
Payment Medium	• Various payment media are in use globally including cash, smartcard, credit card, mobile payment, QR codes. • Selection of appropriate payment media for Timor-Leste depends on various factors including user profile (e.g., access to mobile phones), availability of technologies (e.g., smartcards and mobile applications), funding sources, and the business model for public transport operations and management. • In addition, on-board devices need to be installed to enable fare transactions.		X	X
Clearing House	• A clearing house can act as a central system to process fare transactions between multiple operators, as well as handle reconciliation and revenue settlement. • The clearing house can be a public or private provider and is tied to the institutional set-up of public transport operations and management.		X	X
Interoperability for Non-Transit Payments	• This involves usage of smartcard at non-transit uses (e.g., at convenient stores). • Such non-transit payments require interoperability across different business markets.			X
Institutional and Legal Framework	• All the above components of a modern ticketing system require institutional reforms (such as a set-up of a land transport authority) and refinements to legal/regulatory framework, as well as capacity building and training activities in the short, medium, and long-term (across all the phases).	X	X	X

To guide the development of a modern ticketing system in Timor-Leste, a case study of Fiji's successful model from cash-based to card-based fare collection is explored in **Box 6.1**. Key lessons and takeaways are summarized as follows:

- **Upfront Investment** – Card-based approaches (e.g., smartcard systems) require a large upfront investment to be committed by the government, the operators, and their partners to purchase, install, and maintain a complex set of infrastructure, ranging from endpoint devices in vehicles and at bus stations for validating passenger cards to a central clearing house backend system to handle the re-distribution of revenue to the operators accordingly. Furthermore, this may pose significant financial, technological, and institutional challenges.[119]

- **Public Acceptance** – There could be cultural and socioeconomic obstacles that may impede the acceptance of a new payment method for public transport.[120] This includes distrust of digital payments in favor of the material-based cash economy, the unwillingness to constantly perform top-ups, the lack of access to a bank account (in the case of account-based top-ups), or simply a wish to maintain traditional cash-based payment system. Implementation of a new fare collection scheme may take significant time and education to be overcome.

- **Potential Technology Options** – Card-based solutions are also not the only option on the table, with many other alternative fare collection means being experimented and implemented around the world. For example, the growing prevalence of NFC-enabled (Near Field Communication) mobile devices can be considered as a substitute to transit smartcard ownership, saving the hassle of obtaining and carrying a separate item for the passenger. Another mobile-based solution that has seen success is with QR codes, which requires little infrastructure setup and offers greater flexibility to the operator in management but may run into issues such as limited usage in areas with poor internet connectivity and potential for misuse. More in-depth explorations shall therefore be taken to evaluate the strengths and weaknesses of the different approaches before determining one that is best suited to Timor-Leste's local context.

Box 6.1: Case Study for Ticketing System for Public Transport in Fiji

Case Study: e-Transport, Fiji

1. Prior to the introduction of electronic ticketing, Fiji's public transport was purely cash-based as was the case of all other Pacific Island countries. The informal nature of cash fare collection led to prevalent pilferage by the drivers, which was estimated to be some 25% of the total amount of fare revenue.[121] On August 1st 2017, the Fiji government announced the start of the transition of Fiji's public transport network from a cash-based transaction model to a fully electronic one using a smart card system called *e-Transport*.[122] The main posited advantages of switching over to the e-ticketing system include:

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[119] Source: https://blogs.worldbank.org/transport/ticket-better-ride-how-can-automated-fare-collection-improve-urban-transport

[120] Source: https://publications.iadb.org/publications/english/viewer/The_Future_of_Fare_Media_in_Automated_Fare_Collection_Systems_for_Urban_Mobility_in_the_Latin_America_and_Caribbean_Region_en.pdf

[121] Source: https://www.fijitimes.com/cashless-pros-and-cons/

[122] Source: https://www.fijivillage.com/news/Students-can-redeem-their-E-Transport-cards-from-today-8xf54r/

- Improved cash collection efficiency and reduction of pilferage;
- Greater transparency in concessionary fare offerings;
- More efficient operation by shortening the boarding time;
- Collection of passenger boarding data which was impossible with cash payments;
- Potential to introduce future fare incentive scheme.

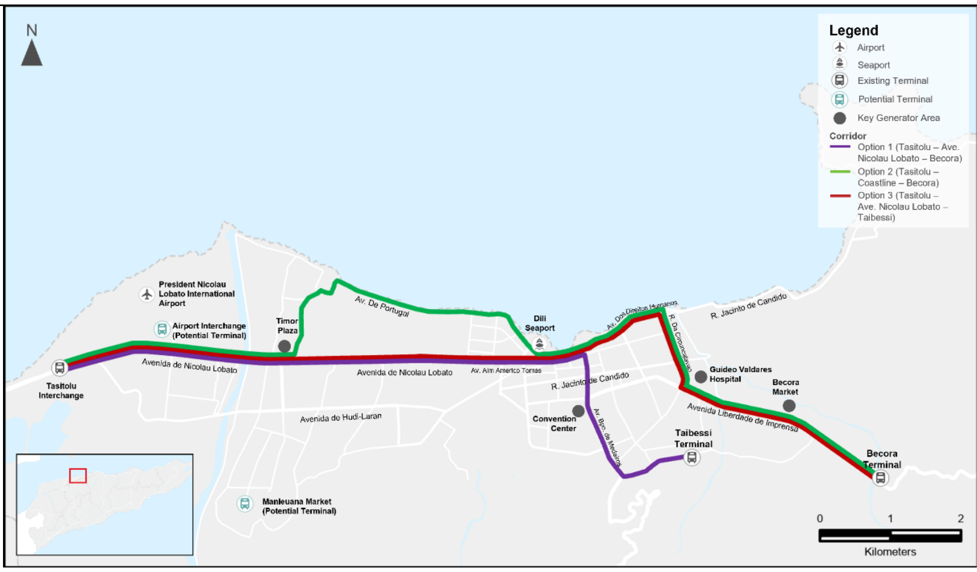
2. The initiative was undertaken through cooperation between the Land Transport Authority (LTA) of Fiji, the telecom and IT infrastructure provider Vodafone, and the 54 private bus operators who agreed to the new fare collection arrangement. A permanent *e-Transport* card is issued to Fiji residents for free, which can also be replaced once for free with subsequent replacements be charged for $5.00 each.[123] Meanwhile, tourists can obtain a disposable e-*Transport* card at various face values ready to use. All *e-Transport* cards can be topped up at Vodafone salespoints by an authorized agent; alternatively, users can utilize the Vodafone M-PAiSA mobile wallet app to perform a top-up.[124] Students, elderlies, and persons with disability are given specially color-coded versions of the *e-Transport* cards to receive their corresponding concessionary fares. Schools in particular were also provided with POS terminals (offered by Vodafone at a substantially discounted rate) to facilitate the top-up of the student concessionary cards.[125] To enforce the use of *e-Transport*, Fiji LTA have placed officers on patrols to monitor any potential fare evasion issue.[126]
3. The initiative was first rolled out on the mainline routes before proceeding to the rural areas where top-up points had to be set up. Since October 1, 2017, cash payment was no longer accepted across the system and the transition was completed for the more than 520,000 commuters in Fiji (and it is still in operation 6 years after initiation).

6.7 Potential Piloting of New Bus Routes

6.7.1 Potential Three Pilot Bus Routes

During the ADB mission conducted in August 2023, the MOTC expressed interest in two new bus routes along the major east-west trunk corridor in Dili (i.e., Ave. Presidente Nicolau Lobato) connecting Tasitolu to Becora – with one route along the entirety of Ave. Presidente Nicolau Lobato and the other plying the coastal road (i.e., Ave. de Portugal). In addition, the Dili Urban Master Plan also proposes a route from Tasitolu to Taibessi utilizing Ave. Presidente Nicolau Lobato (as presented in **Section 4.3.2**). These potential routes are shown in **Figure 6.47**. No other information or activities have taken place in regard to these three pilot routes other than the government interest in one or more of these.

[123] Source: https://fijivillage.com/news/No-cash-payment-on-bus-fares-from-1st-of-October--sr952k/
[124] Source: https://www.vodafone.com.fj/personal/products-services/m-paisa/more-on-m-paisa/m-paisa-app-e-ticketing-top-up
[125] Source: https://www.uncdf.org/article/6237/smart-electronic-ticketing-for-public-transport-in-fiji
[126] Source: https://fijisun.com.fj/2018/03/25/introduction-of-e-transport-card-a-milestone-nath/



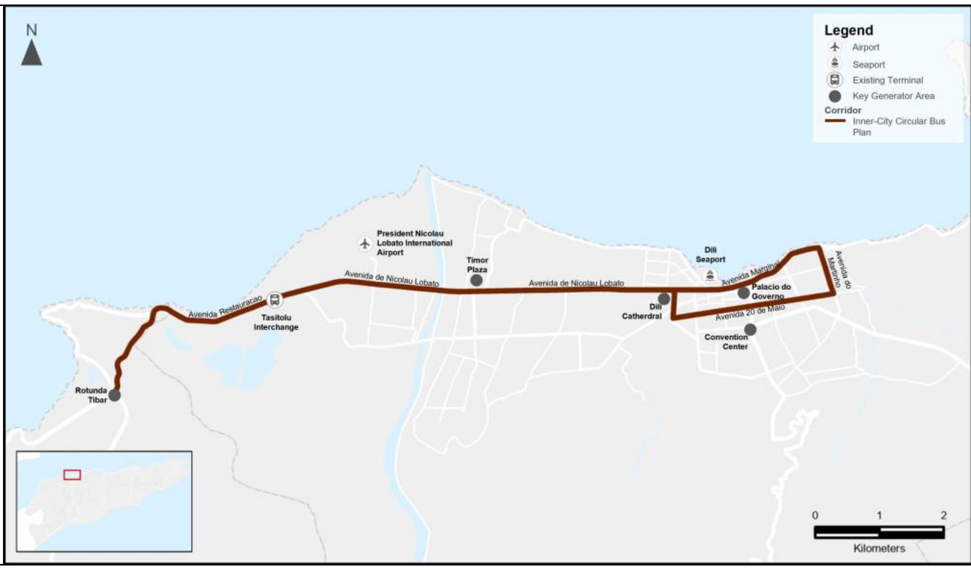
Source: Arup Study Team
Notes:
[A] Pilot Bus Option 1 and Option 2 are proposed by MOTC, while Pilot Bus Option 3 are identified in the Dili Urban Master Plan Update.
[B] The route alignment is indicative only and detailed corridor assessment including road configuration (i.e., number of lanes, direction, width), starting/ending points, and potential turnaround circulation is required to determine the final alignment for a pilot bus corridor.

Figure 6.47: Potential Pilot Bus Corridor(s)

6.7.2 MOTC Minister's Bus Plan Concept

Background

A briefing to the MOTC Minister on the 2023 PTMP was conducted by ADB on 23 November 2023 to incorporate feedback on the draft 2023 PTMP as well as to obtain buy-in for on-going activities such as the feasibility study on selected bus facilities. During the meeting, the Minister presented a concept for introducing a new bus system along the major east-west corridor (Ave. de Nicolau Lobato) connecting Rotunda Tibar with the city center as shown in the map below.



Source: Arup Study Team
Notes:
[A] The route alignment is indicative only based on the Minister's idea. Detailed corridor assessment including road configuration (i.e., number of lanes, direction, and width), starting/ending points, and potential turnaround circulation is required to determine the final alignment for this pilot bus corridor.

Figure 6.48: Bus Corridor Concept Suggested by MOTC Minister

High-Level Service Plan & Infrastructure

Based on this Minister's concept, a high-level assessment on service (i.e., headway, span of service, operating times, and required vehicles) and infrastructure (i.e., bus stops and depot sizing) was conducted to estimate indicative investment costs for introducing a new bus service on this east-west corridor as summarized below.

Table 6.183: Key Elements of MOTC Minister's Bus Concept

Item	Assumption / Estimation [A]
Route Distance (Roundtrip)	25.3 km
Proposed Operating Times	6:00AM – 6:00PM
Proposed AM Peak Period	7:00AM – 9:00AM
Proposed PM Peak Period	4:00PM – 6:00PM
Max Trips/Hour (Weekday)	12
Assumed Roundtrip Travel Time (including 15% Layover Time)	~92 mins
Assumed Travel Speed	~20 km/hour
Expected Daily Vehicle Kilometers	~2,700 km
Expected Daily Vehicle Hours	~160 hrs
Vehicle Type	12m (Diesel)
Required Number of Vehicles (Without Spare)	19
Required Number of Vehicles (Including 10% Spares)	21
# of Bus Stops (Estimated based on 400m Spacing)	64

Notes:
[A] This service parameters are indicative only. This pilot bus is assumed to operate on a 5-minute headway basis which is similar to Microlet Route#10 (runs on the same east-west corridor).

Potential Impact on Existing Microlet Routes

The Minister's bus concept may also impact existing microlet routes due to duplication of routes. The restructuring of the microlet routes should be carried out as part of a subsequent feasibility study once MOTC agrees to pursue such a pilot bus initiative. Based on the review of existing microlet routes, a total of ten routes will be likely affected by the pilot bus route including:

Table 6.184: Potential Impact on Existing Microlet Routes

Route	Origin	Destination	Approx. Overlapping Segment (%)
Microlet Route#2	Becora Terminal	Becora Terminal	~5%
Microlet Route#3	Manleuana Market	Manleuana Market	~50%
Microlet Route#4	Taibessi Terminal	Taibessi Terminal	~25%
Microlet Route#5	Taibessi Terminal	Taibessi Terminal	~5%
Microlet Route#6	Rua do Fomento	Rua do Fomento	~25%
Microlet Route#7	Taibessi Terminal	Taibessi Terminal	~25%
Microlet Route#9	Kampung Baru	Kampung Baru	~5%
Microlet Route#10	Tasitolu Terminal	Tasitolu Terminal	~75%
Microlet Route#11	Tasitolu Terminal	Tasitolu Terminal	~5%
Microlet Route#13	Kasnafar	Kasnafar	~5%

Potential Depot Location

A potential location for a depot is presented in the map below. This site (approx. 800m^2) is currently used by bus drivers/ operators to clean vehicles and conduct daily maintenance and is located at Rua de Tali Laran 1. However, this site can only accommodate up to 6 vehicles (regional bus) and lacks adequate maintenance facilities such as washing, fueling, workshop, storage spaces, parking, and admin offices.

Source: Arup Study Team (Geocode location: -8.562139, 125.527292)
Notes: This site is indicative only as a future modern bus system will likely require a new site to a accommodate larger fleet.

Figure 6.49: One Potential Depot Site for Further Exploration

Potential Business Models

There are two main considerations in determining suitable commercial model options for a modern bus system – considering the need to deliver the various scheme components (i.e., bus fleet, bus-related infrastructure (such as bus stops, terminal, depot), and other capital improvements (sidewalks, ITS, etc.), capacity building):

- Identify the need or opportunity to integrate some of these components or contracts into packages; and

- Consider which party (public or private sector) would be best placed to deliver the components (this in particular needs to align with the Government's objectives and technical or operational considerations).

Based on this, three primary commercial model options have been identified that could be adopted for an investment project, namely:

- **Option 1 –** Public sector delivery of civil works, infrastructure, ITS (bus and non-bus related), and bus fleet. Private sector operates and maintains the bus fleet, with the government-owned fleet leased to private bus operators.

- **Option 2** – Public sector delivery of civil works, infrastructure, and ITS (bus and non-bus related). Private sector delivers, operates, and maintains the bus fleet.

- **Option 3 -** Public sector delivery of civil works, infrastructure, and non-bus related ITS. Private sector delivers, operates, and maintains bus related ITS and bus fleet.

Option 1 requires the most public sector involvement and investment, whereas at the other end of the scale, Option 3 requires the least involvement and second least investment from the public sector. Furthermore elaboration and detailing of options would be part of a more detailed subsequent feasibility study.

Way Forward

It is important to highlight that detailed assessment is required to develop a bus modernization plan including origin-destination analysis, surveys to understand congestion, stated preference surveys to gauge willingness to pay and shift modes, to develop bus routing and the detailed operations plan (including route optimization of existing microlet routes), formulate traffic and vehicle circulation enhancements, develop potential terminal design modifications, plan and design the depot(s), estimate more detailed capital and O&M costs, conduct financial and economic analysis, formulate institutional refinements (i.e., service contracts and business model), as well as define a transition and implementation plan.

7 Public Transport Facility Enhancements

7.1 The Role of Public Transport Facilities

7.1.1 Overview

Public transport facilities are crucial elements in the operation of public transport systems. In the case of Timor-Leste, facilities can be categorized into: (i) passenger facilities such as bus stations, bus terminals as well as bus stops; and (ii) non-passenger facilities such as depots.

Passenger facilities provide a key interface for passengers to access public transport services. Most cities around the world have public bus systems, with local bus services in local towns and cities oriented around bus stations. Typically, networks are focused on a large station, or stations, in the central urban area, with smaller stations located in outer urban areas and at the end of routes. These core facilities are supported by a range of other infrastructure interventions across the city, such as bus stops. Based on observations and assessments from **Section 3.4.4, key issues were identified for terminals, bus stops and other key public transport facilities. The "problem statement" related to these facilities is noted below:**

Problem Statement for Public Transport Facilities in Timor-Leste:

Public transport facilities in Timor-Leste are not well aligned with service and passenger needs, with minimal oversight/guidance and systematic maintenance – this results in limited access to facilities from surrounding areas, limited provision and low quality of facilities and passenger amenities, as well as minimal organized coordination of services.

The issues highlighted above are a major barrier to the continued modernization of the country's public transport system, generating several key issues:

- Provision of public transport facilities across Timor-Leste are provided inconsistently to serve the population - resulting in poor accessibility to a public transport terminal for most of the population, which causes operators to circulate the streets for passengers ("keliling') and park along the roadside.
- Existing facilities lack systematic maintenance routines – leading to a poor passenger experience and safety concerns. Existing facilities need a major quality upgrade or rebuild.
- Facilities lack a clear concept of operations – microlets, buses, and anggunas are all observed to use the same facility, often coming into conflict with passengers due to the lack of delineated operating area for each mode. This negatively impacts safety and efficiency.
- Lack of public transport facilities – The provision of public transport facilities in each city is not consistent, some cities have them while others do not. Lacking such facilities, there is no clear departure point, making it difficult to implement/enforce schedules to improve reliability and passenger service levels.

A comprehensive plan for facilities across the country is required to contribute to the modernization of Timor-Leste's public transport system. These should be strategically located to maximize passenger accessibility, and well-designed to achieve a high-quality passenger experience and efficient network operations.

While the terms are often used interchangeably, bus stations and bus terminals are technically not the same thing. The key distinction is that terminals are a location where public transport routes “terminate” (i.e., end their route, turn around and continue in the opposite direction), whereas stations may be at intermediate locations. Both facility types should possess adequate passenger amenities and be designed for safety – however, they may be designed differently in size and function based on service requirements (for instance, average dwell time and required number of bays).

Stations and terminals should also provide sufficient space for buses to layover – or park between journeys for buses that are away from their “home base”. However, such facilities should not serve as long-term parking facilities – particularly in dense urban areas where land is at a premium. Buses dwelling excessively in central facilities may indicate operational inefficiencies (such as a timetable that has not been optimized or an oversupply of vehicles to service demand). Ideally when buses are not in revenue service (i.e., carrying passengers), they should be parked elsewhere (although not on the street), such as at a depot for servicing and cleaning.

Two primary factors that influence the effectiveness of public transport facilities are: (i) their location; and (ii) their design. This section addresses location and also defines the required typologies and sizes, with the supporting **Appendix D - Technical Note: Design Guidance for Timor-Leste Public Transport Facilities** providing a comprehensive assessment of existing design conditions, issues, opportunities, and proposed design guidance for adoption (throughout the country) based on international practice. Design should also be functional – for instance bus facilities designed as “landmarks” rather than for practical operations may result in poor passenger and operational outcomes and reduce the attractiveness of the public transport network for users.

This section presents key principles aligned to the vision for public transport in Timor-Leste to facilitate “good practice” facility site location and then translates this into the context for this study. Combined with the Design Guidelines documentation, these two elements are intended to contribute to the modernization of Timor-Leste’s public transport system underpinned by the provision of safe, inclusive, and efficient public transport facilities.

7.2 Five Strategic Principles for Locating Public Transport Passenger Facilities

7.2.1 Overview of Five Strategic Principles

Defining strategic principles for locating public transport passenger facilities requires being very clear on the fundamental purpose of public transport. Public transport, like all transport systems, is not provided for transport’s sake. It is a means to an end – the purpose is to connect people from “where they are” (origin) - to useful destinations, or “where they want to go” (destination). Public transport has an especially important role in the broader transport system, as well-designed public transport can reduce reliance on private vehicles, facilitating mobility built on a foundation of active travel (walking or cycling) and public transport. To achieve an integrated and sustainable transport system, active travel should be the primary access mode for public transport.

Five key strategic principles for locating public transport facilities are provided below, aligned to the vision for public transport in Timor-Leste developed for this study, and validated with the Ministry of Transport and Communications (MOTC). While these strategic principles are intended to guide strategic identification of preferred sites, they also must be supplemented with technical criteria (such as size of site to accommodate required capacity, engineering feasibility, etc.) that will be expanded further in later sections.

Table 7.1: Five Key Strategic Principles to Guide Location of Public Transport Facilities and Linkage to Overall Vision for Public Transport

Public Transport Vision Statement		Passenger Facility Location Principles
Economic Growth: The public transport system supports economic growth and the growth of urban centers. It connects Dili with other strategic centers and enables the movement of people and goods to support the economy.	→	***1. Alignment with Policy Documents and Strategic Location:*** *Facilities should be located to align with strategic planning and policy documents and within urban centers to maximize economic benefit.*
Access for all: The public transport system provides the entire community with better access to jobs and services. Affordable, reliable services meet people's needs, are inclusive of marginalized groups like women and the disabled and improve social mobility.	→	***2. Regional Distribution & Inclusivity:*** *Facilities should be equitably distributed to provide access across Timor-Leste, while also being conveniently located to enable walk-up access for a range of user groups.*
Livable Cities: The public transport network and facilities are integrated with urban activity centers. The system underpins healthy, safe, and connected places that improve livability in urban centers and beyond.	→	***3. Convenient Access to Activities:*** *Facilities should facilitate convenient access to activity-generating land use to maximize the network's usefulness in connecting convenient destinations.*
Mode of Choice: The public transport network provides seamless and integrated journeys that encourage sustainable travel choices, attracting more users and reducing private vehicle use and congestion.	→	***4. Seamless Journeys with Efficient Operation:*** *Facilities should be located to enable efficient operation of the public transport network, both for passengers and their travel time, and bus operators.*
Sustainable Future: The public transport system plays a key role in meeting the goals of the Paris Agreement including by encouraging mode shift to reduce the emissions intensity of travel and harnesses new technologies and innovative features to support climate mitigation and resilience.	→	***5. Future-Proof Against Climate Change:*** *Facilities should be located to avoid negative environmental impacts while prioritizing access for active travel and future low emissions technologies.*

Under each of the passenger facility location principles above, there are a number of considerations based on learnings from international practice that should be incorporated into the facility assessment process. Each of the principles is expanded below.

7.2.2 Principle 1: Alignment with Policy Documents and Strategic Locations

It is generally accepted in international practice that bus passenger facilities serving a city or region should be aligned to support economic growth. A key way in which public transport does this is by providing access to employment, which is generally concentrated in cities and city centers more specifically. Effectively designed bus systems facilitate employment and economic productivity benefits that not just benefit residents, but also the urban and national economy.

Box 7.1: Case Studies of Public Transport Successfully Maximizing Economic Benefit Globally

Case Study: Bus Rapid Transit in Curitiba, Brazil

Curitiba is often hailed as a best-practice example of Bus Rapid Transit (BRT) implementation across the world. The City's bus system carries over 2 million passengers per day, with approximately 70% of the city's population using the bus system despite the population of the city having a higher car ownership and income than the rest of Brazil.

The bus system in Curitiba was developed as part of an overall Master Plan (the Curitiba Master Plan). The success of the system is due in large part to the alignment and integration with land use and growth policies:

- The busway is designed to provide good and preferential access to the areas of highest demand (such as city centers), with bi-articulated buses providing fast access (~20 minutes) from outer terminals to the city centers.
- Land use and transport are integrated based on a "structural axes" concept that aligns the BRT system with high intensity development to connect the areas of highest demand (i.e., highest employment, highest activity) with the public transport system by walking.
- Land within walking distance of the busway is zoned for mixed commercial-residential development, contributing further to broader economic outcomes by stimulating efficient urban development in places that are served by high-quality public transport, while also inherently creating a public transport system that is aligned with the densest areas of demand.
- Key streets within the center of the city are "car free" and are zoned specifically for pedestrians and buses only.

Case Study: Bus Rapid Transit in South East Hampshire, UK

The South East Hampshire Bus Rapid Transit (BRT) system is a sub-regional public transport network designed to provide a high quality alternative to private vehicle travel, and to remove barriers to economic growth and facilitate the development of key development sites.

Key objectives of the project contributing to economic success of the project included the following:

- Improve access to future and existing employment sites by public transport: which means aligning public transport facilities in the BRT network to areas with highest employment density.
- Improve public transport to and from the North Fareham Strategic Development Area to employment, education, and health services: which means connecting key growth areas and regional areas to employment and other key destinations located in the urban core.
- Improve access to tertiary education by public transport: which means aligning public transport provision with education facilities and universities to make commuting easier for students.

Evaluation of the economic benefits of the project by KPMG for Greener Journeys deemed the project a success, significantly increased demand for public transport as a result of new passengers, due to the strong customer focus and planning of the system to align with demand. The scheme returned a Benefit Cost Ratio of 5.51 when excluding the lost parking revenue generated by the local authority due to a higher proportion of public transport trips.

While these examples are in cities and regions with higher populations than Dili and smaller municipalities across Timor-Leste, the principles are still transferrable. Public transport facilities (that facilitate access to public transport for passengers) should be conveniently located in the center of urban areas so that they are accessible to the most people and contribute to wider economic outcomes for the surrounding area.

Consideration of public transport alignment with strategic planning and policy documents of the Government of Timor-Leste is an important component of delivering a network contributing to broader national development objectives. This may include considering existing development and economic activity, and the associated plans around it, or future development plans and the role that public transport can play in realizing that vision.

Public transport may either serve the center of the city directly (by terminating at a central facility location) or be connected to the center of the city by associated feeder/connector services. Terminal locations further from the city center require interchange on the urban fringe, creating additional travel time to the urban core for passengers. Unless these locations are directly integrated with key economic nodes (e.g., employment or education hubs on the urban fringe), there is a risk they will not significantly contribute to the local economic activities.

The following considerations, particularly related to site locations, are incorporated into the planning of public transport facilities in Timor-Leste:

➔ **Assess sites for their alignment to key planning and policy documents as part of strategic assessment of site locations.**

➔ **Assess sites for their proximity to the city/urban center as part of strategic assessment of site locations.**

➔ **Incorporate consideration of centralized (regional buses into center of Dili) vs. decentralized (regional buses terminating in outskirts of urban area) into facility assessment approach.**

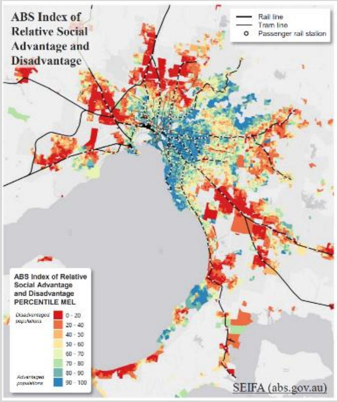
7.2.3 Principle 2: Regional Distribution & Inclusivity

Facilities should be aligned to demand, but should also provide equitable access for the populace, including low-income groups that may lack easy access to alternative modes of transport. Similarly, design has a key role to play in enabling equitable facilities that meet the needs of vulnerable user groups (including women, elderly, youth, and disabled). Areas with lower density still require public transport services – however large scale and complex passenger facilities are unlikely to be warranted based on population, passenger demand and associated number of vehicles.

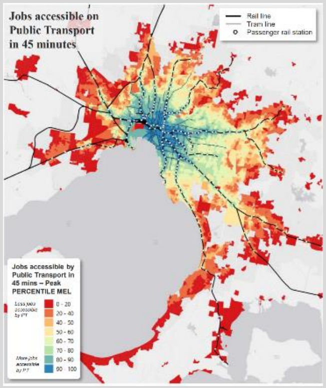
Passenger facilities that are located outside of the urban area, particularly in smaller municipalities where there are more informal local networks (and in many cases, no formal public transport within the urban area) are more difficult to access on foot. This is particularly important when considering the needs of vulnerable users, such as women, children, and the elderly – who may not have access to private vehicles or motorbikes.

Box 7.2: Case Study of Equitably Distributed Facilities in Australia

Case Study: "Transport Poverty" in Melbourne, Australia



Melbourne has the world's largest light rail (tram) network. However, researchers at Monash University studied the spatial provision of the city's public transport and identified a trend that they called "transport poverty" – whereby the public transport system primarily serves the wealthiest populations, and the lower socio-economic groups in the city have less access to good public transport options. This trend is not unique to Melbourne and it is the case across many global cities.



The researchers highlighted that approximately 100,000 Melbourne households are forced to own cars because they do not have access to good public transport. These households were generally lower socio-economic households that are required to travel further to reach work. As such, the combination of lower incomes, and increased travel distance – results in a higher relative proportion of their incomes being spent on transport costs (in their case: car ownership, insurance, fuel, etc.).

The maps shown on the right, developed by Arup, show the correlation between socio-economic advantage (top – blue areas) and good public transport access (bottom – blue areas), and similarly the correlation between socio-economic disadvantage (top – red areas) and poorer public transport access (bottom – red areas).

This case study demonstrates that if people do not have convenient access to public transport – they end up spending much more on alternative modes of transport if they are to reach opportunities like employment. If they cannot walk to a public transport stop - they need a car, motorbike or they need to spend money on connecting services like buses or rideshare/taxis. As such, equitable distribution of public transport should be a key focus – with facilities located as conveniently as possible to remove barriers to access for vulnerable groups.

In Timor-Leste, Dili is the primary demand generator. While Principle 1 highlights the importance of providing strong public transport access to the center of the city, there is also a need to consider the equitable distribution of public transport access across the city.

Similarly, smaller municipalities should also have convenient access to facilities, which in the case of these municipalities should be accessible by walking (rather than needing connecting services or private vehicles). Locating passenger facilities (particularly in smaller municipalities) outside of the urban center should be avoided, as this limits access for the population as a whole, but particularly for vulnerable users.

The following considerations, particularly related to site locations, are incorporated into the planning of public transport facilities in Timor-Leste:

➔ **Define "service regions" for the supply of public transport passenger facilities to enable equitable distribution across Timor-Leste, including sub-regions of Dili.**

➔ **Assess municipal sites for their proximity to the urban center as part of strategic assessment of site locations, to remove barriers to access for vulnerable groups.**

7.2.4 Principle 3: Convenient Access to Activities

As much as possible, facilities should be aligned with key activity generating land uses to maximize the number of useful destinations that can be reached on public transport. This includes consideration of local amenities including medicals, schools, government offices, hotel, park, historic sites, and retail destinations. This links back to why people use public transport in the first place – to reach useful destinations. By strategically aligning the provision of facilities in this way, the system serves its function more effectively and is better placed to attract more users. Examples of public transport integration with activity centers are widespread, as this is generally good public transport planning practice – some examples are provided below.

Box 7.3: Examples of Large-Scale Integration of Public Transport and Activity-Generating Land Uses Globally

Examples of Large-Scale Integration of Public Transport & Activity-Generating Land Use

Kuala Lumpur, Malaysia: KL Sentral

Kuala Lumpur Sentral is a transport hub in Malaysia that is integrated with various modes of transport, including local buses, intercity buses, commuter trains, light rail transit (LRT), monorail, airport express rail link and taxi services. The KL Sentral is also seamlessly connected to the NU Sentral Mall, providing travelers easy access to a wide range of shopping and dining options.

Singapore: Jurong East MRT Interchange

Singapore's Jurong East MRT interchange is a major public transport hub that is directly connected to several large shopping centers, such as Westgate, JEM, and IMM. The MRT station is also near the Ng Teng Fong General Hospital, further integrating healthcare services into the transportation infrastructure. The station also serves as an interchange between the East-West and North-South MRT lines, providing easy and quick access to different parts of the city.

Portland, United States: Beaverton Transit Center

The Beaverton Transit Center in Oregon, USA is a key transport hub that connects local bus routes, light rail services, and bike paths. This transport center is located right across from The Round, a mixed-use development that includes retail, dining, residential and office spaces. Furthermore, it's just a short walk to Cedar Hills Crossing, a large shopping center. This demonstrates good land use planning and integration of transport and activity centers.

London, United Kingdom: Stratford Station

Stratford Station in London is another great example. The station is part of Stratford City, a mixed-use development with shopping (Westfield Stratford City, one of the largest shopping centers in Europe), leisure, and residential spaces. The transport hub incorporates multiple lines (Underground, Overground, DLR, and National Rail) and a bus station, promoting multi-modal connectivity. The development is also home to the Queen Elizabeth Olympic Park, creating a vibrant community and entertainment hub.

While the Southeast Asian examples above are of a larger scale than is needed in Timor-Leste, the principles of aligning public transport with activity generating land use is relevant regardless of the scale. A well-positioned on-street terminal in the center of the city, connecting to key destinations such as markets, offices and retail will facilitate a more sustained level of passenger demand, than a large, complex facility without any adjacent land use or opportunities. In trading-off key activity generators and access to adjacent activity generating land use, it is necessary to design appropriately sized facilities based on level of demand. In short, complex terminal facilities are not required in every location. In many cases all that is required is a sufficiently sized curb space for vehicles to collect and drop off passengers, wait for layovers, and turn around.

Examples of smaller scale, tactical integration of public transport with activity generating land use are provided below.

Box 7.4: Examples of Tactical Integration of Public Transport and Activity-Generating Land Use Globally

Examples of Tactical Integration of Public Transport and Activity-Generating Land Use

Phuket, Thailand: Phuket Weekend Market

Phuket is renowned for its vibrant local markets, and the Phuket Weekend Market is no exception. Located just outside Phuket Town, the market is accessible via several local bus lines that have a dedicated stop nearby. The bus stop ensures that locals and tourists alike have easy access to the market's diverse range of food, clothing, and handicrafts.

Bali, Indonesia: Ubud Art Market

Ubud in Bali, is famous for its Art Market, an epicenter of local crafts, artwork, and souvenirs. The market has a dedicated bus stop serviced by local minibuses known as "Bemos". This small-scale integration allows for efficient movement of locals and tourists to and from the market.

Lake District, United Kingdom: Keswick Market

The scenic Lake District is home to several small towns and villages that are serviced by a robust rural bus network. Keswick, one of the larger towns, holds a popular market twice a week. There is a bus stop directly adjacent to the market square, providing access to locals from nearby rural areas and tourists from further afield.

Large-scale complex terminals are only required where they are justified by demand. Where there are numerous vehicles converging on the terminal at one time, off-street interchanges are likely required (depending on space on-street). However, in most instances, particularly in some of the smaller municipalities in Timor-Leste, a high-quality on-street interchange may be adequate to service regional and local buses (given relatively lighter activities compared to Dili). This should of course be analyzed on a case-by-case basis and justified by current future demand.

In many cities, the heart of the urban area typically has one or more main bus terminals. Having a single bus terminal located in the center of the city has benefits for passengers as it allows convenient interchange for passengers across a range of routes covering various regions within the city. However, there are also trade-offs. The key challenges with a centralized terminal model are access to land in the center of major cities, where land is at a premium, as well as potential traffic impacts of numerous buses entering the city center with already elevated levels of traffic (particularly if no supporting infrastructure/traffic interventions area applied). Therefore, in bigger cities, multiple terminals can be found at the outskirts of the city, acting as an interchange point between regional services and urban services.

In Timor-Leste, given the low population and low levels of traffic congestion in many of the smaller municipalities – and reduced competing demands for land availability at a scale that would warrant a public transport passenger facility unfeasible as an alternative – the only place where consideration of this trade-off is needed is in Dili.

The following considerations, particularly related to site locations, are incorporated into the planning of public transport facilities in Timor-Leste:

➔ **Assess sites for their alignment to key activity generating land use as part of strategic assessment of site locations.**

➔ **Develop facility typologies based on levels of demand to balance need for urban connectivity with land and space allocation requirements.**

7.2.5 Principle 4: Seamless Journeys with Efficient Operation

The location of public transport facilities is primarily governed by the availability of sites. This can lead to public transport facilities being located in sub-optimal locations, which can lead to inefficient operations for bus operators and inconvenient outcomes for passengers. The further facilities are from passenger demand, the more “deadheading” that is required for operators (whereby deadheading refers to the distance traveled out of revenue service for instance to/from the depot at the start and end of the day). Deadheading adds costs to operations.

Across the network a combination of terminals, stations and bus stops should be provided to serve demand. Where central terminals are provided – land availability and allocation are likely to be constraining factors, thus operations should be planned to minimize time vehicles spend in the central facility. Efficient utilization of buses will result in minimal waiting time needed at facilities. Essentially, it is more expensive to provide parking space at a central terminal than at an outer urban terminal, due to trends in land costs based on competing interest in the land. However, it can also be expensive for buses to drive long distances to outer terminals without passengers.

Box 7.5: Case Studies for Locating Facilities to Enable Efficient Public Transport Globally

Case Study: Singapore, Toa Payoh Bus Interchange

Toa Payoh Bus Interchange, situated in the heart of the Toa Payoh town center, is an example of strategic terminal placement to facilitate efficient operational outcomes. The interchange was designed to integrate seamlessly with Toa Payoh MRT Station and a shopping mall, embodying Singapore's vision of multi-modal transport hubs that combine retail and public transport. This design not only provides commuters with enhanced convenience but also ensures that bus services cater directly to high-demand areas.

The interchange's strategic location helps minimize "deadheading" - the need for buses to travel without passengers. Since the interchange is in an area with high passenger demand, buses often start their service with a good number of passengers, enhancing the efficiency of the network. This operational model allows for optimal use of resources, leading to decreased operational costs and improved service reliability.

Overall, Toa Payoh Bus Interchange serves as a benchmark in effective terminal placement, demonstrating how the integration of public transport with urban amenities can benefit both passengers and operators. The model adopted by the interchange not only fosters better utilization of public transport but also enriches the urban experience by facilitating easy access to retail and recreational activities.

Case Study: Mor Chit Bus Terminal in Bangkok, Thailand

The Mor Chit Bus Terminal serves as the primary hub for inter-regional bus services traveling to and from Northern and Northeastern Thailand. The facility's strategic placement plays a crucial role in its operational efficiency. Despite being located relatively close to the center of Bangkok (~20km from the urban fringe) the terminal's proximity to the Vibhavadi Rangsit Road, a significant artery in Bangkok, offers direct access to this

main thoroughfare, facilitating smoother transit for buses entering and exiting the city.

The terminal's design minimizes the impact of Bangkok's notorious traffic congestion on bus operations, although it is not immune – as Bangkok is one of the world's most congested cities. However, the direct access to Vibhavadi Rangsit Road does alleviate some of the impacts by allowing buses to transition from the terminal onto the main road. This direct access reduces travel times, especially during peak hours when inner-city traffic can be particularly heavy.

Case Study: Alabang South Station in Muntinlupa, Philippines

Alabang South Station, located in Muntinlupa City in the southern part of Metro Manila, serves as a critical transit hub for regional bus services. The terminal is strategically placed near the South Luzon Expressway (SLEX), a major highway connecting Metro Manila with provinces in the southern part of Luzon. This location provides buses with direct access to the expressway, allowing them to bypass local traffic and transition smoothly onto the highway.

The terminal's proximity to the SLEX plays a crucial role in mitigating the effects of Metro Manila's often intense traffic congestion. Buses departing from Alabang South Station can move directly onto the expressway, avoiding congested local streets. The facility is located in the southern region of Manila, however, is integrated with the large Festival Shopping Mall and provides connectivity to a large region of the urban area of regional passengers who can interchange at this station.

It is important that facilities are placed to facilitate efficient operations. In the case of regional buses, one strategic consideration that can be embedded in site assessment is the proximity to major roads. By providing direct access for buses into facilities from major roads, local roads with lower capacity can be avoided. In many cities, particularly in Southeast Asia, traffic congestion is a major problem. Some cities opt to relegate regional buses to the urban fringes (such as in Manila) to avoid traffic congestion in the center of the city. This approach is most common in Southeast Asia. Elsewhere, such as in North America and Europe, long-distance buses connect into central terminals, supported by other interventions (such as bus priority lanes and traffic reduction measures) to facilitate efficient operations.

The following considerations, particularly related to site locations, are incorporated into the planning of public transport facilities in Timor-Leste:

➔ **Assess alignment to main roads and public transport operations as part of as part of strategic assessment of site locations.**

➔ **Incorporate consideration of centralized (regional buses into center of Dili) vs. decentralized (regional buses terminating in outskirts of urban area) into facility assessment approach.**

7.2.6 Principle 5: Plan with Climate Change and Resilience in Mind

Public transport facilities should also be designed to account for an unknown future and to build resilience against future climate events to ensure the system maintains operability. In addition, beyond inherent environmental advantages of public transport over private vehicle travel, public transport facilities can act as beacons of sustainable design and integration with the natural environment. As such, facilities should be both planned (located) and designed with climate change and resilience in mind. Below are some examples of public transport facilities that have demonstrated leadership in sustainability.

Box 7.6: Examples of Environmental Leadership in Public Transport Globally

Examples of Environmental Leadership in Public Transport Facility Provision

Byron Bay, Australia: Byron Bay Transit Interchange

The Byron Bay transit interchange was specifically designed to integrate with the natural environment and leverage the natural environment to improve passenger amenity. Native trees populate the main square, while a treed median of Blueberry Ash within the internal busway pavement provides both tree canopy within the interchange but also shades the passenger platform (Platform One) from the western sun, improving the passenger experience.

Vancouver, Canada: LEED-certified Transit Centers

To minimize environmental impacts, TransLink, the public transportation authority in Metro Vancouver, has designed several of its transit centers to meet the Leadership in Energy and Environmental Design (LEED) standards. These standards focus on sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. For instance, the Hamilton and Burnaby Transit Centers incorporate energy-efficient lighting, heating and cooling systems, and recycled materials in their construction. An entire railway in Vancouver (the Canada Line) has all 16 stations certified to LEED standards.

Curitiba, Brazil: Bus Rapid Transit Tube Stations

As part of its innovative bus rapid transit (BRT) system, Curitiba developed tube stations that were designed to be light, cost-effective, and minimize environmental impact. The stations were designed to be largely open to allow for natural ventilation, reducing the need for energy-consuming climate control systems. The BRT stations are also quite spatially efficient, and such a model lends itself

	to modular construction for environmental benefits (such as waste minimization).

Many of the features of public transport facilities that contribute to a sustainable future are achieved through design, such as the inclusion of environmentally friendly technologies, energy efficiency systems or the inclusion of green space. However, the strategic location of facilities can also play a role. There is a need to consider the environmental credentials of sites, and the level of environmental impacts that are generated from the construction of a facility at a particular site.

As such, the following consideration will be incorporated in the strategic assessment of public transport facility sites:

➔ **Assess environmental impacts as part of strategic assessment of site locations.**

➔ **Locate facilities to naturally encourage active transport (walking and cycling) as the most convenient first and last mile transport choice.**

7.2.7 Integrating Facilities with Urban Development

Evident in the case studies above, it is important as facilities are implemented that they are integrated with the surrounding area. This section provides an overview of some successful examples of public transport facility integration, and summarizes lessons learned.

While the three case studies mentioned below regarding transit-oriented development are on a much larger scale than what we are considering in Timor-Leste, they can still offer valuable lessons on how to approach TOD and urban regeneration. These examples can provide inspiration for Timor-Leste's planning efforts, guiding the development of a detailed land use plan for the area around the public transport node.

Box 7.7: A Modern Transit-Oriented Development in Sydney, Australia

Barangaroo Station serves as a vital transportation hub in Sydney's emerging business district, connecting to the Walsh Bay Arts and Culture precinct and other developments. Integrated into the Sydney Metro network, it boasts efficient design with seven key objectives: safety, customer focus, accessibility, connectivity, activation, diversity, and identity/placement.

- **Mixed Land Use -** The station incorporates diverse amenities, including lawns, gardens, plazas, cultural venues, and retail spaces, fostering a vibrant urban environment.
- **Active Transport -** Prioritizes active transport with no onsite parking, supported by bus routes, bicycle parking, and a dual-direction cycleway.
- **Pedestrian-Friendly -** Enhances pedestrian integration with new footpaths and priority crossings, ensuring safe movement.

- **Cultural Significance -** Utilizes natural barriers and native vegetation to enhance the station's cultural significance and character while providing shelter.
- **Accessibility -** A step-free accessibility plan promotes inclusivity and equality.
- **Landscaping Strategy -** Extensive landscaping creates a distinctive tree canopy, encouraging outdoor use of public plazas and green spaces, including outdoor dining.

Box 7.8: A Model Transit-Oriented Development near Perth, Australia

Subi Centro is an urban revitalization project located just 4km west of Perth's CBD, centered around the upgraded Subiaco Train Station. This transportation hub serves as the core for high-density housing, a dedicated commercial and community district, and is considered Perth's prime example of transit-oriented development.

- **Revitalized Industrial Areas -** Formerly underutilized industrial areas around Subiaco have been redeveloped to promote public access, open spaces, and a vibrant retail zone.
- **Integrated Design -** Subi Centro prioritizes comfortable walking environments, reducing private vehicle reliance and optimizing walksheds through key transport corridors.
- **Rail and Bus Access -** The development offers easy and reliable access to public transport, with a well-integrated design accommodating both rail (underground) and bus services.
- **Enhanced Connectivity -** Continuous walking and cycle paths enhance connectivity, complemented by mixed-use redevelopment that places parks, businesses, and shops in proximity to residential zones.

Box 7.9: A Model Transport Hub in the Netherlands

Coervorden Railway Station, situated in the Dutch province of Drenthe, serves as a crucial connection hub for a small town with 15,500 residents. Part of the major Emmen-Zwolle rail line, this project, funded by the Prorail Railway Plan for Northern Netherlands, stands as an exemplary model for integrating transport hubs seamlessly into the public realm.

- **Natural Integration -** The built-up environment harmoniously integrates with the natural surroundings, supporting local ecology and creating a vibrant place.

- **Art and Lighting -** Public art displays and dynamic lighting enhance the station's ambiance, improving space quality and safety, indirectly encouraging off-peak train travel.
- **Accessibility -** The station ensures accessibility for all patrons through ramps, alternative entry points, traffic calming measures, and pedestrianization of key transport corridors.
- **Pedestrian and Cyclist Tunnel -** A dedicated tunnel under the station provides sheltered access for pedestrians and cyclists, ensuring unrestricted movement.
- **Bike Infrastructure -** Specialized bike infrastructure with around 500 bicycle parking spots promotes active transport and supports the community's cycling culture.

Relevance to Timor-Leste:

- **Renewed Urban Space -** Develop transport hubs as part of broader urban renewal initiatives, directing investments into the heart of integrated commercial and community precincts. Integrate land use around the transport hub with features like lawn spaces, gardens, public plazas, cultural amenities, and retail to enhance the patron experience.
- **Optimized Network -** Consider the broader network to optimize active transport routes in and around the interchange. Emphasize a connected network to reduce the reliance on private transport, increase public transport frequency on key corridors, and facilitate cross-precinct travel. Support existing routes with landscaping and natural protection measures to promote an active travel network.
- **Quality Amenities -** Focus on placemaking to maximize amenities and promote usage by creating a better environment for patrons. Address patron needs, including amenities like bicycle parking, to enhance accessibility. Maximize accessibility and wayfinding through the implementation of crossings and alternative routes.
- **Enhanced Safety -** Implement traffic calming measures in the immediate vicinity of the interchange to enhance pedestrian and cyclist safety. Incorporate principles of crime prevention through environmental design, such as passive surveillance, access control, and space management, to maximize patron safety.
- **Attractive Service -** Encourage ridership by providing a more efficient and reliable public transport service.

7.2.8 Summary and Implications

In summary, the five strategic principles above that are aligned to the vision for public transport in Timor-Leste developed for this study are reflective of international practice and planning approaches. For each of the principles, based on the case studies presented – several key considerations are highlighted for incorporation into the provision of public transport facilities in Timor-Leste.

A summary of the incorporation of these key considerations is summarized the table below:

Table 7.2: Incorporation of Key Strategic Considerations in Facility Planning Process

Key Strategic Considerations	Manner Incorporated in Planning
Develop facility typologies based on levels of demand to balance need for urban connectivity with land and space allocation requirements.	Three facility typologies are defined in the following subsection (**Section 7.8**): Defining Facility Types) with differing scales to suit different levels of public transport demand.
Define "service regions" for the supply of public transport passenger facilities to enable equitable distribution across Timor-Leste, including sub-regions of Dili.	17 service regions are defined across Timor-Leste (4 in Dili), with a longlist of facility sites developed and defined in the context of these service regions.
Incorporated in Multi-Criteria Assessment of Site Locations:	
Assess sites for their alignment to key planning and policy documents as part of strategic assessment of site locations.	Covered by the proposed MCA Criteria: Alignment with Strategic Documents
Assess sites for their proximity to the city/urban center as part of strategic assessment of site locations.	Covered by the proposed MCA Criteria: Proximity to Urban Centre
Assess sites for their alignment to key activity generating land use as part of strategic assessment of site locations.	Covered by the proposed MCA Criteria: Proximity to Key Activity Generating Destinations
Assess municipal sites for their proximity to the urban center as part of strategic assessment of site locations, to remove barriers to access for vulnerable groups.	Covered by the proposed MCA Criteria: Proximity to Urban Centre (as above)
Assess alignment to main roads and public transport operations as part of as part of strategic assessment of site locations.	Covered by the proposed MCA Criteria: Accessibility to Main Road; Alignment with Public Transport Operations.
Assess environmental impacts as part of strategic assessment of site locations.	Covered by the proposed MCA Criteria: Impact on Tree Removal; Impact on Nearby Water Bodies; Impact on Air and Noise Pollution.
Locate facilities to naturally encourage active transport (walking and cycling) as the most convenient first and last mile transport choice.	Covered by the proposed MCA Criteria: Proximity to Urban Centre and Proximity to Key Activity Generating Land Use (as above).
Incorporate consideration of centralized (regional buses into center of Dili) vs. decentralized (regional buses terminating in outskirts of urban area) into facility assessment approach.	Define alternate operating concepts for Dili bus operations based on the concept of Centralization vs. Decentralization. Consider trade-offs and determine preferred model.

7.3 Defining Facility Types

To provide clarity – key facility types are defined into several distinct categories, ranging from bus stops (the smallest type of facility which are implemented on-street), to interchanges and terminals (larger passenger facilities) and depots (primarily operational facilities, typically separate from passenger facilities):

- **Bus Stops -** On-street locations where road-based public transport load/unload passengers, with simpler amenities/facilities compared to terminals/ interchanges.
- **Interchanges/Terminals -** Larger facilities where routes/services connect with one another, and more robust passenger amenities/facilities are provided.
- **Bus Depots -** Locations where buses are stored overnight and cleaned, washed, and maintained on a daily basis, with administrative buildings for such functions.

This document takes a passenger-focused approach in assessing optimal locations for passenger interchanges / terminals. These facilities act as main anchors in the network for passengers and public transport operations. Demand for bus stops and depots are assessed as supporting interventions and require different considerations for their provision.

Three interchange / terminal typologies are defined below for this Study as different facilities are recommended for different locations based on level of demand, type of service (urban vs. regional) accommodated, street and land conditions, etc. This classification is used to generate typical costs and then feed into the overarching public transport master plan, but also provide a sense of scale and amenities to stakeholders for each type of facility at the planning stage (with key design details to be developed for each site in the Feasibility Study stage). These three typologies include:

- **On-Street Interchange -** High-quality, on-street facility with space for buses to load/unload passengers, while also providing layover/parking provisions where needed. Key considerations include availability of curbspace in urban centers to accommodate the interchanges, however where possible on-street interchanges can provide high public transport accessibility in strategic locations in the urban core.
- **Municipal Public Transport Hub -** Larger, off-street passenger facilities that accommodate urban public transport services (i.e., microlets), typically with passenger waiting areas and vehicle layover spaces. These hubs are often strategically located in the urban core, where land is available.
- **Regional Multi-Modal Terminal -** Large, multi-modal terminals that serve as primary interchange points between urban and regional bus services. These facilities are designed for microlets and regional buses, while also being future proofed to support a potential future urban bus fleet. Regional multi-modal terminals require the most land to implement.

The table below describes key elements of each typology, with case studies for each typology following.

Table 7.3: Proposed Facility Type and Characteristics for Timor-Leste Public Transport Master Plan

	Typology#1: On-Street Interchange	Typology#2: Municipal Public Transport Hub	Typology#3: Regional Multi-Modal Terminal
	 ***Example: On Street Interchange, Singapore***	 ***Example: Christchurch Bus Interchange, New Zealand***	 ***Example: Manila PITX Terminal, Philippines***
Facility Type and Characteristics	• Serves microlets only (or in the case of smaller municipalities, a small number of daily regional buses as well). • Located at key points within the city/ municipality for convenient transfers. • Includes basic passenger amenities like sheltered waiting areas, seating, route maps, and real time arrival information. • Possesses integrated pedestrian connectivity to surrounding urban areas and provisions for persons with disabilities. • May incorporate active travel infrastructure (e.g., bicycle racks) to improve last mile connectivity.	• Serves microlets and/or major regional routes. • Located in residential and commercial areas/centers to improve access to public transport. • Includes additional amenities (beyond ones at on-street interchange) like restrooms, food and beverage options, and bicycle parking. • Supports integration with other modes of transport, such as taxis and private shuttles. • Provides customer support (e.g., ticketing) • May include depot provisions – i.e., administration, maintenance, fueling, cleaning and storage for public transport vehicles, however these would be separate from the passenger areas.	• Services as a primary hub for regional buses, with interchange options to other public transport modes (microlet, ferries). • Located at strategic locations across the region/country, near major highways. • Offers extensive amenities – waiting areas, food, beverage, retail shops, baggage storage, and car/motorbike/cycling parking, restroom facilities. • Facilitates seamless transfers between different transport modes. • Provides ticketing services, including customer support. • May also have depot facilities at same location.
Demand	Moderate passenger volume, primarily serving local areas.	Moderate to high passenger volume, serving urban centers and major employment centers.	High passenger volume, serving as a regional hub for multiple modes of transport
Scale	Smaller-size footprint, generally occupying a single block or less.	Medium-size footprint, occupying a block or more, depending on available space and need.	Large footprint, requiring substantial land allocation and infrastructure investment
Selection Logic	*Implement at key locations within city/municipality, where bus/microlet routes intersect or where interchange is required between services.*	*Implement in areas with high public transport ridership*, where *multiple routes converge and there is a need to connect local neighborhoods to selected regional bus services.*	*Implement at strategic locations across the country,* based *on public transport demand, regional population, and economic activity.*

Box 7.10: On-Street Interchange Case Study (Jurong, Singapore)

Singapore's Next Generation Bus Stop in Jurong East is a prime example of innovative on-street public transport facilities. Unveiled in 2016 by the Land Transport Authority (LTA), it redefines the concept of an on-street bus stop.

- **Strategic Location -** Situated in Jurong East, a bustling residential and commercial hub, this bus stop maximizes accessibility and convenience for passengers.
- **User-Centric Design -** Featuring a swing and a book rack, it offers an engaging waiting experience, fostering community and promoting a reading culture.
- **Rooftop Garden -** A green roof enhances aesthetics and contributes to sustainability by reducing heat and absorbing rainwater, aligning with Singapore's 'city in a garden' concept.
- **Climate Consideration -** Extended roof and large fans accounts for Singapore's tropical climate, providing shelter while ensuring excellent ventilation.
- **Digital Features -** Real-time information screens, seat availability details, and Wi-Fi enhance experience and reduce uncertainty.

Box 7.11: Municipal Public Transport Hub Case Study (Christchurch, New Zealand)

Completed in 2015, the Christchurch Bus Interchange stands as a model for public transport facility design. Its success is underpinned by:

- **Strategic Central Location -** Situated in the heart of Christchurch, it serves multiple routes enhancing convenience for residents, and promoting walking and cycling. Its central position also aids in the efficiency of the network by minimizing deadheading.
- **Operational Efficiency -** Through-routing and dynamic bay allocation streamline services, offering passengers route switches within the same terminal, maximizing space efficiency.

- **Urban Integration -** Its modern, transparent design seamlessly blends with the cityscape, incorporating retail space and catering to various transport modes.
- **Design and Sustainability -** Its prominent, architectural roof, constructed from sustainable materials capable of withstanding seismic activity, symbolizes the city's commitment to resilience and sustainability.
- **Passenger-Centric Design -** Real-time information displays, comfortable waiting areas, and excellent customer service contribute to a positive user experience, encouraging greater public transport use.

Box 7.12: Regional Multi-Modal Terminal Case Study (PITX, Manila, Philippines)

Inaugurated in 2018, the Parañaque Integrated Terminal Exchange (PITX), serves as a pivotal transport hub in Metro Manila, connecting urban and regional public transportation services. Developed through a Public Private Partnership with the Department of Transportation and Megawide Construction Corporation, PITX offers:

- **Strategic Location -** Adjacent to major expressways like the Ninoy Aquino International Airport Expressway, PITX acts as a gateway between Cavite and Metro Manila, alleviating congestion while integrating various transport services.
- **Urban Integration -** Beyond being a transit hub, PITX incorporates retail establishments and food outlets, transforming it into a lifestyle destination for passengers and setting an example of a sophisticated public transportation facility in the Philippines.
- **Efficient and Safe Passenger Flow -** The terminal's design clearly separates different public transport modes, featuring dedicated bays for city and regional buses, minibuses, and jeepneys, ensuring smooth and secure passenger movement.
- **Centralized Ticketing -** PITX implements a centralized ticketing system, simplifying ticket booking across various operators and enhancing the passenger experience.

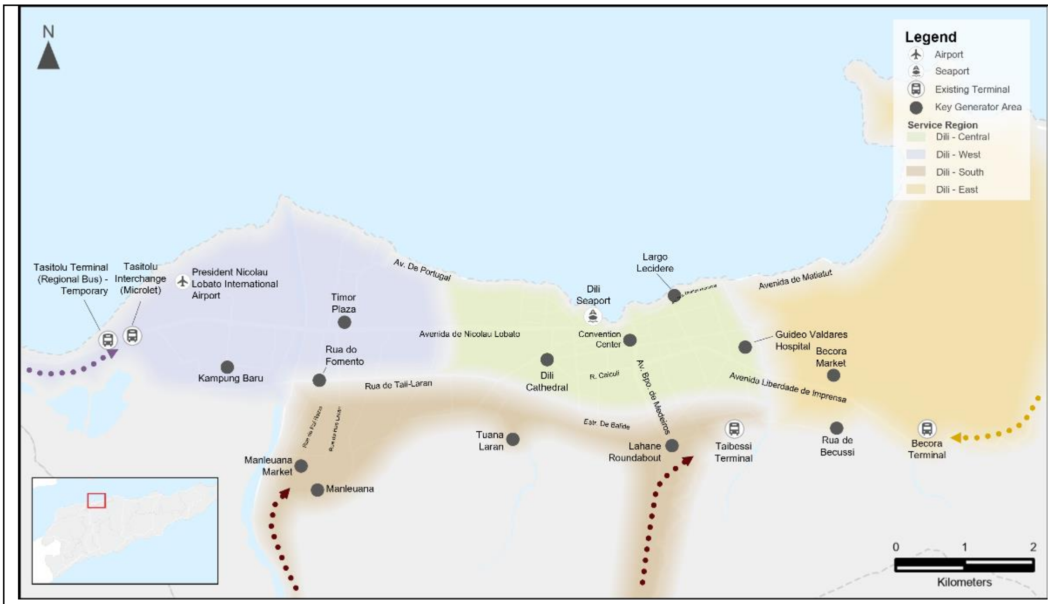
7.4 Future Operating Model for Dili Municipality

7.4.1 Overview of Principal Service Areas in Dili

Dili is the most complex location for facility provision and public transport operations. As the capital city of Timor-Leste, Dili serves as the major hub for regional routes from other municipalities, as well as microlet routes in the city. The existing situation sees Dili's service area divided into three key regions (Dili - West, Dili - South, and Dili – East) characterized as follows:

- **Dili - West Service Area** – This caters regional routes originating from the west and is served by Tasitolu Terminal.
- **Dili – East Service Area** – This caters to regional routes from the east and is served by Becora Terminal.
- **Dili – South Service Area** – This caters regional routes from the south, which is served by Taibessi Terminal.

Each of these service regions are shown in the Figure 7.1 below, as well as a conceptual 'Dili Central Service area'.



Source: Arup Study Team

Figure 7.1: Dili Service Areas

The provision of a public transport facility in Dili Central could potentially serve as an interchange point between regional and microlet services, or as a hub for microlet interchange. The establishment of Dili - Central as a service region would enhance the transportation network within Dili, providing convenient transfer options for both regional and microlet passengers.

Key components of the conceptual model of operations for public transport in and around Dili are as follows:

- A public transport facility will be required in the west, south, and east of Dili to facilitate interchange between long-distance regional buses and Dili microlets (that service the broader city).
- A public transport facility should be provided in the Central area of Dili, acting as a main public transport hub for the urban core – which can either have regional buses travelling to this destination, or serve as an urban interchange only.
- There may be other key destinations within Dili (such as the Airport and the Port) that will require connectivity via public transport.
- Both radial and orbital microlet services will provide access between the key public transport facilities in each of the east, south, west, and central facilities and broader urban area.

For Dili, it is instructive to look globally to understand how other cities handle terminal placement – either placing it at the center of the city or placing them on the outskirts of the city. Given these two models in other locations and the role of this Study to provide a visionary look at public transport in the future, two potential service concept options are proposed below for consideration: (i) Option 1 – Centralized Service Model; and (ii) Option 2 – Decentralized Service Model. These are described in more detail in the subsequent sections.

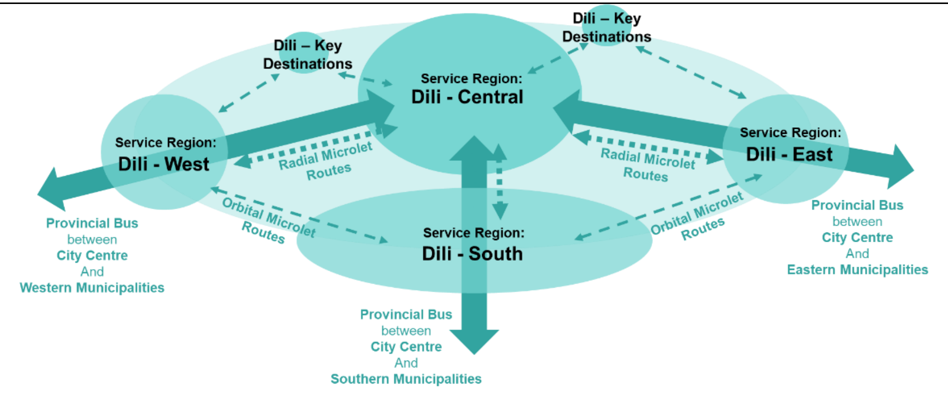
7.4.2 Option 1 – Centralized Service Model

Cities globally operate with central intercity bus services, allowing passengers to travel directly into the city center, rather than terminating on the urban fringes and requiring interchange. Examples are provided in **Table 7.4** below.

Table 7.4: Examples of International Cities with Central Intercity Bus Terminals

Central Regional Bus Terminal	Location	City Population
Victoria Coach Station	London, United Kingdom	~9,648,000
Port Authority Bus Terminal	New York City, United States	~8,468,000
Civic Centre Intercity Bus Station	Cape Town, South Africa	~4,890,000
Durban Bus Station	Durban, South Africa	~3,228,000
Central Coach Station	Amsterdam, Netherlands	~1,174,000
Transbay Transit Centre	San Francisco, United States	~815,000
Edinburgh Bus Station	Edinburgh, United Kingdom	~554,000

For Dili, this model would have regional bus services from eastern, southern, and western municipalities all traveling into the city center to serve Dili Central Terminal. From here, passengers interchange with microlet services to reach final destinations across Dili.



Source: Arup Study Team

Figure 7.2: Schematic of Dili Centralized Service Model

Several case studies for a centralized model of services are provided below to highlight key potential lessons learned for Dili.

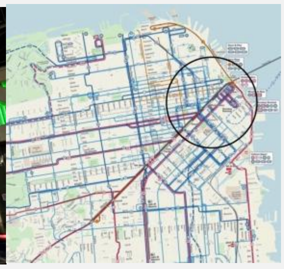
**Box 7.13: Centralized Service Model –
Cape Town Civic Center Intercity Bus Station**

**Population of Cape Town:
~4,890,000**

The Civic Centre Intercity Bus Station in Cape Town, South Africa, plays a crucial role in connecting the city of almost five million people to various regions:

- **Strategic Location -** Situated near Cape Town Civic Centre, the bus station provides central access and intermodal connectivity to the MyCiti Bus Rapid Transit system, local trains, and minibus taxis, facilitating seamless transfers for passengers.
- **Congestion Management -** In response to congestion challenges in the city, strategies were implemented, including investments in high-quality public transport, traffic officers at critical intersections, travel demand management, and rescheduling of intercity bus services to alleviate peak-hour traffic impacts.
- **Balancing Benefits and Congestion -** The central bus station's advantages must be weighed against congestion concerns. Cape Town's case illustrates the need for an integrated approach to manage congestion, with public transport playing a pivotal role in South Africa's most congested city.

Box 7.14: Centralized Service Model – San Francisco Transbay Transit Center



**Population of San Francisco:
~3,328,000**

Situated in San Francisco's South of Market district, the Transbay Transit Center, or Salesforce Transit Center serves as a central hub for diverse transportation modes.

- **Elevated Bus Deck -** Featuring an elevated bus deck, the center separates bus operations from street-level traffic, accommodating over 300 buses per hour while reducing congestion potential. Direct connections to the Bay Bridge facilitate efficient bus travel.

- **Strategic Scheduling and Routing -** Careful scheduling and routing of buses prevent bottlenecks, aided by real-time tracking for smooth ingress and egress.
- **Transit-Oriented Development (TOD) -** Surrounding the terminal, high-density housing, offices, and retail are being developed with easy access by walking or public transit, reducing car dependence and promoting public transport use.
- **Comprehensive Integration -** The center integrates with various transportation modes, including local buses, regional rail services like BART and Caltrain, and high-speed rail in the future, making transfers convenient and spreading passenger flows efficiently. The network map shown above (right) highlights the convergence of routes into the Transbay Transit Center.

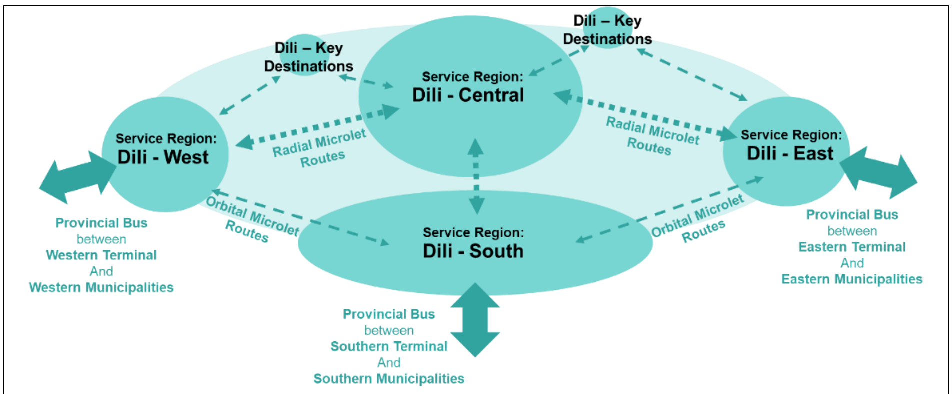
7.4.3 Option 2 – Decentralized Service Model

Similarly, there are many examples of cities globally that are providing bus terminals outside of the urban core (following a "decentralized" or "satellite" model) to alleviate congestion in the city center. This practice is most prominent in Southeast Asia, with examples provided in the table below.

Table 7.5: Examples of International Cities with "Decentralized" or "Satellite" Intercity Bus Terminals

Central Regional Bus Terminal	Location	City Population
PITX Integrated Terminal	Manila, Philippines	~14,700,000
Terminal Bersepadu Selatan (TBS)	Kuala Lumpur, Malaysia	~8,622,000
Mo Chit 2 Bus Terminal	Bangkok, Thailand	~11,069,000
Woodlands Temporary Bus Interchange	Singapore	~5,986,000

For Dili, under this model, regional bus services from eastern, southern, and western municipalities terminate at passenger facilities in each respective region on the periphery of Dili. No regional bus services penetrate the urbanized city center to serve Dili Central, with passengers having to interchange to microlets to reach the city center.



Source: Arup Study Team

Figure 7.3: Schematic of Dili Decentralized Service Model

Several case studies for a centralized model of services are provided below to highlight key potential lessons learned for Dili.

Box 7.15: Decentralized Service Model – Kuala Lumpur Terminal Bersepadu Sealatan (TBS)

Population of Kuala Lumpur: ~8,622,000

Established in 2011, Terminal Bersepadu Selatan (TBS) is a transportation hub located just outside Kuala Lumpur, Malaysia. It serves as the primary terminal for buses to southern Malaysia, Singapore, and Thailand.

- **Location Strategy -** TBS is strategically placed on the urban fringe to divert intercity buses away from the congested city center.
- **Express Buses to the City Center -** Express buses link TBS with key city center locations, providing efficient transportation options for passengers and reducing traffic congestion.
- **Rail integration -** TBS is integrated with the Bandar Tasik Selatan railway station, offering connections to three railway lines, facilitating access to various parts of Kuala Lumpur, including the city center.
- **High-Quality Passenger Amenities -** TBS boasts a range of passenger amenities, including comfortable waiting areas, free Wi-Fi, food, and retail options, enhancing the overall travel experience.

Box 7.16: Decentralized Service Model – Bangkok Mo Chit 2 Bus Terminal

Population of Bangkok: ~11,069,000

The Mo Chit 2 Bus Terminal, also known as the Bangkok Bus Terminal (Chatuchak), is a vital transportation hub in Bangkok, Thailand. Located in the Chatuchak District in the northern part of the city, it serves intercity and long-distance buses.

- **Strategic Location -** Mo Chit 2 is Bangkok's largest bus terminal, diverting long-distance buses away from the congested city center, contributing to reduced traffic congestion.
- **Integration with Rail -** The terminal connects with the Mo Chit BTS Skytrain station and Chatuchak Park MRT station, offering rapid transit options for passengers to access various parts of Bangkok, including the city center.
- **High-Quality Amenities -** Mo Chit 2 offers passenger-friendly amenities such as food vendors, retail shops, comfortable waiting areas, and information counters, enhancing the overall travel experience.
- **Success Model -** This case study demonstrates the effectiveness of satellite bus terminals when integrated with efficient rail systems and high-quality facilities to minimize passenger wait times and congestion.

7.4.4 Comparing Conceptual Service Models for Future Operations

The key purpose for comparing these conceptual service models of future operations is that they influence the facility requirements at various locations, particularly any theoretical Dili Central Terminal. **Table 7.6** highlights key tradeoffs between the two models in Dili.

Table 7.6: Comparing Conceptual Service Models for Future Operations

Features	Conceptual Service Model 1: Centralized	Conceptual Service Model 2: Decentralized
Regional Bus Terminus Location(s)	• Dili - Central	• Dili – East • Dili – South • Dili – West
Interchange Opportunity Between Regional Bus and Urban Microlet	• Dili – East • Dili – South • Dili – West • Dili – Central	• Dili – East • Dili – South • Dili – West
Modes Serving Terminal(s)	• Dili – East: Multi-modal • Dili – South: Multi-modal • Dili – West: Multi-modal • Dili – Central: Multi-modal	• Dili – East: Multi-modal • Dili – South: Multi-modal • Dili – West: Multi-modal • Dili – Central: Microlet/ Future Urban Bus only
Impact on Regional Passenger Travel Time to Reach City Center	• Shorter travel times due to direct connection of regional services into the center of Dili.	• Longer travel times due to interchange at satellite terminals on the fringe of the urban area.
Interchange Needed for Anywhere-to-Anywhere Access across Dili	• Passengers need to interchange once to reach any part of Dili (either at the outer terminal or at Dili Central depending on which service region their destination is in).	• Passengers may need to interchange twice (because they may be seeking to access a destination outside of their direct service region – where microlets may not provide city-wide coverage).
Implications on Regional Accessibility to Opportunities in Dili	• Passengers have better access to opportunities across Dili regardless of the municipality they come from • For instance, regional buses carry passengers into the center of Dili (where the highest density of opportunities are), where a single interchange with urban microlet/future bus services allow passengers to reach any region of Dili.	• Public transport passengers" access to opportunities within Dili is somewhat constrained by where they come from • For instance, if passengers are coming from the east, regional buses terminate in the east and passengers interchange to microlet/future urban bus services that have more frequent services focused on the eastern service region.
Implications for Central Terminal Sizing (Central)	• Regional buses will terminate at Dili Central terminal, therefore Dili Central will accommodate both regional buses and microlet/urban buses. This will require a much larger Dili Central terminal.	• Regional buses will not travel to Dili Central terminal – therefore Dili Central terminal will be sized for microlet/urban buses and not to accommodate regional buses, resulting in a smaller, more space efficient facility Dili Central Terminal.
Land Value Based on Location	• Land values in urban centers are at a premium. • Using such land for a public transport terminal is a relatively low value use of this land.	• Generally, land values on the urban fringe are lower than in the city center, meaning that larger terminals are easier to accommodate on the urban fringe. • This is a benefit of this model.
Implications for Urban Traffic	• This model risks contributing to congestion in the center of Dili if not managed effectively. • While regional buses carrying more passengers into the center of Dili are occupy less road space than lower capacity alternatives (either microlets	• Regional buses do not enter the central urban area with Dili, therefore avoiding to potential traffic congestion with the city.

Features	Conceptual Service Model 1: Centralized	Conceptual Service Model 2: Decentralized
	in the short-term, or private vehicles), high volumes of regional buses queuing to enter a Central terminal can create localized congestion.	
Potential Supporting Measures	• An integrated transport approach that seeks to reduce private vehicle use across Dili. • Bus priority measures, such as bus lanes that can be used by regional buses and microlets/ future urban buses. • Improved urban bus services to increase the competitiveness and attractiveness of public transport (reducing congestion). • Prioritization of pedestrians, cyclists, and public transport in urban core.	• Highly efficient microlet/urban bus networks to support access to destinations in the center of Dili. • High quality multi-modal terminals to support a positive interchange experience for passengers.

Both models are applied in different cities around the world with success stories. Regardless of model, the key is that adequate supporting measures are adopted to mitigate potential risks associated with each model. Ultimately, key considerations that govern this decision include:

- **Land Availability in the Urban Core -** One of the main reasons to avoid a large central bus terminal is the fact that land is at a premium in the city center and can be utilized for a range of potentially more socially and economically beneficial uses. If there is inadequate space in the city center for a regional multi-modal terminal, then a decentralized/satellite solution may be preferred. This is explored in the next section.
- **Anticipated Traffic Impacts -** Dili is a much smaller city than many of the cities that have adopted decentralized/satellite bus terminals due to traffic congestion. The cities cited in this report have considerably higher populations (i.e., millions of residents), with congestion serving as a key driver in decisions and investments compared to Dili. The main risk of adopting a centralized approach would be that traffic increases over time in Dili, as population grows, which would require active mitigation measures (and on-going improvement to public transport services).
- **MOTC Integrated Transport Priorities -** Ultimately, the Government of Timor-Leste's transport priorities will also govern the function of the network. If the Government does not wish to provide priority bus measures, and disincentivize private vehicle travel over time (to improve the competitiveness of public transport), then a satellite model may be more suited to maintaining road space for other vehicle types and land in the city center for more productive uses. MOTC has expressed a preference for a decentralized/satellite model.

Government Priority:

The preference of the Government of Timor-Leste is to retain the current decentralized/satellite operating approach and prefers not to construct a Dili Central Terminal. This relates to the above key considerations:

- **Land Availability in the Urban Core -** There is currently no land for a Dili Central Terminal. There is one vacant site north of the Dili Convention Centre, however a higher value use has been identified (hotel).
- **Anticipated Traffic Impacts -** Consistent with many Southeast Asian cities, the Timorese government is cognizant that traffic congestion poses a risk in Dili and that the introduction of larger vehicles (regional buses) into the central area may exacerbate these issues over time. As such, the preference is for regional buses to terminate at outer satellite locations.
- **MOTC Integrated Transport Priorities -** It is the priority for MOTC to develop and operate high-quality satellite terminals with passengers interchanging to urban services, which will perform the main public transport

function within Dili. Regional buses will primarily be focused on inter-city travel.

As a result, the focus on the facility optioneering process is to identify priority locations for satellite terminals in Dili – while exploring options for improved passenger facilities in the center of Dili (without constructing a large-scale facility – thus on-street bus stops, etc.).

This current policy and decision, however, does not preclude the idea of a Dili Central Terminal should priorities change in the future. For example, a private developer may identify the opportunity for a Public-Private Partnership in conjunction with a commercial development (this model is seen for example in Malaysia with shopping centers and bus stations). Similarly, land may become available that prompts a re-think of transport priorities – as public transport ridership grows over time in-line with the recommended improvements contained in this Masterplan. Thus, there is nothing precluding the development of a Dili Central Terminal in the long-term if preferred by the Government.

7.5 Facility Planning Overview

7.5.1 Overview

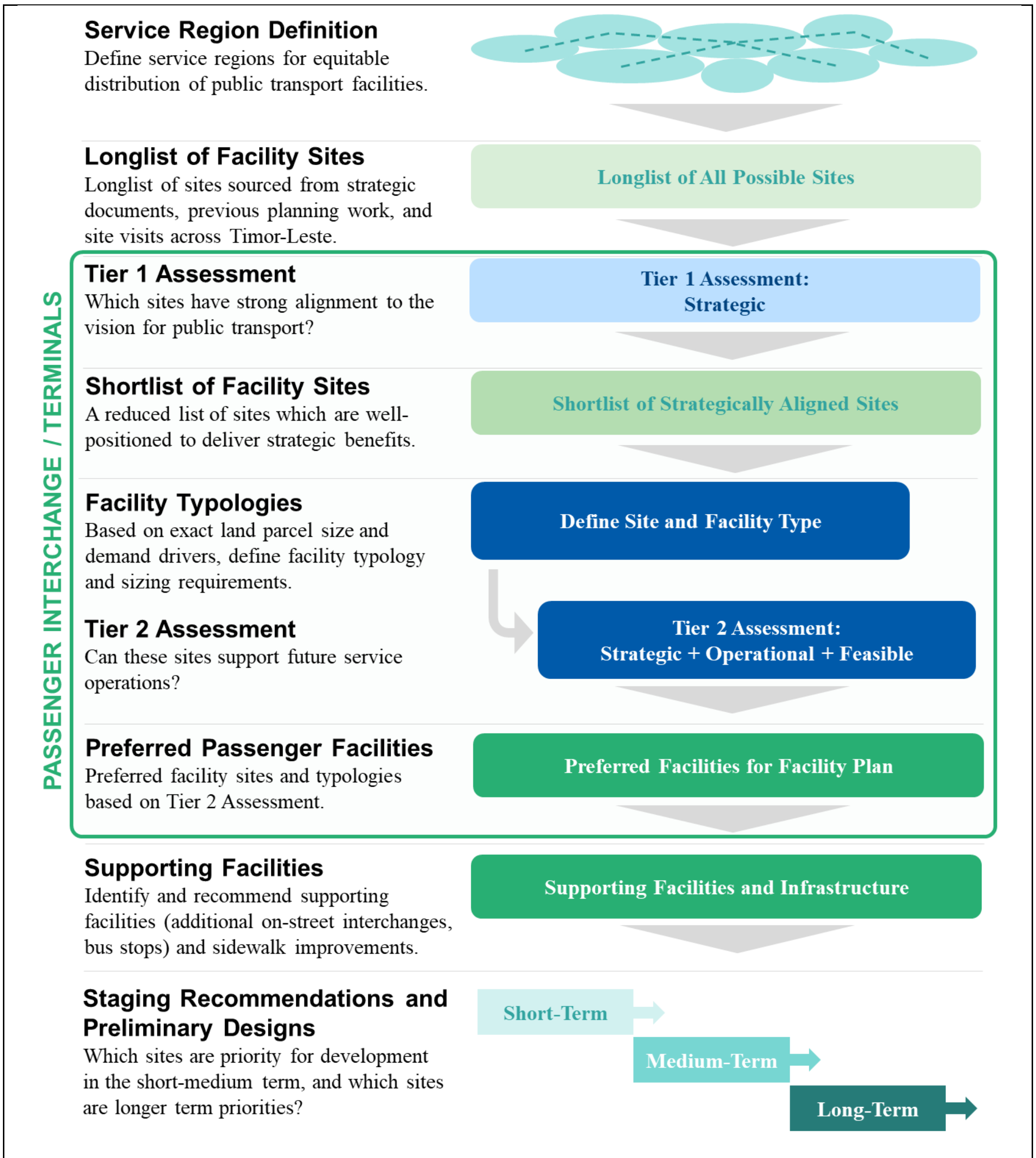
Establishing a high-quality public transport network across Timor-Leste requires an integrated approach to both the provision of infrastructure and operational measures. Public transport facilities form a key part of a well-functioning public transport system and provide a crucial role in providing access to public transport for the community, while also providing the facilities and services needed for operation and maintenance of the public transport fleet.

Stakeholder engagement in conjunction with physical site visits across Timor-Leste with the Ministry of Transport and Communications (MOTC), National Directorate of Land Transport of Timor-Leste (DNTT), and local municipal offices identified a longlist of potential public transport facility sites across Timor-Leste. A total of 45 sites have been identified.

To provide a systematic and transparent approach to selecting the optimal sites among this longlist for establishment of public transport facilities, a facility assessment process has been applied to each of the sites as shown below.

7.5.2 Facility Assessment Framework and Process

In short, this process includes a two-tier assessment, with the Tier 1 Strategic Assessment identifying those shortlist sites aligning with the overarching public transport vision. Next facility typologies are defined for public transport, followed by the Tier 2 assessment, which looks at this shortlist from a strategic, operational, and feasibility lens. Based on this Tier 2 assessment, a sub-set of preferred facilities are then identified. Supporting facilities and infrastructure including bus stops and depots, as well as improvements in the vicinity of preferred facilities are also identified. Lastly, these proposed enhancements are assigned to different time-based phases based on importance and prioritization.



Source: Arup Study Team

Figure 7.4: Facility Assessment Process

7.5.3 Tier 1 and Tier 2 Assessment Criteria

A set of criteria has been developed to objectively assess each of the proposed sites across Timor-Leste – which span both Tier 1 and Tier 2 assessments. These criteria combine MOTC preferences, strategic alignment, operational impacts, environmental and social, and desktop-based engineering feasibility assessment.

The Tier 1 Site Assessment is focused on assessing the large number of potential sites across the country against strategic criteria, to narrow down the range of sites that have strategic merit. This Tier 1 Assessment is followed by a more detailed, quantitative/ technical site assessment to finalize the recommended facilities across Timor-Leste. The Tier 2 assessment specifically includes operational and engineering criteria to align with the operating plan and sizing requirements for terminals.

Table 7.7 on the following page presents the criteria and specific technical indicators used in the Tier 1 and Tier 2 assessments. Each of the 45 sites has been evaluated against a set of quantitative indicators, with individual scores combined to determine the total weighted score for each site. Each criterion is scored on a 1-5 basis, with 5 being the highest score and 1 being the lowest score – indicative scoring thresholds are shown in the right-most column of this table for guidance to provide transparent and consistent assessment.

The criteria used incorporates the findings from **Section 7.2** Strategic Principles for Locating Public Transport Passenger Facilities, with key criteria including strategic alignment to policy and planning documents, alignment to city centers, proximity to activity-generating land use, and environmental impacts. Together, these criteria provide a holistic strategic view of the merit of each of these sites and identifies which of the sites should be investigated further as part of the facility planning process.

Table 7.7: Facility Site Assessment Criteria

Category	Criteria	Tier 1	Tier 2	Description	Scoring Thresholds (1 =Lowest; 5 = Highest)
A: Stakeholder Feedback	A1: MOTC Feedback as Strategic Site	X	X	• The decision of which site to develop first is often influenced by a range of factors, including the prioritization of local government, the preferences of clients, and the needs and opinions of local residents.	1 – MOTC disagree 3 – No MOTC comment 5 – MOTC support
B: Strategic Alignment	B1: Alignment with Strategic Documents	X	X	• Alignment of public transport facilities with the national / city strategies and plans is essential in ensuring transport improvement supports the development in Timor-Leste.	1 – Identified in no Strategic Planning Docs 3 – Identified in 1 Strategic Planning Docs 5 – Identified in 2+ Strategic Planning Docs
	B2: Accessibility to City Center	X	X	• Integrating public transport facilities with activity-generating land use makes it more convenient for people to get to where they need to go using public transport, thus improving the attractiveness of public transport services. • Activity generating land uses may include those that provide access to goods and services, jobs opportunities, recreation, or education. • Additionally, land use types that can be considered include commercial, business, industrial, tourism, public/community facilities, and educational facilities.	1 – More than 5 km 2 – 2 km to 5 km 3 – 1 km to 2 km 4 – 500 m to 1 km 5 – 0 to 500 m
	B3: Existing Key Generators Density	X	X		1 – Less than 5 key generators 2 – 5 to 9 key generators 3 – 10 to 19 key generators 4 – 20 to 39 key generators 5 – More than 40 key generators
C: Operational	C1: Accessibility to Main Road	X	X	• Alignment with Primary Roads/Highways to provide a direct and efficient route to the facility for vehicles, avoids the need for navigation through local roads or busy urban areas, and improves connectivity to other modes of transportation.	1 – More than 1 km 2 – 500 m to 1 km 3 – 300 m to 500 m 4 – 100 m to 300m 5 – 0 to 100 m
	C2: Traffic Implication		X	• Potential local congestion caused by introduction of buses, safety issues, changes on the street character, access restrictions, and merging opportunities with general traffic. • This indicator will be assessed from road classification where the terminal located and existing side friction.	Road Classification 1 – National road 3 – Municipal road 5 – Local road Side Friction 1 – High side friction 3 – Medium side friction 5 – Low side friction Final score is the average between the two above.

Category	Criteria	Tier 1	Tier 2	Description	Scoring Thresholds (1 =Lowest; 5 = Highest)
	C3: Public Transport Line/ Network Integration		X	• Integration of facility locations and size with public transport operating plan is essential for a well-functioning public transport system. • This indicator assesses the alignment of the facility location to public transport operations.	1 – Significantly increased vehicle operating distances (+5km) 2 – Increased vehicle operating distances (+2km) 3 – No change from current (or in the case of smaller municipalities without current services, neither negative nor positive). 4 – Reduced vehicle operating distances 5 – Significantly reduced vehicle operating distances
D: Environmental and Social	D1: Resettlement & Economic Impacts	X	X	• This criterion considers the impacts to existing residents or businesses that would result from the utilization of a particular site for public transport facility. • Mitigation measures may include compensation for displaced residents and businesses, or provision of alternative housing or economic opportunities.	1 – Approx 100% existing resettlement or business on site 2 – Approx 75% existing resettlement or business on site 3 – Approx 50% existing resettlement or business on site 4 – Approx 25% existing resettlement or business on site 5 – Approx 0% existing resettlement or business on site
	D2: Trees Removal	X	X	• Facilities should seek to minimize impacts to the natural environment where possible. • This criteria measures impacts to the natural environment, including natural habitats and ecosystems, loss of biodiversity and potential harm to wildlife.	1 – Approx 100% trees on site 2 – Approx 75% trees on site 3 – Approx 50% trees on site 4 – Approx 25% trees on site 5 – Approx 0% trees on site
	D3: Impact on Nearby Water Bodies	X	X	• Bus terminal construction can impact soil and sediment erosion, leading to run off into nearby water bodies. • Similarly, the release of pollutants from bus engines and other operations at the terminal can risk impacting water quality. • This criterion seeks to avoid impacts to water bodies as a result of public transport facilities.	1 – Water body immediately adjacent site 2 – Water body within 500 m of site 3 – Water body within 1 km of site 4 – Water body within 2 km of site 5 – No water body observed within site vicinity
	D4: Proximity to Air and Noise Receptors		X	• Proximity of public transport facilities to air and noise sensitive receptors in an important consideration as potential increased exposure to pollutants and noise pollution can impact the health and quality of life of local residents. • Several land use that are being considered as sensitive receptors are hospitals, residential areas, schools, libraries, and care facilities.	1 – Sensitive sites are immediately adjacent site 2 – Sensitive sites are within 500 m of site 3 – Sensitive sites are within 1 km of site 4 – Sensitive sites are within 2 km of site 5 – No sensitive sites are observed within site vicinity
E: Engineering Feasibility	E1: Disruption to Existing Utilities		X	• Bus terminal construction and operation may disrupt existing, such as electricity systems.	1 – Substation is immediately adjacent site (<100m) 2 – Substation is within 250 m of site

Category	Criteria	Tier 1	Tier 2	Description	Scoring Thresholds (1 =Lowest; 5 = Highest)
				• This criterion seeks to identify risks to utility disruption through desktop review, available data, and engagement with local authorities.	3 – Substation is within 500 m of site 4 – Substation is within 800 m of site 5 – No substation is observed within site vicinity
	E2: Exposure and Sensitivity to Climate Change / Hazard Risk		X	• Assessment of sensitivity to climate change hazard risks including extreme storm events, cyclones, flooding, and inundation which would disrupt public transport operations and endanger public transport users.	1 – Extreme multi hazard mortality risk 2 – High multi hazard mortality risk 3 – Medium multi hazard mortality risk 4 – Moderate multi hazard mortality risk 5 – Low multi hazard mortality risk

7.6 Tier 1 Facility Assessment

7.6.1 Longlist of Potential Facility Sites

A total of 42 possible facility sites were identified across Timor-Leste. This longlist encompasses a diverse range of locations, including existing terminals, markets, vacant land, and other areas currently utilized as boarding and alighting spots for passengers.

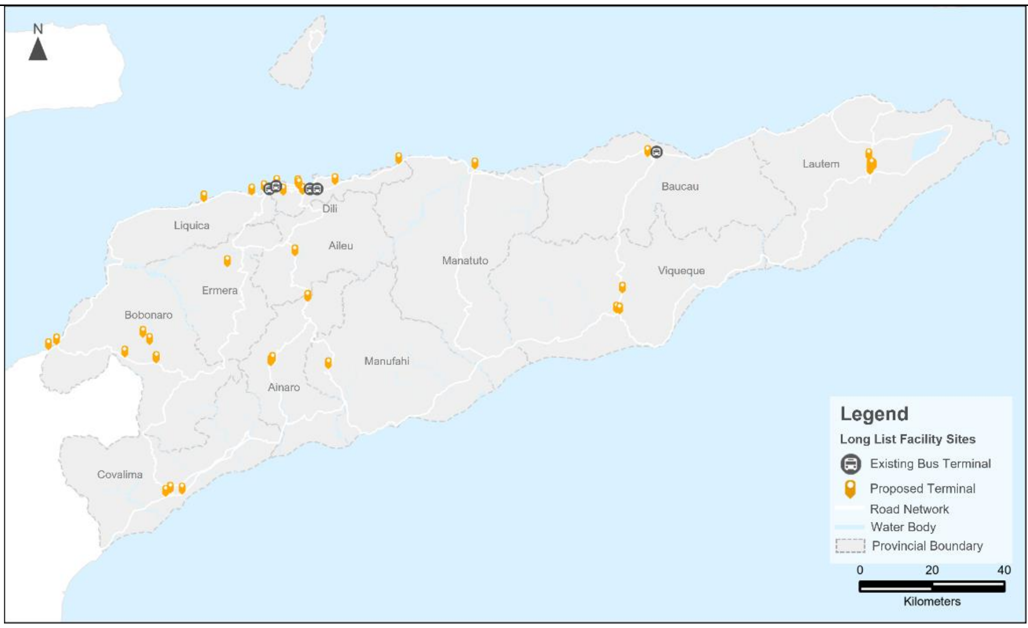
The project team has not considered/identified any sites that have not already been proposed as potential public transport facility sites in strategic documents, previous studies, or by MOTC during the Inception Phase of this project. Thus, the longlist of sites has been sourced from:

- **Policy and Planning Documents -** A review of Timor-Leste policy and planning documents, extracting where sites have been identified for public transport facilities (e.g., Transport Sector Master Plan, Dili Urban Master Plan, Baucau Strategic Development Plan).
- **Previous Planning Studies -** Previous work undertaken in the development of a Public Transport Master Plan for Timor-Leste, extracting sites proposed by MOTC for passenger facilities.
- **MOTC Consultation and Site Visits -** A mission was undertaken across Timor-Leste in November 2022 to visit a range of possible public transport facility sites.

In addition, site information was shared with DNTT who liaised with the Department of Land and Property within the Ministry of Justice to confirm that the sites that proceeded to the Tier 1 assessment were available for public transport facility. It was confirmed that all shortlisted and preferred sites were available for public transport facility – with those that weren't removed from the short list and preferred site list.

The Tier 1 assessment focuses on the strategic alignment of longlist sites with the strategic criteria and needs of Timor-Leste. Given the vast number of potential sites across the country, the Tier 1 assessment represents a "strategic filtering" of possible sites – so that more detailed assessment can be targeted on the sites that are strategically aligned to both the vision for public transport in Timor-Leste developed for this study, and the principles of good public transport.

The longlist of potential facility sites from these sources are summarized spatially in Figure **7.5** below.



Source: Arup Study Team

Figure 7.5: Longlist of Facility Sites

7.6.2 Service Region Definition

A key objective of interchange/terminal provision in Timor-Leste in-line with the vision for public transport is to provide a primary anchor location for passengers to access public transport. To consider the provision of public transport facilities equitably across Timor-Leste, service regions have been defined as the spatial division of the country, scaled by population. For example, as per

Table 7.8 below Dili has been divided into four distinct service regions, some larger municipalities are comprised of multiple service regions, while smaller municipalities are represented by a single service region. Taking a service region approach facilitates a more equitable distribution of passenger facilities across the country, identifying where the major population clusters are within a given municipality.

As priority, a single, strategically-located passenger facility should form the “backbone” of the public transport network in each service region – with local routes stemming from the main terminal to service the population more broadly. 17 service regions have been defined across Timor-Leste, summarized in

Table 7.8 below.

Table 7.8: Public Transport Service Regions and Associated Facility Sites

Municipality	Service Region	Longlist of Potential Facility Sites
Dili	**Dili – Central**	• Dili Port Interchange • Dili Convention Centre
	Dili – East	• Becora Terminal • Hera • Wenunuc • Metinaro
	Dili – South	• Taibessi Terminal • Manleuana Market • Lahane
	Dili – West	• Tasitolu Terminal (Microlet) • Tasitolu Terminal (Regional Bus) • Ulmera • Airport Transit Hub • Tibar
Baucau	**Baucau**	• Baucau Central Terminal • Aldeia Samalakuliba, Suco Buibau
Aileu	**Aileu**	• Aileu – Plot 1
Ainaro	**Ainaro**	• Ainaro – Plot 1 • Ainaro – Plot 2
	Maubisse	• Maubisse – Plot 1 • Maubisse – Plot 2
Bobonaro	**Batugade**	• Batugade – Plot 1 • Batugade Border Bus Terminal
	Maliana	• Maliana City Center • Tunubibi, Aldeia Pip Galak, Suco Tapi Memo • Maliana Market • Samelaun, Ritabou • Moleana, Ritabou
Covalima	**Suai**	• Suai Market • Covalima • Camenaca
Ermera	**Ermera**	• Ermera Bus Stop
Lautem	**Lospalos**	• Bemoris • Nakroman 1 • Nakroman 2 • Aldeia Bemoris (Peternakan)
Liquica	**Liquica**	• Liquica – Plot 1
Manatuto	**Manatuto**	• Manatuto – Plot 1
Manufahi	**Same**	• Same – Plot 1
Viqueque	**Viqueque**	• Viqueque City Center • Wesae • Buanurac

7.6.3 Tier 1 Site Assessment

7.6.3.1 Tier 1 Weighting and Scoring Threshold

Weighting to Procure a Total Score

A weighting methodology is applied to appropriately capture the importance of each of the overarching scoring categories. Importantly, the "Stakeholder Feedback" category – representing MOTC's preferences for site locations is allocated an overall weight of 25%, i.e., this single criterion weighs the same as the combined sub-scores of each of the other three categories. The weighting of overarching scoring categories is shown in **Table 7.9** below.

Table 7.9: Weighting of Scoring to Produce Total (Average) Score

Scoring Category	Stakeholder Feedback	Strategic Alignment	Operational	Environmental and Social
Weighting	25%	25%	25%	25%

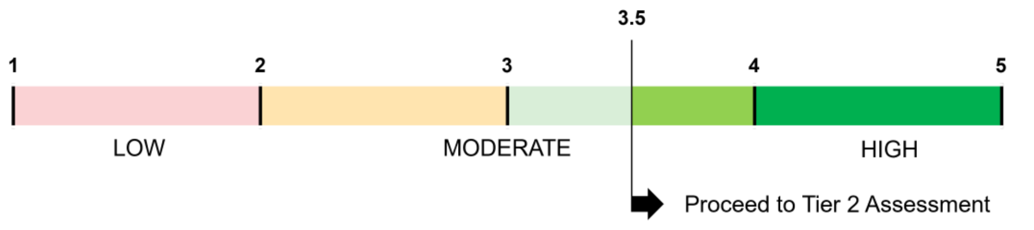
Total and Proceed to Tier 2 Assessment

A composite score of 3.5 is defined as the threshold for proceeding to the Tier 2 analysis. An average score of 3 represents the true average of a 1-5 scoring range (because there are no scores of zero allocated). Therefore, facility site options returning an average score of 3 do not necessarily represent a strategic fit, they may score equally negative as they do positive. As such, given the 40+ possible sites across Timor-Leste, 3.5 is adopted as a more ambitious cut-off threshold – to capture the site options that represent a true strategic fit based on the criteria identified. Potential facility sites will proceed to Tier 2 assessment if they achieve an average score over 3.5.

There are some exceptions to this rule. Sites scoring lower than 3.5 will proceed only if:

- They are the only site option to service a particular region.
- They are an existing facility site.

Figure 7.6 below represents the scoring cut-off for the Tier 1 assessment.



Source: Arup Study Team

Figure 7.6: Scoring Schematic with Sites Scoring over 3.5 Proceeding to the Tier 2 Assessment

7.6.3.2 Tier 1 Findings - Dili Facility Overview

Dili Municipality has the highest population and population density among other municipalities in Timor-Leste. Based on Timor-Leste 2022 Population and Housing Census, the population of Dili is around 325,000 residents. Dili has the highest population density among all municipalities, above 1,000 residents/km^2, due to its status as the national capital and economic center. Some 14 potential sites were identified for consideration as potential public transport facilities across Dili, with four of these being existing bus terminals, while the other 10 are proposed sites for newly located interchanges or terminals.

Source: Arup Study Team

Figure 7.7: Longlist of Potential Public Transport Facility Sites across Dili

For the purposes of facility planning, Dili is divided into four service regions as noted previously - Dili Central, Dili East, Dili South, and Dili West.

Dili Central Service Region

The current public transport priorities for MOTC are to avoid a major public transport terminal in the center of Dili – however, given the many microlets that circulate through the center of Dili there is a still a need for high quality passenger infrastructure in the form of on-street interchanges. This enables passengers to change with microlet routes to access different areas within Dili.

Two potential sites for public transport facilities have been identified in Dili Central:

- **Dili Seaport Interchange -** The Dili Port Redevelopment planning documents highlighted the potential for a public transport facility in the development. While this development is a longer-term work in progress, this site is in the city center surrounded by high activity. This site would also facilitate connectivity between sea-based services and land-based services.

- **Dili Convention Center -** Dili Convention Center in the city center is within close proximity to activity generating land uses (i.e., government offices, convention center, university, and market). This site will be located on an empty area near the convention center, which currently acts as an informal interchange point for microlet services.

Source: Arup Study Team

Figure 7.8: Longlist Facility Site Options for Dili Central Service Region

The table below provides a summary of site assessment results for the Dili Central service region. Based on the site scoring undertaken, all sites warrant further interrogation through Tier 2 assessment.

Table 7.10: Tier 1 Site Assessment Results (Dili – Central)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	**Site**	**A1: Priority Site**	**B1: Alignment with Strategic Documents**	**B2: Accessibility to City Center**	**B3: Existing Key Generators Density**	**C1: Accessibility to Main Road**	**Resettlement & Economic Impacts**	**Trees Removal**	**Impact on Nearby Water Bodies**	**Tier 1 Compo-site Score**
Dili - Central	Dili Convention Center	3.0	3.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0
Dili – Central	Dili Port Interchange	3.0	3.0	4.0	5.0	5.0	5.0	5.0	2.0	4.0

A summary of the Tier 1 site assessment results is provided below:

- **Dili Port Interchange -** The Dili Port interchange has the highest score among sites in Dili, as it is frequently mentioned in multiple planning documents as part of the Dili Port Development. This site is strategically located, not only in proximity to the Port, but also other key generators. The proposed location is on vacant land, reducing the likelihood of business resettlement or tree removal. This site would also facilitate connection to Port services, providing broader transport system integration. Regarding environmental assessment and potential licensing categorization, there is some encroachment on certain tree stands. However, it may not be necessary to remove them if a careful plan is implemented. It's worth noting that the presence of concrete pavement could potentially impact the absorption level of runoff during the rainy season. While the environmental impact is expected to be minor, it could fall under category B classification.

- **Dili Convention Centre -** Dili Convention Center shares the highest score among sites in Dili along with Dili Port Interchange. This site is in the heart of the Dili urban area and is surrounded by several major key generators. This site is also currently vacant land, reducing the likelihood of economic replacement of resettlement.

Recommendation: It is recommended that the **Dili Port Interchange** and **Dili Convention Center** proceed to Tier 2 Assessment.

Dili East Service Region

The objective of a public transport facility located in the Eastern Service Region of Dili is to connect regional bus services travelling to/from eastern cities (Baucau, Lospalos, Viqueque) with intra-city public transport services within Dili. The Becora Bus Terminal is the existing bus terminal servicing the East of Dili.

A site at Hera has been identified further east of Becora, which would act as an alternative location for an eastern terminal. In addition, sites at Wenunuc and Metinaro have been proposed to the east of Dili in the Dili Urban Master Plan (2023 Update).

The following public transport facility site options are identified:

- **Becora Terminal -** Located on the eastern fringe of Dili, the Becora Terminal currently serves microlets operating within Dili and regional bus services travelling to the eastern municipalities.
- **Hera -** Located along the national road that connects Dili to the eastern municipalities, the location is in the vicinity of the National University of Timor-Leste (UNTL) Hera Campus. The land immediately adjacent to the proposed site location is currently vacant with some informal settlements, however, plans for an affordable housing development at this site have been proposed.
- **Metinaro -** Located along the national road that connects Dili to eastern destinations. This site is some distance from the Dili urban area, however, does have population and therefore may be more suited as an intermediate stop for regional services rather than a central facility for the eastern service region.
- **Wenunuc -** Located along the national road that connects Dili to eastern destinations. The site is some distance from the Dili urban area, however, does have population and therefore may be more suited to an on-route stop for regional services rather than a central facility for the eastern service region.

Source: Arup Study Team

Figure 7.9 Longlist Facility Site Options for Dili Eastern Service Region

Scoring results for Dili (East) are summarized in the table below. There are two sites (Becora and Hera) that score highly and offer the strongest strategic benefits as public transport passenger facility sites to for the eastern service region of Dili.

Table 7.11: Tier 1 Site Assessment Results (Dili – East)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Dili - East	Becora Terminal	3.0	3.0	2.0	3.0	5.0	5.0	5.0	2.0	3.7
Dili - East	Hera	5.0	3.0	1.0	2.0	4.0	2.0	4.0	3.0	3.5
Dili - East	Wenunuc	3.0	3.0	1.0	2.0	5.0	3.0	4.0	3.0	3.3
Dili - East	Metinaro	3.0	3.0	1.0	1.0	4.0	4.0	3.0	4.0	3.1

A summary of the Tier 1 Site Assessment results is provided below:

- **Becora (Existing Terminal) -** Becora Terminal is an existing terminal in Dili. It has the strongest strategic alignment with the vision for public transport in Timor-Leste, as it is located in a built-up urban area, providing access to a range of the population from across the eastern service region of Dili by walking, cycling and other modes. Because it is an existing terminal, there are minimal displacement impacts associated with redeveloping the site (the current site is owned by MOTC). It is worth noting that the site is located adjacent to a river. One key issue that is potentially associated with the Becora site is the size, with reports the site is already at capacity. This may prevent future growth in public transport service and needs to be interrogated further at the shortlist stage.

- **Hera -** There is a strong Government desire to develop a public transport facility at Hera. Currently however, this site has very limited adjacent land use and as such, limited alignment with the vision for public transport. Being located a considerable distance from the city center, the site lacks adjacent key activity generators apart from residential areas and the UNTL Hera Campus. Residents live on the site (albeit informally), which creates displacement impacts if this facility is developed.

One key potential benefit of the Hera site is the proposed affordable housing development that is planned to be constructed in this area – there is potential to integrate a facility at Hera with this development, potentially exploring PPP options.

- **Wenunuc -** Wenunuc scored low relative to this group of sites (and one of the lowest across Dili). This is due to it being located a significant distance from the city center and as such being co-located with minimal activity generators or population. There may be an opportunity for public transport connectivity here in the future if this area develops further, however not as the primary passenger facility servicing the eastern service region of Dili.

- **Metinaro -** The Metinaro site has development potential due to the relocation of some government functions to the area in 10 years. However, due to its significant distance from Dili, this site is not recommended as the primary passenger facility for the eastern service region of Dili and should instead be connected to the Dili-Baucau route as part of the development of the area.

Recommendation: It is recommended that the **Becora** and **Hera** sites proceed to the Tier 2 Assessment as shortlisted candidate sites for the primary terminal to service the eastern service region of Dili. Given their distance from the Dili urban area, but mention in the Dili Urban Master Plan, **Wenunuc** and **Metinaro** should still have bus stop/interchange infrastructure provided, however are not suited for the primary interchange location between regional bus services and Dili microlet services.

Dili South Service Region

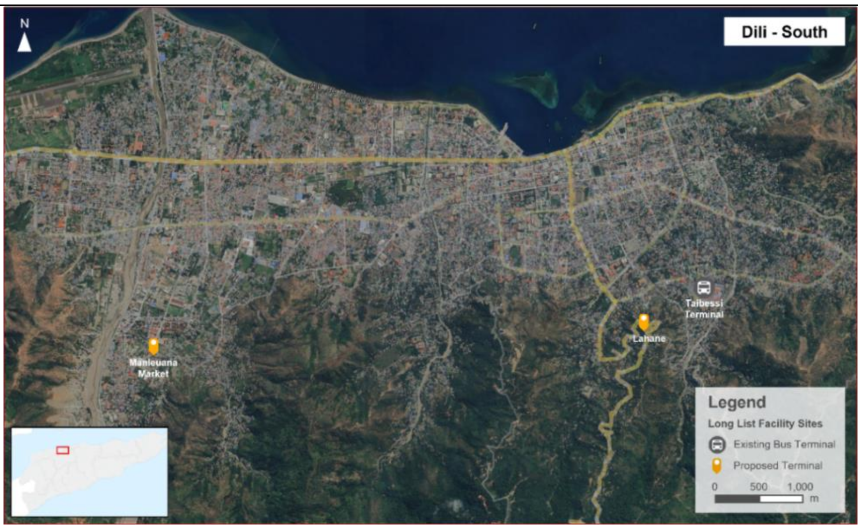
The objective of a public transport facility located in the southern service region of Dili is to connect regional bus services travelling from the southern municipalities (Aileu, Maubisse, Ainaro, Same and Suai) with intra-city public transport services within Dili. Taibessi Bus Terminal is the existing public transport facility in the southern region of Dili that performs this function. Regional buses travel on National Road Number 2, which serves traffic from the south into Dili. Currently, the Taibessi Bus Terminal involves divergence onto local roads from the main corridor to reach the terminal.

The following public transport facility site options are identified:

- **Taibessi Terminal -** Located between two markets, Taibessi Market and Naan Market and also to high density residential area and school. This is the current site servicing regional buses and microlets in the southern service region of Dili.

- **Manleuana Market -** Located in western Dili with proximity to Manleuana Market, school, and residential area. This government-owned site aligns with the recent construction of a new road connecting National Road Number 2 with Manleuana, significantly reducing travel times between southern destinations and Dili – and resulting in a number of microlets and regional buses already using this site informally.

- **Lahane -** Located on the southern side of Taibessi Terminal, this site is in a relatively vacant area. The Ministry of Transport and Communications (MOTC) mentioned potential plans to replace Taibessi Terminal with Lahane Terminal due to its better alignment to National Road Number 2.



Source: Arup Study Team

Figure 7.10: Longlist Facility Site Options for Dili Southern Service Region

Scoring results for Dili (South) are summarized in the table below. Two sites (the existing Taibessi Terminal site, and the newly proposed Manleuana Market site) both have potential to service the southern region of Dili.

Table 7.12: Dili – Tier 1 Site Assessment Results (Dili – South)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	**Site**	**A1: Priority Site**	**B1: Alignment with Strategic Documents**	**B2: Accessibility to City Center**	**B3: Existing Key Generators Density**	**C1: Accessibility to Main Road**	**Resettlement & Economic Impacts**	**Trees Removal**	**Impact on Nearby Water Bodies**	**Tier 1 Composite Score**
Dili - South	Taibessi Terminal	3.0	3.0	3.0	3.0	1.0	5.0	5.0	2.0	2.8
Dili - South	Manleuana Market	5.0	1.0	2.0	2.0	4.0	5.0	5.0	3.0	3.8
Dili - South	*Lahane**	*5.0*	*1.0*	*3.0*	*3.0*	*4.0*	*5.0*	*2.0*	*3.0*	*3.7*

** Following assessment of the long list sites – the project team was informed there is no suitable site in Lahane.*

A summary of the Tier 1 site assessment results is provided below:

- **Manleuana Market -** Since the construction of Sarlala Road, which provides a more direct access route into Dili from the South, the Manleuana site has become an informal location for regional buses and microlets to service to gather and collect passengers. The site has strategic merit due to being adjacent to the Manleuana Market. It has been identified by MOTC as a priority site for a public transport facility, however, has not been captured in official strategic/policy documents. In the context of environmental assessment and potential licensing categorization, we've noted encroachment on agricultural land. Additionally, the introduction of concrete pavement may impact runoff absorption levels, particularly during the rainy season, potentially warranting a category B classification.

- **Taibessi (Existing Terminal) -** Taibessi Terminal is one of Dili's current operating terminals, despite having a generally low level of passenger amenity and facility infrastructure generally. It is located adjacent to activity generating land uses (the Taibessi Market) and is currently a popular stop for microlets and regional buses serving the southern municipalities. One operational issue for Taibessi Terminal that has led to the proposal of alternative southern sites by the Government is that it is located off the main road and requires some detour to access due to a one-way circulatory flow leading to the site. Regarding environmental assessment and potential licensing categorization, there is some encroachment on existing kiosks. It could fall under category C classification.

- **Lahane -** Lahane was raised as a potential site by MOTC to service the southern service region of Dili however there has been limited further development for identifying a specific site for a potential terminal. A general area was proposed in the mountainous region outside of the urban area, which may create operational challenges and would certainly involve trees removal. There is very limited activity density out in this area and as such, a site in this area has less strategic merit than the alternative two site options above to service the southern service region of Dili.

Recommendation: It is recommended that the **Taibessi** and **Manleuana** sites proceed to the Tier 2 assessment as shortlisted candidate sites for the primary terminal to service the southern service region of Dili.

Dili West Service Region

The objective of a public transport facility located in the western service region of Dili is to connect regional bus services travelling from the western municipalities (Ermera, Liquica, Batugade and Maliana) with intra-city public transport services within Dili.

The following public transport facility site options are identified:

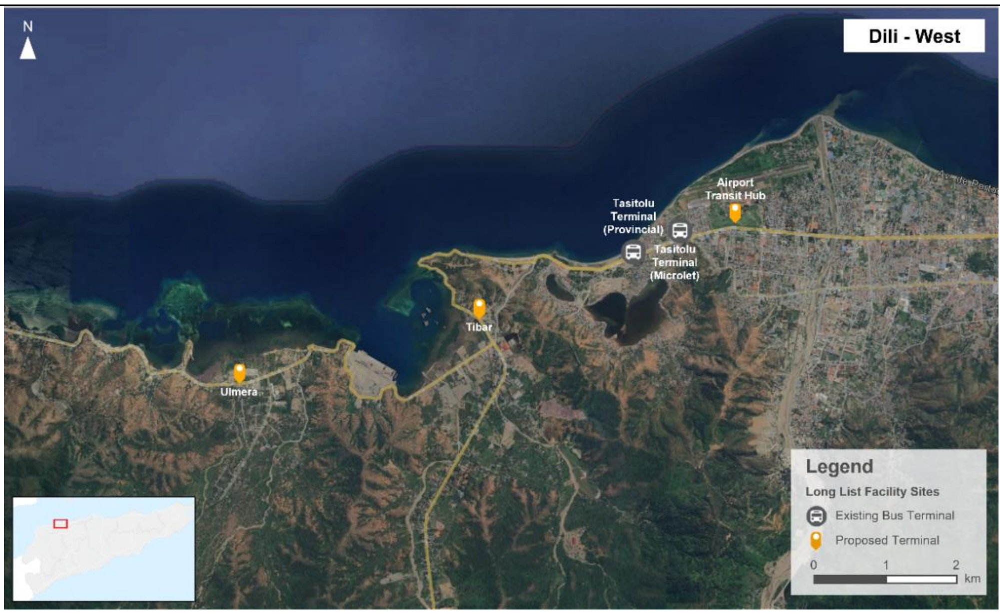
- **Tasitolu Terminal (Microlet) -** This site, located on the eastern part of Dili, currently is an on-street interchange for microlet routes. It is an informal site that makes use of vacant space on the side of the road. This site is in close proximity to market and also to residential area.

- **Tasitolu Terminal (Regional) -** This site serves as a temporary regional bus boarding and alighting location, conveniently located near a residential area. It is an informal site that makes use of vacant space on the side of the road.

- **Airport Transit Hub -** This site is an integral part of the Comoro West development and Airport Development Plan. This site is highlighted in the Dili Urban Master Plan. The various planning documents highlight this site with a vision to seamlessly integrate land public transport services with the airport development, facilitating a smooth and convenient journey to and from the airport.

- **Tibar -** This site is in close proximity to Tibar Port. It is located some distance from the Dili urban area, creating longer travel distances for microlets if this is to be the main terminal location for regional buses.

- **Ulmera -** This site is located in a residential area, industry area, and port. The site is some distance from the Dili urban area; however, it does have population and therefore may be more suited to an on-route stop for regional services rather than a central facility for the western service region.



Source: Arup Study Team

Figure 7.11: Longlist Facility Site Options for Dili Western Service Region

Table 7.13 below provides a summary of site assessment results for the Dili West service region. Based on the site scoring undertaken, three sites (Airport Transit Hub and Tasitolu terminal sites) emerge as the preferred sites for a passenger facility to service the western service region of Dili.

Table 7.13: Tier 1 Site Assessment Results (Dili – West)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Dili - West	Ulmera	3.0	3.0	1.0	3.0	5.0	2.0	4.0	2.0	3.3
Dili - West	Tibar	5.0	3.0	1.0	2.0	4.0	5.0	3.0	2.0	3.4
Dili - West	Tasitolu Terminal (Microlet)	3.0	1.0	1.0	4.0	5.0	5.0	5.0	2.0	3.5
Dili - West	Tasitolu Terminal (Regional Bus)	3.0	3.0	1.0	3.0	5.0	5.0	5.0	2.0	3.6
Dili - West	Airport Transit Hub	3.0	3.0	1.0	4.0	4.0	5.0	5.0	3.0	3.5

A summary of the Tier 1 site assessment results is provided below:

- **Airport Transit Hub -** The potential for an Airport Transit Hub is highlighted in the Dili Urban Master Plan as a public transport interchange integrated with the Airport. The proposed land parcel for the Airport Transport Hub is currently unoccupied – reducing the likelihood of resettlement impacts or tree removal. The Airport Transport Hub site has strategic benefits in that it can be integrated with the airport and provide access from the airport to the west of Dili (including to the border with Indonesia), as well as connecting regional buses with microlet/future urban bus services across the western and broader Dili service areas. Regarding environmental assessment and potential licensing categorization, it can be merged with current development plan for the expansion of the airport runway if possible.

- **Tasitolu (Existing Informal Regional Bus Terminal) -** The existing Tasitolu Terminal used by regional buses is located on the outer western border of Dili. It has relatively worse access to nearby activity generating land uses that the Airport site. Currently, the site is informally used as for regional bus operations. If this site was developed, there would be reduced risk of resettlement/displacement due to the existing use of the site. The Government also expressed that despite Tasitolu being discussed and proposed as a terminal site over the past decade, it is preferred that this is not a terminal site due to it being a religious area.

- **Tasitolu (Existing Informal Microlet Terminal) -** The existing Tasitolu Terminal used by microlets is located on the outer western border of Dili. This site has a reasonable agglomeration of activity generating land use around it and is currently serving multiple microlet routes within Dili. If a new facility was to be constructed in this location, there is minimal risk of displacement or resettlement impacts. In relation to environmental assessment and potential licensing categorization, it's worth noting that the current road is designed to accommodate heavy loads. Consequently, there should be heightened consideration regarding the potential impact of traffic. Similar to Informal Regional Bus Terminal in Tasitolu, this site is not preferred as a terminal site due to it being a religious area

- **Tibar -** Tibar is located a significant distance outside of the urban area, resulting in a lack of activity generating land use adjacent to the site. The site provides minimal additional strategic value in contributing to broader urban and economic development of the adjacent area, unless of course it is implemented as a Transit-Oriented Development (TOD) with new land use in the long-term. The alternative sites in the western service region have more strategic merit. This site has been highlighted by MOTC as a priority site, so may be better suited to an integrated TOD in the longer term to connect to the future industrial precinct.

- **Ulmera -** Ulmera scored the lowest of the sites in the western region of Dili due to its distance from the urban area. Being a significant distance from the city center it lacks alignment to useful destinations and key generators. If there is government appetite to develop this area further in the future, such as through a TOD, then a public transport connection should be provided in conjunction with this development, however the current site is not suited to act as the primary terminal for the western service region of Dili.

Recommendation: It is recommended that the **Airport Transit Hub** and **Tasitolu** sites proceed to Tier 2 assessment as potential priority sites for the western region of Dili. **Tibar** should be considered as a long-term facility option if there is to be future development of an industrial precinct.

7.6.3.3 Tier 1 Findings - Baucau Facility Overview

Baucau is the third largest municipality in Timor-Leste by population and is an economic hub in the eastern part of the country. The municipality attracts economic activity from Dili and Manatuto on the west, Viqueque on the south and Lospalos on the east. There are two potential sites identified in Baucau - the existing central terminal and a vacant site at Aldeia Samalakuliba. The existing terminal serves regional bus to Dili, Baguia and Quelicai as well as local microlet services.

Baucau Service Region

There are two potential sites situated within the Baucau Municipality. One of these sites is positioned in the city center, specifically in Suco Trilolo with a population of about 13,000, while the other site is located slightly outside the city center in Suco Bahu with 8,100 population, boasting a larger area.

The following public transport facility site options are identified:

- **Baucau Central Terminal -** This site is an existing terminating point for public transport and located in the city center next to the Baucau Market. The existing site has very limited passenger amenities, essentially representing vacant land.
- **Aldeia Samalakuliba, Suco Buibau -** This site is outside of the Baucau city center however is adjacent to a major market development that is planned to host close to 1,000 vendors from various municipalities.

Source: Arup Study Team

Figure 7.12: Longlist Facility Site Options for Baucau Service Region

Table 7.14 below provides a summary of site assessment results for the Baucau service region. Based on the site scoring undertaken, both sites warrant further assessment as part of the Tier 2 assessment.

Table 7.14: Tier 1 Site Assessment Results (Baucau)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	**Site**	**A1: Priority Site**	**B1: Alignment with Strategic Documents**	**B2: Accessibility to City Center**	**B3: Existing Key Generators Density**	**C1: Accessibility to Main Road**	**Resettlement & Economic Impacts**	**Trees Removal**	**Impact on Nearby Water Bodies**	**Tier 1 Composite Score**
Baucau	Baucau Central Terminal	1.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	3.8
Baucau	Aldeia Samalakuliba	3.0	1.0	3.0	3.0	3.0	5.0	5.0	5.0	3.3

A summary of the Tier 1 Site Assessment results is provided below:

- **Baucau Central Terminal -** The existing Baucau Central Terminal is identified in the Baucau Regional Development Plan. It is located near key activity generators in the city center. Developing this site into a modern terminal would avoid any displacement or resettlement impacts and would connect passengers into the heart of the urban area. The future of the site is unclear and must be validated at the Tier 2 Assessment stage, as DNTT expressed potential plans to convert this land into accommodation for the adjacent sports center. It is possible that this could be undertaken as a joint development to also provide a new bus terminal.

- **Aldeia Samalakuliba, Socu Buibau -** Aldeia Samalakuliba site is located further away from Baucau city center, however, is directly adjacent the Baucau marketplace, a significant development that is planned to host vendors from across various municipalities in Timor-Leste. While the site has less activity generators directly adjacent, the market and the potential for a bus terminal to play a role in unlocking the associated economic opportunities makes this site a strategic fit for a future bus terminal.

Recommendation: It is recommended that the **Baucau Central Terminal** and **Aldeia Samalakuliba** terminal sites progress to Tier 2 assessment.

7.6.3.4 Tier 1 Findings - Aileu Facility Overview

Compared to other municipalities in Timor-Leste, Aileu has a relatively small population of 54,600 residents and a population density of 80.8 residents/km^2, according to the 2022 Population and Housing Census. Despite its size, Aileu serves as a connection point between Dili and other municipalities located to the south, resulting in one potential site for a public transport facility.

Aileu Service Region

There is one potential site located in Aileu within Aileu Municipality. This site is in Seloi Malere with 5,700 residents and is described below:

- **Aileu – Plot 1 -** Located next to the national road connecting Dili with southern municipalities with a combination of activity generating land use such as a school, government offices, and residential development.

Source: Arup Study Team

Figure 7.13: Longlist Facility Site Options for Aileu Service Region

As the only identified site in Aileu, Aileu Plot 1 is selected to proceed to the Tier 2 assessment as the site to service the Aileu service region. The identified site has been designated for a facility and is currently vacant land, reducing displacement impacts. Additionally, this site is in the city center. In the context of environmental assessment and potential licensing categorization, there is identified encroachment on some tree stands. However, it may not be necessary to remove these stands if a meticulous plan is executed. The resultant environmental impact is anticipated to be minor, though it may potentially fall under a category B classification.

Table 7.15: Tier 1 Site Assessment Results (Aileu)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Aileu	Aileu – Plot 1	3.0	1.0	5.0	5.0	5.0	4.0	5.0	3.0	3.9

Recommendation: It is recommended that **Aileu – Plot 1** proceed to Tier 2 assessment as the priority passenger facility to service the Aileu service region.

7.6.3.5 Tier 1 Findings - Ainaro Facility Overview

Ainaro has a relatively small population of 73,000 residents and a population density of 83.9 residents/km^2, according to the 2022 Population and Housing Census. There are 4 potential sites located across two service regions of the Ainaro Municipality – the Ainaro service region and the Maubisse service region.

Maubisse Service Region

In Maubisse, these two sites are located within the same suco, separated by a mere distance of approximately 150. Both sites are within the suco of Maubisse, which has about 7,300 residents. This suco boasts the highest population density compared to other sucos within the Maubisse administration post.

The following public transport facility site options are identified:

- **Maubisse – Plot 1:** This site is in a residential area close the market and other destinations, benefiting from convenient access to the national road connecting Dili with the southern side of Timor-Leste.
- **Maubisse – Plot 2:** Similar to Plot 1, this site is situated near markets and other destinations, and benefits from convenient access to the national road connecting Dili with the southern side of Timor-Leste.

Source: Arup Study Team

Figure 7.14: Longlist Facility Site Options for Maubisse Service Region

Two sites have been identified and assessed for the Maubisse service region – summarized in the table below. Maubisse – Plot 2 is recommended to proceed to the Tier 2 assessment as the preferred option for a passenger facility in this region.

Table 7.16: Tier 1 Site Assessment Results (Maubisse)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Maubisse	Maubisse – Plot 1	3.0	1.0	5.0	4.0	5.0	3.0	3.0	5.0	3.8
Maubisse	Maubisse – Plot 2	3.0	1.0	5.0	4.0	5.0	5.0	5.0	5.0	4.1

A summary of the Tier 1 site assessment results is provided below:

- **Maubisse – Plot 2:** Maubisse – Plot 2 is in the city center in proximity to key activity generators, providing convenient access to the population and nearby origins/destinations to attract passengers to public transport. The site is currently vacant and is not expected to require the removal of trees. In the context of environmental assessment and potential licensing categorization, there is a minor encroachment observed on certain tree stands. It may not be necessary to remove these stands if a meticulous plan is implemented. The resulting environmental impact is anticipated to be minor, falling under category C classification.

- **Maubisse – Plot 1:** Similar to Plot 2, this stie is located close to the main road and the city center. However, half of the plotted area for this site is vacant green area, with the other half taken up by residential dwellings which will result in resettlement / displacement impacts for business and residents.

Recommendation: It is recommended that **Maubisse Plot 2** proceed to Tier 2 assessment as the priority passenger facility to service the Maubisse service region. Although Maubisse Plot 1 has a total score above 3.5, the similarity between these sites renders Plot 1 inferior due to the associated displacement impacts.

Ainaro Service Region

Within the Ainaro service region, there are two potential public transport facility sites. Both sites are located in the suco of Ainaro, which has a total population of 6,700 residents. Notably, this suco boasts the highest population density among other sucos within the Ainaro administration post, with 208 residents/km^2.

The following public transport facility site options are identified:

- **Ainaro – Plot 1 -** Located on currently vacant land in close proximity to a school, government offices, and low-density residential area.

- **Ainaro – Plot 2 -** Located next to the national road connecting Dili with Suai with proximity to government offices, and a sports center.

Source: Arup Study Team

Figure 7.15: Longlist Facility Site Options for Ainaro Service Region

Two sites have been identified and assessed for the Ainaro service region – summarized in the table below. Ainaro – Plot 2 is recommended to proceed to the Tier 2 assessment as the preferred option for a passenger facility in this region.

Table 7.17: Tier 1 Site Assessment Results (Ainaro)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Opera-tional	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Ainaro	Ainaro – Plot 1	3.0	1.0	5.0	4.0	4.0	5.0	4.0	3.0	3.6
Ainaro	Ainaro – Plot 2	3.0	1.0	4.0	4.0	5.0	5.0	4.0	2.0	3.7

A summary of the Tier 1 site assessment results is provided below:

- **Ainaro – Plot 2 -** Ainaro – Plot 2 is located adjacent to a major road that connects Aileu and Suai, making it easily accessible. Furthermore, it remains near key generators. Although this site is presently vacant, it is worth noting that this site might have an impact to nearby water based on its proximity to river.

- **Ainaro – Plot 1 -** Ainaro – Plot 1 is in city center, offering convenient proximity to key generators. However, this site is slightly set back from the major road, which may result in slightly reduced accessibility compared to other location.

Recommendation: It is recommended that **Ainaro Plot 2** proceed to Tier 2 assessment as the priority passenger facility to service the Ainaro service region.

7.6.3.6 Tier 1 Findings - Bobonaro Facility Overview

Bobonaro Municipality is the fourth biggest municipality population in Timor-Leste. Based on Timor-Leste 2022 Population and Housing Census, Bobonaro population is 106,500 residents, with a population density of 77.2 residents/ km^2. Bobonaro Municipality shares a direct border with Indonesia, with a border gate located in the Batugade Suco serving as the official crossing point between Timor-Leste and Indonesia.

Batugade Service Region

In Batugade Suco, two sites are identified with different types of key generators around it. Batugade Suco has 3,200 residents, with the second highest population density in the same administration post. The following public transport facility site options are identified:

- **Batugade Border Control -** Situated near the Indonesian border control, this location offers integrated public transport services, connecting Dili to the border and vice versa.
- **Batugade – Plot 1 -** Located in a vacant land parcel next to Batugade market.

Source :Arup Study Team

Figure 7.16: Longlist Facility Site Options for Batugade Service Region

Two sites have been identified and assessed for the Batugade service region – summarized in the table below. Both sites are recommended to proceed to the Tier 2 assessment as the preferred option for a passenger facility in this region.

Table 7.18: Tier 1 Site Assessment Result (Batugade)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Batugade	Batugade – Plot 1	3.0	1.0	5.0	3.0	5.0	5.0	4.0	2.0	3.7
Batugade	Batugade Border Bus Terminal	3.0	1.0	2.0	3.0	5.0	5.0	5.0	2.0	3.5

A summary of the Tier 1 site assessment results is provided below:

- **Batugade – Plot 1 -** Batugade – Plot 1 is in close proximity to the city center, with a few key generators nearby. This site is situated next to a major road that connects the Timor Leste – Indonesia border to Dili, ensuring good accessibility. However, it is important to consider that the site is near a river, which raises concerns about potential impacts on the water body. In relation to environmental assessment and potential licensing categorization, there is identified encroachment on the coastal area. Additionally, the introduction of concrete pavement may potentially influence the absorption level of runoff, particularly during the rainy season. The anticipated environmental impact is minor, though it may potentially fall under a category B classification.

- **Batugade Border Control Bus Terminal -** Batugade Border Control Bus Terminal is strategically situated adjacent to the Timor Leste – Indonesia border control, benefiting from its proximity to a major road. However, it should be noted that this site has a relatively low density of key generators and may have limited access to the city center.

Recommendation: It is recommended that **Batugade Plot 1** and the **Batugade Border Bus Terminal** proceed to Tier 2 assessment as the facility site options to service the Batugade service region.

Maliana Service Region

In the Maliana service region, there are 4 potential sites which are located in different sucos, among them are Lahomea, Tapo Memo and Ritabou. Lahomea has the highest population density of the administration posts with 391 residents/km^2.

The following public transport facility site options are identified:

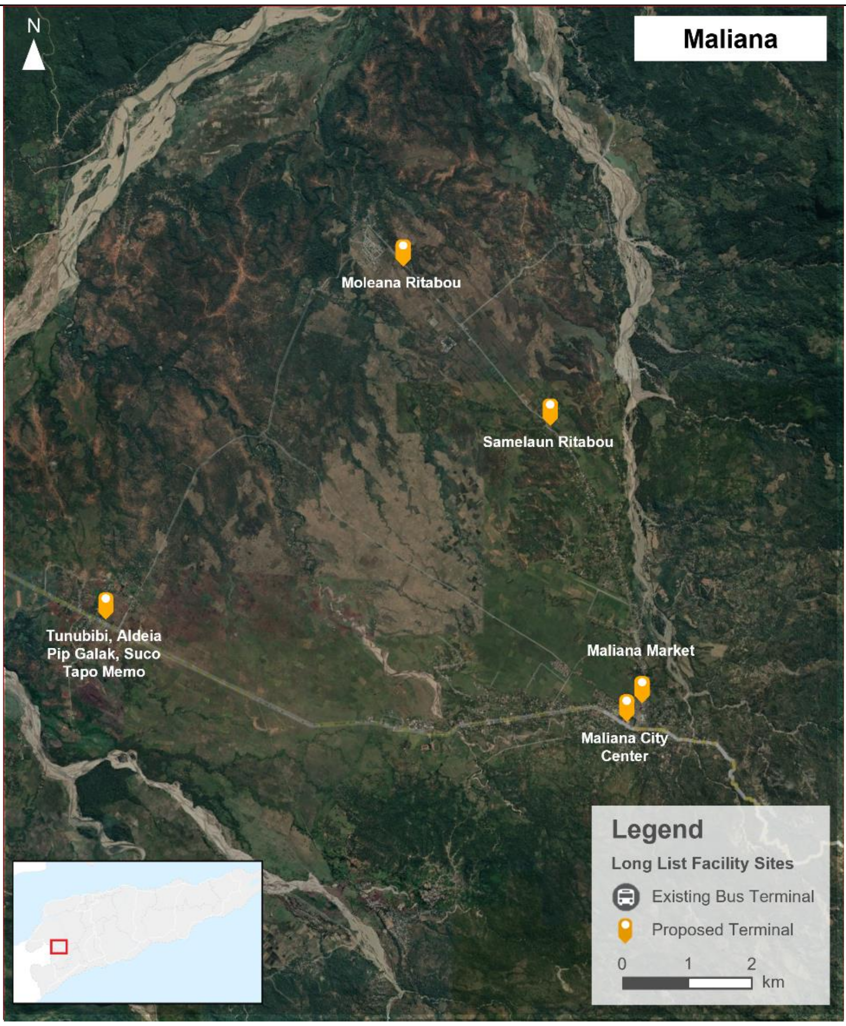
- **Maliana Market -** Located in the center of the urban area adjacent to the existing markets. The land parcel is of limited size but would accommodate an on-street interchange.

- **Maliana City Center -** Located next to Maliana Market on land that is currently partially used for sporting activities.

- **Samelaun Ritabou -** This location is located adjacent to the Merkadu Maumali (market) site, which is of deteriorating quality and site visits suggest it is rarely used. Apart from the market, there are no other activity generating land uses nearby and this site is a significant walk from where the population lives.

- **Moleana Ritabou -** This site is in close proximity to Australian Army Force site, with limited other activity generating land use around it. It is the furthest from the Maliana urban area.

- **Tunubibi, Aldeia Pip Galak, Suco Tapo Memo -** Located in a residential area on the outskirts of Maliana, a significant distance requiring long walks to access and deadheading from an operational perspective. There are limited activity generating land uses adjacent.



Source: Arup Study Team

Figure 7.17: Longlist Facility Site Options for Maliana Service Region

The table below provides a summary of site assessment results for the Maliana service region. Based on the site scoring undertaken, the Maliana Market site is the preferred site option for a public transport facility to service the region.

Table 7.19: Tier 1 Site Assessment Results (Maliana)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	**Site**	**A1: Priority Site**	**B1: Alignment with Strategic Documents**	**B2: Accessibility to City Center**	**B3: Existing Key Generators Density**	**C1: Accessibility to Main Road**	**Resettlement & Economic Impacts**	**Trees Removal**	**Impact on Nearby Water Bodies**	**Tier 1 Composite Score**
Maliana	Maliana City Centre	1.0	1.0	5.0	4.0	5.0	5.0	4.0	3.0	3.3
Maliana	Tunubibi, Aldeia Pip Galak, Suco Tapo Memo	3.0	1.0	1.0	2.0	5.0	3.0	4.0	4.0	3.3
Maliana	Maliana Market	3.0	1.0	5.0	4.0	4.0	3.0	5.0	3.0	3.5
Maliana	Samelaun, Ritabou	3.0	1.0	1.0	1.0	1.0	5.0	5.0	4.0	2.4
Maliana	Moleana, Ritabou	3.0	1.0	1.0	1.0	1.0	5.0	1.0	5.0	2.2

A summary of the Tier 1 site assessment results is provided below:

- **Maliana Market -** The Maliana Market is optimally located to service the Maliana service region due to being in the city center, adjacent to a marketplace, with a high density of key generators nearby. It has good access to a main road. However, due to the adjacent marketplace there is a risk that construction may impact the existing businesses – this will be a key consideration during development.

- **Maliana City Centre -** Maliana City Centre scores highly across technical criteria however has reportedly been assigned for alternative use by the local government. DNTT indicated that the previously proposed site has been allocated for another use and is no longer available, thus scoring low on stakeholder "Priority Site" criteria.

- **Tunubibi, Aldeia Pip Galak, Suco Tapo Memo -** The site identified in Tunubibi, and is approximately 9km from the Maliana City Centre, making this location a long-distance walk for passengers from the center of Maliana who may not have access to alternative modes of transport (e.g., children). There is also existing land use at the site creating the risk of displacement impacts.

- **Samelaun, Ritabou -** The Samelaun site in Ritabou is not associated with any major resettlement or environmental impacts, however, it is located away from the center of the municipality and approximately 5km from the main road. As a result, this site does not present an optimal passenger facility location as it would require passengers to walk long distances to access public transport, or otherwise rely on / pay for alternative modes of access to the terminal.

- **Moleana, Ritabou -** The Moleana site in Ritabou is the lowest scoring site in Maliana, due to its location away from the center of the municipality and key destinations, and approximately 7km from the main road. This site would also require significant tree removal.

Recommendation: It is recommended that **Maliana Market** proceed to Tier 2 assessment as the priority passenger facility to service the Maliana service region.

7.6.3.7 Tier 1 Findings - Covalima Facility Overview

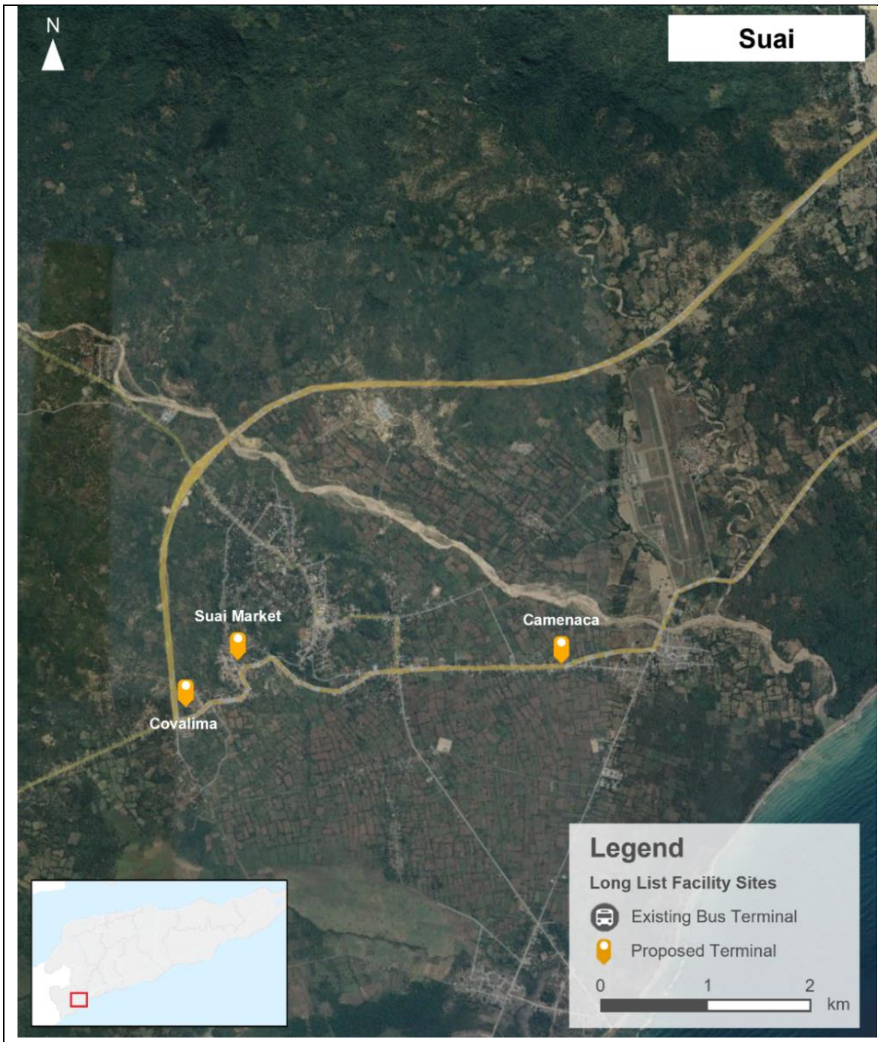
Covalima Municipality is located on the southern side of Timor-Leste. Based on Timor-Leste 2022 Population and Housing Census, Covalima's population is 73,900 residents with a population density of 61.3 residents/ km^2.

Suai Service Region

Three potential sites in Suai are in two different sucos, Debos and Camenaca. Debos has a higher total population than Camenaca, however only 260 residents live here in total. Meanwhile, Camenaca has the higher population density with 324 residents/km^2.

The following public transport facility site options are identified:

- **Suai Market -** This site is in the city center next to Suai Market and hospital. It currently acts as an informal on-street interchange for microlets and regional buses.
- **Covalima -** Located on the intersection between Timor-Leste National Road and highway. Most of the land use around this site is residential.
- **Camenaca -** Located outside of the city center near to the Xanana Gusmao International Airport, with residential area surrounding it.



Source: Arup Study Team

Figure 7.18: Longlist Facility Site Options for Suai Service Region

The table below provides a summary of site assessment results for the Suai service region. Based on the site scoring undertaken, the Suai Market site is the preferred site option for a public transport facility to service the region.

Table 7.20: Tier 1 Site Assessment Results (Suai)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	**Site**	**A1: Priority Site**	**B1: Alignment with Strategic Documents**	**B2: Accessibility to City Center**	**B3: Existing Key Generators Density**	**C1: Accessibility to Main Road**	**Resettlement & Economic Impacts**	**Trees Removal**	**Impact on Nearby Water Bodies**	**Tier 1 Composite Score**
Suai	Suai Market	3.0	1.0	5.0	4.0	5.0	3.0	5.0	4.0	3.8
Suai	Covalima	3.0	1.0	2.0	2.0	5.0	5.0	4.0	5.0	3.6
Suai	Camenaca	3.0	1.0	3.0	2.0	5.0	2.0	4.0	2.0	3.2

A summary of the Tier 1 site assessment results is provided below:

- **Suai Central Market -** The Suai Market is in the city center with high access to useful destinations which can contribute to significant trip generation in the local area. The site is also located next to a major road. However, this site is located adjacent an existing market, which means there is a possibility of business displacement (particularly during construction), however would lead to integrated benefits for the public transport system and market in the long term.
- **Covalima -** The Covalima site in Suai is located at the intersections of the highway and a major road. It is a significant distance from the city center and does not provide convenient access for passengers to nearby amenities and is less likely to generate passenger trips. However, it may be a convenient layover/vehicle storage location as there is unlikely space at the Suai Central Market for vehicle layover.
- **Camenaca -** This site is located closer to the city center than the Covalima site however it still lacks existing activity generators within its vicinity. This separation from land use reduces the strategic alignment of this site and reduces the likelihood of attracting passengers based on the current land use.

Recommendation: It is recommended that **Suai Market** proceed to Tier 2 assessment as the priority passenger facility to service the Suai service region.

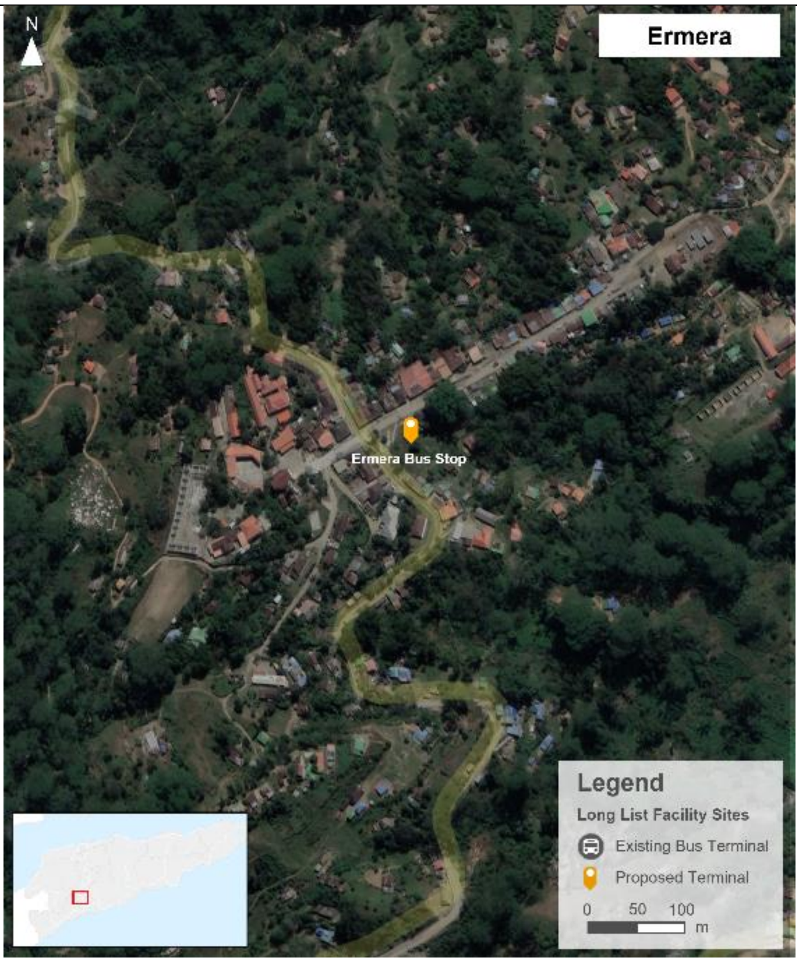
7.6.3.8 Tier 1 Findings - Ermera Facility Overview

Ermera Municipality has the second biggest population in Timor-Leste after Dili with 138,100 residents and a population density of 179.1 residents/km^2, based on Timor-Leste 2022 Population and Housing Census. Similar to Aileu, Ermera serves as a connection point between Dili and other municipalities located to the south. Several road projects and developments have been initiated in and around Ermera to improve accessibility between Dili and municipalities located to the south.

Ermera Service Region

There is only one potential site in Ermera Municipality which is located in Poetete suco. This suco has a population of 8,900 and has the highest population in the same administration post. The following public transport facility site option is identified:

- **Ermera Bus Stop -** Located in the city center next to a school, church, and government office.



Source: Arup Study Team

Figure 7.19: Longlist Facility Site Options for Ermera Service Region

As the only identified site in Ermera, the Ermera site is selected to proceed to Tier 2 assessment to act as the key public transport hub servicing the Ermera service region. The site is currently located on vacant land that contains some trees – and is located adjacent to a main road with a decent agglomeration of key activity generators surrounding it.

Table 7.21: Tier 1 Site Assessment Results (Ermera)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Emera	Ermera Bus Stop	3.0	1.0	5.0	3.0	5.0	5.0	3.0	5.0	3.8

Recommendation: It is recommended that **Ermera Bus Stop** proceed to Tier 2 assessment as the priority passenger facility to service the Ermera service region.

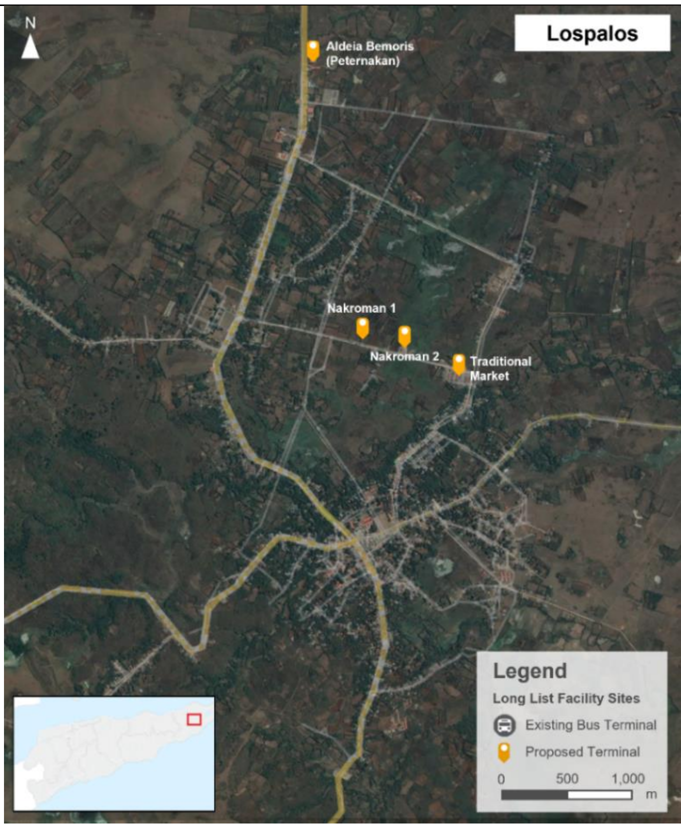
7.6.3.9 Tier 1 Findings - Lautem Facility Overview

Lautem is the easternmost municipality in Timor-Leste, with a population of 69,800 residents and a population density of 38.5 residents/km^2 according to the Timor-Leste 2022 Population and Housing Census. It has the second lowest population growth from 2015 to 2022 of all municipalities across the country.

Lospalos Service Region

In Lospalos, the largest administration post in Lautem, there are a total of five sites that have been identified for a potential public transport facility. These locations are situated within the same suco, Fuiloro. Fuiloro has a population of 16,500 residents, with a population density of 172 residents/km^2. This suco has the highest population among other sucos in Lautem. The following public transport facility site options are identified:

- **Bemoris (Traditional Market) -** Located adjacent to the Lospalos Bemoris. The structure that is currently utilized as the traditional market was once a public transport terminal, however, has been discontinued in use with local stalls taking over the space.
- **Nakroman 1 & 2 -** Two sites located on vacant land, both with low residential area and activities nearby.
- **Aldeia Bemoris (Peternakan) -** Located outside of the city center, vacant land with limited adjacent activity.



Source: Arup Study Team

Figure 7.20: Longlist Facility Site Options for Lospalos Service Region

The table below provides a summary of site assessment results for the Lospalos service region. Based on the site scoring undertaken, the Lospalos City Centre site is the preferred site option for a public transport facility to service the region.

Table 7.22: Tier 1 Site Assessment Results (Lospalos)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Lospalos	Bemoris	3.0	1.0	3.0	3.0	5.0	1.0	5.0	5.0	3.5
Lospalos	Nakroman 1	3.0	1.0	3.0	1.0	2.0	5.0	3.0	5.0	2.8
Lospalos	Nakroman 2	3.0	1.0	3.0	1.0	3.0	5.0	2.0	5.0	2.9
Lospalos	Aldeia Bemoris (Peternakan)	3.0	1.0	2.0	1.0	5.0	5.0	3.0	5.0	3.4

A summary of the Tier 1 Site Assessment results is provided below:

- **Aldeia Bemoris (Peternakan):** Aldeia Bemoris is located the furthest from the city center of all the sites, without proximity to population or activity generating land use. The development of a public transport facility site would not result in an accessible public transport system, requiring passengers to walk long distances (or pay for connecting services) to access the terminal, rather than facilitating walk-up access.

- **Bemoris:** The Lospalos Bemoris is an old public transport facility that has been informally re-purposed into a market. There are currently many vendors who use the space to sell goods, and this has become an established practice in the Municipality. As such, while reconfiguring this space to connect public transport to the traditional market would offer convenient access – it was stated by DNTT that there is a local preference within the community for this site to remain as a market rather than undergoing repurposing. However, an on-street interchange could be provided at the market with an alternative location used for layover/overnight storage of vehicles.

- **Nakroman Site 1:** The Nakroman Site 1 is located away from the city center and key activity generators within Lospalos, creating longer walking distance and reducing accessibility to public transport services for passengers. It is not optimal for a central passenger facility to service the region.

- **Nakroman Site 2:** Similar to Nakroman Site 1, Nakroman Site 2 is located away from the city center and key activity generators within Lospalos, creating the same challenges in accessibility for passengers who rely on public transport to connect with key services.

Recommendation: It is recommended that **Lospalos Bemoris** proceed to Tier 2 assessment as the priority passenger facility to service the Lospalos service region.

7.6.3.10 Tier 1 Findings - Liquica Facility Overview

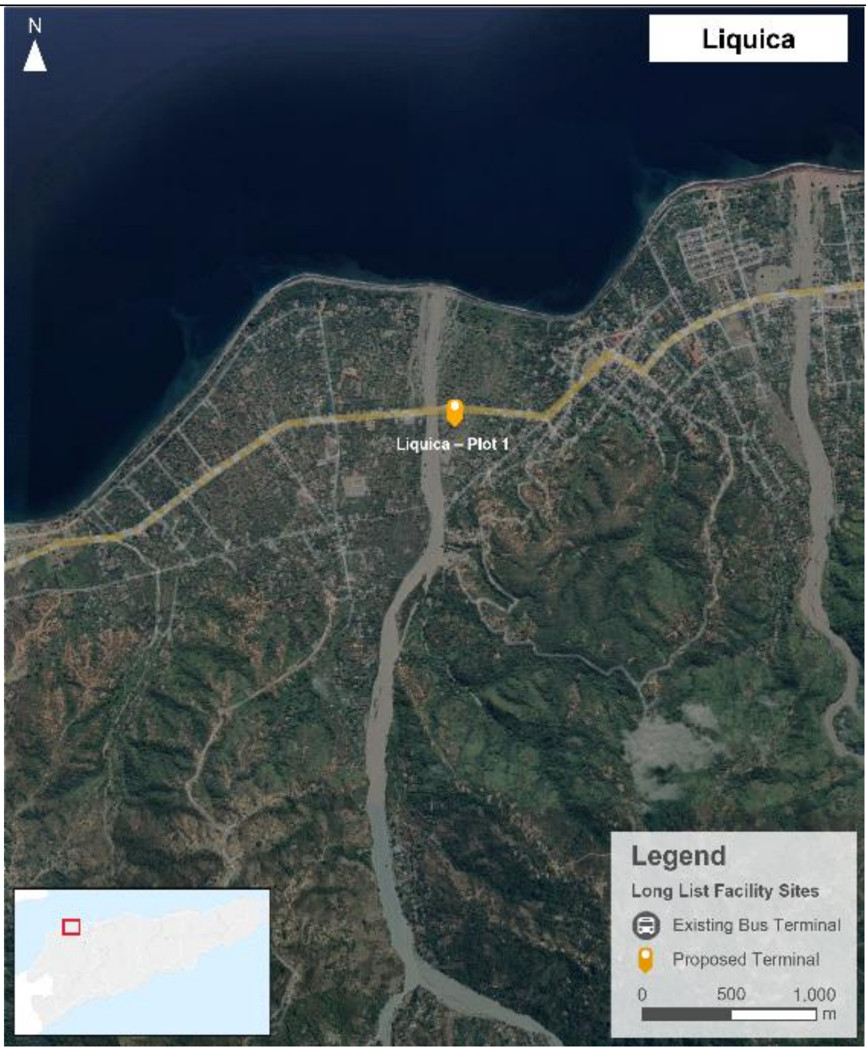
Liquica municipality, which shares a border with Dili municipality to the east, has a population of 83,900 residents and a population density of 151.9 residents/m^2, according to the Timor-Leste 2022 Population and Housing Census. Liquica has the third highest population density after Dili and Ermera. The municipality experienced a population growth of 2.19% from 2015 to 2022.

Liquica Service Region

The potential site identified in the Liquica service region, is located in the Maumeta suco, which has a population of 5,100.

The following public transport facility site option is identified:

- **Liquica – Plot 1:** Located adjacent to the national road connecting Dili with Batugade and Maliana. Most of the land use around this site is residential.



Source: Arup Study Team

Figure 7.21: Longlist Facility Site Options for Liquica Service Region

As the only identified site in Liquica, Liquica Plot 1 is selected to proceed to Tier 2 assessment as the site to service the Liquica service region. However, the identified site has a building on the site currently creating potential risk of displacement impacts.

Table 7.23: Tier 1 Site Assessment Results (Liquica)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Liquica	Liquica – Plot 1	3.0	1.0	3.0	4.0	5.0	2.0	4.0	2.0	3.3

Recommendation: It is recommended that **Liquica Plot 1** proceed to Tier 2 assessment as the priority passenger facility to service the Liquica service region.

7.6.3.11 Tier 1 Findings - Manatuto Facility Overview

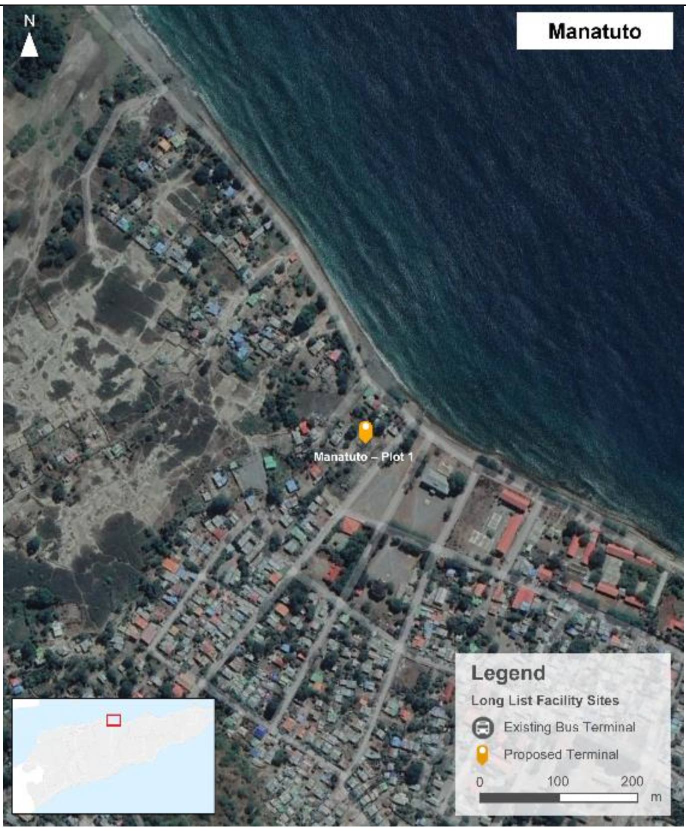
Manatuto Municipality, which shares a border with Dili municipality to the west, has a population of 83,900 residents and a population density of 28.6 residents/km^2, according to the Timor-Leste 2022 Population and Housing Census. This municipality has the lowest population among other municipalities in eastern Timor-Leste. Despite its size, Manatuto serves as a connection point between Dili and other municipalities located to the east, resulting in one potential site for a transport facility.

Manatuto Service Region

The following public transport facility site option is identified:

- **Manatuto – Plot 1**: A potential site for a facility in Manatuto is in the city center with mixed land use, including government office, school, and residential area.

As the only site identified in Manatuto, Manatuto Plot 1 is selected to proceed to Tier 2 Assessment as the site to service the Manatuto service region. The identified site has been designated for a facility and is currently vacant land, reducing displacement impacts. The site is, however, located away from the main road and is close to water bodies. In connection with environmental assessment and potential licensing categorization, it is planned to develop the facility in close proximity to the waterfront. It is imperative to devise a careful plan for the minor excavation/construction to prevent sedimentation in the sea. The resultant environmental impact is expected to be minor, but it could potentially warrant a Category B classification.



Source: Arup Study Team

Figure 7.22: Longlist Facility Site Options for Manatuto Service Region

Table 7.24: Tier 1 Site Assessment Results (Manatuto)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Manatuto	Manatuto – Plot 1	3.0	1.0	5.0	4.0	1.0	5.0	5.0	2.0	2.8

Recommendation: It is recommended that **Manatuto Plot 1** proceed to Tier 2 assessment as the priority passenger facility to service the Manatuto service region.

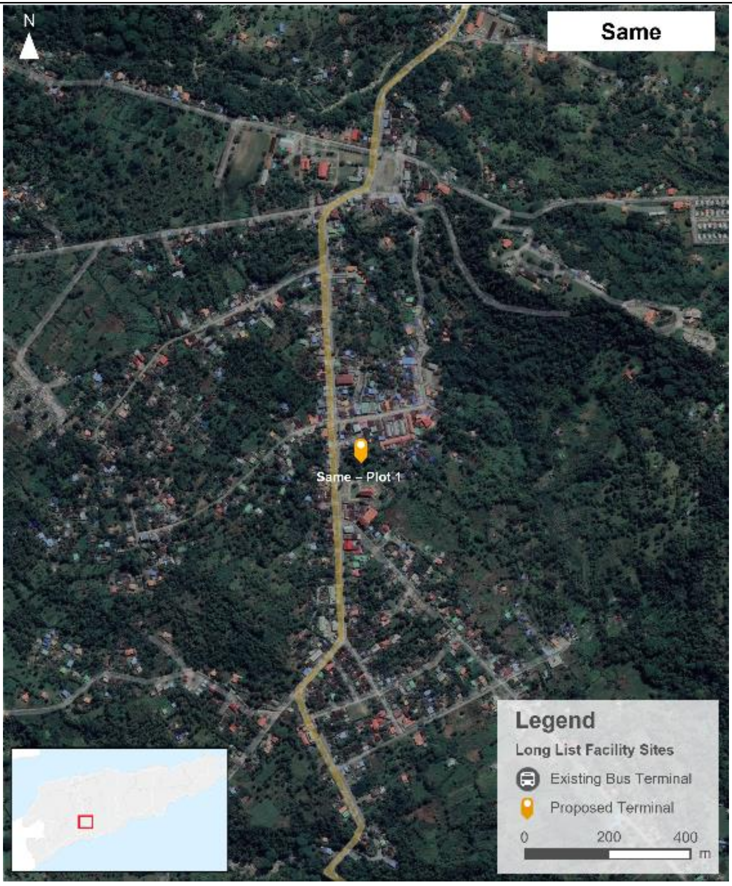
7.6.3.12 Tier 1 Findings - Manufahi Facility Overview

Manufahi Municipality is located in southern Timor-Leste with a population of 60,500 residents and a population density of 45.6 residents/ km^2 according to the Timor-Leste 2022 Population and Housing Census.

Same Service Region

There is 1 potential site for facility in Same, Manufahi's eastmost subdistrict. This suco has a higher population density than other sucos in the municipality. The following public transport facility site option is identified:

- **Same – Plot 1** - Next to a national road connecting Dili with Suai, in close proximity to key activity generators and residential area.



Source: Arup Study Team

Figure 7.23: Longlist Facility Site Options for Same Service Region

- Same – Plot 1 is currently the only site designated for use as a public transport facility in Same. This site is located quite close to the main road and located in the city center, with decent key generators in proximity. However, tree removal will be necessary. In connection with environmental assessment and potential licensing categorization, there is observed encroachment on certain tree stands, which may have an impact on local wildlife. However, it may not be imperative to remove these stands if a thorough plan is put into place. The resultant environmental impact is expected to be minor, yet it could potentially warrant a Category B classification.

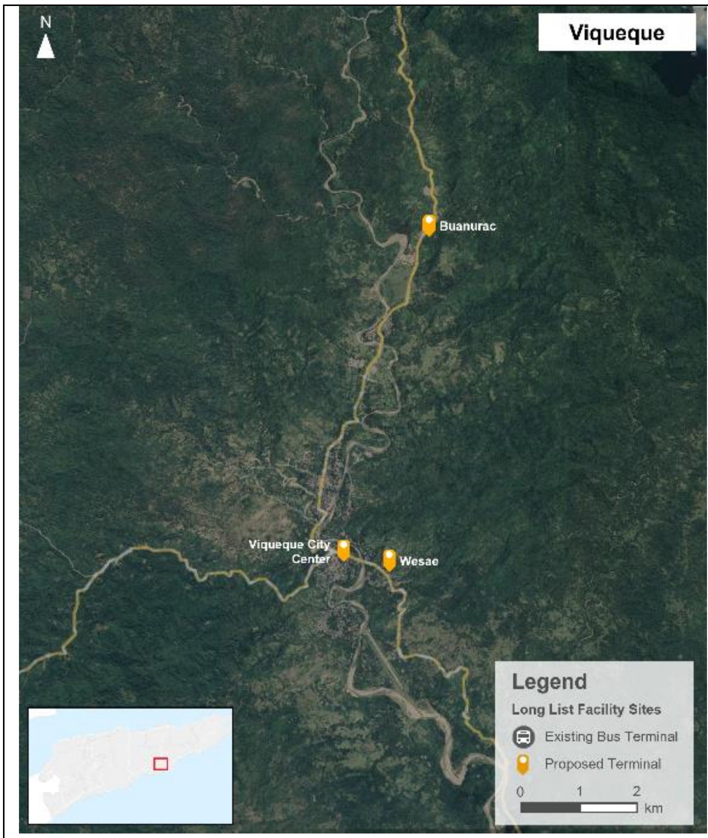
Table 7.25: Tier 1 Site Assessment Results (Same)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Same	Same – Plot 1	3.0	1.0	5.0	4.0	5.0	5.0	1.0	4.0	3.7

Recommendation: It is recommended that **Same – Plot 1** proceed to Tier 2 assessment as the priority passenger facility to service the Same service region.

7.6.3.13 Tier 1 Findings - Viqueque Facility Overview

Viqueque Municipality is located in south-eastern Timor-Leste with a population of 76,000 residents and a population density of 42.6 residents/ km^2 according to the Timor-Leste 2022 Population and Housing Census. Viqueque Municipality has the lowest population growth from 2015 to 2022.



Source: Arup Study Team

Figure 7.24: Longlist Facility Site Options for Viqueque Service Region

Viqueque Service Region

There are three potential sites in Viqueque Municipality, two of which are located in the most populous suco in Viqueque, Uma Uain Craic suco and another one located to the north. The following public transport facility site options are identified:

- **Viqueque City Center -** This site is in the city center next to Monumento Pancasila, with this site acting as the existing public transport interchange site for boarding and alighting.
- **Wesae -** Located in a primarily residential area in the southern part of Viqueque.
- **Buanurac -** Located on the northern side of Viqueque City Center on vacant land with steep terrain, with low adjacent activity. This site is a significant distance from the city.

The table below provides a summary of site assessment results for the Viqueque service region. Based on the site scoring undertaken, the Viqueque City Centre site is the preferred site option for a public transport facility to service the region.

Table 7.26: Tier 1 Site Assessment Results (Viqueque)

		A: Stake-holder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
Service Region	Site	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	Resettlement & Economic Impacts	Trees Removal	Impact on Nearby Water Bodies	Tier 1 Composite Score
Viqueque	Viqueque City Centre	3.0	1.0	5.0	4.0	5.0	5.0	5.0	2.0	3.8
Viqueque	Wesae	3.0	1.0	4.0	2.0	5.0	3.0	2.0	2.0	3.2
Viqueque	Buanurac	3.0	1.0	1.0	1.0	5.0	5.0	1.0	2.0	2.9

A summary of the Tier 1 site assessment results is provided below:

- **Viqueque City Centre -** The site located in the Viqueque City Centre scored the highest of the sites in this service region. This site is vacant and avoids potential displacement/resettlement impacts. Because of its primary location in the urban center, this location is best suited to providing convenient access to public transport for all users, including vulnerable user groups such as women, children and the elderly who cannot walk long distances to access terminals, and may not have access to alternative modes of local transport to access a public transport facility.
- **Wesae -** While the Wesae site is also located near the city center, there are fewer key activity generators within the vicinity of the site. Site visits highlighted other land use taking place on the site, with several houses present – highlighting the potential for resettlement/displacement impacts. Moreover, environmental impacts are also likely due to trees across this site.
- **Buanurac -** The Buanurac site is a significant distance from the city center and is not located near any current key activity generating land use. This limits the site's ability to attract passengers from nearby land uses. It also means that this site would be challenging for a portion of the population to reach – i.e., it is a long walk from the center of the urban area. Although it is vacant land, developing it would require the removal of many trees, and the terrain of the site is very steep, likely creating engineering challenges.

Recommendation: It is recommended that **Viqueque City Centre** proceed to the Tier 2 assessment stage as the priority site to service the Viqueque service region.

7.7 Tier 1 - Shortlist Summary

The outcome of the Tier 1 Assessment of the 42 long list sites is presented in Table 7.27. Each site has been scored independently and transparently against the strategic criteria, with a total score out of 5 assigned to each site (an equally weighted average of each of the four criteria).

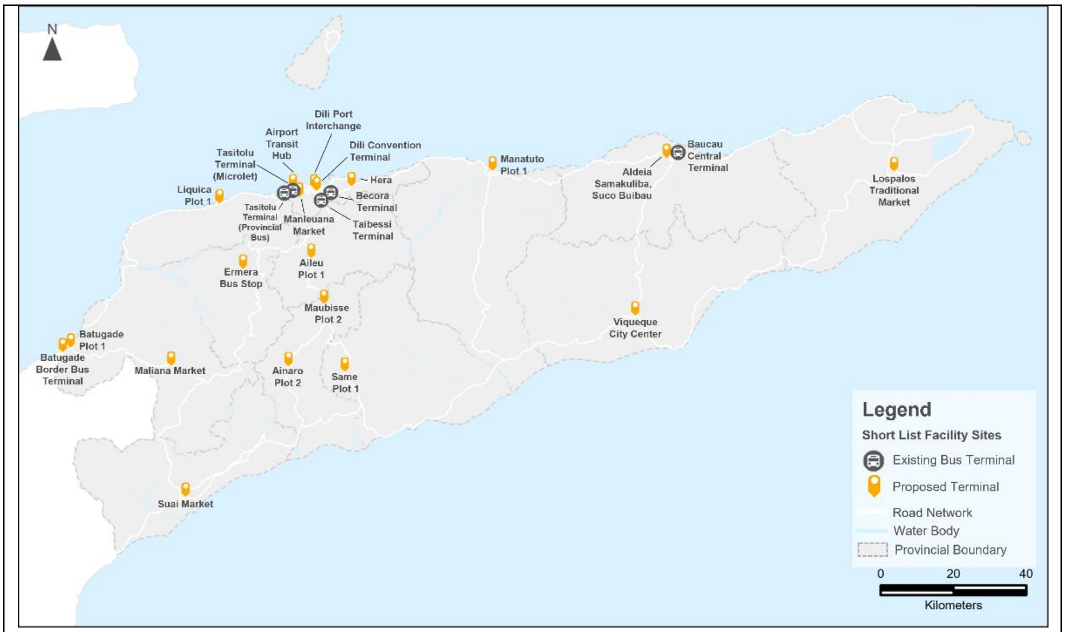
Table 7.27: Tier 1 Site Assessment Scoring

			A: Stakeholder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
ID	**Municipality / Area**	**Name**	**A1: Priority Site**	**B1: Alignment with Strategic Documents**	**B2: Accessibility to City Center**	**B3: Existing Key Generators Density**	**C1: Accessibility to Main Road**	**D1: Resettlement & Economic Impacts**	**D2: Trees Removal**	**D3: Impact on Nearby Water Bodies**	**Tier 1 Composite Score (Out of 5)**
Service Region: Dili - East											
1	Dili	Becora Terminal	3.0	3.0	2.0	3.0	5.0	5.0	5.0	2.0	3.7
2	Dili	Hera	5.0	3.0	1.0	2.0	4.0	2.0	4.0	3.0	3.5
3	Dili	Wenunuc	3.0	3.0	1.0	2.0	5.0	3.0	4.0	3.0	3.3
4	Dili	Metinaro	3.0	3.0	1.0	1.0	4.0	4.0	3.0	4.0	3.1
Service Region: Dili - South											
5	Dili	Taibessi Terminal	3.0	3.0	3.0	3.0	1.0	5.0	5.0	2.0	2.8
6	Dili	Manleuana Market	5.0	1.0	2.0	2.0	4.0	5.0	5.0	3.0	3.8
7	Dili	Lahane	5.0	1.0	3.0	3.0	4.0	5.0	2.0	3.0	3.7
Service Region: Dili - West											
8	Dili	Tasitolu Terminal (Microlet)	3.0	1.0	1.0	4.0	5.0	5.0	5.0	2.0	3.5
9	Dili	Tasitolu Terminal (Regional Bus)	3.0	3.0	1.0	3.0	5.0	5.0	5.0	2.0	3.6
10	Dili	Ulmera	3.0	3.0	1.0	3.0	5.0	2.0	4.0	2.0	3.3
11	Dili	Airport Transit Hub	3.0	3.0	1.0	4.0	4.0	5.0	5.0	3.0	3.5
12	Dili	Tibar	3.0	3.0	1.0	2.0	4.0	5.0	3.0	2.0	3.1
Service Region: Dili - Central											
13	Dili	Dili Convention Center	3.0	3.0	5.0	5.0	4.0	5.0	5.0	5.0	4.0
14	Dili	Dili Port Interchange	3.0	3.0	4.0	5.0	5.0	5.0	5.0	2.0	4.0
Service Region: Ainaro											
15	Ainaro	Ainaro - Plot 1	3.0	1.0	5.0	4.0	4.0	5.0	4.0	3.0	3.6
16	Ainaro	Ainaro - Plot 2	3.0	1.0	4.0	4.0	5.0	5.0	4.0	2.0	3.7
Service Region: Aileu											
17	Aileu	Aileu - Plot 1	3.0	1.0	5.0	5.0	5.0	4.0	5.0	3.0	3.9
Service Region: Batugade											
18	Batugade	Batugade - Plot 1	3.0	1.0	5.0	3.0	5.0	5.0	4.0	2.0	3.7
19	Batugade	Batugade Border Control Bus Terminal	3.0	1.0	2.0	3.0	5.0	5.0	5.0	2.0	3.5
Service Region: Baucau											
20	Baucau	Baucau Central Terminal	1.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	3.8
21	Baucau	Aldeia Samalakuliba, Suco Buibau	3.0	1.0	3.0	3.0	3.0	5.0	5.0	5.0	3.3
Service Region: Ermera											
22	Ermera	Ermera Bus Stop	3.0	1.0	5.0	3.0	5.0	5.0	3.0	5.0	3.8
Service Region: Liquica											
23	Liquica	Liquica - Plot 1	3.0	1.0	3.0	4.0	5.0	2.0	4.0	2.0	3.3
Service Region: Lospalos											
24	Lospalos	Bemoris	3.0	1.0	3.0	3.0	5.0	1.0	5.0	5.0	3.5
25	Lospalos	Nakroman 1	3.0	1.0	3.0	1.0	2.0	5.0	3.0	5.0	2.8
26	Lospalos	Nakroman 2	3.0	1.0	3.0	1.0	3.0	5.0	2.0	5.0	2.9
27	Lospalos	Aldeia Bemoris (Peternakan)	3.0	1.0	2.0	1.0	5.0	5.0	3.0	5.0	3.4
Service Region: Maliana											
28	Maliana	Maliana City Center	1.0	1.0	5.0	4.0	5.0	5.0	4.0	3.0	3.3

			A: Stakeholder Feedback	B: Strategic Alignment			C: Operational	D: Environmental and Social			
ID	Municipality / Area	Name	A1: Priority Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	D1: Resettlement & Economic Impacts	D2: Trees Removal	D3: Impact on Nearby Water Bodies	Tier 1 Composite Score (Out of 5)
29	Maliana	Tunubibi, Aldeia Pip Galak, Suco Tapo Memo	3.0	1.0	1.0	2.0	5.0	3.0	4.0	4.0	3.3
30	Maliana	Maliana Market	3.0	1.0	5.0	4.0	4.0	3.0	5.0	3.0	3.5
31	Maliana	Samelaun, Ritabou	3.0	1.0	1.0	1.0	1.0	5.0	5.0	4.0	2.4
32	Maliana	Moleana, Ritabou	3.0	1.0	1.0	1.0	1.0	5.0	1.0	5.0	2.2
Service Region: Manatuto											
33	Manatuto	Manatuto - Plot 1	3.0	1.0	5.0	4.0	1.0	5.0	5.0	2.0	2.8
Service Region: Maubisse											
34	Maubisse	Maubisse - Plot 1	3.0	1.0	5.0	4.0	5.0	3.0	3.0	5.0	3.8
35	Maubisse	Maubisse - Plot 2	3.0	1.0	5.0	4.0	5.0	5.0	5.0	5.0	4.1
Service Region: Same											
36	Same	Same - Plot 1	3.0	1.0	5.0	4.0	5.0	5.0	1.0	4.0	3.7
Service Region: Suai											
37	Suai	Suai Market	3.0	1.0	5.0	4.0	5.0	3.0	5.0	4.0	3.8
38	Suai	Covalima	3.0	1.0	2.0	2.0	5.0	5.0	4.0	5.0	3.6
39	Suai	Camenaca	3.0	1.0	3.0	2.0	5.0	2.0	4.0	2.0	3.2
Service Region: Viqueque											
40	Viqueque	Viqueque City Center	3.0	1.0	5.0	4.0	5.0	5.0	5.0	2.0	3.8
41	Viqueque	Wesae	3.0	1.0	4.0	2.0	5.0	3.0	2.0	2.0	3.2
42	Viqueque	Buanurac	3.0	1.0	1.0	1.0	5.0	5.0	1.0	2.0	2.9

Based on the scoring and ranking of the 42 potential public transport facility sites across Timor-Leste, a shortlist of 24 sites is recommended to proceed to detailed assessment as part of the Tier 2 assessment using the facility assessment framework agreed with stakeholders during the project Inception Phase. In conclusion, the 24 shortlisted sites have been identified as the most suitable locations for public transport facilities based on the strategic indicators assessed.

The next stage of the project will assess these 24 sites in further detail with a view to creating a modern, efficient, and sustainable public transport system that meets the needs of Timor-Leste's public transport users and the broader community.



Source: Arup Study Team

Figure 7.25: Shortlisted Public Transport Facility Sites Across Timor-Leste

In summary, the 24 shortlisted sites are listed shown in **Figure 7.25** are:

1. Dili Port Interchange (Dili Municipality)
2. Dili Convention Centre (Dili Municipality)
3. Manleuana Market (Dili Municipality)
4. Airport Transit Hub (Dili Municipality)
5. Becora Terminal (Dili Municipality)
6. Tasitolu Terminal (Microlet) (Dili Municipality)
7. Tasitolu Terminal (Regional Bus) (Dili Municipality)
8. Taibessi Terminal (Dili Municipality)
9. Hera (Dili Municipality)
10. Aileu - Plot 1 (Aileu Municipality)
11. Ainaro - Plot 2 (Ainaro Municipality)
12. Batugade - Plot 1 (Batugade Municipality)
13. Batugade Border Bus Terminal (Batugade Municipality)
14. Baucau Central Terminal (Baucau Municipality)
15. Aldeia Samalakuliba, Suco Buibau (Baucau Municipality)
16. Ermera Bus Stop (Ermera Municipality)
17. Liquica - Plot 1 (Liquica Municipality)

18. Lospalos City Center (Lospalos Municipality)
19. Maliana Market (Maliana Municipality)
20. Manatuto - Plot 1 (Manatuto Municipality)
21. Maubisse - Plot 2 (Maubisse Municipality)
22. Same - Plot 1 (Same Municipality)
23. Suai Market (Suai Municipality)
24. Viqueque City Center (Viqueque Municipality)

7.8 Facility Infrastructure Requirements by Type

7.8.1 Typical Operational / Passenger Infrastructure

Typical bus terminals, interchanges, and bus stops have both operational and passenger infrastructure requirements, whose scale and sizing depends on the function of the facility and ultimately peak passenger demand.

- **Operating Infrastructure -** Operating infrastructure include the bays/spaces used for loading/ unloading as well as layover and parking bays and administrative/management space where needed. Layover and parking bays are used at the end of the route when vehicles may be temporarily parked before continuing on their journey in the opposite direction or for overnight storage in some cases.

- **Passenger Infrastructure -** Passenger infrastructure include the terminal building, passenger waiting areas (with shelter and/or seats as well as signage and trash bins), as well as supplementary elements including sidewalk and crossing improvements.

As noted, bus stops typically have more basic amenities including a bus loading zone and bus stop flagpole and/or shelter (sometimes with bays allowing vehicles to load/unload outside of the main right-of-way), while terminals/interchanges have loading/unloading bays, and potentially layover/parking bays and the afore mentioned passenger terminal building/structure. Samples of typical infrastructure at public transport facilities are shown below:

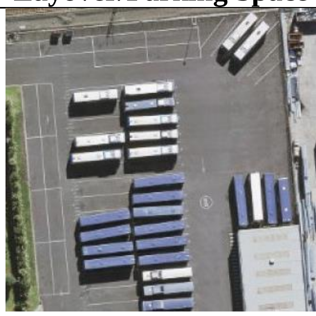
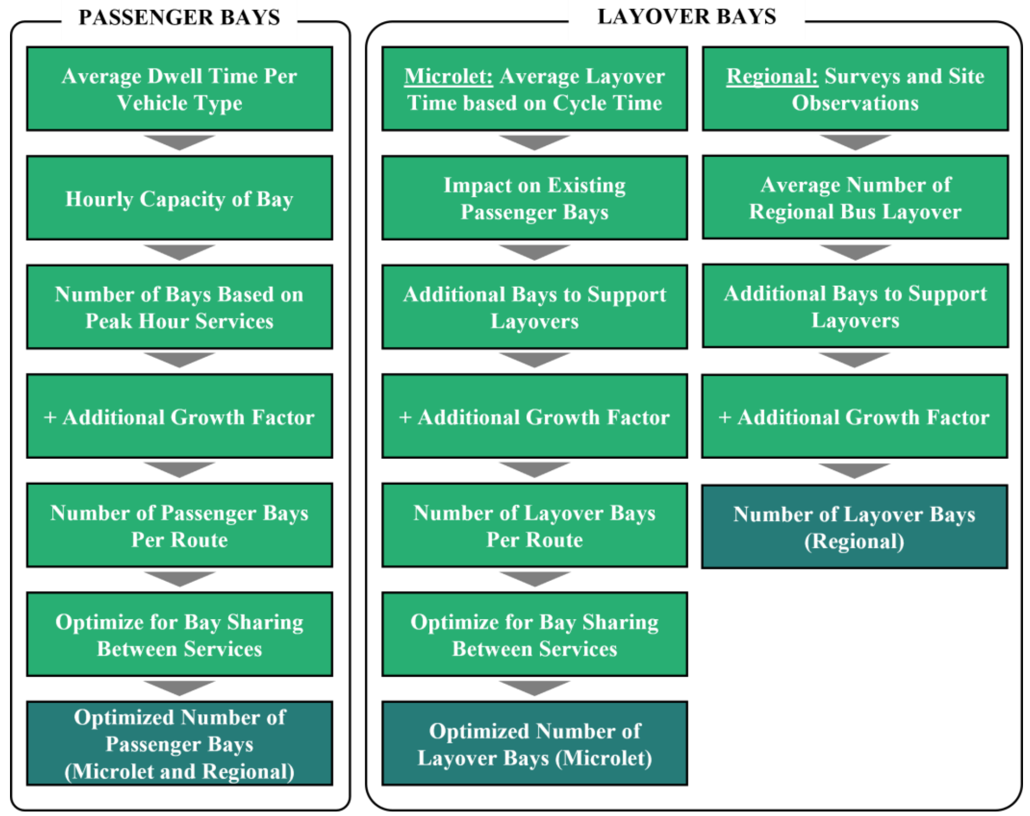
Loading/Unloading Bays	Layover/Parking Space	Terminal Building
		
St. Margaret's Bus Station, Leicester, United Kingdom	Onehunga, Auckland	Shenton Way Bus Terminal, Singapore

Figure 7.26: Examples of Typical Infrastructure at Public Transport Facilities

For the Tier 2 assessments, the sizing of the facility focuses on the operating infrastructure (i.e., loading/unloading bays and layover/parking spaces). Broad passenger infrastructure assumptions are used in this stage. More detailed assessment of passenger infrastructure requirements (based on peak passenger demand for various routes/services) will be undertaken in the Feasibility Study.

7.8.2 Overarching Approach to Estimate Operating Infrastructure Requirements

The scale of public transport facilities required to service existing and future public transport services is an important consideration prior to finalizing sites. Terminal sizing guidelines established by the Transportation Research Board (TRB) in the United States, through the Transit Cooperative Research Program (TCRP) provides a methodology for calculating and optimizing the number of bays required based on the expected level of service and the operating schedule.[127] This overarching estimation process is shown below:



Note: Approach based on TCRP estimation approach (Adapted for regional bus layover bays)

Figure 7.27: Bay Estimation Approach

Essentially, the number of bays required at a given facility is calculated based on the peak number of trips serving the facility. The proposed estimation approach calculates the number of loading/unloading bays as well as the layover/parking spaces – depending on whether the route is a "terminating route" that starts/ends at the facility in question (where it requires both loading/unloading bays and layover/parking) or is a "through route" that does not start/end at the facility in question, serving it as an intermediate stop along the way to its final destination.

The estimation process is as follows:

- **Passenger Loading/Unloading Bays** – As noted, these bays are where the vehicles come to load/unload passengers. Typically, such bays are directly adjacent

[127] Based on formula from TCRP Book 19: Guidelines for the Location and Design of Bus Stops, 1996.

to the main passenger waiting area. The calculation for required loading/unloading bays is based on average dwell times (the amount of time that vehicles spent dwelling in the bay for boarding/alighting) and the number of trips per hour by route. Public transport operating principles guiding this design recommend that vehicles are not dwelling in passenger pick up/drop off bays longer than they need to. Key inputs to the calculation of required pick up/drop off bays in Timor-Leste include:

  - **Microlet Dwell Times -** A 2-minute combined boarding and alighting time is assumed per vehicle (i.e., 1 minute to board, 1 minute to drop off passengers). In practice, microlets are observed to spend a much shorter time boarding and alighting (with some vehicles observed to complete this function in less than 20 seconds). However, a conservative assumption was adopted to ensure good operating practice in the future, including enough time for PWDs to board and alight the vehicle. Additionally, in the future if modern buses are to be procured, future facilities should accommodate their operations (thus future-proofing facilities). As such, a longer dwell time was adopted to allow for the increase in boarding/alighting time for larger vehicles. In summary, when accounting for a 20% growth factor, one microlet bay can accommodate up to 20 microlet services per hour.
  - **Regional Bus Dwell Times -** A 10-minute combined boarding and alighting time is assumed per vehicle (i.e., 5 minutes to load and the same amount of time to unload). This longer dwell time compared to that for microlet accounts for loading/unloading of luggage and the larger size of regional buses (particularly at the terminating locations). When accounting for a 20% growth factor, one regional passenger pick up/drop off bay can accommodate up to 5 regional bus services per hour.
  - **Growth Factor -** As mentioned above, a 20% growth factor is applied to account for potential increases in future demand and service provision.
- **Layover/Parking Bays –** These bays are separate from loading/unloading bays and are used by vehicles to stay for longer periods (which may occur during the layover between the start of the next trip or in some cases for overnight storage prior to the first departure of the day). In some cases, the location of loading/unloading and the parking/layover bays are co-located in the same facility, while in other cases they may be separated (so long as the layover/parking bays are located close to the starting/ending point of the route and available land exists). For the purposes of this analysis, it is assumed that the loading/unloading and layover/parking bays are co-located at the same facility. Key inputs to the calculation of required layover/parking bays in Timor-Leste include:
  - **Microlet Layover Times -** As per the above approach, urban layover times are assumed at ~15% of the total roundtrip time (i.e., the driving time to complete one roundtrip). Although in practice the majority of microlet services in Timor-Leste have a shorter observed layover time in facilities (with some instances longer), to account for a safer system with better driver conditions – a layover time of 15% of the roundtrip time is adopted.
  - **Regional Bus Layover Times -** Given the longer travel distances and different operating requirements for regional bus services (i.e., in some cases 2-4 trips per day, e.g., Dili-Baucau; and in other cases, 1 trip per day, e.g., Dili-Viqueque), translating the adopted approach does not produce a result consistent with the Timor-Leste context. Instead, survey data from site visits conducted in August 2023 where the number of buses parked at facilities was counted (observing the current layover times of regional buses based on service patterns) and in municipal locations with long-distance journeys – resulting in the recommendation of one bay for each daily service (i.e. if a municipality has 8 regional services per day, 8 layover bays are recommended) to ensure

that drivers have the option to rest and store their vehicles overnight should they wish to do so. However, under the current owner and operator model of the public transport network, drivers are more likely to either take their buses to a private location or continue their next service journey.

7.8.3 Proposed Facility Typology and Bay Requirements by Location

Service regions with the highest volume of public transport service and largest populations (Dili and Baucau) warrant more robust facilities (such as municipal transport hubs), while other municipalities can be adequately serviced with an on-street interchange. In addition, terminals may also have provisions for layover/parking bays to account for future conversion to bus in the longer term. In some instances, these municipalities do not currently have microlet services, or some do but have fewer than 20 microlets per hour traversing a central location. The number of regional buses per hour in municipal locations outside of Dili and Baucau are typically fewer than one per hour.

As such, on-street interchanges can be provided as a primary passenger boarding location for municipalities – allowing the co-location of public transport with amenities that passengers want to reach. The current regional bus/microlet ownership model sees drivers/owners store their own vehicles overnight, so a “depot” as such is not required until a future bus fleet is procured (in the long term).

In Dili and Baucau, larger passenger facilities are warranted to support both microlets and regional bus services, while also allowing layover space for vehicles based on observed operating patterns.

As such, proposed facility typologies across Timor-Leste are as follows:

- **Dili - Municipal public transport bubs** (Becora, Manleuana Market and Airport Transit Hub) for interchange between regional bus services and microlet/future urban bus services are proposed, to be supported by **on-street interchanges** at the Dili Port (long-term), Convention Centre (medium-term), and Tasitolu, with these three on-street interchanges serving ng microlets only, with the option to also service regional buses in the longer term should the government prioritize network evolution in this direction.
- **Baucau - Municipal public transport hub** co-located with the new market development, supported by bus stop infrastructure within the core urban area to support passenger drop-off close to amenities.
- **Other Municipalities -** High quality **on-street interchange** facilities to support passenger loading/unloading in the heart of urban areas, with the option to provide layover parking where warranted. Under the current operating model, based on observed survey data and private vehicle ownership, operators do not dwell long at facilities and as such this layover parking space / depot infrastructure may only be required in the long-term as new vehicle fleets are procured and professionalization of the private sector operator network occurs.

Table 7.28: Bay Requirements and Proposed Typology by Location

	Microlet			Regional Bus				
Location	**# of Peak Vehicle Trips / Hour**	**# of Loading/ Unloading Bays**	**# of Layover/ Parking Bays A, B**	**# of Peak Vehicle Trips / Hour**	**# of Loading/ Unloading Bays**	**# of Layover/ Parking Bays A, B**	**Total Bays**	**Presumed Facility Typology**
Dili – East	*200*	**8**	**48**	*46*	**4**	**18**	**78**	Municipal Public Transport Hub
Dili – West	*360*	**14**	**28**	*52*	**6**	**20**	**68**	Municipal Public Transport Hub
Dili – South	*360*	**14**	**31**	*18*	**2**	**7**	**54**	Municipal Public Transport Hub
Baucau	*6*	**1**	**12**	*12*	**2**	**4**	**19**	Municipal Public Transport Hub
Lospalos	*<10*	**1**	**2**	*1*	**1**	**3**	**7**	On-Street Interchange *w Layover Parking*
Viqueque	*<10*	**1**	**2**	*5*	**3**	**3**	**9**	On-Street Interchange *w Layover Parking*
Aileu	*<10*	**1**	**2**	*10*	**2**	-	**5**	On-Street Interchange
Maubisse	*<10*	**1**	**2**	*5*	**1**	-	**4**	On-Street Interchange
Same	*4*	**1**	**1**	***2***	**1**	**5**	**8**	On-Street Interchange *w Layover Parking*
Suai	*<10*	**1**	**2**	*2*	**1**	**5**	**9**	On-Street Interchange *w Layover Parking*
Ainaro	*<10*	**1**	**2**	*3*	**1**	**3**	**7**	On-Street Interchange *w Layover Parking*
Liquica	*10*	**1**	**6**	*6*	**1**	**-**	**8**	On-Street Interchange *w Layover Parking*
Batugade	**-**	-	**-**	*3*	**1**	**5**	**6**	On-Street Interchange
Maliana	*3*	**1**	**2**	*3*	**1**	**8**	**12**	On-Street Interchange *w Layover Parking*
Ermera	*12*	**1**	**4**	*5*	**1**	**8**	**14**	On-Street Interchange *w Layover Parking*

Notes:
[A] On-street interchange with layover parking at rural locations would require parking overnight due to long-distance travel between Dili and rural locations (these are not necessarily for staging during the day).
[B] The number of layover / parking bays in Dili is based on site observations conducted in August 2023.

7.9 Public Transport Facility Sizing Estimates

Rules for Sizing Facility Elements

Scaling the sizing requirements for each facility is based on a combination of variable bay sizing (from the previous section) and the number of passengers accommodated for the relative number of peak hour trips. For example, concrete bus bay area and vehicle circulating area is increased relative to the number of bays. Similarly, concrete curb and gutters are scaled based on the total curb length required to support the total number of bays. Passenger amenities, such as the waiting area and roof are scaled based on the total number of potential passengers that result from the number of peak hour vehicles servicing the facility.

Table 7.29: Rules for Sizing Facility Elements

Element		Unit	Based on	Adopted Rule for Sizing Estimate
Concrete Bus Bay + Bus Circulating Area	Microlet Passenger Bay	m^2	Per Bay	Microlet Bay: 5m x 3m = 15m^2 Off-Street Facility: Circulating Area Assumed to be 1.5x Total Parking Bay Area.
	Microlet Layover Bay	m^2	Per Bay	Microlet Bay: 5m x 3m = 15m^2 Off-Street Facility: Circulating Area Assumed to be 1.5x Layover Bay Area.
	Regional Passenger Bay	m^2	Per Bay	Regional bus bay sized to future-proof for future urban bus. Regional bus bay: 13m x 3m = 39m^2 Off-Street Facility: Circulating Area Assumed to be 1.5x Total Parking Bay Area.
	Regional Layover Bay	m^2	Per Bay	Regional bus bay sized to future-proof for future urban bus. Regional bus bay: 13m x 3m = 39m^2 Off-Street Facility: Circulating Area Assumed to be 1.5x Layover Bay Area.
	Total	**m^2**		**Total of Above**
Concrete Curb and Gutters		m	Per Bay	36m per Passenger Bay; 72m per Layover Bay (to Account for Entire Perimeter of Circulating Area).
Drop-off Area		m^2	Per Bay	Off-Street Facility: Minimum of 126m^2 (2 Car Park Spaces with entry/exit), Additional 13m^2 per 3 Passenger Bays.
Waiting & Queuing Area (With Seating)		m^2	Per Passenger	Transit Capacity and Quality of Service Manual[128]: Adopt Level of Service A (1.2m^2 per person) + 18m^2 Per Passenger Bay (For Walking/Loading) + 25% Growth Factor on Total.
Terminal Facility Roof		m^2	Per Waiting Area	1.25 x Waiting Area + Retail + Offices and Toilets (Roof covers waiting area, retail offices and toilets with some overhang).
Wayfinding Signage		#	Per Facility	Off-Street Facility: 10. On-Street Interchange: 4.
Ticket & Fare Collection Point		m^2	Per Facility	Off-Street Facility: 16m^2 Per Facility
Retail/Kiosk		m^2	Ratio of Waiting Area	Off-Street Facility: Additional 40% of Passenger Waiting Area.
Toilets		m^2	Per Facility	Off-Street Facility: 40m^2 Per Facility
Lighting		#	Per Concrete Area	Off-Street Facility: One per 100m^2
Tactile Paving		m^2	Per Bay	1x Long Length of Regional Bus Passenger Bay (13m) - Longest bus bay.
Fan		#	Per Waiting Area and Retail	Off-Street Facility: One fan per 250m^2 for waiting area and retail/kiosk
Security Office		m^2	Per Facility	Off-Street Facility: 16m^2 Per Facility
Operation Office		m^2	Per Facility	Off-Street Facility: 25m^2 Per Facility
Administration office		m^2	Per Facility	Off-Street Facility: 25m^2 Per Facility
External Works		m^2	Per Facility	On-Street Interchange: Number of bays + 100m^2 (50m^2 Either Side of Facility). Off-Street Facility: 100m^2 (50m^2 Either Side of Facility Entrance)

The results of the facility sizing estimates are shown in the table below. These are indicative sizes to inform costing estimates however may be refined at later design stages based on site specific constraints/opportunities.

[128] TRB Transit Cooperative Research Program Report 165, 2017.

Table 7.30: Indicative Size Requirements by Location

Service Region		Units	Dili - East	Dili - West	Dili - South	Baucau	Lospalos	Viqueque	Aileu	Maubisse	Same	Suai	Ainaro	Liquica	Batugade	Maliana	Ermera
Proposed Facility Type			**A**	**A**	**A**	**A**	**B**	**B**	**C**	**C**	**B**	**B**	**B**	**C**	**B**	**B**	**B**
Concrete Bus Bay + Bus Circulating Area	Microlet – Loading/ Unloading Bays	m²	300	525	525	38	38	38	38	38	38	38	38	38	0	38	38
	Microlet - Layover/ Parking Bays	m²	1,800	1,050	1,163	450	75	75	75	75	38	75	75	225	0	75	150
	Regional – Loading/ Unloading Bays	m²	488	585	195	195	98	293	195	98	98	98	98	98	98	98	98
	Regional - Layover/ Parking Bays	m²	1,755	1,950	683	390	293	293	0	0	488	488	293	0	488	780	780
	Total	m²	**4,343**	**4,110**	**2,565**	**1,073**	**503**	**698**	**308**	**210**	**660**	**698**	**503**	**360**	**585**	**990**	**1,065**
Concrete Curb and Gutters		m²	5,220	4,176	3,312	1,260	432	504	252	216	504	576	432	504	396	792	936
Drop-off Area		m²	182	213	195	139											
Waiting & Queuing Area (With Seating)		m²	686	1,014	744	179	111	246	179	111	111	111	111	111	68	111	111
Ticket & Fare Collection Point		m²	16	16	16	16											
Retail/Kiosk		m²	274	406	298	71											
Toilets		m²	40	40	40	40											
Tactile Paving		m²	169	260	208	39	26	52	39	26	26	26	26	26	13	26	26
Operation Office		m²	25	25	25	25	-	-	-	-	-	-	-	-	-	-	-
Administration Office		m²	25	25	25	25	-	-	-	-	-	-	-	-	-	-	-
Security Office		m²	16	16	16	16	-	-	-	-	-	-	-	-	-	-	-
Total Facility Area (Loading/Unloading)		m²	**2,052**	**2,864**	**2,079**	**743**	**246**	**576**	**411**	**246**	**246**	**246**	**246**	**246**	**165**	**246**	**246**
Total Facility Area (Layover/Parking Only)		m²	**3,555**	**3,000**	**1,845**	**840**	**368**	**368**	**75**	**75**	**525**	**563**	**368**	**225**	**488**	**855**	**930**
Total Facility Area (Combined)		**m²**	**5,607**	**5,864**	**3,924**	**1,583**	**614**	**944**	**486**	**321**	**771**	**809**	**614**	**471**	**653**	**1,101**	**1,176**
Indicative Total Facility Area (Rounded to Nearest Hundred)		**m²**	**5,700**	**5,900**	**4,000**	**1,600**	**700**	**1,000**	**500**	**400**	**800**	**900**	**700**	**500**	**700**	**1,200**	**1,200**

Note: Proposed facility type is as follows: A – Off-Street Terminal; B – On-Street with Layover Parking; and C – On-Street Interchanges.

7.10 Tier 2 Assessment Results

7.10.1 Tier 2 Overview

The Tier 1 assessment considers a subset of the overall criteria presented in **Table** 7.7. The purpose of the Tier 1 assessment is the filter the longlist of more than 40 sites to a more manageable shortlist of more than 20 sites. The purpose of the Tier 2 assessment is to take a more detailed assessment of the sites considering more detailed and quantitative factors to identify the preferred list of facilities. The Tier 2 analysis builds on the Tier 1 analysis and also includes the following criteria (using the same 1-5 point scoring range used before with scoring thresholds identified in **Table** 7.7):

- **Stakeholder Feedback** – The Tier 2 assessment includes the MOTC Feedback criterion, which was also considered in the Tier 1 assessment.
- **Strategic Alignment** – The Tier 2 assessment covers the three criteria also assessed under Tier 1, that is: (i) Alignment with Strategic Document; (ii) Accessibility to City Center; and (iii) Existing Key Generators Density.
- **Operational** – The Tier 2 assessment covers the Accessibility to Main Road criterion also used for Tier 1. However, Tier 2 assessment covers two additional criteria; (i) Traffic Implication; and (ii) Public Transport Line / Network Integration.
- **Environmental and Social** – Similar Tier 1 and Tier 2 criteria include: (i) Resettlement Impact / Economic Impact; (ii) Trees Removal; and (iii) Impact on Nearby Water Bodies. Tier 2 also covers Proximity to Air and Noise Receptors.
- **Engineering Feasibility** – Tier 1 does not assess any criteria under this category; however, Tier 2 includes two criteria: (i) Disruption to Existing Utilities; and (ii) Exposure and Sensitivity to Climate Change / Hazard Risk.

7.10.2 Tier 2 Scoring Results Summary

Table 7.31 presents the Tier 2 finds. Tier 2 results for service regions of Dili are used to identify the particular facility site, whereas for other municipal sites, this Tier 2 assessment represents validation against the additional Tier 2 assessment criteria. Findings by service area are presented in the subsequent sections.

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Table 7.31: Tier 2 Site Assessment Scoring

			A: Stakeholder Feedback	B: Strategic Alignment			C: Operational			D: Environmental and Social				E: Engineering Feasibility		
ID	Munici-pality / Area	Facility	A1: MOTC Feedback as Strategic Site	B1: Alignment with Strategic Documents	B2: Accessibility to City Center	B3: Existing Key Generators Density	C1: Accessibility to Main Road	C2: Traffic Implication	C3: Public Transport Line/ Network Integration	D1: Resettlement & Economic Impacts	D2: Trees Removal	D3: Impact on Nearby Water Bodies	D4: Proximity to Air and Noise Receptors	E1: Disruption to Existing Utilities	E2: Exposure and Sensitivity to Climate Change / Hazard Risk	Tier 2 Composite Score (Out of 5)
Dili - East																
1	Dili	Becora Terminal	3.0	3.0	2.0	3.0	5.0	1.0	3.0	5.0	5.0	2.0	2.0	5.0	2.0	3.1
2	Dili	Hera	5.0	3.0	1.0	1.0	4.0	3.0	2.0	2.0	4.0	3.0	2.0	5.0	3.0	3.3
Dili - South																
5	Dili	Taibessi Terminal	3.0	3.0	3.0	3.0	1.0	3.0	3.0	5.0	5.0	2.0	2.0	5.0	3.0	3.2
6	Dili	Manleuana Market	5.0	1.0	2.0	3.0	4.0	3.0	4.0	5.0	5.0	3.0	2.0	5.0	3.0	3.7
Dili – West																
8	Dili	Tasitolu Terminal (Microlet)	3.0	1.0	1.0	3.0	5.0	2.0	3.0	5.0	5.0	2.0	2.0	5.0	3.0	3.1
9	Dili	Tasitolu Terminal (Regional Bus)	3.0	3.0	1.0	3.0	5.0	2.0	3.0	5.0	5.0	2.0	2.0	5.0	3.0	3.2
11	Dili	Airport Transit Hub	3.0	3.0	1.0	4.0	4.0	3.0	4.0	5.0	5.0	3.0	2.0	5.0	3.0	3.4
Dili - Central																
13	Dili	Dili Convention Center	3.0	3.0	5.0	5.0	4.0	3.0	3.0	5.0	5.0	4.0	2.0	5.0	3.0	3.7
14	Dili	Dili Port Interchange	3.0	3.0	4.0	5.0	5.0	3.0	3.0	5.0	5.0	2.0	2.0	5.0	3.0	3.6
Ainaro																
16	Ainaro	Ainaro - Plot 2	3.0	1.0	4.0	3.0	5.0	3.0	3.0	5.0	4.0	2.0	2.0	5.0	2.0	3.2
Aileu																
17	Aileu	Aileu - Plot 1	3.0	1.0	5.0	4.0	5.0	2.0	3.0	4.0	5.0	3.0	2.0	5.0	2.0	3.3
Batugade																
18	Batugade	Batugade - Plot 1	3.0	1.0	5.0	3.0	5.0	3.0	3.0	5.0	4.0	2.0	2.0	5.0	3.0	3.4
19	Batugade	Batugade Border Control Bus Terminal	3.0	1.0	2.0	4.0	5.0	2.0	3.0	5.0	5.0	2.0	3.0	5.0	3.0	3.3
Baucau																
20	Baucau	Baucau Central Terminal	1.0	3.0	5.0	5.0	5.0	1.0	3.0	5.0	5.0	5.0	2.0	3.0	2.0	3.0
21	Baucau	Aldeia Samalakuliba	3.0	1.0	3.0	2.0	3.0	5.0	3.0	5.0	5.0	5.0	3.0	5.0	2.0	3.3
Ermera																
22	Ermera	Ermera Bus Stop	3.0	1.0	5.0	3.0	5.0	3.0	3.0	5.0	3.0	5.0	2.0	5.0	2.0	3.4
Liquica																
23	Liquica	Liquica - Plot 1	3.0	1.0	3.0	4.0	5.0	1.0	3.0	2.0	4.0	2.0	2.0	4.0	4.0	3.0
Lospalos																
24	Lospalos	Lospalos Bemoris	3.0	1.0	3.0	3.0	5.0	3.0	3.0	1.0	5.0	5.0	2.0	5.0	3.0	3.3
Maliana																
30	Maliana	Maliana Market	3.0	1.0	5.0	4.0	4.0	2.0	3.0	3.0	5.0	3.0	2.0	5.0	3.0	3.3
Manatuto																
33	Manatuto	Manatuto - Plot 1	3.0	1.0	5.0	3.0	1.0	4.0	3.0	5.0	5.0	2.0	2.0	5.0	2.0	3.1
Maubisse																
35	Maubisse	Maubisse - Plot 2	3.0	1.0	5.0	4.0	5.0	1.0	3.0	5.0	5.0	5.0	2.0	5.0	3.0	3.5
Same																
36	Same	Same - Plot 1	3.0	1.0	5.0	4.0	5.0	2.0	3.0	5.0	1.0	4.0	2.0	5.0	3.0	3.3
Suai																
37	Suai	Suai Market	3.0	1.0	5.0	4.0	5.0	2.0	3.0	3.0	5.0	4.0	2.0	5.0	3.0	3.4
Viqueque																
40	Viqueque	Viqueque City Center	3.0	1.0	5.0	4.0	5.0	3.0	3.0	5.0	5.0	2.0	2.0	5.0	3.0	3.5

7.10.3 Tier 2 Findings - Dili Central Service Region

A summary of the Tier 2 site assessment results is provided below:

- **Dili Convention Center –** The Dili Convention Center is strategically positioned at the city center, surrounded by numerous key generators, making it an ideal pass-through location with an extensive microlet network that effectively covers the entire Dili City Center area. Nestled beside the convention center, this site optimizes its limited available space by utilizing vacant land and capitalizes on its proximity to a local road, rendering it suitable as an on-street interchange.

- **Dili Port Interchange -** Dili Port Interchange presents a strategic location for a public transport interchange in conjunction with future port redevelopment. It presents an opportunity to implement a public transport interchange in conjunction with the port redevelopment, therefore the timing of this implementation will depend on the progress redeveloping the Port. Given the land requirements for broader Port functions, the Dili Port Interchange site is not suited to act as the primarily regional terminal in Dili, however it is more suited to a smaller-scale on-street interchange for microlet and future urban bus services.

Recommendation: Dili Convention Center represents a priority site in the medium-term, while the Dili Port Interchange presents an opportunity for a public transport interchange in conjunction with the Port redevelopment.

A facility concept design (indicative only) of the selected terminal is provided below:

Source: Arup Study Team

Figure 7.28: Dili Convention Center Concept Design (Indicative)

7.10.4 Tier 2 Findings - Dili South Service Region

A summary of the Tier 2 site assessment results is provided below:

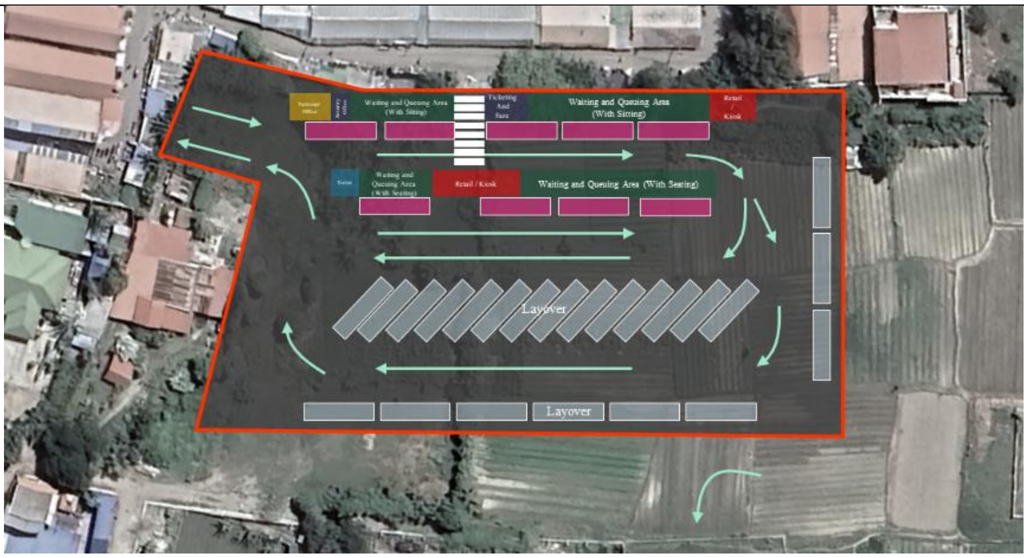
- **Manleuana Market -** The Manleuana Market presents an opportunity for an integrated and modern interchange with the market, with the preference of this site over the existing Taibesi Terminal strengthened since the construction of the new direct road connection Sarlala Road to the Manleuana Market, reducing travel times for passengers – with many public transport vehicles already travelling to

Manleuana Market and using it informally without dedicated public transport infrastructure.

- **Taibesi Terminal -** While not preferred for a passenger terminal due to increased travel times, the opportunity exists to transition Taibesi Terminal to a primary freight hub serving anggunas for Dili. This opportunity is strengthened by its co-location with the adjacent markets.

Recommendation: Manleuana Market is a priority site in the medium-term, creating more capacity at Taibessi Terminal for angguna drop off and public transport parking.

A facility concept design (indicative only) of the selected terminal is provided below:



Source: Arup Study Team

Figure 7.29: Manleuana Market Concept Design (Indicative)

7.10.5 Tier 2 Findings - Dili West Service Region

A summary of the Tier 2 site assessment results is provided below:

- **Airport Transit Hub -** The Airport Transit Hub presents the opportunity to develop a municipal public transport hub integrated with the airport, connecting municipalities, the Indonesia Border, airport, and the rest of Dili. This should be developed in conjunction with the airport redevelopment.

- **Tasitolu -** The current site used for the Tasitolu Terminal is informal and has been highlighted for other uses or earmarked for development into a more formal on-street interchange with a particular focus on serving the inner city microlet transportation needs. However, the Government also expressed that it is preferred that this is not a terminal site due to it being a religious area.The Dili Airport Transit Hub is preferred as it offers the potential to connect western border services to the airport.

Recommendation: The Airport Transit Hub presents a priority public transport facility location in the medium-term to integrate with the airport redevelopment and connect regional services to Dili urban services. A bus stop can be provided at Tasitolu to minimize any impacts to adjacent religious sites. In the longer-term, an "on-street" regional bus passenger interchange should be implemented at Tibar in conjunction with industrial development.

A facility concept design (indicative only) of the selected terminal is provided below (note bays are sized to accommodate two Microlets each, while remaining large enough to fugure-proof for future bus vehicles):

Source: Arup Study Team

Figure 7.30: Airport Transit Hub Concept Design (Indicative)

7.10.6 Tier 2 Findings - Dili East Service Region

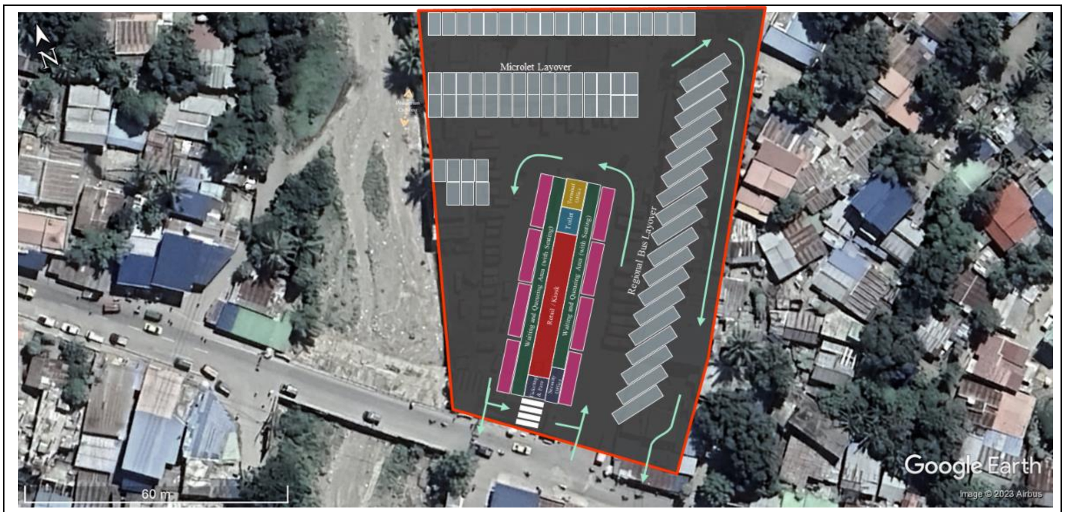
A summary of the Tier 2 site assessment results is provided below:

- **Becora Terminal -** The Becora Terminal is situated within the urban area surrounded by activity generators. While there are concerns about safety due to the current operation of the facility, the facility should be redeveloped to accommodate modern public transport services and safety for passengers. This results in a strategically placed terminal within the urban area, reducing the deadheading that would be required by microlet services if they were to travel to Hera. If during the design stage additional space is required, it can be achieved by expanding the terminal footprint north (also owned by government) however would involve some displacement of current informal settlements.

- **Hera -** The Hera site currently has no adjacent land use and some informal settlements. The site would also require longer distance microlet travel to take passengers to this location outside of the Dili urban area to access regional bus services. However, in the longer-term, as this site is developed, the site should be connected to Dili with an on-street interchange for regional buses and buses travelling between the eastern settlements of Dili Municipality.

Recommendation: The Becora Terminal should be redeveloped to provide a modern public transport level of service, due to its preferrable location. An on-street interchange for through routes should be provided at Hera in the long term, in conjunction with the affordable housing development that is planned.

A facility concept design (indicative only) of the selected terminal is provided below (note Microlet layover bays are defined with line marking, this open space can be reconfigured if future urban bus vehicles are procured):



Source: Arup Study Team

Figure 7.31: Becora Terminal Concept Design (Indicative)

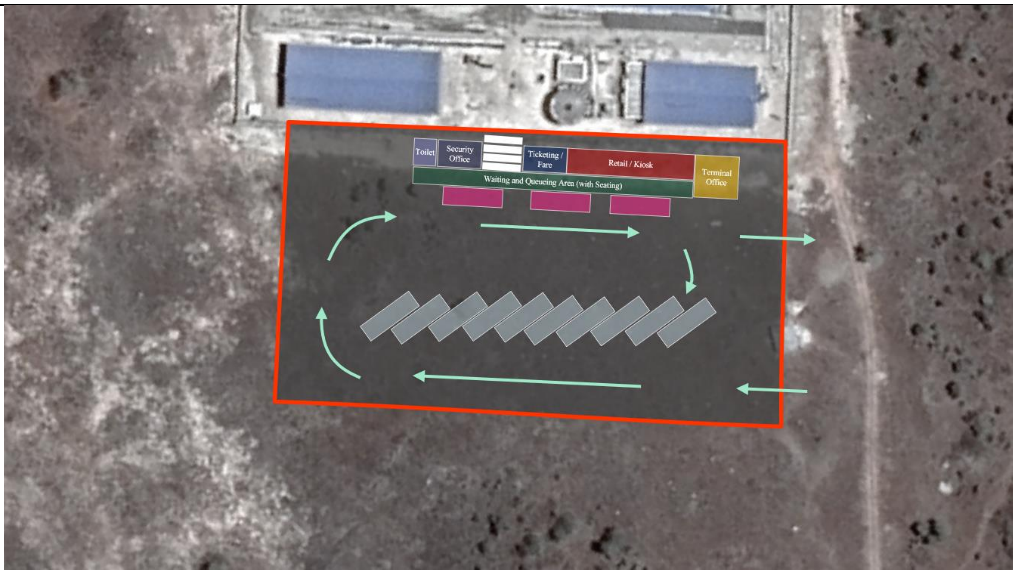
7.10.7 Tier 2 Findings - Baucau Service Region

A summary of the Tier 2 site assessment results is provided below:

- **Aldeia Samalakuliba (Integrated Market Terminal) -** Scoring highest of the two site options in Baucau, the opportunity to integrate a public transport terminal with the new market development should be pursued with the development of a municipal public transport hub serving regional buses connecting to the eastern municipalities, as well as microlet services connecting into the urban area of Baucau.
- **Baucau Central Terminal -** The existing Baucau Central Terminal site is being redeveloped into a sports venue by the local government, which is a higher value use than a public transport terminal. Therefore, the preferred site is Aldeia Samalakuliba however the opportunity still exists to provide an on-street interchange facility for microlet services at this location (as well as potentially regional bus services on their way to the terminating location at the market).

Recommendation: A municipal terminal should be developed at Aldeia Samalakuliba integrated with the marketplace to support passenger access from across the region. Additionally, an on-street interchange should be provided adjacent to the existing terminal, to connect passengers with the sporting facility that is planned to be developed at this location.

A facility concept layout (indicative only) of the selected terminal is provided below (note bays are sized to accommodate two Microlets each, while remaining large enough to future-proof for future bus vehicles):



Source: Arup Study Team

Figure 7.32: Aldeia Samalakuliba Concept Design (Indicative)

7.10.8 Tier 2 Findings - Other Service Region

A list of the preferred on-street interchange locations arising from the facility assessment process is summarized in **Table 7.35**.

For those facilities where layover parking is required, the size of the preferred passenger sites in most municipalities allows for the co-location of parking space off-street behind the on-street interchange passenger area. In select locations (Lospalos, Maliana and Suai), space constraints at priority passenger interchange locations in the urban area result in the preference for layover parking spaces to be located separately, to maintain accessibility of the central passenger boarding/alighting location.

Table 7.32: Facility Locations in Service Area Regions Outside of Dili

Service Region	On-Street Interchange Location (Priority Passenger Locations)	Layover Parking Location
Aileu	Aileu - Plot 1	Aileu - Plot 1
Ainaro	Ainaro - Plot 2	Ainaro - Plot 2
Batugade	Batugade - Plot 1	-
Batugade	Batugade Border Bus Terminal	Batugade Border Bus Terminal
Ermera	Ermera Bus Stop	Ermera Bus Stop
Liquica	Liquica - Plot 1	Liquica - Plot 1
Lospalos	Lospalos Bemoris	Nakroman 2
Maliana	Maliana Market	Samelaun, Ritabou
Manatuto	Manatuto - Plot 1	Manatuto - Plot 1
Maubisse	Maubisse - Plot 2	Maubisse - Plot 2
Same	Same - Plot 1	Same - Plot 1
Suai	Suai Market	Covalima
Viqueque	Viqueque City Centre	Viqueque City Centre

Recommendation: It is recommended that based on capacity requirements, high-quality on-street interchanges are implemented at the above locations, integrating with the surrounding urban form, and providing convenient accessibility to the urban centers.

In some locations where layover parking may be required in the future (with the upgrade of future bus fleets), layover/overnight parking can be co-located with these facilities (off-street) in Manatuto, Aileu, Ainaro, Batugade, Ermera, Liquica, Same and Viqueque.

In the long-term, layover/parking space should be provided at a different location in Lospalos, Maliana and Suai to maintain the convenience in location of the core passenger interchange.

A concept layout for an on-street interchange is provided below in Viqueque (on-street interchange co-located with layover parking), and Suai (on-street interchange with two short-stay layover parking bays, separated from additional layover parking bays):

Viqueque City Center (On-Street Interchange co-located with Layover Parking)

Suai Market (On-Street Interchange) and Samelaun, Ritabou (Layover Parking)

Source: Arup Study Team

Figure 7.33: On-Street Interchange Concept Design (Indicative)

7.11 Bus Stop

7.11.1 Overview

Bus stops are an important infrastructural element to support the safe, efficient, and comfortable boarding and alighting of public transport services. As the highest populated urban center with the most urban public transport services – Dili is a priority location for bus stop infrastructure to support the population. Based on existing demand data observed during field surveys, prioritization of bus stop improvements has been developed for short, medium, and long-term implementation.

There are five compelling reasons why bus stops play a vital role and why it is crucial for Dili to invest significantly in improving its bus stop systems as supporting passenger infrastructure. These reasons are:

- **Easy Implementation and Integration**
    - Bus stops are agile, easy to implement, and can be integrated into cities for Transit-Oriented Development (TOD).
    - Bus stops can be easily integrated with other modes of transportation, such as taxis and non-motorized mobility options, facilitating seamless travel for passengers.
- **Promoting Public Transport**
    - Research shows that better bus stops attract more passengers to use public transport, reducing reliance on individual cars and promoting sustainable mobility.
- **Accessibility and Connectivity**
    - Bus stops improve accessibility, providing designated points for passengers to board and alight safely.
    - Unlike train stations, bus stops can easily enhance rural connectivity, linking remote communities to urban centers and supporting inclusive development.
- **Economic Benefits**
    - A well-developed bus stop system contributes to economic development by enabling people to access job opportunities and markets easily.
    - Bus stops also serve to drive foot traffic to nearby commercial areas, stimulating local businesses and improving the overall economy.
- **Safety and Security**
    - Bus stops offer a safer environment for passengers, keeping them away from traffic and potentially dangerous areas.

To achieve the full potential of bus stops, as listed above, they need to be properly designed and constructed to be welcoming to all users. As such, two distinct categories of passenger infrastructure are recommended for a bus stop -

- **Bus Stop / Shelter**
    - **Flagpole** - Highlights the bus stop location and allows easy identification of the stop from a distance.
    - **Bus Stop Signage** - Provides essential information, such as bus route numbers and schedules, aiding passengers in making informed decisions.
    - **System Information Panel** - Displays route maps, timetables, and real-time service updates for easy journey planning. This information should

be clear and easily legible by all, with friendly user graphics and up-to-date details to assist passengers in planning their journeys.

    - **Bus Shelter -** Provides passengers with protection from weather elements like rain and sun, making the wait more comfortable and encouraging the use of public transport services.
    - **Bench -** Offers comfortable seating for passengers, including elderly individuals, people with disabilities, and those carrying heavy bags, while waiting for the bus.
    - **Concrete Bus Bay (1 bay) -** Allows buses to pull off the main road, avoiding traffic congestion and offering a designated space for buses to stop. This allows smooth and safe boarding and alighting, while reducing traffic build-up due to bus starting and stopping.
    - **Concrete Curb and Gutters -** Ensure a clear separation between the road and the bus stop area, enhancing safety for passengers.
    - **Streetlight -** Ensures visibility during nighttime, enhancing safety for passengers waiting at the bus stop and improving confidence in public transport.
    - **Tactile Paving -** Helps visually impaired individuals navigate the area safely by providing tactile cues.
    - **Tree Removal/Replanting -** Enables the efficient utilization of space while preserving greenery and maintaining an aesthetically pleasing environment.

- **Pedestrian Real and Crossing Improvement -**
    - **Sidewalk Improvement -** Creates a smooth and safe walking path, enhancing the pedestrian experience. This also improves the accessibility of bus stops as they can be reached easily by walking.
    - **Curb Ramp Improvement -** Enables easy wheelchair and stroller access to sidewalks, promoting inclusivity.
    - **Zebra Crossing -** Provides a marked pedestrian crossing area for safe road crossings.
    - **Crosswalk Signals with Pedestrian Countdown Timers -** Enhances pedestrian safety by providing clear signals for crossing and countdown timers for added awareness.
    - **Pedestrian Refuge Islands -** Offers a haven for pedestrians during multi-lane road crossings, reducing the risk of accidents.
    - **Proper Street Markings and Signage -** Enhances visibility and informs drivers of pedestrian crossings, promoting safety.

7.11.2 Priority Locations for Bus Stop Improvement

Currently there are no formally utilized bus stops in Timor-Leste, meaning that boarding and alighting patterns cannot be easily assigned. As shown in **Appendix A**, surveyors travelled on each of the 13 microlet routes in Dili to profile the pattern of boardings/ alightings. While specific bus stops do not exist, passengers are observed to board and alight at locations with some level of convenience – i.e., near their ultimate origin or destination along the prescribed microlet route.

Based on the results of the surveys and field observations, priority locations for bus stop improvement are identified as below:

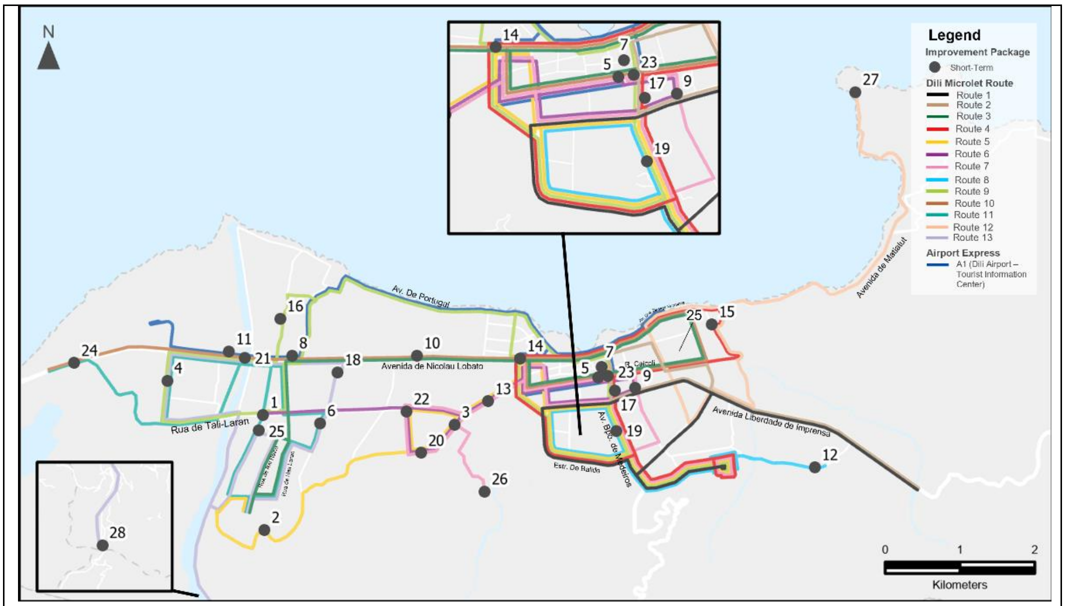
- **Highest Demand Locations** – Key locations with high passenger alightings/boardings include Timor Plaza Hotel, UNTL, Governmetn Palace, Tasitolu, etc.

- **Terminating Locations of Microlet Routes (without Terminal Access)** – Five Dili microlet routes operating in Dili (Microlet Route#6, #7, #8, #9, #12, and #13) do not serve the terminal resulting in passengers waiting on street without covered bus shelters and passenger amenities.

Table 7.33: List of Priority Bus Stops in Dili

ID	Location	Quantity	Note
A. Locations with Highest Demand (Based on Survey Results)			
1	Rotunda Fomento	1	Terminating location of Route 6
2	Manleu (Bua Laran)	2	
3	Ailok Laran-O1	2	
4	Kampung Baru	1	Terminating location of Route 9
5	UNTL Central	2	
6	Ai Mutin	2	
7	Palacio Do Governo	2	
8	Timor Plaza	2	
9	AUDIAN	2	
10	Fatuhada	2	
11	Academia Policia	2	
12	Bekusi (STM Becora)	1	Terminating location of Route 8
13	Fatumeta	2	
14	Mandarin	2	
15	Bidau Cruzamento	2	
16	Bebonuk	2	
17	Estádio	2	
18	Aimutin UNPAZ	2	
19	UNDIL	2	
20	Bairo Pite	2	
21	Fomentu/Tuty (Ponte Cplp Ninin)	2	
22	Hudi Laran	2	
23	Untl (Vaganza)	2	
24	Tasi-Tolu (Bandidu Qualidade)	2	
25	Delta 3	2	
B. Additional Locations (End of Microlet Route without Access to Terminal)			
26	Tuana Laran	1	Terminating location of Route 7
27	Cristo Rei	1	Terminating location of Route 12
28	Kasnafar	1	Terminating location of Route 13
Total Quantity		50	

Notes: For quantity, a pair of bus stops (two) is assumed for each location except the terminating location of the microlet routes without access to the terminal(s).



Source: Arup Study Team

Figure 7.34: Location of Priority Bus Stop Improvements

7.12 Summary of Recommended Passenger Facilities

The two maps below **(Figure 7.35** and **Figure 7.36**) provide a summary of the preferred passenger facilities across Timor-Leste, and more specifically across Dili, respectively. Together, these facilities once implemented can provide high-quality, safe, and amenable access to public transport services for the population of Timor-Leste, contributing to the country's economic and social development objectives.

- **Municipal Public Transport Hubs –** These hubs are recommended in areas with the highest combination of regional and microlet bus services – namely Dili and Baucau. These facilities support the interchange between the relatively highest number of regional bus services each day, with urban microlet services. These locations act as natural convergence points for regional bus services travelling to and from a range of more remote municipalities. As such, both the number of bays required, and the number of passengers serviced requires a high-quality facility with adequate space and amenities.

Table 7.34: Municipal Public Transport Hub Locations

Service Region	On-Street Interchange Location	Layover Parking Location
Dili – West	Airport Transit Hub	Airport Transit Hub
Dili – East	Becora Terminal	Becora Terminal
Dili – South	Manleuana Market	Manleuana Market
Baucau	Aldeia Samalakuliba	Aldeia Samalakuliba

- **On-Street Interchanges with Layover Parking** – Such interchanges are recommended at municipal locations with "terminating" regional bus services. Most of these locations only require 1-2 passenger pick up/drop off bays to support the number of combined regional and microlet trips during the peak hours. In many cases, these locations do not experience more than two regional buses/day. By making the distinction between passenger loading/unloading bays and layover/parking bays – the provision of on-street interchanges in these municipalities can be optimized for maximum passenger accessibility and spatial efficiency, while layover/parking spaces in the long term can be provided in more remote locations (outside of the core urban area).

Table 7.35: On-Street Interchange Locations (with Layover/Parking)

Service Region	On-Street Interchange Location	Layover Parking Location
Aileu	Aileu - Plot 1	Aileu - Plot 1
Ainaro	Ainaro - Plot 2	Ainaro - Plot 2
Batugade	Batugade Border Bus Terminal	Batugade Border Bus Terminal
Ermera	Ermera Bus Stop	Ermera Bus Stop
Liquica	Liquica - Plot 1	Liquica - Plot 1
Lospalos	Lospalos Bemoris	Nakroman 2
Maliana	Maliana Market	Samelaun, Ritabou
Manatuto	Manatuto - Plot 1	Manatuto - Plot 1
Maubisse	Maubisse - Plot 2	Maubisse - Plot 2
Same	Same - Plot 1	Same - Plot 1
Suai	Suai Market	Covalima
Viqueque	Viqueque City Centre	Viqueque City Centre

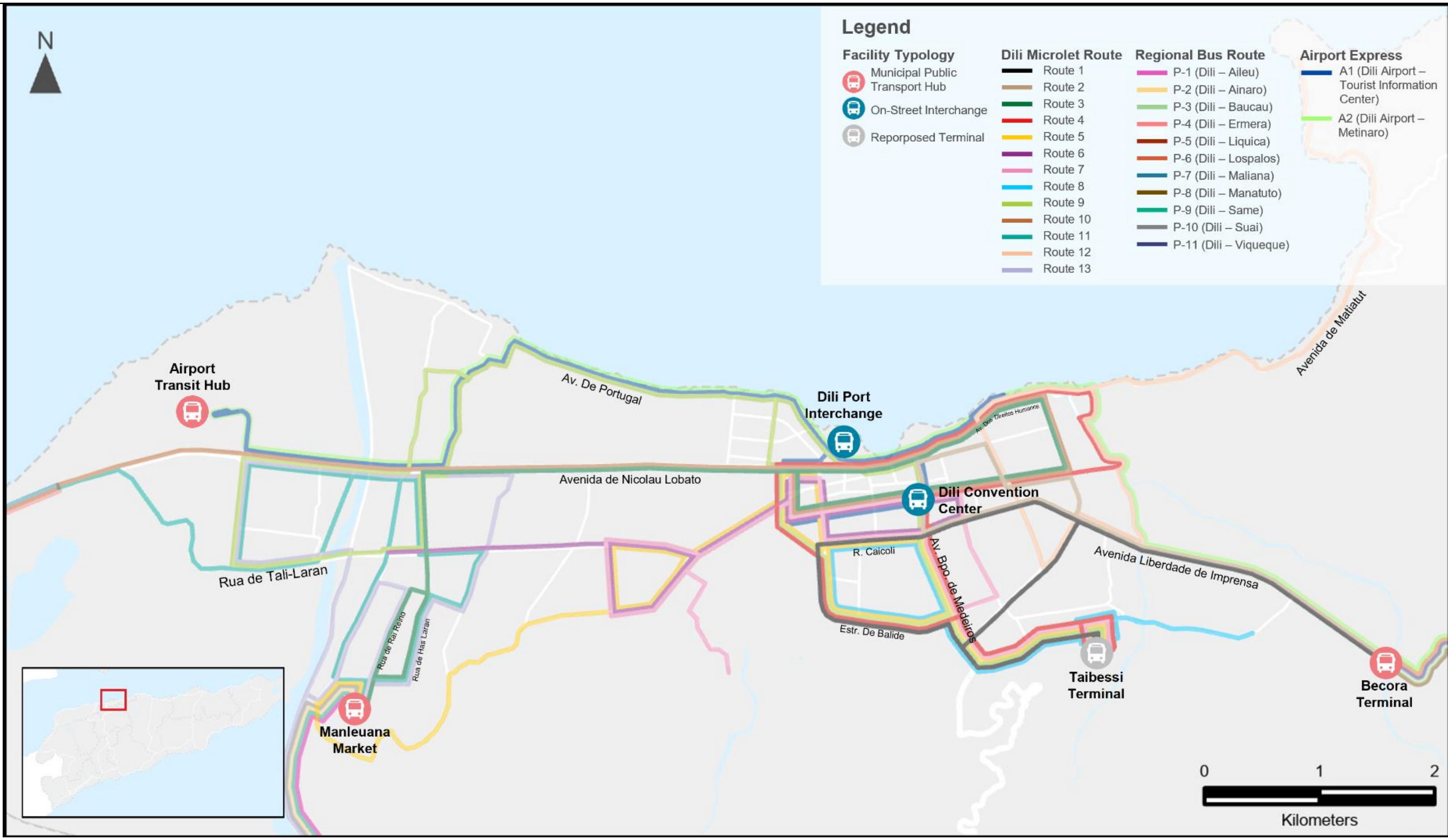
- **On-Street Interchanges** Without Layover Parking – These facilities are provided at key “through” destinations on regional bus routes, and in urban areas for Dili. These locations do not have terminating services or layovers, and act primarily as loading/unloading points for through routes.

Table 7.36: On-Street Interchange Locations (Without Layover Parking)

Service Region	On-Street Interchange Location
Dili – Central	Dili Port Interchange
Dili - Central	Dili Convention Center
Dili – East	Hera
Dili – East	Metinaro
Dili – East	Wenunuc
Dili - West	Tibar
Dili – West	Ulmera
Batugade	Batugade - Plot 1

Source: Arup Study Team

Figure 7.35: Timor-Leste Facility Locations and Typologies



Source: Arup Study Team

Figure 7.36: Dili Facility Locations and Typologies

7.12.1 Summary and Phasing

The recommended staging of public transport facilities and supporting infrastructure is summarized in **Table 7.37**. Investments are grouped into the following three stages:

- **Short-term (2023-2025) -** Will require MOTC / DNTT to implement in the short-term. Short-term recommendations are limited to bus stop infrastructure only.
- **Medium-term (2026-2030) -** To be included in the Asian Development Bank loan to the Timorese Government, with a more expansive focus on major terminals in Dili and supporting bus stop infrastructure.
- **Long-term (2031-2035) -** Longer term facility initiatives, such as regional terminals outside of Dili. The priority facilities among the long-term initiatives are the on-street facilities, with parking/layover space provided on an as-need basis.

Fundamentally, facilities and infrastructure that stand to have the most significant impact on achieving the Vision for Public Transport in Timor-Leste. This requires considering both strategic and technical criteria. Technical criteria include level of population services, level of public transport service (i.e. trips per day, peak trips), and level of demand. Strategic criteria were primarily ascertained through engagement with MOTC and identification of strategic opportunities. Together, these considerations informed the prioritization of public transport facilities for the medium term.

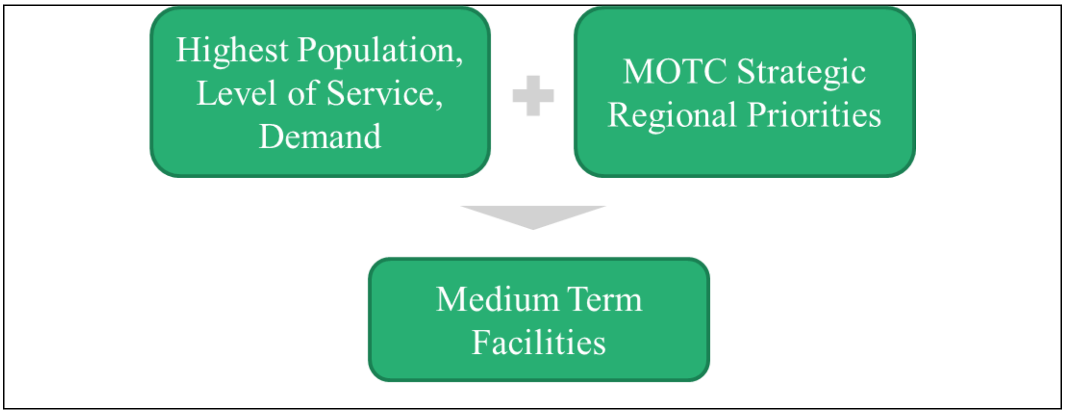


Figure 7.37: Screening Framework for Mid-Term Facilities

Based on both technical and strategic criteria, Manleuana Market, Airport Transit Hub, and the redevelopment of Becora Terminal all emerged as priorities. In addition, Baucau also emerged as a priority location. In addition, MOTC provided the following strategic insights to result in the following four locations being prioritized for implementation in the medium term.

The strategic considerations for specific sites highlighted by MOTC are summarized below.

Maliana

- Maliana is a neighboring municipality of Indonesian border (West Timor).
- Maliana will host border trade activities, a transit place for Indonesian tourists due to its proximity to Indonesia's land border.
- Maliana receives public transport passengers from 6 other administrative posts (Atabae, Balibo, Bobonaro, Cailaco, Lolotoe and Maliana).

- Maliana has land available for a public transport facility.

Suai

- Suai is a neighboring municipality of the Indonesian border (West Timor).
- Suai will host border trade activities, a transit place for Indonesian tourists due to its proximity to Indonesia's land border.
- Suai receives public transport passengers from 7 other administrative posts (Fatululic, Fatumean, Fohorem, Maucatar, Suai, Tilomar and Zumalai).
- Suai will construct an oil refinery/industrial center from the Tasi-Mane Project. Half of the section of highway road, the first highway section (Suai – Zumalai) has already been built. The remaining sections will be built in coming years to connect Suai to Viqueque.
- Suai has international airport currently in operation.
- Suai has land available for public transport facility.

Lospalos

- According to statistic data, the population of Lautem municipality is about 70,000 as of the 2022 Census. The number of public transport vehicles currently in operation in Lautem is 479 including bus, angguna, microlet and tum-tum. The number of public transport vehicles is increasing over time. According to data, there are about 50 new public transport proposals applying every year, and 30 tum-tum every year.
- Lospalos receives public transport passengers from 6 other administrative posts (Iliomar, Lautém, Lospalos, Luro, Lore and Tutuala).
- Even so there is no public transport terminal to accommodate the growth of public transport in Lautem Municipality.
- Lautem collects annual revenues from vehicle registration, licensing, and inspection services which is approximately US$53,800 collected in 2022. There is an opportunity to collect more fares through terminal use.
- Lautem municipality is a tourism center with both beaches such as Jaco, Com, Loré, Lautem etc. and mountains such as Ira-Lalar, Paicau, Ili Kere-Kere, Laleno, etc. The largest national park, known as Nino Konis Santana, is located in Lautem municipality. Thus, Lospalos town is positioned as a central transport hub in the future.
- Lospalos has land available for a public transport facility. The land has been attributed for terminal; if there is no mid-term development, this land could be reallocated by other priority development needs.

Viqueque

- Viqueque will construct an oil refinery/industrial center from the Tasi-Mane Project. As mentioned in Suai's description, there will be a highway connecting Viqueque to Beasu, which is close to the Viqueque town. This will potentially attract more movement for Viqueque public transport facilities.

- Viqueque receives public transport passengers from 5 other administrative posts (Lacluta, Ossu, Uatucarbau, Viqueque and Watulari).
- Viqueque has some well-known tourism centers such as Craras, and Hotspring.
- Viqueque also has a production center of coconut oil, and future fishing industry in Adarai.
- Viqueque collects annual revenues from vehicle registration, licensing, and inspection services which is approximately US$57,000 collected in 2022. There is an opportunity to collect more fares through terminal use.

Hera

- Following the ADB Mission held in 8-12 April 2024, the MOTC requested that the Mission consider Hera as a strategic bus terminal in the future. Given the Mission's observation (Box 7.1), it is anticipated that there is sufficient potential for a bus terminal at Hera in the future. Although Hera is included in the long-term investment plan as a target for an on-street bus stop in this Master Plan, a feasibility of developing a bus terminal at this location will be further assessed in align with the future government's plan.

Box 7.1: Mission's Observations on Hera Based on Site Visit

- According to MOTC, the land has been secured for future bus terminal development.
- Both locations are optimal and can effectively serve as interchange and transportation hubs.
- Considering factors such as demand, distance between Hera and Becora, existing infrastructure, and affordability of transportation options, it is advisable to designate both locations as hubs in the Master Plan.
- However, Hera will require additional improvements, including improved access roads to accommodate larger vehicles and possible relocation efforts if necessary. Environmental considerations such as tree replantation, and biodiversity screening / assessments will also need to be undertaken.
- In this context, a phased approach to the development of the Hera terminal is proposed. This would involve prioritizing the improvement of access infrastructure, followed by the phased development of the microlet terminal, and ultimately establishing it as a fully functional hub.
- In addition, the Hera terminal could be positioned to serve the needs of nearby cities, while the Becora hub would focus on serving the connectivity needs of Dili and act as a central link between Dili and Hera. Improvements to Becora can be initiated early.

The public transport facility and infrastructure phasing plan for each location is summarized as below:

Table 7.37: Timor-Leste Public Transport Facility and Infrastructure Phasing

ID	Facility	Location	Name	Proposed Facility Type in Future	Short Term 2023-2025	Medium Term 2026 - 2030	Long Term 2031 - 2035
1	Bus Stop	Dili	Dili Bus Stops	On-Street Bus Stop and Pedestrian Facility	X		
2	Interchange	Dili - Central	Dili Convention Center	On-Street Interchange		X	
3	Terminal	Dili - East	Becora Terminal	Municipal Public Transport Hub		X	
4	Terminal	Dili - West	Airport Transit Hub	Municipal Public Transport Hub		X	
6	Terminal	Dili - South	Manleuana Market	Municipal Public Transport Hub		X	
7	Terminal	Baucau	Aldeia Samalakuliba, Baucau	Municipal Public Transport Hub		X	
8	Terminal	Maliana	Maliana	On-Street Interchange with Layover Parking		X	
9	Terminal	Suai	Suai Market	On-Street Interchange with Layover Parking		X	
10	Terminal	Lospalos	Lospalos Bemoris	On-Street Interchange with Layover Parking		X	
11	Terminal	Viqueque	Viqueque City Center	On-Street Interchange with Layover Parking		X	
12	Interchange	Dili - Central	Dili Port Interchange	On-Street Interchange			X
13	Interchange	Dili - West	Ulmera	On-Street Interchange			X
14	Interchange	Dili – West	Tibar	On-Street Interchange			X
15	Interchange	Dili - East	Hera [A]	On-Street Interchange			X
16	Interchange	Dili - East	Wenunuc	On-Street Interchange			X
17	Interchange	Dili - East	Metinaro	On-Street Interchange			X
18	Terminal	Aileu	Aileu – Plot 1	On-Street Interchange with Layover Parking			X
19	Interchange	Maubisse	Maubisse – Plot 1	On-Street Interchange with Layover Parking			X
20	Terminal	Manatuto	Manatuto – Plot 1	On-Street Interchange with Layover Parking			X
21	Terminal	Same	Same – Plot 1	On-Street Interchange with Layover Parking			X
22	Terminal	Ainaro	Ainaro – Plot 2	On-Street Interchange with Layover Parking			X
23	Terminal	Liquica	Liquica – Plot 1	On-Street Interchange with Layover Parking			X
24	Interchange	Batugade	Batugade – Plot 1	On-Street Interchange			X
25	Terminal	Ermera	Ermera	On-Street Interchange with Layover Parking			X

Notes:
[A] During a consultation mission held in Dili, Timor-Leste, from 8-12 April 2024, the MOTC requested to consider Hera as a strategic bus terminal in the investment plan as there is sufficient potential for a bus terminal in the future. Based on the Mission’s site visits attended by ADB/MOTC, it was agreed that the Hera terminal could be positioned to serve the needs of nearby cities (as a bus terminal), while the Becora hub would focus on serving the connectivity needs of Dili and act as a central link between Dili and Hear.

8 Institutional Assessment, Operating Model & Capacity Development

8.1 Background

Effective management and operation of the public transport system in Timor-Leste requires a robust institutional framework – which is characterized by efficient coordination among key stakeholders, clear regulations and policies, clear roles and responsibilities, and a strong capacity for planning, operations, and evaluation.

This section builds on prior work to date conducted as part of the establishment of an LTA in Timor-Leste, specifically focusing on public transport within the broader transport ecosystem, conducting analysis of the current government's capacity to manage and operate the public transport system, with a focus on identifying opportunities for improvement in-line with the ongoing creation of the LTA.

This section is focused on achieving the following objectives based on the review of existing institutional framework and issues identified in **Section 3.5**:

- Review international best practice in the operation of public transport facilities and services in comparable contexts, drawing lessons and insights that can be applied in Timor-Leste;
- Propose an overarching institutional model for Timor-Leste, and more specifically an operational framework for public transport facilities, incorporating key principles, guidelines, and strategies to ensure efficient and effective service delivery;
- Conduct a gap assessment between existing institutional conditions and those required to implement the proposed operational framework, specifically highlighting where further development and capacity building is required; and
- Develop a roadmap for capacity development, outlining a series of actionable steps and recommendations to build the government's capacity to manage and operate the public transport system in-line with the proposed operational framework.

By systemically examining the current state of the public transport system and drawing on international best practice, the resulting operational framework and capacity development roadmap will serve as a practical guide for enhancing the overall performance of the public transport system, ensuring that it meets the needs of all users and contributes to the country's long-term growth objectives.

8.2 International Best Practice Review

8.2.1 Governance Principles for the Transport Sector

The focus on effective institutional arrangements is vital for the success of public transport in Timor-Leste. It is also consistent with international best practice. The development of effective institutions, both public and private sector, for transport planning, delivery and operations has been a consistent factor identified for successfully addressing transport and mobility problems globally, particularly where transport has historically been progressed on an output-based or project-by-project basis. In the same vein, institutional weaknesses have been documented as the source of observed failures in transport planning, delivery, and operations in many places.

Large and emerging megacities have received a large share of assessment of good practice. In contrast, smaller developing towns and cities may have limited basic services and the necessary institutional capacity to be able to manage rapidly increasing populations. This is an omission since such areas can offer greater potential for more rapid and far-reaching sustainable transformation than large cities. They generally have a smaller ecological footprint, and, in principle, their size allows for greater flexibility in terms of urban expansion, adoption of green travel modes and environmental protection. At the same time, smaller towns and cities may have fewer resources, as well as political leverage and technical assistance, to implement necessary transport measures and might be more vulnerable to fluctuations in the world economy and climate. Also, due to their size, they may be characterized by smaller and less efficient public transport systems, lower modal shares for public transport and higher-transport-related energy consumption than larger cities.

Irrespective of city categorization or geographical characteristics, no single institutional blueprint for urban transport emerges from the literature. Nevertheless, there is enough experience of the issues arising from the failure to align policies between different national and local authorities, public agencies, and private transport operators, or to secure clear relationships and effective collaboration between them, to establish some general principles.

The distinguishing features of most successful examples are to:

- Recognize and manage the transport system as an integrated whole across modes and networks;
- Share or align policy, strategy, and operational objectives across different bodies;
- Introduce and maintain effective integrated infrastructure and asset management, service planning and design across all parts of the asset lifecycle;
- Support functions within and between organizations with a clear legal basis or mandate, adequate organizational skills and capacity, systems, and processes, and with a culture which emphasizes sector or organizational learning and continuous improvement over time;
- Ensure that transport planning and delivery reflects the extent of public sector finance available, balances costs and revenues, considers appropriate use of the private sector, and makes investment decisions based on clear value for money criteria;
- Deliver public and private transport within a wider vision and strategy for the area, including management of demand as well as provision of supply-side measures; and
- Where the private sector provides significant resources and capacity for transport operations, to ensure an appropriate regulatory model is in place to ensure private individuals or entities balance their own immediate interests with the delivery of public value and that the supply chain as a whole is professionalized, capacitated, and resourced to meet public policy goals.

Table 8.1 below sets out a set of good practice benchmarks with above points, around institutional coordination, capacity, and public-private collaboration. In many emerging locales, significant gap exists between these ideals and the present reality on the ground.

Table 8.1: Overall Good Practice Benchmarks in Transport Governance

Theme	Good Practice
Jurisdictional Coordination	• Policy objectives and strategies should be compatible and clear at every level and accepted by all parties. • Allocation of responsibility among government bodies should be clearly established by law or regulation, consistently recognized, and adhered to by all. • Legal responsibilities should be linked to specific finance, including estimated user fees and the ability to raise revenue. • Where multiple bodies have an interest or role, formal institutional arrangements, as well as a mindset and culture, should be established to facilitate collaboration around shared goals and priorities. • Executive functions should be accountable to a higher administrative or political body to determine policy or strategic direction, although with appropriate degrees of delegation on tactical decision-making.
Functional Coordination	• Transport policy should be explicitly linked to, and support, wider economic, social, and environmental goals. • There should be a clear strategic land-use and transport planning framework with which detailed planning, design and implementation should be aligned. • A hierarchy of transport plans should be established to be mutually supporting and consistent at local, metropolitan, and national, and sub-sector thematic, levels. • Functions should be clearly allocated between agencies, with strategic functions being retained at the higher level. • The exercise of functions should be based on consistent systems and processes, including engagement with stakeholders and a strong customer/user focus.
Functional Capacity Capability and Human Resource Development	• Relevant agencies should establish an administrative structure within which responsibilities for technical functions are clearly identified and allocated. • Professional staff should have appropriate skills and competencies, and be appropriately motivated and incentivized, to maximize their performance. • Agencies should audit, and have or develop, capacity building and training programs for relevant skills. • Scarce professional skills should be concentrated, and retained by adequate reward, in public sector "Centers of excellence" or in private sector organizations. • Collaboration between agencies should be encouraged to share and further develop skills, experience, and an open culture of joint working. • Effective planning, design, program, and performance management tools should be developed and maintained, with commitment to ongoing budgets for support.
Effective Involvement Across Public and Private Sectors	• Responsibility for planning, regulating and operating public transport should be institutionally separated. • Operating agencies should be fully commercialized or privatized. • A clear legal and regulatory framework should be established for competition in public transport, including moving from competition "in the market" (i.e., on-street) to competition "for the market" (through contracts or franchises). • Technical regulation (e.g., safety) should be separated from procurement and economic regulation (e.g., fares). • Procurement of transport services by public sector agencies should be to a consistent and high standard, including monitoring of contract performance.

Having established a foundation in good governance principles, it is now crucial to examine various case studies to extract valuable lessons that can be applied to the reform of public transport in Timor-Leste. The case studies comprise different categories, ranging from the roles of public agencies to the contribution from private sector.

8.2.2 Reforming the Public Transport Sector

Reforming public transport, especially around the informal sector, has therefore become a key priority for policy makers across the world with overall consensus on some key elements of reform. An increasing number of governments are recognizing the benefits of increasing planning, regulation, and active intervention in the public transport sector with changes in three basic areas:

- Changes to the **market structure, role, and capacity of the public transport regulator**, as well as the basis of the relationship between the regulator and operators;
- Changes to the **nature, format, ownership, and structure of public transport operators** and means of participation by the private sector; and
- Changes in the **type, structure, quality, and scale of public transport services**, as well as provision of **supporting infrastructure and facilities**.

International cases in comparable socio-economic contexts highlight a clear trend towards a hybrid institutional arrangement for the public transport system, simplified in **Figure 8.1** whereby a strengthened public sector, through new or strengthened planning, regulating and contracting entities, plans, regulates and oversees service delivery by private sector operators. The latter are incentivized, co-opted, or required to become more organized, professionalized and corporatized at scale to deliver a more structured network of public transport infrastructure, assets and services to passengers and communities.[129] Users themselves become a greater priority for, and may be formally represented within, policy making, operational delivery and service monitoring. Digital processes, data and systems may also increasingly support, or be enabled by, these strengthened governance arrangements.

In addition, under this hybrid approach, disorganized and often chaotic private sector "competition in the market" (i.e., on-street) is replaced by more open and transparent "competition for the market." Operators, organized collectively through associations, consortia, or companies, bid for the right to operate services against formal partnerships or contracts of varying degrees of exclusivity and sophistication, rather being licensed to individual services, route or areas.[130] These may initially be allocated to incumbent operators, but can be eventually competitively tendered, including to new entrants, and include a range of service quantity, quality, customer satisfaction and other (e.g. sustainability, employee conditions) set by the public sector.

[129] New private entities may also be created through the restructuring, break-up, and privatization of State-owned monopoly operators. The continuation of publicly owned operating entities does not remove the need for separate and independent regulators with appropriate powers and capacity. Where State-owned and private operators exist within the same market, they should generally be treated equally on a level playing field in licensing and regulatory terms.

[130] The distinction between net and gross cost operating contracts in terms of passenger fare determination, collection and revenue risk is noted, but not discussed extensively in this Paper, although gross cost contracts are generally associated with greater public sector control of the service, more flexibility to negotiate service changes with operators, financial transparency, and higher quality provision.

Source: Arup Study Team (Adapted from EBRD, 2019)

Figure 8.1: Principal Responsibilities of the Public and Private Sectors Under the Hybrid Model

Such a system is well established and has operated for many years in cities like London and elsewhere in Europe, as well as cities like Singapore, where professional private operators employing salaried drivers are subject to continuous retendering of routes against gross cost concessions of between and seven years in duration and a penalty and reward payment system based on quality standards. In the London case, operators may receive payments from the transport agency, Transport for London (TfL), with bonuses of 15% over basic remuneration for good performance and penalties of -10% for poor performance. Pre-COVID, the London system was seen as working well, raising service standards, increasing levels of customer satisfaction, seeing increased ridership and mode share, integrating with other public modes, and supporting the metropolitan areas economic and social development and delivery of the mayor’s policy objectives under the London Plan (Spatial Development Strategy).

Given such successes, many cities in the developing contexts have embarked on reforms towards an equivalent approach in planning, regulatory and institutional terms. This has either been as a stand-alone public transport improvement program, for example as documented in Rwanda, or to implement more comprehensive Bus Rapid Transit (BRT) investments. As well as regulatory and contracting changes, such programs have also included new or enhanced infrastructure, including on-street priority or guideways, centralized fare collection and revenue management and new or upgraded bus passenger terminals, stops, depot and other operational facilities. Vehicles have also been replaced to common and higher-quality standards, procured either by the consolidated and professionalized private sector, or directly by the contracting authority, with fleet investment enabled through economies of scale, collective financing models and Government or IFI-supported business cases and underwriting.

The current view of many is that such reforms are still “work in progress” with a need to further understand critical success factors and tailoring to different local contexts. The application of these approaches in a specific location usually reflects historical context, national and local policies as well as the skills and capacity of the institutions involved. In more mature examples the various issues of policy, planning, development, and integration of public transport may be handled by a semi-autonomous transport authority. The authority is often accountable to senior (elected or appointed) decision makers within Government, but operationally independent of it so that agreed policies can be delivered in the most efficient, effective, and economic manner.

Some observers have also noted that reforms have usually been a success when implemented in the context of implementing a BRT system.[131] In such cases, for example Columbia (Bogota), Brazil (Curitiba), Mexico (Mexico City), Peru (Lima) and Tanzania (Dar es Salaam), the travel time savings, reliability improvements and ride quality benefits generated by segregated guideways, high-frequency services and other infrastructure changes, have left passengers much better off and more satisfied and the successful contract operators with enhanced profitability and economic viability (due to higher asset productivity and relief from congestion), whilst the cities themselves have been left safer, cleaner, more competitive and prosperous.

Outside these successful BRT cases, generally focused on large cities, success for public transport reforms has to date been somewhat more mixed. In particular, the financial viability of some new operating contracts has been limited, leading to volatility, renegotiation, and outright cancelation, for example in South Africa, Chile, Columbia, and Mexico (outside of the largest cities). There are also a number of on-going challenges in most of the reform efforts in practice even if the basic theory remains accepted as sound[132]:

- **Dissatisfied Users -** Passengers have not always seen better journey times, while reforms have been implemented without continuous service planning to adjust routes, schedules, and fleet to changing demand and user expectations. Also though, users themselves, including vulnerable groups, may not be adequately consulted, or represented.

- **Lack of Open Competition and Regular Retendering -** Initial reform has sometimes been designed to excessively safeguard the interest, employment, and livelihood of incumbent operators. While the interests of current operators should be considered, especially if their support for, and transition to, the new system is to be secured, ultimately a truly competitive and open tendering process stands the best chance of securing the best outcomes for passengers, communities, and society. Incumbents may be given some presumption and advantages in the early days of reform, but this should not be unconditional or open-ended; the expectation should be for new supplier market entrants as part of the process.

- **Weak Regulatory Entity -** Limited skills and capacity may hamper the public sector's ability to effectively plan, manage and regulate a more structured and organized public transport system, including designing, tendering, and managing performance-based operating contracts, managing digital and technology innovations, managing revenue risk (including revenue protection), and proportionately enforcing new rules and regulations.

- **Financial Risk -** Lower than forecast demand, weak governance and corporate controls may expose the public sector to higher-than-expected costs (which may be unsustainable) or undermine the access of operators to commercial finance for investment in vehicles and other improvements.

- **Private Sector Strengthening -** The atomized, disorganized private sector operators may prove unwilling or unable to organize themselves collectively, form efficient and effective corporatized entities, or move beyond protecting their individual interests to providing an organized public service under new and higher-performing contractual conditions. In practice, it may also prove difficult for drivers who rent a vehicle as individuals on a daily or weekly basis to move to a new position of salaried employees of a corporatized entity.

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[131] Source: Mehndiratta and Rodriguez, 2017.
[132] IBID.

Such issues do not undermine the inherent attractiveness, logic, and potential viability of the hybrid model, especially given its clear success in a range of settings across Europe and in respect of some well publicized cases in the Global South. However, achieving the full set of benefits may take time, involve early trial and error to adapt to local circumstances, require close attention to detail, involve proactive identification and management of risks, and may require close stakeholder engagement and collaborative joint working across public and private entities to make progress.

There is also growing interest in small and medium-sized cities where atomized paratransit operators are under-regulated to experiment with incremental reforms which may deliver more modest service quantity and quality improvements for passengers without the major infrastructure investment, organizational transformation, and political challenges of a "big-bang" approach. This context, which would certainly be applicable to Timor-Leste, currently focuses on a few more limited improvement areas:

- **Strengthening the Regulating Entity -** Developing a public transport unit or department within the overall organization with appropriate skills and capacity to develop, implement and monitor specific targeted improvement initiatives, and enable, at varying degrees of formalization, more effective partnerships and/or contracts with operators.
- **Capacity Enhancement for Operators -** Encouraging operators to professionalize, work collaboratively and form various levels of association to develop and adhere to schedules, serve passengers, and consider investments (e.g., digital platforms) on a collective basis.
- **Incentivizing Better Performance from Drivers -** Introducing driver training for enhanced road safety and customer service, modifying remuneration arrangements to reflect service quality rather than passengers carried or using smartphone user ratings to identify, reward or penalize driving behavior.
- **Crowdsourcing New or Improved Services -** Using smartphones to map, identify and formalize paratransit routes directly based on user demand and preferences.
- **Using Technology to Schedule and Pay for Services -** Extending principles of app-based ride-hailing to informal transport by allowing passengers to get information on, book and pay for their ride via their phones without using cash.

Based on the initiatives above, and potentially other locally relevant activities, it may be possible to retain the longer-aspiration of the full formalized public-private hybrid model based on an open contracting approach, supported by infrastructure investment and regulatory transformation, but focus on incremental, practical, and focused improvements on a tactical basis in the interim. Success in early initiatives, even on a pilot basis, can lay the basis for scaling up and more comprehensive reform in the longer-term.

8.2.3 Strengthening the Public Agencies

Much of the focus on strengthening public transport governance is on the development of more integrated and coordinated planning and regulatory entities within the public sector.

Typically, in many parts of the Global South, multiple agencies at different levels of government are involved in the delivery of transport infrastructure and services. There is also often little coordination between them, resulting in duplication and inefficiency in the use of resources and poor-quality services. There is an increasing recognition of the need for institutional coordination or centralization across function, modes, and space, as well as spanning supply and demand-side considerations.

Making progress in this area includes the creation of new "transport authorities" of various kinds to replace the separation of functions, powers and resources across multiple predecessor national ministries, delivery agencies, local governments, and transport operators. These authorities may be focused specifically on the public transport sector and be relatively compact regulatory and coordinating bodies, or larger organizations with operational functions (and workforces) and a public-facing presence. In some instances, transport authorities may be fully multimodal, planning, regulating, and coordinating the full suite of public and private transport networks, modes, and services, including highways and traffic, travel demand management, freight as well as passengers. Examples include Singapore's Land Transport Authority (LTA), Transport for London (TfL), Transport Scotland, Dubai's Road, and Transport Authority (RTA) and Translink in Vancouver, Canada.

Examples of such transport authorities in the Global South are scarcer. Nevertheless, the need for closer functional coordination of planning, delivery and operations is recognized, evidenced by new Land Transport Authorities in Fiji, Papua New Guinea, and as now potentially planned for Timor-Leste itself.

Developing, implementing, and bringing into a state of operational readiness a new lead transport institution in the public sector is a potentially major undertaking. Existing structures should be examined, and new approaches designed which may distinguish strategic, tactical, and operational levels. They should also distinguish whether the public sector wishes to fund, define, and operate transport services itself or whether operations are provided by the private sector under policies, regulations and potentially contracts defined by the lead institution. Effective transport authorities can act as the value-added link between strategic-level stakeholders in Government (i.e., senior political decisionmakers) and operators (who deliver services directly to the public). Alongside public transport, they may internalize, or maintain close links with, other tactical level actors within the transport sector, for example roads and traffic management, land use and development control or active travel.

There is no one size that fits all end point, or process to establishing a new transport authority, although a range of useful advice is available including various documents[133]. Each institution will be different in its combination of modes, functions, legal powers, capacity, and resources, contracting functions and wider stakeholder networks. A range of examples from across the world in countries at different stages of development is shown below. Again, the point is made that the literature focuses on cases for large cities and metropolitan areas than smaller cities or more rural regions, although many of the principles are broadly transferable.

[133] These studies include: GTZ (2004), Kumar and Agarwal (2013), PIARC (2019) and UITP (2022)

Table 8.2: Functions Performed by Different Lead Transport Authorities

Elements of the integrated metropolitan regional transport system																										
Metropolitan region (Strategic level responsible authorities)	Transport Executive (Tactical level organisation)	Spatial planning	Metropolitan transport plan	Transport data warehouse	Mobility education/training	Road infrastructure	Traffic management	Parking management	Road planning (ERP)	Vehicle permits and licenses	Commuter rail	Urban rail	Intermodal interchanges	Bus infrastructure	Transit service planning	School transport	Fare policy	Public transport control centre	Ticketing	Operator licensing	Operator contracting	Operation urban transit	Taxi and assimilated	Shared mobility	Cycling infrastructure	Walking/streets
Bangkok	MRTA	-	+	-	-	-	-	-	-	-	+	++	++		+++	-	+	+	++	-	-	++	-	-	-	+
Brussels	BM	+	+++	++	+	++	++	++	+	-	+	+++	++	+++	+++	++	++	++	+++	+++	++	++	++	++	++	++
Dubai	RTA	-	+++	+++	+	+++	+++	+++	+++	++	+	+++	+++	+++	+++	+++	+++	+++	+++	++	++	+++	+++	++	++	+
Jakarta	BPTJ	+	+++	+	+	++	-	-	+	-	+	++	++	+++	++	+	++	-	+	-	-	+	+	+	+	+
Kochi	KMTA	-	+++	+++	+	-	-	-	-	-	++	+++	++	+	+++	+	++	+++	+++	+++	++	+	++	++	++	++
London	TfL	-	+	+++	++	++	+++	++	+++	-	++	+++	++	+++	+++	+++	+++	+++	+++	+	+++	++	++	++	++	++
Manila	LTFRB	-	+	+	+	-	-	-	-	+++	++	++	++	++	+	+	++	-	+	+++	-	-	++	-	-	
Newcastle	NEXUS	-	+	+	+	+	++	+	-	-	-	+++	++	+++	++	++	+	+	-	++	+++	-	+	+	+	+
Paris	IdFM	+	++	+++	+	-	-	-	-	-	++	++	++	+	+++	+	+++	+	+++	+	+++	-	-	-	-	-
Seoul	MTC	+	++	++	-	-	-	-	-	-	+++	+	++	+	++	-	+	+	+	-	-	-	-	-	-	-
Singapore	LTA	++	+++	++	+++	+++	+++	+++	+++	-	+++	+++	+++	+++	+++	+	++	+++	+++	+	+++	-	+++	++	+++	+
Stockholm	SL	+	++	++	-	-	-	-	+	-	+++	+++	+++	+	+++	++	+++	+++	+++	+	+++	-	-	-	-	-

- No Involvement + Contributor ++ Co-Responsible +++ Lead Executive Source: Union Internationale des Transports Publics (2020), Kumar and Agarwal (2013)

Irrespective of the precise role and form of the specific lead transport institution under evaluation, in Institutional Labyrinth emphasize that the following aspects of organizational design should be determined from the outset:[134]

- **Legal Basis -** Established through an executive order, specific primary legislation, indirectly through the mandates of existing government entities, as well as various forms of formal or informal agreements to determine the strength, form and nature of power and authority.

- **Jurisdiction -** Affecting the spatial area and administrative and political boundaries covered by the defined remit, including in relation to travel patterns and trip origins and destinations.

- **Functions -** Ranging from central planning and strategy development, through design and construction to direct or regulation of operations. The remit may also be limited to public transport only or extend to roads, traffic, land use planning and development control and other networks to represent a truly multi-modal remit and the full integration of transport across a range of needs, objectives, and priorities. As noted already, the trend in recent times has been to separate policy, planning and regulation from direct transport service provision, maintenance, and operations, with the latter carried out by arms-length public enterprises or contracted to the private sector under various concession and franchise arrangements.

- **Personnel Profile and Size -** With manpower, working procedures and skills requirements determined by functions, as well as decisions on whether to carry out certain roles in-house, develop subsidiaries of the lead entity, delegate to other public agencies or outsource to the private sector. Authorities which contract significant volumes of services externally will clearly be smaller and leaner (e.g., in terms of headcount) than those which do not, but with more capacity located (and needing to be assured) within the wider supply chain of partners and service providers.

- **Management Structure -** Typically, with a decision-making board or steering group to provide senior political or management leadership, supported by a larger technical executive entity or secretariat to advise on decisions and implement the decisions once the board has set direction. There are various best practice principles of how such boards should be structured, make, and implement decisions in the most efficient, informed, transparent, and accountable manner.

- **Financing Arrangements -** It is vital that a transport authority has the financial flexibility and muscle to fulfil its mandate and secure services for its customers and stakeholders. Funding may come from user fees, such as public transport fares, vehicle license fees or road tolls, but may also be met by taxation at national and local level and contributed by the appropriate government entity.

- **Evolution -** Reflecting the fact that organizational remits, functions, structures, and resources change over time, both in response to changing political agendas, economic and social challenges, and the desire to become more effective in certain areas. For example, historically many public transport services in European cities were provided directly in-house or through arms-length publicly owned operating subsidiaries before more recent trends towards privatization and the contracting or franchising of operations to private companies within a strong regulatory and performance-management framework.

[134] Source: Kumar and Agarwal, 2013

Against these factors, which vary widely according to local circumstances, critical success factors for the effectiveness and sustainability of a transport authority, or equivalent entity, is its ability to:

- Reflect clear policy objectives and outcomes, plan and deliver public value and focus on the needs and expectations of transport users;
- Enjoy and retain political support, legal authority, as well as stakeholder and public acceptance, for its activities;
- Develop internal skills and capacity to carry out its remit, including effective processes, systems, residents, leadership, line management and other organizational resources;
- Control or have authority over financial resources for capital investment and appropriate support to operations across the whole asset lifecycle; and
- Identify, develop, nurture, and strengthen partnership arrangements with suppliers, stakeholders, communities and the wider public to whom it is accountable.

Finally, the initial set-up of the authority should not be considered unalterable. The ability of adapt to changing circumstances, build on earlier successes to do more things or to do them better, improve continuously, take advantage of new technologies and innovations, and respond to evolving stakeholder and public expectations will be critical to retain organizational relevance, credibility, performance, and effectiveness.

Case studies of Jakarta and Singapore are provided below.

Box 8.1: Regulatory Entities: Greater Jakarta Transport Authority

Presidential Decree 103 of 2015 appointed the Badan Pengelola Transportasi Jabodetabek (BPTJ) as the coordinator for Greater Jakarta's transportation system. Its functions include:

- **Coordinating role:** BPTJ is responsible for coordinating and synchronizing transportation plans and budgets among government agencies in Greater Jakarta
- **Infrastructure development:** BPTJ ensures the development and improvement of transportation infrastructure and facilities to support integrated public transportation services.
- **Traffic demand management:** It oversees traffic demand management and recommends spatial planning focused on public transportation.
- **Regulation and licensing:** BPTJ grants licenses for public transport services spanning Jakarta, Bogor, Depok, Tangerang, and Bekasi, while also providing recommendations for feeder services.
- **Monitoring and enforcement:** BPTJ monitors, evaluates, and enforces compliance with transportation master plans, imposing sanctions on violators.

Relevance for Timor-Leste: The BPTJ plays a more significant role in land transport planning. The upcoming LTA in Timor-Leste can learn from the BPTJ's model in managing public transport, particularly by drawing from their experience in preparing action plans for the sector and coordinating and synchronizing budgets.

Box 8.2: Regulatory Entities: Singapore Land Transport Authority


The Land Transport Authority (LTA) is the primary agent for land transport development and policy setting in Singapore. It plans the long-term transport needs of Singapore, overseeing all road uses, including private and public transportation. The authority's functions include:

- **Policy formulation:** LTA shapes land transport policies and strategies, including the Land Transport Master Plan (LTMP).
- **Integration with land use:** LTA collaborates on transport planning with urban development authorities.
- **Infrastructure development**: LTA plans, designs, and manages transport infrastructure, including MRT and road systems.
- **Traffic management:** LTA oversees traffic management, public transport service standards, and **private** transport regulation.
- **Public transport:** LTA works with the Public Transport Council (PTC) to regulate fares and services, including taxis and ride-hailing.
- **Enforcement:** LTA and the Traffic Police enforce traffic laws, investigate accidents, and address illegal parking and vehicle-related offenses.
- **Walking and cycling:** LTA leads in walking and cycling infrastructure development, aligning with the Walk-Cycle-Ride (WCR) strategy.

Relevance for Timor-Leste: The LTA in Singapore, a mature organization, efficiently integrates transport planning and execution, encompassing bus, rail, and active mobility systems. This model offers valuable insights for Timor-Leste's emerging LTA as it seeks to bolster its capacity in overseeing the land transport sector comprehensively.

8.2.4 Developing Effective Approaches to the Informal Sector

It has already been noted that in the Global South, significant proportions, and sometimes the entirety, of the public transport system is provided by the so-called informal sector, also known as paratransit, intermediate public transport, and a range of other terms. This sector has arisen to fill the lack of organized public sector transport services in places where mobility needs are rising, and more people need to access employment, education, and other opportunities. In Timor-Leste too, privately owned and driven informal transport using a range of vehicles (e.g., buses, anggunas, microlets, taxis, ojeks) provides most of the mobility needs within and between district Centers, urban and rural areas.

From a policy perspective, informal transport provides for practical, de facto mobility of much of the population with limited or no finance, resources or planning and regulatory effort from Government. However, as has been shown it also generates significant externalities, often does not provide attractive or particularly safe services to passengers and does not support long-term economic and social development or environmental sustainability. In some cases, such as Ghana, Senegal and Chile, paratransit which initially emerged to fill service gaps has become the dominant form of transport and effectively "killed" the previous State-owned or run large bus service.

A summary of key informal sector strengths and weaknesses is set out in **Table 8.3** below.

Table 8.3: Strengths and Weaknesses of the Informal Sector

Strengths of the Informal Sector	Weaknesses of the Informal Sector
• Organic development rather than Government-led. • Major role in providing mobility for millions of people across the Global South. • Provision of a variety of flexible transport services with different vehicle types/sizes. • Broadly matched to passenger demand, including being door-to-door or ability to deviate from standard routes. • Little or no burden on public finance, resources, planning and regulatory efforts. • Open to innovation. • Low barriers to market entry. • Provision of flexible employment and economic opportunities. • Adoption of internal self-regulation and potentially form associations/cooperatives to inform collective representation, service planning and provision. • Legalization and proportionate regulation can secure mitigation of weaknesses, operational challenges, and externalities, as well as provide the basis for formal public transport in due course.	• No explicit alignment with public policy objectives, interests, or values. • Business model dependent on low income and social protection of service providers. • Decentralized ownership and operation with no economies of scale. • Low operational efficiency, service integration or coordination. • Focus on high-demand corridors, with limited service in low demand areas. • Provision of low service quality, safety, and customer service. • “Collectively damaging behavior” with significant externalities e.g., congestion, emissions, safety, noise. • Limited professional knowledge, expertise, supporting resources and data to support improvements. • Low margins and limited access to investment capital and funding for modern vehicles/assets/infrastructure. • On-street competition and territorial ownership which may lead to social tensions and sometimes violence. • Potentially undermining Government plans for modernized public transport. • Informal operators are often politically weak and poorly represented within Government decision making.

Source: Adapted from UITP (2022) and Cervero and Golub (2007)

In many cases, public authorities often have a strong lack of awareness about the informal sector and, by direct intention or unconscious bias, tend to ignore it when it comes to developing transport policies, strategies, and plans. Paratransit operators may be politically weak and in many cases the Government has given up on trying to do anything about the sector, content to let it exist on the margins of society[135]. Proposals for future public transport may also bypass the role of the informal sector, the people who use it, and are employed within it, and continue to regard it as part of the problem rather than part of the potential solution.

This is a missed opportunity. An informed approach suggests that the informal sector should be explicitly recognized as part of the mobility landscape and that informal operators should be engaged to become part of a more regulated, outcome-orientated, sustainable, and quality public transport system. This has happened in some locations; for example, matatus (privately owned/operated minibuses) in Nairobi and dala dalas (privately owned/operated minibuses) in Dar es Salaam have been legalized and minimum levels of regulation applied, for example around route licensing, driver behavior and vehicle maintenance. In Hong Kong, certain services like the Red and Green Minibuses have been integrated into the mainstream public transportation (PT) network over time.

In policy terms, governments can take several stances in response to the growth of the informal sector[136].These include prohibition, acceptance, recognition, and regulation. The precise regulatory approach appropriate in any given circumstance depends on the local political context, the characteristics of paratransit demand, the extent of externalities (and

[135] Source: Cervero and Golub, 2007
[136] Source: Cervero and Golub, 2007.

whether these can be addressed through internal self-regulation, technology, and other tactical fixes) as well as the organizational structures, capacity and skills of the operators and regulatory bodies themselves.

Nevertheless, an approach based on a degree of recognition, regulation and partnership working is usually warranted, not least to organize market entry, maintain minimal safety and security standards, ensure operators have proper licenses and insurance, and promote equitable employment practices and sustainable livelihoods of workers. More capable public entities may also perform planning functions, provide infrastructure and asset support and be able to move towards a contracting or franchising regulatory model, with and without public subsidy to achieve economic and social objectives, as has been described above.

In most cases, where dominated by individuals or very small businesses, it is advisable that informal operators should associate to become organized, professionalized, and potentially corporatized, in order to secure more coordinated service planning, asset procurement (e.g., vehicle fleets), better access to credit and insurance, and better passenger services. This may emerge through competition or internal self-regulation within the informal sector itself or be encouraged or even required by the regulatory body (for example as a condition of access to credit, infrastructure use, license renewal or contract tendering).

This is generally beneficial for reasons which have been described, but care needs to be taken that association and/or consolidation of previous independent operators does not limit new entry or competition for the market or result in other unplanned negative or anti-competitive consequences such as formation of cartels.

Three case studies around the formalization of paratransit in Rwanda, Malta, and the Philippines, are set out below.

Box 8.3: Case Study - Reforming Urban Public Transport in Kigali, Rwanda

Kigali, the capital of Rwanda, recognizes the importance of an efficient public transport system for its economy. It is revamping its public transport with second-generation contracts to boost ridership, reduce pollution, and enhance passenger satisfaction.

- **Introduction of Second-Generation Contracts -** Kigali plans to implement second-generation public transport contracts to increase ridership, reduce pollution, and improve passenger satisfaction. These contracts emphasize improved route planning, increased capacity, strict scheduling with a proposed waiting time of 5-10 minutes, and fare alignment with distance traveled.

- **Public Transport Reform -** Since 2008, Kigali has undertaken significant public transport reforms in response to its growing population and the need for better coordination. Initial reforms included grouping minibuses into the Association des Transports en Commun (ATRACO) and introducing a queueing system.

- **Policy Development -** In 2011, the Ministry of Infrastructure (MININFRA) initiated the development of the first public transport policy and strategy for Rwanda. This policy became the guiding document for formalizing public transport in Kigali.

- **Formation of Cooperatives -** Minibus owners were encouraged to form cooperatives and companies, enabling access to credit, loans, and government tenders for public transport operations. The Rwanda Federation of Transport Cooperatives (RFTC) and other companies emerged from this process.

- **Competitive Tendering -** RFTC, KBS, and Royal Express won tenders to operate the Kigali public transport system. The competitive tendering process took approximately six months, and five-year contracts were signed in 2013.

- **Quality Improvement -** Routine inspections, smart card payments, and improved working conditions for drivers and conductors enhanced the quality of public transport.

- **Ongoing Reforms -** Rwanda continues its public transport reforms, including a shift to a gross cost contracting model, an expansion of the bus fleet, modernization of terminals, and restrictions on motorcycle taxis along key transport corridors.

Relevance for Timor-Leste - The successful reformation of the public transport system in Kigali serves as an exemplary model for transforming outdated small buses into advanced bus systems with increased capacity and improved service reliability in terms of frequency. The reform process in Kigali showcases the effective collaboration between the public and private sectors, emphasizing the importance of each entity playing its role and leveraging their respective strengths, and highlighting that each must be strengthened.

Box 8.4: Case Study - Competitive Tendering of Bus Services in Malta

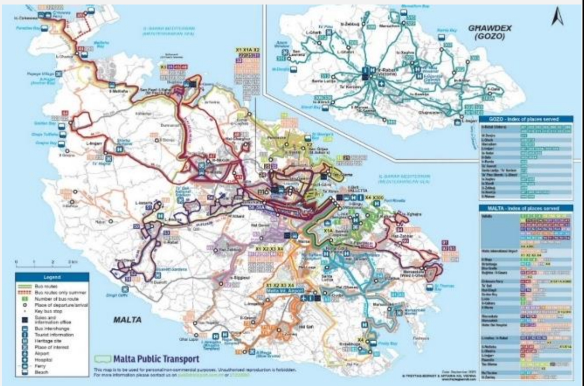


Until 2011, Malta's public bus system faced challenges with 400 independent licensed drivers and a centralized collective called the Association of Public Transport (ATP). Dissatisfaction grew due to service issues, and car ownership increased while bus patronage declined. In 2011, a new single bus operator, Arriva, was introduced through competitive tender, with the government investing in infrastructure and facilities. This "big bang" change brought improvements, including:

- **Infrastructure -** New bus stops, upgraded termini, Park & Ride sites, shelters, and interchanges with Real Time Passenger Information.
- **Fleet -** A modernized fleet with environmentally friendly and hybrid electric buses, wheelchair accessibility, air-conditioning, and CCTV.
- **Routes -** Increased routes, bus stops, interchanges, longer operating hours, higher frequency, and night services.
- **Fare -** A uniform fare system and introduction of weekly tickets.
- **Passenger Information -** Improved information via mobile, SMS, internet, and on-board visual and audible systems.
- **Drivers:** Formal training and management for drivers, creating employment opportunities.

- **Intelligent Transport System -** Automated Passenger Counting System (AVC) and Automatic Vehicle Monitoring System (AVL) across the fleet.

Despite initial success, issues such as bus fires, delays, and industrial relations challenges led to Arriva's contract termination in 2014. A new contract was awarded to ALSA in 2015, resulting in phased implementation. Malta Public Transport expanded its route network, modernized its fleet, introduced the Tallinja smart card for residents, and, as of October 2022, made public transport free for residents with a valid personalized Tallinja Card.



Relevance to Timor-Leste: The transition from multiple bus operators to a single operator streamlines the cooperative process between the government and private sector, resulting in improved public transport services. However, it is crucial to recognize that the government’s investment in new infrastructure and technology plays an equally vital role. Nevertheless, the unfortunate failure of the first operator under the new tendering process highlights the importance of implementing changes gradually to ensure a smooth and effective transition.

Box 8.5: Public Utility Vehicle Modernization Programme of the Philippines

Initiated in 2017, the Public Utility Vehicle Modernization Programme (PUVMP) in the Philippines aims to revamp the road-based public transport sector by introducing safer, cleaner vehicles, enhanced regulation, operator consolidation, and local government empowerment.

- **Background -** The Philippines' fragmented public transport sector relies heavily on jeepneys, leading to low-quality services, congestion, and negative externalities. The PUVMP seeks to transform this sector into a formalized, high-quality system with newer, eco-friendly vehicles.
- **Structural Changes -** To achieve this, the PUVMP targets several structural changes, including policy and regulatory improvements, institutional reorganization, advanced planning and management, national financial support for new vehicles, establishment of a monitoring system, and the strengthening of Local Government Units.
- **Consolidation -** Encouraging the merger of operators, licenses, and public transport fleets to improve efficiency and service quality is a key focus.

- **Challenges and Controversies -** The PUVMP has encountered criticism regarding financial impacts on individual operators and resistance to losing traditional jeepneys. Protests prompted the government to review its approach.
- **Future Outlook -** While the PUVMP will continue, the government aims to make reforms more affordable and acceptable to operators and the public. The program presents opportunities for new employment in the public transport sector.
- **Deadline -** Operators must create or join consolidated entities by the end of 2023, or risk losing their licenses. The debate over public transport reform in the Philippines is expected to persist.


Relevance to Timor-Leste: The public transport reform in the Philippines underscores the importance of creating a new regulatory framework, a step Timor-Leste is preparing for with the formation of the Land Transport Authority (LTA) to oversee the land transport sector. Timor-Leste can learn from this initiative by proactively addressing potential challenges faced by the private sector during the transition, either by reconsidering certain measures or implementing remedial actions to alleviate difficulties.

In polarized societies and/or cases of poor regulatory capacity, paratransit associations or collectives can become powerful political forces in their own right which are difficult to counterbalance. This has been seen, for example, in Nigeria, South Africa, Jamaica and Mexico and is especially problematic where collective organizations start to act as cartels or combine with organized crime to spark territorial disputes and threaten law and order.

South Africa represents an extreme example of how ruthless and deadly unregulated competition of collective paratransit organizations can be. There are instances of rival cartels controlling thousands of low-cost "combis" and fighting over the most lucrative routes. During the 1990s more than 2,000 people, based on official statistics, died as a result of paratransit-related violence across the country, exacerbated by political instability during the transition to a post-apartheid regime.

The multiple dimensions around the efficacy of informal transport make it impossible, from a public policy standpoint, to reach overarching and uniform conclusions on what should be done in any particular locality. Each circumstance calls for its own careful assessment and balancing of social benefits and social costs relative to the strength of public entities, as well as operators themselves, to develop plans, regulations, and enforcement regimes for the public transport sector as a whole. What is important, however, is that Government, at the appropriate level, takes a firm policy position on informal transport, choosing between the extremes of laissez-faire acceptance of bottom-up activity and outright prohibition in favor of an alternative approach.

Nevertheless, it is likely that in most cases, proportionate regulation of paratransit within the overall policy for public transport reform will be appropriate. Existing informal operators, if collectively organized and professionalized, can evolve from being part of the problem to part of the solution. Moreover, effective co-option of the informal sector can avoid political opposition (and sometimes strikes, public disorder and violence), and support consensus and a smooth transition towards any reform or modernization program.

For this reason, a number of commentators emphasize the importance of partnership and collaboration as crucial for the improvement of public transport services[137]. The main focus of this is between the public and private sectors, as policy maker/regulator and operator respectively. A number of models, including so-called Quality Bus Partnerships, are available at varying degrees of formality, obligation, and sophistication. Platforms and champions need to be put in place to clarify roles and responsibilities, develop, and maintain consensus around a shared reform program, and jointly address and arbitrate issues of agreement and difference as they emerge.

There is also a need that partnerships should involve active representation from public transport users and communities so that passenger needs and expectations are kept at the heart of change proposals and the outcomes to be delivered, especially in respect of women, the elderly, children, disabled and other vulnerable groups. International experience suggests that users are often not consulted or co-opted into reform proposals or the resulting modernized structures and processes. This is another missed opportunity, for example, through the organization of Customer Satisfaction Surveys, Mystery Shopper exercises, formal consultation events (e.g., focus groups, public meetings and exhibitions, questionnaire surveys) as well as more standing arrangements such as Bus User Groups or the inclusion of passenger representatives on the governing bodies of the regulatory or operating entities.

Finally, it is noted that improvements to the informal sector, aside from broader structural and regulatory reform, can be driven by the adoption of digital tools, data, and new vehicle technologies[138]. Even before the COVID-19 Pandemic, a range of innovations were in evidence across the World, providing mitigation of externalities, offering better customer experience, and supporting operational efficiency and integration. This has been accelerated by the expansion of the internet and ownership and use of mobile phones, although penetration rates vary sharply by country.

Particular advances, which are often private-sector led, include the growth in ride-hailing apps (such as *Grab* in Southeast Asia), new payment platform (such as *M Pesa* in East Africa, or *EFI* in the Philippines) and the use of digital mapping, journey planning and tracking (such as *Whereismytransport* in Latin America) to support enhanced passenger information. Such tools have shown they can contribute to better service quality and a more user-centric approach without significant upfront investment by regulators or operators.

This is also the case for cleaner fuels and electrification of paratransit vehicles, although in this instance the upfront capital costs of vehicle purchase or modification may require financial support from the Government or IFIs or necessitate operator consolidation and professionalization due to the need to secure access to affordable credit and finance.

[137] Source: Sohail and Maunder, 2007
[138] Source: MobiliseYourCity Partnership 2021, UITP 2022

Box 8.6: Chalo Bus Tracking and Ticketing App in India

A mobile app operating in 31 Indian cities, Chalo aims to improve bus transportation by providing real-time tracking and estimated arrival times to passengers.

- **Real-Time Bus Tracking -** Chalo's mobile app allows passengers to track buses in real-time and provides accurate arrival time information, reducing the need for long wait times at bus stops. Riders can head to their bus stop just a few minutes before their bus arrives, rather than waiting 15-20 minutes, as they did earlier.
- **Digital Ticketing -** The app offers digital ticketing solutions, eliminating the need for passengers to carry cash or stand in lines for travel passes. It integrates with physical or virtual smart cards and includes mobile-based on-board validators on buses.
- **Monitoring and Reporting -** Chalo provides bus owners and drivers with live dashboards and daily activity reports, enabling better management of bus operations.
- **Collaboration with Governments -** Chalo collaborates with city governments across India and currently tracks nearly 15,000 buses, with plans for significant expansion.

Relevance to Timor-Leste: The importance of implementing a digital system for ticketing and live updates is exemplified by the Chalo project. As Timor-Leste plans to reform its public transport, integrating digital solutions can prove to be an effective and future-proof strategy. By incorporating these systems from the outset, it can avoid the need for abrupt additions of digital infrastructure later on.

Box 8.7: Development of an Integrated Bus Operating System in Sri Lanka

iBuSys
INTEGRATED BUS MANAGEMENT AND OPERATIONS SYSTEM

Sri Lanka's road-based public transport system is a complex mix of public and private operators, including the Sri Lanka Transport Board (SLTB) and numerous private owners. The existing institutional arrangement has led to challenges in regulation and coordination, resulting in a decline in public transport usage. To address these issues, the "Sahasara" technology platform was introduced as a pilot project in 2016, leading to the development of the IbuSys bus management platform and operating system in 2018.

- **Background -** Sri Lanka's public transport comprises the SLTB with 5,500 buses and government support, alongside a private sector with 25,000 buses owned by approximately 20,000 individuals, with limited government involvement. Regulation involves ten different entities, making coordination challenging.

- **Current Issues -** Sri Lanka's public transport comprises the SLTB with 5,500 buses and government support, alongside a private sector with 25,000 buses owned by approximately 20,000 individuals, with limited government involvement. Regulation involves ten different entities, making coordination challenging.
- **Introduction of "Sahasara" -** In 2016, the "Sahasara" technology platform was piloted in Kandy, Central Province, to centralize timetable development, bus rostering, dispatch, electronic fare collection, and revenue apportionment. The pilot was successful and led to the development of the IbuSys bus management platform in 2018.
- **IbuSys Transformation -** Under IbuSys, operational coordination, revenue collection, and risk management are centralized and enabled by technology. Fare revenue is consolidated into a single account, and payments to bus owners are settled daily. Competition shifts from on-road to operating cost and service quality within a coordinated collective of service providers.
- **IbuSys Architecture -** IbuSys employs an integrated technology platform, operating system, and databases to oversee and coordinate bus operations regardless of the operator. It is designed to be rolled out nationwide, achieving operational integration without major institutional restructuring of the bus sector.
- **IbuSys Benefits -** Bus owners receive guaranteed monthly payments based on overall revenue, while bus crews have regular monthly wages and welfare benefits. Passengers enjoy more reliable, higher-quality, and safer services with cashless payment options.

Relevance to Timor-Leste: The IbuSys system in Sri Lanka serves as an example of the importance of a centralized system in reducing unhealthy competition among private operators while providing them with a less risky platform to deliver public transport services. The role of the government in safeguarding the well-being and benefits of employees is also crucial. Timor-Leste's public transport system shares similarities with Sri Lanka's informal system and thus requires a similar reformation approach.

8.2.5 Public Transport Infrastructure and Facilities

There is relatively limited literature dedicated to the planning, design, operations, and management of public transport infrastructure within the overall reform agenda described above, except in the case of various forms of BRT system. Nevertheless, new or upgraded infrastructure and facilities is often included, and needs to be considered, within as part of wider modernization programs. For example, bus terminals and bus stops were upgraded as part of the Rwanda and Malta case studies described above.

Irrespective of the precise infrastructure, facilities or assets being provided, there is a large body of generic guidance around good governance including:[139]

- Strategic planning should be undertaken to define a vision, set of objectives and desired outcomes the infrastructure is required to achieve;
- The full asset life cycle and delivery chain should be considered, including needs identification, specification, design, construction/implementation, operation, and management within an overall approach to integrated asset management;
- Funding, affordability, and value for money considerations should be paramount;

[139] Source: OECD, 2015

- The needs and views of asset users and communities should be ascertained and used to inform various points of decision-making;
- The full range of potential delivery and operating models should be considered, ranging from direct Government provision through traditional public procurement to various forms of private sector contracting or partnership.

Where provided new or improved, capital investment for public transport infrastructure is often funded and programmed by the relevant Government entity, either on its own account or supported by IFI grants or loans.

In some cases, this may be a Central Government body or delegated to the local or municipal level. In Jordan, for example, the Land Transport Regulatory Commission (LTRC) of the Ministry of Transport regulates all public transport throughout the country. However, since 2007, all urban public transport in Amman, the capital, including regulatory functions, bus contracting and the planning, construction, and management of infrastructure, including passenger terminals and physical aspects of BRT, has been the responsibility of Greater Amman Municipality, whilst LTRC provides the same role across the rest of Jordan.

More variable are responsibilities for operation and management of facilities which may be undertaken by the public sector (e.g., Rwanda, London, Bahrain) or delegated to the service operator (e.g., Malta, Singapore, Saudi Arabia) as part of their contract.

In the vicinity of passenger terminals, Central and Local Government entities, or the relevant transport authorities, usually plan, design, and provide connecting highway and right-of-way infrastructure. Where this is the case, good practice is such infrastructure should also include pedestrian and cycling routes as first and last mile connections to adjacent communities and land uses. The planning of facilities should also align with the relevant land use plans, zoning demarcations and be consistent with surrounding community, residential or commercial developments.

Public entities, for example the Traffic Police, may also often be responsible for traffic and parking management on roads and streets surrounding public transport terminals. In the context of public transport reforms described in this Paper, this may also include enforcement activity against illegal or informal public transport operators who continue to pick-up or drop-off on-street outside the remit of newly introduced formalized operating contracts or franchises using the designated terminal facilities.

In some cases, provision of passenger terminals, as well as operational facilities, may be undertaken by separate private sector interests, especially where user fees, advertising, land development rights and other revenue streams support a commercial business case. One case of this is Hong Kong where high-value development value from Transit-Orientated Development significant exceeds and have supported the costs of integrated public transport hubs and associated infrastructure for urban rail and bus. Singapore provides similar examples and at a smaller scale, a number of “Sentral” long-distance terminals in Malaysia have been developed and are operated by the private sector as part of wider real-estate development which includes adjacent office or retail floorspace.

There is no “no size fits all” approach to the governance of physical public transport infrastructure and facilities, especially in respect of operations and management functions. Successful approaches will be closely tailored to local institutional capacities, administrative and contractual approaches, land development potential, commercial opportunities, and other revenue streams, as well as the management and allocation of risk between public and private sectors.

Box 8.8: Modernization of Major Bus Terminals in Malaysia

Bus transportation in Malaysia is vital for intra-state and inter-state travel, mainly provided by private express bus companies. The Land Transport Public Agency (APAD) regulates and licenses these operators. Major terminals, like KL Sentral, Melaka Sentral, and KK Sentral, serve as comprehensive transportation hubs, connecting various modes of transport and offering diverse amenities.

- **Modernization Efforts -** Malaysia has embarked on a significant modernization of its major bus terminals, transforming them into comprehensive transportation hubs with diverse amenities and services.
- **Public-Private Collaboration -** Modernizing these terminals involves collaboration between public and private sectors. KL Sentral, for example, was developed by a consortium led by a private company (MRCB) and a government-owned corporation (KTMB).
- **Government Operation -** Although private companies are involved in their development, major terminals in Malaysia are primarily operated by the government or government-owned entities to ensure effective oversight and coordination.
- **KL Sentral as a Model -** KL Sentral exemplifies a comprehensive transportation hub, featuring bus and rail services, office spaces, hotels, condominiums, and entertainment facilities. Such facilities enhance passenger experience and contribute to terminal sustainability.
- **Urban Development Success -** Residential and commercial developments around Malaysian bus terminals, such as Suasana Sentral Loft and Plaza Sentral, have thrived, demonstrating the positive impact of well-planned transportation hubs on surrounding areas.
- **Traffic Management -** Malaysia's focus on traffic management includes providing indoor and outdoor parking near transportation hubs to enhance convenience and accessibility.

Relevance to Timor-Leste: Timor-Leste can learn from Malaysia's approach to public-private collaboration in modernizing bus terminals and stimulating urban development. Balancing private sector involvement with government control is crucial for efficient and sustainable terminal operation.

Box 8.9: Pacific Island States Land Transport Authorities (LTAs)

Several neighboring Pacific Island states have implemented reforms in their public transportation systems in recent decades. Both Fiji and PNG have established their respective Land Transport Authorities (LTAs) to regulate public transport and address challenges effectively.

- **Fiji's LTA Functions -** Fiji's LTA is responsible for coordinating and improving passenger and goods transport by road. They ensure adequate public transport provision, register vehicles, license drivers, and enforce safety standards. They also develop traffic management and enforcement strategies to enhance safety and infrastructure protection.
- **Quality Assurance Maintenance System -** Fiji's LTA has implemented a Quality Assurance Maintenance System, resulting in over 80% of bus operators passing assessments. The LTA is committed to raising standards and adapting to evolving technology and global standards.
- **Unresolved Challenges -** Despite successes, the LTA faces challenges, such as unfair competition and illegal practices in the bus industry. Varying safety and insurance standards pose problems, with the rise of unsafe and uninsured minibuses. The LTA must address these issues to maintain market balance, safety standards, and government revenue.
- **PNG's RTA Functions -** PNG's Road Traffic Authority (RTA) administers and enforces land transport regulations, road safety, and efficiency. They manage data, investigate accidents, conduct research, and promote compliance with regulations. The RTA collaborates with other organizations to achieve these goals.
- **Private Involvement in PNG -** Private companies develop large bus terminals, often as part of community projects. These terminals are later handed over to government authorities.
- **Challenges in PNG -** PNG faces challenges in regulating public bus services due to private bus ownership. Enforcing regulations is difficult, resulting in unregistered buses and congestion. To address this, collaboration between the RTA and National Capital District Commission (NCDC) aims to improve bus terminals and services.

Relevance to Timor-Leste: The LTAs and RTAs in Fiji and PNG, along with their policies and reforms, demonstrate how autonomous authorities can drive service improvements. Timor-Leste should follow these examples as it establishes its LTA, focusing on acquiring the needed expertise and leadership to drive meaningful changes.

Box 8.10: Futa Long Distance Bus Lines in Vietnam

Vietnam's long-distance bus network, overseen by the Department of Transport, is mainly comprised of private operators, with Futa Group as a prominent example. Timor-Leste can look to Futa's focus on service quality to improve its own public transport perception and reliability.

- **Expansive Presence -** Futa operates across 39 provinces in Vietnam, offering 60 inter-province routes and maintaining a fleet of over 2,000 vehicles to meet diverse travel needs, contributing to its competitive advantage.
- **Diverse Services -** Futa provides various transportation services, including taxis, transfer buses, city buses, and long-distance sleeping buses with amenities like Wi-Fi and air conditioning. With 1,600 daily trips, Futa serves over 20 million passengers annually, demonstrating the importance of catering to diverse travel needs.
- **Passenger-Centric Approach -** Futa prioritizes the passenger experience by offering online ticketing options and establishing Rest Stops that provide quality food and services 24/7.
- **Infrastructure Funding -** Vietnam funds bus terminals through various means, including government initiatives and private investment. While the majority of public transport infrastructure is government-built, private companies have the opportunity to construct facilities for their own fleet usage.

Relevance to Timor-Leste: Futa Group demonstrates how private enterprises can deliver high-quality public transportation services, benefiting both residents and visitors. Timor-Leste can explore the possibility of engaging private sector entities to operate its public transport services, while the government focuses on providing infrastructure and regulating the sector to foster healthy competition.

Box 8.11: Quality Bus Partnerships in the UK – Summary of the Operating Model

A Quality Bus Partnership (QBP) is an established UK governance model that enhances local road-based public transport services by fostering collaboration between public agencies (e.g., local authorities) and private bus operators.

- **Legislation -** In the United Kingdom, QBPs are legislatively supported since 2000 and were reinforced by the 2017 Bus Services Act, which introduced Enhanced Quality Partnerships, granting local authorities more control in bus service regulation and franchise management.
- **Objectives -** QBPs aim to promote public transport usage, reduce traffic congestions, enhance environmental conditions, and provide high-quality services to passengers.
- **Collaborative Approach -** QBPs involve coordination between public agencies and private bus operators. They include joint investments in infrastructure and services, as well as the establishment of management groups to monitor progress.
- **Versatile Scale -** QBPs can be implemented at various scales, from individual corridors or centers to entire cities or regions. They can also involve a single public transport operator or multiple operators, even in competitive environments.
- **Flexibility in Partnership Models -** QBPs can vary in collaboration, roles, and agreements. Some are voluntary; others involve formal contracts and obligations.
- **United Kingdom Implementation -** QBPs have been widely adopted in the United Kingdom, particularly in areas where public transport operates without a franchising or contracting model.
- **Responsibilities of Local Authorities -** Local authorities in QBPs ensure clean and welcoming bus stops with real-time information and prioritize bus travel in transport plans.
- **Responsibilities of Bus Operators -** Bus operators commit to coordinating timetables when multiple operators are involved and providing transparent fares.
- **Joint Responsibilities -** Public agencies and operators collaborate by consulting with passengers, coordinating investments, monitoring impacts, and using data for improvements.

Relevance to Timor-Leste: The QBP is a public-private partnership to enhance public transport. Timor-Leste can learn from the United Kingdom's specific regulations and framework, emphasizing the value of such collaborations for high-quality service outcomes to benefit all.

8.2.6 Lessons Learned for Timor-Leste

This section has presented a range of good practices and case studies in multiple dimensions of reform and improvement of public transport. A particular focus is put on the informal sector which plays a critical de facto role in providing mobility to millions across the Global

South, including Timor-Leste. The analysis demonstrates that public transport serves a critical economic and social role in public policy, provides a source of employment and income, and can deliver vital national and local objectives for efficient, safe, integrated, and sustainable movement and access to opportunities. Yet the reality often falls well short of the ideal and public transport in many cases is seen as disorganized, unsafe, low quality, poorly regulated and failing to deliver on the needs of individuals and communities.

The issues highlighted in this section form the basis for a strong case for reform in Timor-Leste. When considering the way forward for the reform, improvement and optimization of public transport infrastructure, assets and services, the international evidence is highly location specific. The position in any one locality is highly dependent on historical, political, cultural, economic, and social circumstances and what works well in one country or city may be less transferable to another. In other words, place matters. However, there is more consensus on what successful outcomes look like and the test for any set of reforms is do they increase the potential for maintaining or increasing public transport ridership and mode share, do they improve service quality and user satisfaction, do they reduce negative externalities such as congestion, emissions, and carbon footprint, do they support happier, more inclusive communities, and are they financially and economically sustainable in the longer-term?

As well as asking these questions, some broad conclusions are possible from the evidence set out in this section which should be considered in the development of future public transport policy, regulatory and institutional frameworks for Timor-Leste. In particular, it is clear that the proposals for infrastructure and technical service improvement which may emerge from other workstreams of the Timor-Leste public transport Master Plan cannot be effectively implemented, nor the benefits of such improvements secured, until a fit-for-purpose institutional and regulatory framework encompassing both the public and private sectors is in place.

Starting with a position of an imperfect supplier market with weak regulation, the broad conclusions and critical success factors for achieving public transport institutional and regulatory reform are as follows:

- **Take a Vision-Led Approach -** Adopt and secure consensus for a clear vision, policy objectives and desired outcomes from public transport reform, so it is clear what long-term success looks like and how it supports stakeholder requirements and expectations.
- **Political Leadership and Support -** Provide strong political leadership and support, both to the vital importance of public transport within the wider land transport system, as well as to the strategic goals of reform and to the tactical mechanisms to achieve successful change.
- **A Hybrid Reform Model -** Pursue a hybrid reform model for public transport across the public and private sectors whereby both are strengthened in terms of their legal basis, functions, rights and obligations, structure, contractual relationships, skills, capacity and availability of sustainable funding and resources to plan, regulate and deliver improved services to users.
- **Lead Regulatory Institution -** Identify and strengthen a robust lead regulatory institution for public transport, either as a stand-alone entity or a unit or department within a larger transport agency, with effective technical, human, and organizational skills and capacity, continuity, and institutional memory. The institution should be brought forward through a comprehensive and multifaceted organizational development and transition plan to achieve a defined state of readiness against a defined target operating model.

- **Strengthen all Levels of Government -** Consider national and local government dimensions of institutional strengthening, with devolution of public transport tasks to the lowest practical level as appropriate, subject human and organizational capacity locally as well as wider debates around municipal or district decentralization of powers and resources.
- **Professionalize the Private Sector -** Capacitate, consolidate, and professionalize the private sector, including informal public transport operators, in order to provide stronger coordination, service integration, economies of scale and benefits for users, owners and employees. Care should be taken, however, to avoid excessively safeguarding vested and incumbent interests and allow for new entrants and healthy competition as the regulated public transport market evolves.
- **Incremental Reform -** Adopt an incremental approach to reform rather than a big bang so that change can be adequately planned and sequenced, key tasks, opportunities and risks can be adequately addressed, and all concerned stakeholders can be fully engaged and brought on board.
- **Stakeholder Partnerships -** Develop effective partnerships across all concerned stakeholders, recognizing that effective coordination of functions, powers, and resources across a range of entities, interests, and individuals, especially between the public and private sectors, will be vital for success, both in terms of formal mechanisms, but also working culture and mindset towards shared goals.
- **Work with the Informal Sector -** Engage, involve and work constructively (although not uncritically) with the informal sector, where paratransit in its various forms provides the mainstay of the current public transport system and is willing and able to consolidate, professionalize and move from being part of the problem to being part of the solution, evolving from a low-cost, low-quality service to one which the public would use by choice.
- **Engage with Users and Communities -** Consult and engage public transport users and communities, especially vulnerable groups, and ensure that immediate and standing mechanisms are in place to inform key decisions, understand the impacts of reforms and ensure public satisfaction and support.
- **Funding and Finance -** Consider the funding and financial implications of the regulatory and business models, and associated investment plans, under discussion, including issues of whether the public or private sector takes revenue risks on public transport services and ensuring that reforms are financially sustainable.
- **Leverage Digital Technologies and Innovative Measures -** Anticipate, pilot, and deploy digital technology, data management and other innovations to improve efficiency, service quality and operational management, whether or not such initiatives require, or lessen the need for, wider institutional or regulatory change.
- **Evaluation Operating Options for Infrastructure, Facilities and Assets -** With no single blueprint or model emerging from the literature, define and evaluate the options for delivering, operating, and managing public transport infrastructure, facilities, and assets, in parallel with regulatory and service changes. Plans may depend on whether a major public transport project, such as BRT, is envisaged, but irrespective, there is a need to ensure that infrastructure is implemented within an integrated approach to robust asset management across the whole infrastructure lifecycle.
- **Leverage Lessons from COVID-19 -** Use the experience of COVID-19, whether as challenges, successful innovation, or post-pandemic opportunities, to further make the case for institutional and regulatory reform, and build back better in terms of efficient, integrated, and sustainable mobility.
- **Act and Evolve -** Plan and implement an initial reform program but keep an eye to the need for further change and the evolution of public transport sector governance arrangements in future. However, care should be taken to give

sufficient time for new arrangements to mature, for stakeholders to understand their changed roles and responsibilities and avoid change for short-term political expediency or until the impacts of the initial reforms have been properly evaluated.

It is recognized that the geographical circumstances of Timor-Leste do not align with many of the large city cases which are frequently the focus of best practice literature and regulatory debate, and that proposals should be naturally locally specific and tailored.

8.3 Institutional / Operating Model for Timor-Leste Public Transport

8.3.1 An Institutional Model for Improving Public Transport in Timor-Leste

The institutional – or operating – model which needs to be designed to deliver an enhanced public transport system for Timor-Leste is the collective term for several important tools for making decisions about future infrastructure, assets, products, and services within and between municipalities, cities, and rural areas. These tools need to balance competing demands and stakeholder interests, develop effective planning and delivery capacity over time, and ensure that the sector is developed in a way which produces the best outcomes for customers, communities, businesses, and investors.

More specifically, the "model" in this context consists of the five core elements shown below, based on adapting and applying a number of long-standing institutional capacity building and organizational development models used for strategy development and the achievement of long-term goals. This model can be applied at varying scales (from an individual asset – such as a bus facility, through the system as a whole). The dimensions at which this model is generally applied, or the "Outputs" include: (i) infrastructure and assets; (ii) products and services; (iii) customers and communities; and (iv) competition and regulation.

The five core components of the model are (shown in **Figure 8.2** as the central circles in the model):

- **Planning and Operating Processes** - An overall end-to-end public transport planning and delivery process and set of coherent and integrated sub-processes which links the national vision for achieving economic, social, and environmental goals through to sector decisions, infrastructure and service delivery and operation on the ground;
- **Policy and Strategy -** A hierarchy of policies, strategies, and plans, adopted at national and sub-national levels, overarching and for different public transport modes and markets;
- **Institutions and Structures -** A set of organizations (institutions) structured and mandated with clear roles and responsibilities to individually and collectively carry out clearly identified tasks within the overall planning and delivery chain;
- **People and Skills -** Populating these institutions with professionals at the right capacity and with the prerequisite skills and capabilities to competently and efficiently carry out key functions and activities; and
- **Culture and Behavior -** A positive culture and set of associated behaviors which promote qualities such as leadership, open communication, inclusiveness, customer focus and collaboration across sectoral, disciplinary, or institutional boundaries.

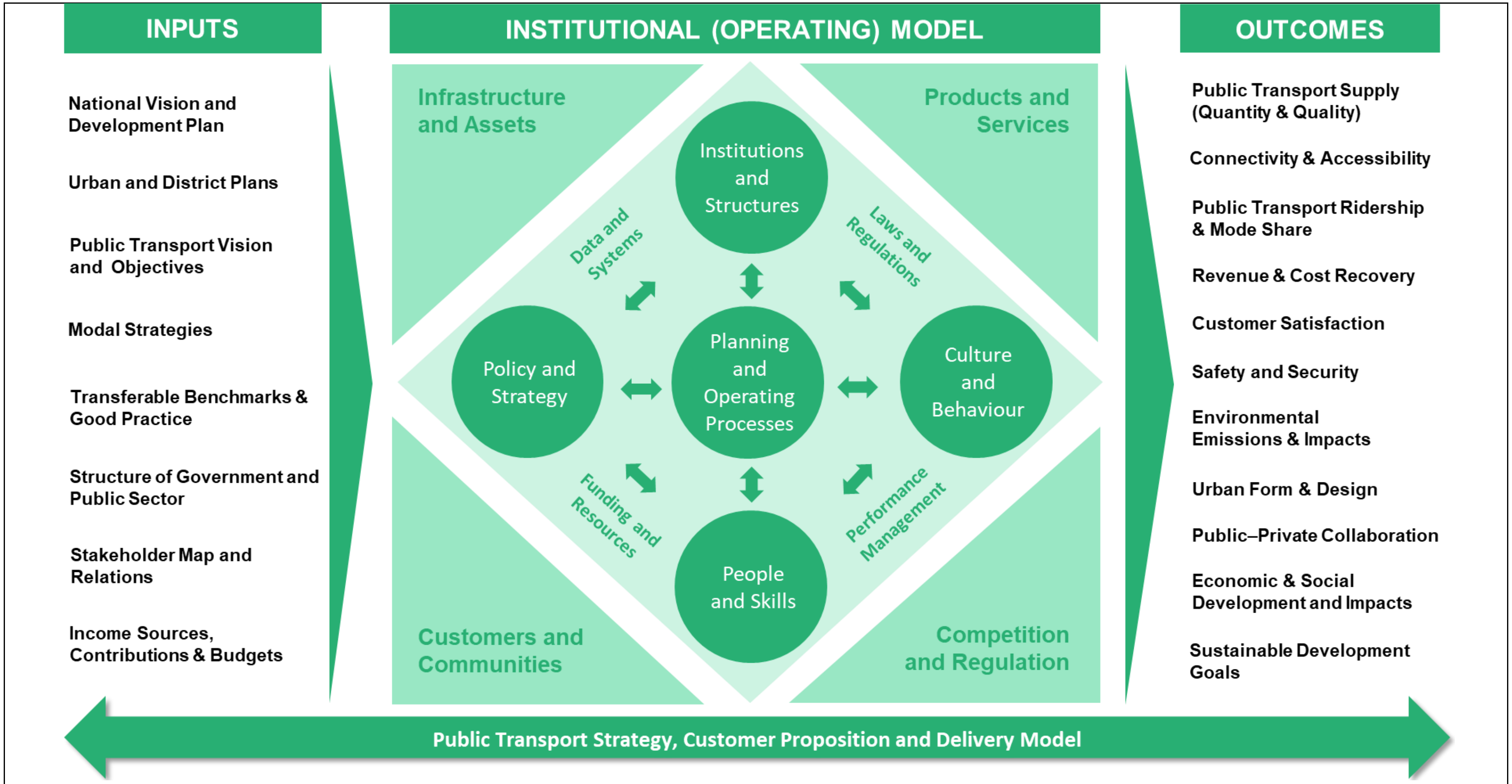
In addition, the system operates effectively through a number of enabling factors. These enabling factors are (shown in **Figure 8.2** as the factors populating the inner triangle):

- **Laws and Regulations -** A robust legal and regulatory framework provides the "ground rules" for operation, setting the standards for service quality, safety, and environmental performance. The legal and regulatory framework should promote fairness and competition in the interests of passengers and align public transport services with broader societal goals.
- **Funding and Resources -** Adequate funding and resources from sources such as government subsidies, fare revenues and private sector investment – to ensure the public transport system can meet demand and provide quality service.
- **Data and Systems -** Comprehensive data and systems to provide insights and processes for decision-making, route planning and service planning – acting as a critical enabler for operational efficiency, service improvement and strategic planning.
- **Performance Management -** Performance management approaches to monitor and optimize the delivery of the desired outcomes at all levels, including setting clear performance targets, monitoring and measurement of performance against these targets, and implementing necessary changes to improve outcomes – creating accountability for both the public and private sector at all levels.

The model has a series of important inputs, including those originating from the overall public transport strategy and master plan, strategies for other transport modes and networks (including roads and active travel), the organization and capacity of Government, and the wider political and economic context. The institutional arrangement also aims to produce or enable a range of desired outcomes, such as increased public transport ridership, mode share, customer satisfaction and alignment with the Sustainable Development Goals, with the intention to monitor and performance manage the same over time.

The key outputs of the institutional transition plan must cover all of the above elements, going beyond a narrow focus on organizational structures, skills, and capacity alone, as well as encompassing the full range of public transport infrastructure, assets, products, and services.

The proposals build on the existing proposals for the creation of the Land Transport Authority. Critically, reflecting the hybrid regulatory model which has been introduced in earlier sections of this report it must enable and strengthen the capacities and competencies of the public and private sectors, both in their own direct roles and in their ability to work constructively and collaboratively together to produce optimum results.



Source: Arup Study Team

Figure 8.2: Institutional Model for Timor-Leste Public Transport

Objectives of Public Transport Institutional Reform

Within the institutional (operating) model above, Timor-Leste's public transport system, and the reforms driving its improvement, should have, and should be assessed against, a series of core themes and objectives broadly based on recognized good practice as follows:

Strategic Focus and Alignment

- Provide strategic direction and leadership across the public transport sector in a manner which ensures planning and delivery is coordinated, transparent, efficient, and effective, from initial strategy development through to monitoring of operations and service delivery on the ground;
- Align institutions logically with a coherent body of strategies, plans, programs, and projects, supported by adequate resources, human capacity and skills, processes, and systems;
- Ensure clarity of roles and responsibilities of all entities, in the public and private sectors, recognized in law and applied in practice, with a lead regulatory agency providing and enforcing an overarching sector framework; and
- Promote efficient, effective, and timely decision-making, supported by consistent data, evidence and technical processes.

Responsiveness to the Needs of Customers, Stakeholders, and the Community

- Promote sensitivity and adaptability of national institutional arrangements to regional and local priorities, opportunities, and constraints, within the context of wider Government policy;
- To focus on, and deliver for, the needs of customers, especially vulnerable groups, who regularly use and rely on effective public transport to conduct their professional or personal business;
- Foster an environment that represents and balances different stakeholder interests, including appropriate incorporation of, and collaboration with, the informal transport sector, itself enabled and incentivized to consolidate and professionalize over time; and
- Encourage the engagement and involvement of communities and the public at all stages of public transport planning and delivery and ensure decisions are made in an open, inclusive, and transparent manner.

Practicality, Use of Resources and Risk

- Focus on phased and incremental reforms building up over time which are practical and reasonably easy to implement within a defined timeline, program, and resource envelope;
- Manage and mitigate costs, risks and disruption resulting from change, and avoid unintended consequences; and
- Build on existing or committed institutional processes, structures, and resources, including the transition to the new Land Transport Authority.

Efficiency of Organizational Management

- Promote organizational arrangements which are lean and efficient in terms of the costs relative to monitoring of the benefits and outcomes;
- Evolve and manage and adequate organizational skills, processes, systems, and other capacity elements; and
- Ensure adequate local presence, visibility, and responsiveness, for example in district Centers.

Capability, Culture and Stakeholders

- Ensure that institutional arrangements reflect, and drive improvements in, professional capacity, skills, and capabilities within, and between, key organizations across the public and private sectors;
- Foster open and positive change in organizational culture and behavior across the public transport sector, including collaboration and putting customers first; and
- Have the support of key stakeholders, including those responsible for sponsoring and driving, or otherwise being impacted by, the proposed sector reforms.

The above objectives have informed the assessment of the current situation, already documented in this report, and the development and assessment of options for reform for public transport infrastructure, assets and services which are set out below.

8.3.2 Roles and Responsibilities

The hybrid model of public transport management and operation encapsulates the shared responsibilities between the public and private sectors to modernize the public transport system in Timor-Leste while achieving optimal resource allocation, financial sustainability, promoting technological innovation and improving overall public transport performance. When properly implemented, and as demonstrated through the case studies presented throughout this report, the hybrid model targets a symbiotic relationship between the public sector (who drive an agenda for inclusivity and the "public good') and the private sector (who focus on efficiency and profit optimization). Overall, it seeks to align public and private incentives in pursuit of achieving the overarching outcomes of the public transport system.

This section summarizes key roles and responsibilities of the public and private sector under the hybrid model. Additionally, there are some "shared and negotiable" responsibilities which cannot be extracted from international best practice and generalized to all contexts – i.e., they will require assessment, discussion, and negotiation between sectors on a case-by-case basis.

To deliver the roles and responsibilities of the public sector will require strengthening from the current model to a proposed Public Transport Department under the new Land Transport Authority. There will be new skills and capacity required within the Department to plan, license, regulate and contract the private sector for operations. Over time, these functions may be devolved to the Municipal level, however municipalities will also require the adequate skills and capacity to perform these functions at a local level. This would require regional offices of the LTA in each of the key municipal Centers.

Crucial to the success of this operating framework is the professionalization and capacity building of the private sector. This represents a shift from competition "in the market" (on the street for passengers) to competition "for the market" – where organized collectives of public transport operators compete for service regions. There is a significant risk that investment into modern public transport infrastructure or facilities will not realize the associated benefits without the cooperation of the operators to deliver a high-quality public transport product for passengers. This process begins with the formation of an operator association to create a more collaborative and coordinated operator sector.

Across both the public and private sectors, skills and capacity are critical. Currently, there is limited local technical expertise or capacity surrounding public transport generally, which is fairly standard across the world for countries with similar levels of development. Therefore, education, upskilling and general capacity building across the LTA/Public transport Department and private sector operators alike is an integral component of modernizing the institutional framework governing public transport.

Systems and processes have an important role to play in the management and operation of the system. Systems and processes provide the foundation for efficiency and accountability. Systems and processes should be established to clearly delineate decision-making, with this process being transparent and data-driven where possible, as well as having clear processes established for routine and emergency situations. These systems and processes contribute to the professionalization of both the public and private sectors as they provide clear standards for operators to adhere to, and clear processes for the government to follow (which can bridge the institutional gap by mimicking the functions of a strong institutional structure).

Strengthening the Public Sector – A Public Transport Department within the LTA

A new approach to policy, planning and regulation of public transport will involve the creation of a new body under the LTA to deliver these functions. For working purposes, we call this the Public Transport Planning and Regulation Department (the Department). The Department will need to be established in parallel with the work program to plan, license, regulate and contract the future public transport network (across all modes).

The Department should be established within the Land Transport Authority. Under the hybrid model, the Department sets policy and regulates while the private sector provides services to passengers under various conditions defined through license, permit, contract, or concession. The provision and operation of facilities and fixed assets would be assigned to either public or private entities depending on the operating model adopted and should be assessed on a case-by-case basis depending on the context and scale of fixed assets. The Department will need to work with the informal sector to support the professionalization of the private sector.

The Public Transport Department could be established as a small technical team, headed by a director, within the Land Transport Authority, building from around 6 to around 12 to 15 professional staff once fully established. This number excludes operational staff on the ground, for example at passenger terminals or vehicle inspection facilities who may be provided as direct Government employees or devolved, outsourced, or contracted to other public or private sector organizations as appropriate. Core headcount will be supported by suitable accommodation, IT and systems, technical software and data, and other resources, either directly or as part of the wider capacity building and resource management of the LTA as a whole.

The establishment of the Department should also reflect the ongoing restructuring and capacity building of the LTA more widely and link to other agencies in Government.

Objectives of the Public Transport Department

The Department should have the following objectives:

- **Vision and Strategic Objectives -** To define a vision, set of strategic objectives and critical success factors for the public transport sector as a whole and in its relationship with other transport modes and networks.
- **Deliver a Step-Change in Service Quality -** To deliver a step-change in the quantity and quality of public transport service provision for all in support of wider integrated transport, social and economic development objectives set by Government.
- **High-Quality Public Transport Facilities -** To ensure public transport facilities are planned, constructed, and managed in order to support operation of assets (vehicles) and services.
- **Integrated Decision Making -** To ensure that investment and management decisions on public transport are integrated with decisions made in respect of other transport modes and networks, including roads and traffic management, aviation and maritime.
- **Value for Money -** To ensure that public funding for public transport is clearly targeted, well-used and delivers value for money.
- **Promote Public Transport -** To act as representative and champion for public transport, and passengers, within Government and in partnership with the private sector as well as the community.

Key Functions of the Public Transport Department

The Public Transport Department within the LTA should have the following functions (i.e., "Public Sector Responsibilities" under the hybrid model):

- **Public Transport Policy and Strategy -** Development of public transport policy and strategy, keeping up to date and overseeing the implementation of a public transport Strategy, including high-level vision, objectives and KPIs for the sector, as well as the evolving service specification and customer proposition. *Under the hybrid model, the Department collaborates with private operators in the implementation of these strategies to realize shared objectives.*
- **Drafting and Enforcing Regulations -** Develop, implement, manage, and monitor any new planning and regulatory framework for public transport operations, including licenses, permits and concessions with private operators. This includes provisions and standards for safety, service quality and fares, among other factors (e.g., environmental performance). *Under the hybrid model, these regulations set the rules that private operators must follow, while establishing and maintaining a level playing field in the market. A key pre-requisite of any agreement/service contract between the public and private sector is regulatory compliance on the private sector's part.*
- **Planning of Routes and Network Service Parameters –** On-going planning of public transport routes and the parameters by which the network is provided to the community – such as timetables, service frequency and hours of operation. *Under the hybrid model, these decisions determine where and when operators will be required to provide services. Given the on-the-ground knowledge of operators, the Department should consult with the operators during the planning process.*

- **Provision of Passenger Facilities -** Plan, oversee or contract design, construction, management, and operation of public transport facilities, including passenger terminals, bus stops and access arrangements. Passenger facilities are planned by the Department to serve the public good and improve passenger experience and safety. *Under the hybrid model, the provision of passenger facilities has implications for passenger demand and operational efficiency – and the Department should work closely with private operators to ensure that facilities meet the needs of both passengers and operations.*

- **Traffic Management/First Last Mile Connections -** Collaboration with other relevant divisions of the LTA, and other Ministries (such as MPW) where relevant, for the improvement of first and last-mile connectivity such as pedestrian and cycling infrastructure. Additionally, coordination with the traffic operations department can maintain reliability of services. *Under the hybrid model, the private sector may be involved in providing solutions (e.g., bike sharing schemes).*

- **Licensing/Contracting -** Licensing private operators to provide public transport services and contracting them for specific services. Modern license and contracting agreements should include performance standards, the responsibilities of operators and payment mechanisms. *Under the hybrid model, the license and contracting specifications have significant impact on private operators as they define the terms under which they operate – the Department should carefully manage these agreements to ensure that incentives are aligned and there is a productive partnership with the private sector operators.*

- **Fares and Ticketing -** Determine arrangements for public transport fares and ticketing, balancing considerations of affordability and cost recovery, as well as passenger information, alongside appropriate marketing, promotion, and measures to encourage greater levels of ridership and ensure affordability and accessibility for all users. Over time the Department should seek to implement integrated ticketing systems where users can use a single ticket for journeys involving multiple operators. *Under the hybrid model, the fare structure has an impact on the private sector as it may impact on their revenue or general ticket sales (i.e., attractiveness of the system overall). Implementing ticketing systems requires collaboration with operators to ensure passengers have a seamless experience.*

- **Budgetary and Financial Management -** Securing appropriate budgetary and financial management arrangements for public transport, including determining and managing, as appropriate, public subsidy in support of socially necessary services. The Department may also be responsible for managing revenue from fares and other sources. *Under the hybrid model, these decisions can determine the level of financial support available to private operators and influence the financial viability of their operations. The public sector's financial management responsibilities should include ensuring that contracts with private operators are fiscally responsible and sustainable.*

- **Convening/Integrating Stakeholders -** Establishing and supporting multi-agency arrangements for improvements to public transport infrastructure and services, alongside service improvements. This might involve hosting public consultations, coordinating with other public services and Ministries, or mediating disputes between different parties. *Under the hybrid model, the Department is uniquely positioned to convene stakeholders, and if different viewpoints and incentives are not managed and balanced this can impact on the operating environment for private operators.*

- **Monitoring/Outcomes -** Monitoring the performance of the public transport system and measuring outcomes against policy goals and contractual obligations, including tracking KPIs, conducting audits, and gathering feedback from passengers and operators. *Under the hybrid model, public sector monitoring and evaluation holds private operators accountable – and can inform contract renewals, performance-based payments, and future policy/planning decisions.*

Additionally, the Department may perform the following functions to varying degrees based on case-by-case negotiation with the private sector (i.e., "Shared or Negotiable Responsibilities" under the hybrid model):

- **Vehicle Procurement -** The public sector may play a role in vehicle procurement, particularly if large-scale investment is required – with the public sector able to leverage their greater purchasing power to negotiate more favorable terms, promote standardization, and ensure vehicles meet safety and environmental standards. The public sector may also intervene in vehicle procurement if specific types of vehicles (for example, electric buses) are preferred in-line with public policy objectives. The level of public sector involvement in vehicle procurement will depend on overarching transport policy, financial resources available, and the capacity of private operators to do this. There are various models under which vehicles can be procured, each of which should undergo detailed procurement analysis at time of procurement – these range from shared procurement, fully privatized, or purchased/owned by the public sector (with private sector responsible for operations only).

- **Depot Provision -** The public sector can own and operate depot facilities in the same way that they may plan, fund, and construct public transport passenger facilities. Depots, however, are a more operator-focused facility, which are primarily used to store and maintain public transport vehicles. The public sector can play varying roles in depot provision based on land availability, financial constraints of the private sector, transport policy, and capacity of the private sector to own and operate their own facilities. There are a number of models that depots can be provided under, including public provision with private operation, joint public-private provision, public ownership and private lease, or full private provision.

- **Infrastructure and Passenger Facilities Operation and Management -** It is most common internationally for the public sector to lead in the provision of infrastructure and passenger facilities, such as bus lanes, bus stops, interchanges, and terminals. The Department can lead the planning and strategic decision-making surrounding infrastructure and passenger facilities to ensure that they align with the public good. However, negotiations with private operators may lead to shared responsibilities – such as private operations/management contracts (e.g., maintenance and cleaning). In certain instances (e.g., in Dili), facilities could potentially be developed as full Public-Private Partnerships from the outset.

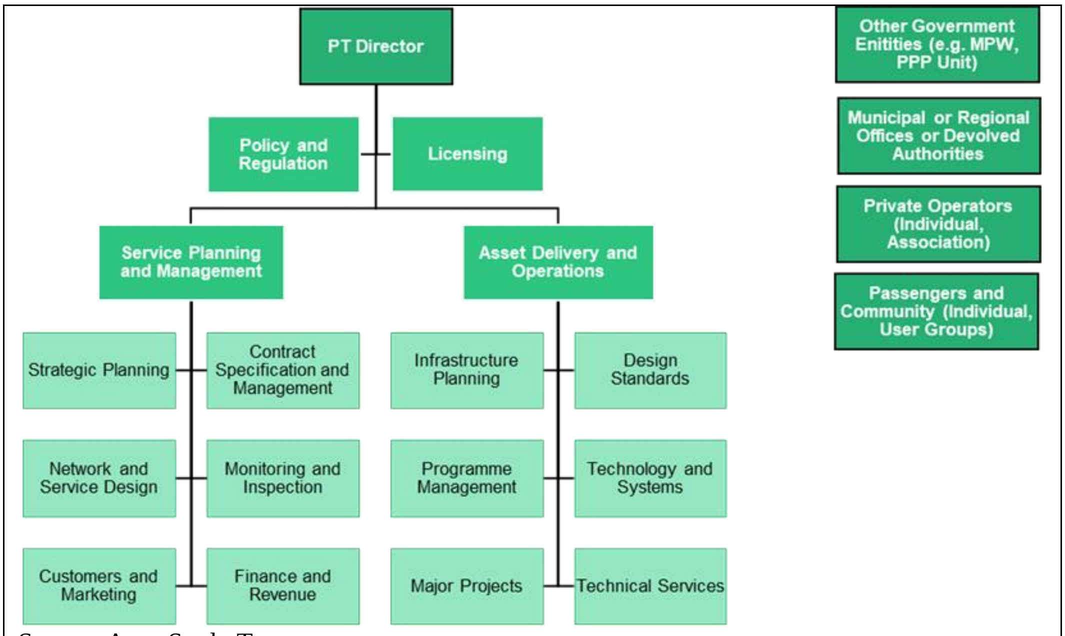
- **Passenger Information and Media -** The public sector would generally take responsibility for providing passenger information across the network. This can include route maps, real-time information at bus stops, and promotional materials promoting the public transport system. However, some of these functions may be shared with the private sector, for example, it may be negotiated that the operators will manage real-time data or advertising on vehicles, while the public sector retains overall control of branding and information standards. These negotiations will depend on factors such as the private sector's capacity for information management, the technology platforms available, and the Department's preference for the level of consistency in information/media messaging.

- **Intelligent Transport Systems (ITS) -** The Department can facilitate the implementation of ITS, which include traffic management systems (in collaboration with other divisions of the LTA), real-time information and smart ticketing. The public sector will generally look to the private sector as solutions providers; however, this will vary depending on the technological capabilities of the private sector. The exact division of responsibility will depend on negotiations and may see the Department partnering with private companies who specialize in ITS systems, while maintaining public oversight.
- **Revenue Collection, Apportionment and Collection -** The Department should oversee the revenue collection and apportionment of the system – prioritizing transparency and equitable distribution of revenues among operators. The specifics will depend on the complexity of the fare system, the revenue model and contracting model, the need for fare integration across operators, and the availability of technology that can enable efficient coordination and management of revenues. Different scenarios may emerge through negotiations, such as all ticket sales managed by the private sector with supervision and auditing from the Department, through to complete public management of the revenue system.

Possible Structure for Public Transport Department within the LTA

It is assumed there is a commitment to implement the LTA. In broad terms, to facilitate the operation of a modern public transport network, over time the LTA will need to cover the functions set out below. The Figure below provides a possible structure for the Public Transport Department based on international benchmarking. A distinction is made between policy and planning functions and delivery and operational functions, which may also have some interaction with the MPW. The Figure excludes wider corporate functions such as Human Resource, Legal and IT which are assumed to be provided by the broader LTA.

While this model will be adapted as the LTA is established, there might be parts of this proposed structure that will form part of the LTA. Nevertheless, this structure is provided here to illustrate the elements that are required for a fully functional public transport department. It is noted that this structure could be established on a stand-alone basis or as part of a wider program of work to create a governance arrangement with functions and powers across all modes of surface transportation, including taxis, water transport, rail transport, highways, and traffic.



Source: Arup Study Team

Figure 8.3: Possible Structure for Public Transport Planning and Regulation Department within the Land Transport Authority

Important Actions to Support Establishment of Public Transport Department

In addition to creation of the Public Transport Department, important actions in this area include:

- Technical Skills and Capacity Building: Building skills and capacity in new technical areas, for example through the recruitment of qualified specialists, supporting training and professional development and providing Technical Assistance;
- Cross-Government Cooperation: Promoting effective cooperation and joint working between public agencies and stakeholders, including those responsible for highways, traffic management, urban planning and management, business development and support;
- Municipal Capacity Building: Developing certain delivery and operational functions to the local level through the creation or strengthening of municipal and regional bodies;
- Working with the Informal Sector: Promoting a stronger, consolidated, and professionalized private sector within and between public transport operators and service providers as a key supply chain partner to Government, including the establishment of one or more public transport associations able to credibly represent the sector and provide a consistent basis for vehicle procurement, service provision, customer service and other functions as appropriate; and
- Stakeholder Engagement: Involving users and stakeholders more closely in decision-making, including commissioning market research, measuring, and managing customer satisfaction, and establishing standing consultation arrangements on a range of issues.

Strengthening the Private Sector – Organization and Professionalization

The professionalization of the private sector is a crucial part of successful public transport operations. The transition from an informal network of individual owner-operators to a coordinated and organized operator association is a transformative process that requires strategic actions. It can also be a highly political process.

Without the professionalization of the private sector, there is a significant risk that investment in the public transport system (including passenger facilities) will not deliver on the benefits as the operation of the network and facilities will not meet passenger standards. Infrastructure investment risks being wasted money without the cooperation of the operators.

Key Functions of the Private Sector

The private sector should have the following functions (i.e., "Private Sector Responsibilities" under the hybrid model):

- **Vehicle Operation and Maintenance -** Ensure that the public transport fleet is in good working condition, is compliant with safety standards, and is serviced regularly. Operators should be responsible for regular maintenance checks, timely repairs and establish preventative maintenance schedules that prolong the life of vehicles and reduce the likelihood of service disruptions.

- **Route Operation -** Deliver a mandate to operate specific routes on the network. Indeed, this model is already in operation in Timor-Leste, however the operators are individuals without the broader capacity to operate a coordinated network. For example, operators should be responsible for meeting prescribed frequency and coverage targets, and broader punctuality and reliability standards. This is best achieved through overarching coordination among individual drivers through an operations association/ organization.

- **Customer Service -** As the primary passenger-facing entity of the public transport system, private sector (operators) receives direct feedback from passengers, including complaints and customer enquiries. Operators should be incentivized to provide timely and relevant information to passengers and deliver services that achieve customer satisfaction.

- **Ticketing and Fare Collection -** Involvement in ticketing and fare collection, employing technologies like electronic ticketing systems and mobile apps. The level of agency that the private sector has over fare structures (within the bounds of government regulation) will depend on the specific contractual arrangement reached between the Public Transport Department and operators. Regardless, under a hybrid model the private sector will be at the interface of passengers and the network, and therefore will have a role in revenue collection and reducing fare evasion.

- **Training and Employment of Drivers and Operational Staff -** Ensure that operational employees are well-trained in safety, customer service and vehicle operation. Professional development programs and employment agreements contribute to attracting and retaining a skilled workforce.

- **Technology and Innovation -** Driving innovation across vehicle technology, operations management, customer service or ticketing systems – the private sector is incentivized to create efficiencies and leverage their resources to increase the efficiency of the public transport system. This may include adopting more efficient or low emissions vehicles and digitizing services and management strategies.

- **Environmental Management -** Managing environmental impacts associated with public transport, including the use of environmentally friendly fuels and waste management for vehicles and facilities. These requirements may be regulated by the Department to contribute to the sustainability goals of the public transport system.

Additionally, the private sector may perform the following functions to varying degrees based on case-by-case negotiation with the Department (i.e., “Shared or Negotiable Responsibilities” under the hybrid model) -

- **Vehicle Procurement -** Private operators can be responsible for vehicle procurement. While this is the current model (at the level of individual vehicle owners), as the operator sector becomes more professionalized the private sector will develop increased commercial acumen and the ability to achieve cost efficiencies at larger scales. This will of course depend on their financial capacity, technical expertise, and the agreement with the Department. Private operators may be required by the Department to procure vehicles with specific parameters.

- **Depot Provision -** Private operators can manage bus depots, taking responsibility for vehicle storage, maintenance and refueling. The extent of private involvement in depot provision and operation will depend on negotiations with the Department and may result in scenarios where private operators lease depots from the public sector, build their own depot facilities, or manage public facilities under contract.

- **Infrastructure and Facilities Operation and Management -** Depending on the operating model at a facility level, which will depend on assessment and negotiations on a case-by-case basis (i.e., a Central Bus Terminal in Dili has a vastly different private sector proposition than a small interchange in a municipality). The role of the private sector can include management and operation of facilities (e.g., cleaning and safety), through to full Public Private Partnerships in the provision of facilities from the outset.

- **Passenger Information and Media -** Depending on negotiations with the Department the private sector can take responsibility for passenger information and media – such as running promotional campaigns or real-time signage at passenger facilities. The Department may wish to maintain control of branding and messaging, however, can contract the private sector for operation and delivery.

- **Intelligent Transport Systems -** The private sector, particularly technology firms who specialize in the rollout of ITS systems can provide these on behalf of the government. This could involve developing and managing software for vehicle tracking, mobile ticketing systems, or data analysis tools. The extent of local private sector involvement will depend on maturity of technology capabilities, however many cities around the world also draw on the expertise of international firms for ITS solutions.

- **Revenue Collection, Apportionment and Protection -** Operators are at the interface of passengers and the transport system, and therefore will likely be involved in revenue collection (either through selling tickets) or management of compliance (passengers boarding vehicles) for tickets that could be purchased through other, e.g., digital, means. The private sector should retain overarching control of revenue management and if the private sector is entrusted with these responsibilities there should be a regulated framework in place.

Important Actions in Strengthening the Private Sector

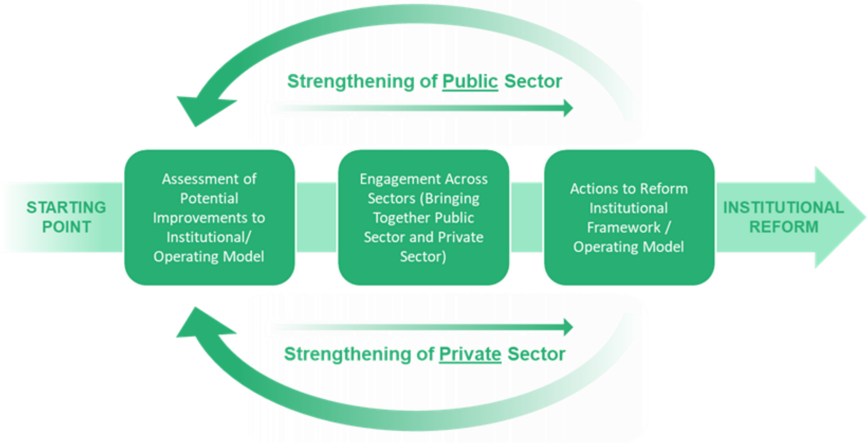
Important actions in the strengthening and professionalization of the private sector include -

- **Moving Beyond a Licensing Model / Establishment of a Regulatory Framework -** The government must first establish a robust regulatory framework that promotes professionalism and standardization in public transport operations. This includes safety regulations, environmental guidelines, fare structures, and service standards. Such a framework will guide the transition and ensure that the restructured transport system meets the societal needs and objectives.
- **Formation of Operator Associations -** Individual owner-operators should be encouraged and incentivized to form associations or cooperatives. These associations can ensure coordinated operations, collective bargaining, and the pooling of resources for the benefit of its members, which can lead to improved service quality and profitability.
- **Capacity Building and Training -** Professionalization requires investment in capacity building and training. This could include technical training for drivers, management training for operators, and customer service training for frontline staff. Improving the skillset of the workforce is critical to elevating the level of service and professionalism in the sector.
- **Technology Adoption -** The use of modern technology can help drive professionalism in the sector. This might involve implementing digital ticketing systems, GPS tracking for vehicles, data management systems for operations, and mobile applications for customer interface. These technologies can help improve efficiency, accountability, and user experience.
- **Access to Finance -** Access to capital is often a significant barrier for individual operators looking to upgrade their services or vehicles. Facilitating access to loans or grants can help operators invest in more efficient, comfortable, and environmentally friendly vehicles, thus enhancing the overall service quality.
- **Promoting Public-Private Partnerships (PPPs) -** PPPs can help leverage private sector resources and expertise for the public good. They can provide a framework for the professionalization of the sector, by setting contractual obligations and performance targets for private operators.

8.4 Institutional Recommendations

8.4.1 An Incremental Approach to Reforming Timor-Leste's Public Transport Sector

Evident from international case studies around the world, institutional reform should be pursued through incremental change rather than a "big bang" approach. Lessons learned from overseas for countries that have embarked on public transport reform agendas clearly show that these processes are complex, difficult, and highly political. Therefore, an iterative approach should be adopted that seeks to strengthen both the public and private sectors over time as the public transport system in Timor-Leste modernizes over the coming decade(s).



Source: Arup Study Team

Figure 8.4: A Model for the Incremental Reform of the Institutional Model Governing Public Transport in Timor-Leste

Over time, a key objective of institutional strengthening and building capacity and skills across both the public and private sector will see a reduced reliance on technical assistance and stronger ability plan, design and deliver public transport initiatives at a local level.

Source: Arup Study Team

Figure 8.5: Level of Technical Assistance vs. Level of Local Capacity

As such, the recommended actions for reform of the public transport sector are separated into three key stages as follows (as indicated in **Table 8.4**):

- **Short-Term (Up to 2025) -** Introduce preliminary reform initiatives that improve existing conditions based on existing laws and policies, begin the process towards LTA establishment and the establishment of a Public Transport Department therein, and outline processes for public transport passenger facility operations.
- **Medium-Term (2026-2030) -** Enact deeper reform to the public transport sector that being to address the fundamental issues and move towards a modern operating model, including the introduction of more formalized scheduling, formalization of an operator association and associated negotiation between this association and the government, and service reform (such as full timetabling).
- **Long-Term (2031-2035) -** Modernization of the public transport system, building on foundations laid by previous actions and strengthening across public and private sectors. These actions include full operation contracting model, vehicle

procurement, modernization of infrastructure and implementation of digital technologies.

8.4.2 Sector-wide Capacity Development Actions Aligned to Key Moves

Each of the key moves identified in **Table 8.4** require some capacity building interventions to enable. These capacity-building actions will be required across the dimensions of the institutional model for public transport presented earlier in the report.

Table 8.4: Key Moves for Reforming the Public Transport Sector in the Short, Medium and Long Term

Short Term "Key Moves" (Up to 2025)	Medium Term "Key Moves" (2026-2030)	Long Term "Key Moves" (2031-2035)
In the short term, key actions are: • Increase enforcement efforts for laws that are already in place, such as traffic, use of facilities, collection of students and vehicle safety. • Introduce a basic timetable of regional bus services and enforce them at key municipal departure locations. • Begin to outline and implement the Public Transport Department of the Land Transport Authority as part of the Transition Plan of the LTA. • Develop systems and processes for facility operations (discussed in next section) as Centerpiece of institutional and regulatory reform following a recognized vision of best practice. • Facilitate operator forums to discuss establishment of operator association. • Engage with MPW on road improvement / maintenance to improve travel times and reliability of inter-city services.	In the medium-term, and building on the momentum established with the short-term actions, key actions are: • Invest in the professionalization of the operator sector through targeted capacity building programs. • Enact collaborative governance between public and private sector (through an operator association) to move away from dealing with individuals. • Implement more stringent requirements in the private sector (move beyond the licensing model) including requirements for service quality (punctuality, reliability, customer experience). • Undertake collective negotiation between public sector and operator association. • Implement timetabled services for both regional and microlet vehicles for regional and urban services. • Implement new systems and processes across public and private sectors, for public transport facilities and broader functions to build capacity and professionalization among both sectors.	In the long-term, building on the momentum of the short- and medium-term actions, key actions are: • Move towards a more organized franchising/ contracting model that is competitively tendered (underpinned by a fully skilled and capacitated Public Transport Department within the LTA that manage operating contracts). • Procure new public transport vehicles. • Implement modern infrastructure and associated maintenance programs. • Implement digital technologies for the management and optimization of public transport networks. • Implement customer charter.

Table 8.5: Key Actions for Capacity Building and Institutional Reform/Strengthening

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
SHORT-TERM *Short-term actions can be recommended with the most certainty as they are based on addressing the current capacity gaps based on the existing situation.*						
1	Increase enforcement efforts for laws that are already in place, such as traffic, use of facilities, collection of students and vehicle safety.	x			Currently there are some traffic enforcement efforts, however specific enforcement around public transport is limited. For example, keliling is still commonplace, vehicles travel over-capacity (even in Dili) with school children hanging off the side, and public transport vehicles can be selective about using terminals.	**1.1 Law-Enforcement Training:** Organize specialized training programs for law enforcement officials on traffic and public transport laws. This can include understanding these laws, their enforcement methods, and dealing with violations effectively. **1.2 Inter-Agency Collaboration:** Strengthen collaboration between transport departments, law enforcement agencies, and judicial systems. This can ensure coherent enforcement of laws, swift handling of violations, and effective legal recourse. **1.3 Public Awareness Campaigns:** Conduct public awareness campaigns to educate the general public, transport operators, and users about traffic and public transport laws. An informed public can aid in better compliance and enforcement.
2	Introduce a basic timetable of regional bus services and enforce at key municipal departure locations.	x			There are currently no timetables for services – with the business model of driver/operators resulting in drivers waiting until buses are full before departing. There is limited capacity for public transport planning and scheduling within DNTT.	**2.1 Timetable Development Training:** Organize training sessions for public sector officials on the basic principles of bus timetable development, including concepts of route frequency, peak and off-peak scheduling, and interconnections with other services. **2.2 Stakeholder Engagement:** Consult with bus drivers and passengers during the timetable development process. Their input can provide valuable on-the-ground insights to refine the timetable.
3	Begin to outline and implement the Public Transport Department of the Land Transport Authority as part of the Transition Plan of the LTA.	x			While the LTA has been outlined, the relevant Laws have not been submitted/passed by the Government of Timor-Leste, and as such there has been limited progress towards establishment of the LTA.	**3.1 Establish Government Mandate:** Submit and pass relevant legislation to provide government mandate for LTA establishment. **3.2 Public Transport Functions:** Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning. **3.3 Align with Broader LTA Establishment Efforts:** Refer to detailed reform proposals as part of previous LTA establishment work and road mapping.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening	
4	Develop systems and processes for facility operations as centerpiece of institutional and regulatory reform following a recognized vision of best practice.		x		There is no current operational framework that surrounds facility operations. Operationally, vehicles move through facilities in an ad-hoc fashion. Public transport facilities were constructed under the Indonesian Government and over the past twenty years have deteriorated in quality without maintenance.	**4.1**	See the table in **Section 7.3** for detailed institutional and capacity building recommendations associated with public transport facility operation.
5	Facilitate operator forums to discuss establishment of operator association.			x	Current bus operations occur on an individual driver basis, establishment of a bus operator association has been highlighted in the previous LTA establishment work however has not been progressed.	**5.1**	**Operator Organizational Skills Training:** Educate the private sector operators on the principles, requirements, and functions of an association.
6	Engage with Ministry of Public Works on road improvement/maintenance to improve travel times and reliability of inter-city services.	x			Road quality remains a major inhibitor to public transport service quality and reliability, particularly for regional buses. The road quality between Dili and most municipalities is of poor quality, creating longer travel times, and creating safety risk for passengers.	**6.1**	**Stakeholder Engagement:** Engage with operators and passengers on road quality impacts on service quality and reliability on the network to prioritize maintenance/improvement efforts.
						6.2	**Collaboration with MPW:** DNTT to engage and collaborate with MPW in planning of road renewal and maintenance programs.
MEDIUM-TERM *Medium-term actions assume some capacity is developed in the short-term in-line with the above recommendations, however become more contingent and uncertain due to this reliance. Medium-term actions should be revisited and assessed prior to implementation.*							
7	Enact collaborative governance between public and private sector (through an operator association) to move away from dealing with individuals.		x		Limited capacity in both the public and private sectors for collaborative governance around public transport – private sector particularly will need professionalizing and organizing in order to realize collaborative governance.	**7.1**	**Professionalization of Private Sector:** Invest in the professionalization of the private sector through targeted capacity building programs, in terms of public transport and organizational management.
						7.2	**Developing Collaboration Frameworks:** Establish clear frameworks outlining the roles, responsibilities, and expectations of all parties in the collaborative governance process. This can help prevent misunderstandings and ensure all stakeholders are working towards the same objectives.
8	Implement more stringent requirements on the private sector (move	x			Current licensing terms are basic and do not incorporate broader public transport outcomes. There are limited public transport	**8.1**	**Public Transport Skills Training:** Government training programs to support knowledge and skills development in public transport systems and the principles of good networks.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
	beyond the licensing model) including requirements for service quality (punctuality, reliability, customer experience).				skills within the government currently to strategize and incorporate context-specific requirements into licensing agreements.	**8.2** **Funding and Staffing:** Increase government budget allocation for planning and policy roles to improve the government's ability to identify and monitor service quality objectives and link these to license agreements.
9	Undertake collective negotiation between public sector and operator association.		x		As per Item 7, there is limited capacity in the public and private sectors around public transport collective negotiation due to the current informal nature of the private sector.	**9.1** **Collaborative Governance and Bargaining:** Invest in training government and the private sector in collaborative governance and bargaining. **9.2** **Legal and Regulatory Understanding:** Develop a thorough understanding of the legal and regulatory context in which the negotiations take place. This can inform the negotiation strategy and ensure that any agreements reached are legally sound and enforceable. **9.3** **Understanding Stakeholder Interests:** Develop capacity in understanding and responding to the interests and concerns of the operator association. This includes regular engagement with the association and its members to understand their perspectives. **9.4** **Developing Negotiation Agendas:** Develop capacity in creating clear, focused negotiation agendas. Agendas should outline the topics to be discussed, the objectives of the negotiation, and the expected outcomes.
10	Implement timetabled services for both regional and microlet vehicles for regional and urban services.	X			As per Item 2, there is limited capacity within the government currently for timetable scheduling. It is assumed that some technical skills can be developed through the implementation of regional timetables in the short-term, with this medium-term imitative then building on that momentum.	**10.1** **Public transport Skills Training:** Building on momentum of skills development in previous actions, invest in government skills development in public transport scheduling and timetabling. **10.2** **Stakeholder Engagement:** Facilitate engagement with key stakeholders throughout timetabling process, including passengers, operators, and business owners.
11	Implement new systems and processes across public and private sectors, for public transport facilities and broader		x		Currently limited capacity to deliver sector-wide systems and processes beyond licensing and monitoring of facilities. Implementation of new public transport facilities will both require additional technical capabilities to be	**11.1** See the table in Section 7.**3** for detailed institutional and capacity building recommendations associated with public transport facility operation.

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
	functions to build capacity and professionalization among both sectors.				developed while also acting as a cornerstone for broader capacity and skills development.	
LONG-TERM *Long-term capacity building actions can be recommended with the least certainty as they are highly contingent on previous phases. Long-term actions should be revisited at the time of implementation and assessed against prior actions and capacity development success.*						
12	Move towards a more organized franchising/ contracting model that are competitively tendered (underpinned by a fully skilled and capacitated Public Transport Department within the LTA that manage operating contracts).		x		As per previous items highlighted in the short- and medium-term, current capacity is very limited, however it is assumed that some capacity will be developed over time through actions in the short and medium terms.	**12.1** **Training on Franchising and Contracting Models:** Invest in training sessions on the various aspects of franchising and contract models in public transport – including how various models are structured, the principles of competitive tendering and contract management. **12.2** **Legal and Regulatory Framework Development:** Develop or refine the legal and regulatory frameworks necessary to support franchising and competitive tendering. **12.4** **Private Sector Capacity Building for Competitive Bidding:** Develop the capacity of local operators to participate in competitive bidding. This can include training on preparation of proposals/bids, understanding contract requirements, and the implications of contract obligations.
13	Procure new public transport vehicles.	x			Procurement capacity in the government more broadly has proven adequate to procure broader infrastructure assets, however public transport-specific capacity is limited.	**13.1** **Training on Vehicle Procurement:** Invest in training programs for government officials on the principles and best practice of vehicle procurement. This includes understanding specifications, procurement processes, and negotiating contracts with vehicle suppliers. **13.2** **Develop Technical Specifications:** Develop capacity in developing technical specifications for public transport vehicles. These specifications form the basis for procurement and should reflect the needs of the public transport system. **13.3** **Engagement with Manufacturers and Suppliers:** Engage and develop relationships with vehicle manufacturers and suppliers to understand the range of options available and to ensure the availability of vehicles over time. **13.4** **Post-Purchase Asset Management:** Build capacity in managing assets post-purchase. This includes understanding

ID	Key Move	Public	Shared	Private	Current Capacity	Key Actions for Capacity Building and Institutional Reform/Strengthening
						maintenance requirements, lifecycle cost analysis, and replacement planning.
14	Implement modern infrastructure and associated maintenance programs.	x			As per previous items highlighted in the short- and medium-term, current capacity is very limited however it is assumed that some capacity will be developed over time through actions in the short and medium term – particularly through the preparation of systems and processes for the operation and maintenance of public transport facilities.	**14.1** **Training on Infrastructure Planning and Maintenance:** Conduct training programs on modern infrastructure planning, implementation, and maintenance. This includes understanding the lifecycle of infrastructure assets, modern maintenance techniques, and the cost impacts. **14.2** **Infrastructure Standards:** Adopt standards for public transport infrastructure to guide the construction and maintenance of public transport. **14.3** **Procurement and Contract Management:** Build capacity in procurement and contract management for public transport projects specifically, working with the National Procurement Commission (NPC). **14.4** **Establishing Regular Maintenance Programs:** Establish regular, preventive maintenance programs for public transport infrastructure. This should include post-purchase asset management of vehicles as per Action 13.4 above.
15	Implement digital technologies for the management and optimization of public transport networks.	x			The only current application of digital technologies within the public transport system is a database managed by DNTT for storing vehicle registrations. There is no existing capacity for applying digital technologies for service delivery, planning or optimization of the network.	**15.1** **Digital Technology Training:** Provide training to public sector officials on the use and benefits of digital technologies in managing and optimizing public transport. **15.2** **Partnerships with Technology Providers:** Establish partnerships with technology providers who can supply the tools and expertise necessary for implementation. **15.3** **Data Management Capabilities:** Build capacities in collecting, managing, and analyzing the large amounts of data that digital technologies can generate. **15.4** **Pilot Projects:** Adopt an iterative approach built around pilot projects to test different technologies before rolling them out at scale. This allows parties to understand impacts and make any necessary adjustments ahead of scaling up initiatives. **15.5** **Cybersecurity Measures:** Develop capacities in cybersecurity to protect the integrity of digital systems and the privacy of users.

9 Indicative Investment Plan with Cost Estimates

9.1 Overview

This section presents the indicative investment plan by phase including indicative order-of-magnitude cost estimates for facilities in **Section 9.2** (based on local and international benchmarks) by facility site. Phasing is staged in three phases with Phase 1 (2023-2025), Phase 2 (2026-2030), and Phase 3 (2031-2035). The indicative investment plan is guided by the vision and goals formulated for public transport system in Timor-Leste in **Section 5** and is summarized in a matrix format (by phase) with columns indicating intervention, discipline, relevance to goals, indicative costs, and assumed lead agency in **Section 9.3**.

9.2 Indicative Facility Cost Estimates

Capital costs for bus facilities (i.e., bus stops, on-street interchange, as well as bus terminals) include various elements as follows:

- **Bus Stops / On-Street Interchange** include bus shelter (regular 3m for bus stops, and larger 6m ones for on-street interchange), concrete bus bays (assumed for a 12m bus), sidewalk improvement, streetlights, trees, utility poles, tactile paving, signage, additional sidewalk improvement on each side of bus stop (to improve access to bus stops), as well as other additional works (including site cleaning, drainage, etc.).

- **Bus Terminals** include terminal facility roof, concrete bus bays (assumed for a 12m bus for conservative purposes), drop-off areas, parking areas, waiting and queuing areas (with seating), pavement markings, wayfinding signages, ticket and fare collection booth, retail and kiosk, security office, operation office, administration office, air conditioning (inside the offices), fans at waiting areas, toilets, lighting, tactile paving, circulation areas, utility removal and relocation, as well as other additional works (including site formation, utility connections+, drainage, mechanical and electrical works).

Indicative cost estimates for bus facilities (i.e., bus stops, on-street interchange, as well as bus terminals), unit costs of each element, and key assumptions are presented in the table below. The size of each facility site (including number of bus stops) is informed by the results of facility assessment in **Section 7.9** and **Section 7.10**.

Table 9.1: Indicative Cost Estimate for Bus Stops & On-Street Interchange (US$)

#	Item	Unit Cost (US$)	Unit	Note	Dili Bus Stops	Dili Convention Centre Interchange	Dili Port I Interchange	Ulmera Interchange	Tibar Interchange	Hera I Interchange	Wenunuc Interchange	Metiaro Interchange	Lospalos Interchange	Viqueque Interchange	Aileu Interchange	Mau-bisse Interchange	Mana-tuto Interchange	Same Interchange	Suai Interchange	Ainaro Interchange	Liquica Interchange	Batugade Border Interchange	Batugade Interchange	Ma-liana Interchange	Ermera interchange
1	Bus Shelter (Regular 3m, Wide 1.8m)	2,000	number	Cost includes covered facilities and seating	100,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Bus Shelter (Enhanced 6m, Wide 1.8m)	3,000	number	Cost includes covered facilities and seating	0	15,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
3	12m Concrete Bus Bay (1 Bay)	20,000	number	Cost includes excavation, curbs, markings	1,000,000	100,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
4	Sidewalk Improvement	20	m^2	Sidewalk Improvement (Shelter - Regular 3m, Wide 1.8m)	9,000	900	540	540	540	540	540	540	540	540	540	540	540	540	540	540	540	540	540	540	540
5	Streetlights at Bus Stop	300	number	Improvements only at stops with new shelters	15,000	1,500	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900
6	Trees at Bus Stop	200	number	Improvements only at stops with new shelters	10,000	1,000	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
7	Utility Pole at Bus Stop	600	number	Improvements only at stops with new shelters	30,000	3,000	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
8	Tactile Paving	60	m^2	Based on the total length of passenger bays	1,500	180	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
9	Additional Sidewalk Improvement (Normal)	20	m^2	Assumed 10m improvement on each side of bus stop x width of sidewalk (including shelter + PWD)	60,000	6,000	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
10	Bus Stop Divider Width	0	m^2	Cost is included in bus bay cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Bus Stop Vertical Signage	60	m^2	Reflectorized thermoplastic pavement markings assuming 6mm depth	3,000	300	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
12	Bus Stop Horizontal Signage	70	number	Assume road makings over the area of 5m x 3m	3,500	350	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
Subtotal					**1,232,000**	**128,230**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**	**76,950**
13	Additional Works	5%	%	Additional Works include site cleaning, drainage, etc.	308,000	32,058	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238
Subtotal (With Additional Works)					**1,540,000**	**160,288**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**	**96,188**
Contingency		**20%**	**%**		308,000	32,058	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238	19,238
Gran Total					**1,848,000**	**192,345**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**	**115,425**
Gran Total (Rounded to Nearest Ten Thousand)					**1,850,000**	**200,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**	**120,000**

Table 9.2: Indicative Cost Estimate for Bus Terminals

#	Cost Item	Unit Cost (US$)	Unit	Note	Becora Terminal	Manleuana Market Terminal	Airport Transit Hub	Baucau Terminal (Aldeia Samalakuliba)
1	Terminal Facility Roof	300	m^2	Assumes 1 per terminal site	399,900	430,500	572,100	133,500
2	12m Concrete Bus Bay (1 Bay)	20,000	number	Includes excavation, curbs, markings	180,000	180,000	260,000	60,000
3	Drop-Off Area	200	m^2	Includes road pavement and sidewalk on each end (5m x 1.8m)	36,600	39,200	42,600	27,800
4	Parking Area	80	m^2	Includes road pavement	138,960	82,080	131,520	34,320
5	Waiting & Queuing Area (With Seating)	800	m^2	Includes waiting facilities and seating	548,800	595,200	811,200	143,200
6	Pavement Markings	70	number	Assumes road makings over the area of 5m x 3m with the letters of "Bus Stop"	630	630	910	210
7	Wayfinding Signage	300	number	Assumes 10 signs per terminal site	3,000	3,000	3,000	3,000
8	Ticket & Fare Collection Booth	500	m^2	Includes building costs	8,000	8,000	8,000	8,000
9	Retail & Kiosk	500	m^2	Includes building costs	137,500	149,000	203,000	36,000
10	Security Office	500	m^2	Includes building costs	8,000	8,000	8,000	8,000
11	Operation Office	500	m^2	Includes building costs	12,500	12,500	12,500	12,500
12	Administration Office	500	m^2	Includes building costs	12,500	12,500	12,500	12,500
13	Air Conditioning	1,000	number	Assumes 1 unit per office	3,000	3,000	3,000	3,000
14	Fan	300	number	Assumes 1 fan to cover passenger areas of 100m2 (10m x 10m) plus 1 per office building	3,000	3,300	4,200	1,500
15	Toilets	20,000	number	Assumes a toilet building of 8m x 6m including toilet facilities	20,000	20,000	20,000	20,000
16	Lighting for Vehicles	2,000	number	Assumes 1 per every 100m2 of concrete area (pickup, drop-off, and parking)	30,000	20,000	30,000	8,000
17	Streetlight	300	number	Assumes1 per every 100m2 of the total facility area	17,100	12,000	17,700	4,800
18	Tactile Paving	60	m^2	Based on the total length of passenger bays	10,140	12,480	15,600	2,340
19	Circulation Areas	80	m^2	Assumes 60% of the total facility area	208,480	123,120	197,280	51,520
20	Utilities Removal / Relocation	600	number	Assumes utility poles removal/relocation every 400m2 (20m x 20m)	9,000	6,000	9,000	2,400
Subtotal					**1,787,110**	**1,720,510**	**2,362,110**	**572,590**
21	Additional Works	25%	%	Includes site formation, utility connections+, drainage, mechanical & electrical works	446,778	430,128	590,528	143,148
Subtotal (With Additional Works)					**2,233,888**	**2,150,638**	**2,952,638**	**715,738**
22	Road & Traffic Improvement	200,000	Lump sum	Includes 50m road upgrades and traffic light improvement outside of terminal	200,000	200,000	200,000	200,000
23	Sidewalk & Crossing Improvement	10,000	Lump sum	Includes 50m walk upgrades and 2 crosswalk improvements (6m x 3m)	10,000	10,000	10,000	10,000
External Works Outside of Terminal					**210,000**	**210,000**	**210,000**	**210,000**
Subtotal With External Works Outside of Terminal					**2,443,888**	**2,360,638**	**3,162,638**	**925,738**
Contingency		20%	%		488,778	472,128	632,528	185,148
Grand Total (Unrounded)					**2,932,665**	**2,832,765**	**3,795,165**	**1,110,885**
Grand Total (Rounded to Nearest Hundred Thousand)					**3,000,000**	**2,900,000**	**3,800,000**	**1,200,000**

9.3 Indicative Investment Plan by Phase

The indicative investment plan with cost estimates for three phases is summarized in **Table 9.3**, followed by detailed cost estimated by phase - with Phase 1 (2023-2025) in **Table 9.4**, Phase 2 (2026-2030) in **Table 9.5**, and Phase 3 (2031-2035) in **Table 9.6**. Three timelines for the action plan are proposed to align with the Dili 2045 Urban Master Plan as follows:

- **Phase 1 (up to 2025)** – Short-term actions/initiatives that can be adopted relatively quickly to improve service and facilities, including technical studies and operation costs for a pilot bus system, with minimal implementation timeline for infrastructure enhancements, as well as minimal modifications to existing institutional or regulatory frameworks (e.g., service and routing changes, operating protocol refinements for terminals, and formulation of design guidelines) – possibly implemented by MOTC and the Timorese Government to facilitate larger-scale investments in latter phases;

- **Phase 2 (2026-2030)** – Medium-term actions/initiatives involving more significant infrastructure enhancements requiring additional design, environmental and social safeguard, as well as land acquisition activities, as well as involving/requiring more substantive institutional and regulatory changes (e.g., new terminals in Dili, regulatory refinements to facilitate creation of a public transport authority (PTA), and capacity building to prepare for eventual contracting); and

- **Phase 3 (2031-2035)** – Long-term actions/initiatives that align with new developments and growth areas in Dili (including Metinaro), as well as continued growth in the population and workforce throughout the country, as well as more substantial changes to the regulatory/institutional framework to enable service contracting.

Table 9.3: Indicative Investment Plan (2023-2035)

Component	2023-2025 US$	2026-2030 US$	2031-2035 US$	Total [A] US$	% of Total
Operation [B]	12,710,000	0	0	12,710,000	36.2%
Facility [C]	1,850,000	11,680,000	1,800,000	15,330,000	43.6%
Institutional [D]	0	250,000	250,000	500,000	1.4%
Capacity Building [D]	600,000	600,000	900,000	2,100,000	6.0%
DED	1,500,000	0	0	1,500,000	4.3%
Technical Study [E]	500,000	2,000,000	0	2,500,000	7.1%
Monitoring [F]	0	0	500,000	500,000	1.4%
Total	**17,160,000**	**14,530,000**	**3,450,000**	**35,140,000**	100.0%
% of Total	48.8%	41.3%	9.8%	100.0%	

Notes:
[A] Summations in this table by component may not match the totals from other due to rounding.
[B] Operation cost includes capital costs (including procurement of 12m diesel buses, bus stops, and depot) as well as annualized operating/maintenance costs (including vehicle-related such as fuel and maintenance, personnel, as well as indirect bus operating costs such as admin, indemnity) are included. Other capital costs such as terminal (included in facility costs), ITS, bus lanes, sidewalk/crossing improvements, as well as additional costs for land acquisition/resettlement are not included. Further assessment of capex and opex is required under a separate technical study.
[C] Facility improvements include three bus terminals in Dili, one on-street interchange in Dili, one bus terminal in Baucau, on-street interchanges in other regional locations, as well as 50 bus stops improvements in Dili. Facility costs exclude land acquisition and compensation associated with resettlement.

[D] Activities under this category include a series of technical support for institutional/regulatory as well as capacity building. Details are shown in the action plan below.
[E] Technical studies include DED for terminal improvement, Dili parking strategy, Dili traffic improvement, feasibility study for Dili pilot bus, fares and ticketing system, Dili active mobility, and Dili urban transport modernization.
[F] Safeguard monitoring includes monitoring of the progress of project implementation to ensure compliance with relevant national and ADB safeguards policy and procedures.

The total investment cost is US$35.1 million, divided as follows: (i) Phase 1 (up to 2025) – US$17.2 million; (ii) Phase 2 (2026-2030) – US$14.5 million; and (iii) Phase 3 (2031-2035) – US$3.5 million. The biggest cost item is the proposed facility improvements (including three bus terminals in Dili, one bus terminal in Baucau, one on-street interchange in Dili, on-street interchanges in regional locations, as well as 50 bus stops improvements in Dili – facility costs exclude land acquisition and compensation associated with resettlement), followed by operation of a pilot bus system in Dili, technical studies, capacity building, institutional refinement efforts, as well as monitoring (for long-term).

Table 9.4: Short-Term Indicative Investment Plan (2023-2025)

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
1	Short	2023-2025	Microlet Route Restructuring	Operation	Dili	• Restructure Dili microlet routes and operate 207.2 km with 13 routes serving key generators/activity centers in Dili	• Improve the efficiency and performance of microlet services through expanding, truncating, rerouting, or combining routes that are currently underperforming.	✓	-	✓	✓	-	-	DNTT	Restructuring of Dili microlet routes completed in this Public Transport Master Plan Update
2	Short	2023-2025	Microlet Service Refinements	Operation	Dili	• Refine Dili microlet services (headway/required vehicles) to meet demand, while improving performance for each route	• Improve the efficiency and performance of microlet services through the adjustment of service frequencies and vehicles deployed to provide the appropriate level of service for each route given its existing and future demand characteristics.	✓	-	✓	✓	-	-	DNTT	-
3	Short	2023-2025	Regional Bus Service Refinements	Operation	Country-Wide	• Refine regional bus services (trips per day/required vehicles) to meet demand, while improving performance for each route	• Improve the efficiency and performance of microlet services through the adjustment of trips operated per day and number of vehicles required to provide the appropriate level of service for each route given its existing and future demand characteristics.	✓	-	✓	✓	-	-	DNTT	-
4	Short	2023-2025	Dili Bus Stops	Facility	Dili	• Provide 50 bus stops across Dili in key demand-generating locations.	• Bus stop infrastructure (including clear pole and signage; shelter and seating) as well as pedestrian improvements benefit both passengers and operational efficiency.	✓	✓	✓	-	-	1,850,000	MOTC, MPW	-
5	Short	2023-2025	Timetable for Regional Bus	Operation	Country-Wide	• Introduce a timetable of regional bus services including providing training sessions to public officials and consulting with bus drivers and passengers.	• Timetables for public transport service adds to the reliability of the system - while broad scale timetables (e.g., microlets) will require further planning and development of the operating sector - introducing a basic timetable for regional bus services aligns with passenger preferences and will improve the user experience of the system.	✓	-	✓	✓	-	-	DNTT	-
6	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• Outline and implement the Public Transport Department of the Land Transport Authority as part of the Transition Plan of the LTA	• Further specificity around a public transport department of the LTA is needed to clearly define roles and responsibilities for public transport within the broader LTA functions.	-	-	-	-	✓	-	MOTC	-
7	Short	2023-2025	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Facilitate operator forums to discuss establishment of operator association	• The current individual owner-operator model in Timor-Leste creates individual operator incentives that limit the overall passenger focus of the network - establishing an operator association is the first step in a more coordinated and professionalized operator sector.	-	✓	-	✓	-	-	MOTC	-
8	Short	2023-2025	Road Improvement and Maintenance	Supporting Infrastructure	Country-Wide	• Engage with MPW on road improvement / maintenance to improve travel times and reliability of inter-city services	• Road quality is essential for shorter public transport travel times and greater reliability of services, particularly for regional routes.	✓	-	-	✓	-	-	MOTC	-
9	Short	2023-2025	Design Guidelines	Institutional	Country-Wide	• Establish design guidelines for public transport facilities including bus stops, terminals, and depots.	• Clear design guidelines linked to passenger outcomes will contribute to quality design and implementation - resulting in comfortable, safe, and operationally efficient facilities.	-	✓	✓	✓	✓	-	MOTC	-
10	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Organize specialized training programs for law enforcement officials on traffic and public transport laws, strengthen inter-agency collaboration, and promote public awareness campaigns on traffic and public transport laws.	• Improve the efficiency of current operations - including reducing keliling, improving route adherence and maintaining safe vehicles. These initial actions provide preparation for a more coordinated and professionalized sector in the medium and long term.	-	✓	✓	-	-	100,000	MOTC	-
11	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Organize specialized training programs for law enforcement officials on traffic and public transport laws. This can include understanding these laws, their enforcement methods, and dealing with violations effectively.	• Currently some level of traffic enforcement is conducted, however specific enforcement around public transport is limited.	-	✓	✓	✓	-	100,000	MOTC	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
12	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Organize specialized training programs for road safety, for DNTT and the Police who are responsible to managing traffic conditions.	• Road conditions are observed to be unsafe, with public transport vehicles contributing to this. Microlet drivers in some instances are observed cutting across busy traffic with full vehicles. Passengers can be observed hanging from the side of the vehicle. Such training can lead to better understanding of potential safety risks.	-	✔	✔	✔	-	100,000	MOTC	-
13	Short	2023-2025	Existing Law Enforcements	Institutional	Country-Wide	• Strengthen collaboration between transport departments, law enforcement agencies, and judicial systems, including between DNTT and PNTL and SEII.	• This can ensure coherent enforcement of laws, swift handling of violations, and effective legal recourse.	-	✔	✔	✔	-	-	MOTC, PNTL, SEII	-
14	Short	2023-2025	Existing Law Enforcements	Capacity Building	Country-Wide	• Conduct public awareness campaigns to educate the general public, transport operators, and users about traffic and public transport laws. Specific public awareness campaigns should include sexual harassment campaigns on public transport.	• An informed public can aid in better compliance and enforcement.	-	✔	✔	✔	-	100,000	MOTC	-
15	Short	2023-2025	Timetable for Regional Bus	Capacity Building	Country-Wide	• Organize training sessions for public sector officials on the basic principles of bus timetable development, including concepts of route frequency, peak and off-peak scheduling, and interconnections with other services.	• There is currently no timetable for services – with the business model of driver/operators resulting in drivers waiting until buses are full before departing. here is limited capacity for public transport planning and scheduling within DNTT.	-	-	-	✔	-	100,000	MOTC	-
16	Short	2023-2025	Timetable for Regional Bus	Institutional	Country-Wide	• Consult with bus drivers and passengers during the timetable development process.	• Operator input to timetable development can provide valuable on-the-ground insights and operational perspectives, ensuring any changes benefit both users and the operators.	-	✔	-	✔	-	-	MOTC	-
17	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• If the Government decides to proceed with the LTA, submit and pass relevant legislation to provide government mandate for LTA establishment.	• While the LTA has been outlined, the relevant laws have not been submitted/passed by the Government of Timor-Leste, and as such there has been limited progress towards establishment of a Public Transport Department.	✔	-	-	✔	-	-	MOTC	-
18	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• If the Government decides to proceed with the LTA, incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning.	• Currently the public transport department within the proposed LTA has had limited definition, and further clarity of roles and responsibilities is required to operate the network effectively.	✔	-	-	✔	-	-	MOTC	-
19	Short	2023-2025	Establishment of Public Transport Department / Land Transport Authority	Institutional	Country-Wide	• If the Government decides to proceed with the LTA, refer to detailed reform proposals as part of previous LTA establishment work and road mapping.	• Ensure alignment to previous work and leverage insights and recommendations that have been developed.	✔	-	-	✔	-	-	MOTC	-
20	Short	2023-2025	Facility Operations	Institutional	Country-Wide	• Develop operational framework for facility operations, defining model selected and roles of the private sector (fully public / DNTT; public private partnership; or contracting models).	• There is no current operational framework that surrounds facility operations. Operationally, vehicles move through facilities in an ad-hoc fashion. Public transport facilities were constructed under the Indonesian Government and over the past twenty years have deteriorated in quality without maintenance.	✔	-	-	✔	-	-	MOTC	-
21	Short	2023-2025	Facility Operations	Capacity Building	Country-Wide	• Include municipal authorities in capacity building of facility management to ensure integration with surrounding urban area.	• Municipalities play an important role in managing the urban environment and involving them in capacity building can benefit the broader system, particularly as it relates to public transport operations surrounding terminals.	✔	✔	✔	✔	-	100,000	MOTC	-
22	Short	2023-2025	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Educate the private sector operators on the principles, requirements, and functions of an association.	• Current bus operations occur on an individual driver basis, establishment of a bus operator association has been highlighted in the previous LTA establishment work however has not been progressed.	✔	✔	-	✔	-	-	MOTC	-

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals					Order-of-Magnitude Costs (US$)	Lead Party	Note
								Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future			
23	Short	2023-2025	Road Improvement and Maintenance	Institutional	Country-Wide	• Engage with operators and passengers on road quality impacts on service quality and reliability on the network to prioritize maintenance/ improvement efforts.	• Road quality remains a major inhibitor to public transport service quality and reliability, particularly for regional buses. • The road quality between Dili and most municipalities is of poor quality, creating longer travel times, and creating safety risk for passengers.	✓	-	-	✓	✓	-	MOTC, MPW	-
24	Short	2023-2025	Road Improvement and Maintenance	Institutional	Country-Wide	• DNTT to engage and collaborate with MPW in planning of road renewal and maintenance programs.	• Road quality remains a major inhibitor to public transport service quality and reliability, particularly for regional buses. • The road quality between Dili and most municipalities is of poor quality, creating longer travel times, and creating safety risk for passengers.	✓	-	-	✓	✓	-	MOTC, MPW	-
25	Short	2023-2025	Feasibility Study for Pilot Bus Service	Technical Study	Dili	• Carry out a feasibility study on pilot bus corridor to formulate operating plans, infrastructure plans, costs, financial, E&S, etc.	• Piloting of a new bus system is envisioned by MOTC to operate modern public transport services along the major corridor(s) in Dili using clean high-capacity vehicles suited to the built environment of the city.	✓	✓	✓	✓	✓	500,000	MOTC	-
26	Short	2023-2025	Detailed Engineering Design & Related Surveys	DED	Country-Wide	• Carry out a detailed engineering design on selected facilities	• DED consultants are expected to carry out detailed design on selected terminals based on the results of 2023 ADB feasibility study.	✓	✓	✓	✓	✓	1,500,000	MOTC	DED is expected to be sourced from national government funding.
27	Short	2023-2025	Capex for Piloting of New Bus System in Dili City	Operation	Dili	• Introduce/pilot a new bus system in Dili connecting key generators and developments across the city.	• Support the continued growth of Dili's public transport services with newer and higher capacity vehicles while promoting more environmentally friendly transport modes in align with Timor-Leste's Nationally Determined Contribution and Paris Agreement. On top of this, the Minister supports this idea and is keen to realize this within his term (thus proposed in a short-term plan).	✓	✓	✓	✓	✓	9,720,000	MOTC	Other capital costs such as terminal, ITS, bus lanes, sidewalk/crossing improvements, as well as additional costs for land acquisition/resettlement are not included as these require further assessment under a separate technical study.
28	Short	2023-2025	Annualized Opex for Piloting of New Bus System in Dili City	Operation	Dili	• Support the operation and maintenance of the pilot bus services in Dili.	• Support the continued growth of Dili's public transport services with newer and higher capacity vehicles while promoting more environmentally friendly transport modes in align with Timor-Leste's Nationally Determined Contribution and Paris Agreement. On top of this, the Minister supports this idea and is keen to realize this within his term (thus proposed in a short-term plan).	✓	✓	✓	✓	✓	2,990,000	MOTC	Annualized O&M costs include (i) vehicle-related operating costs (fuel, maintenance, etc.), personnel/labor, as well as indirect bus operating costs (such as admin, indemnity, etc.) - assumed as USD130,000 per bus based on the benchmarking of regional experience; and (ii) O&M costs for bus stops assumed at 2% of capex and depot at 5% of capex. Further refinement of O&M costs is required under a separate technical study.
												Total	**17,160,000**		

Table 9.5: Medium-Term Indicative Investment Plan (2026-2030)

								Relevance to Overarching Public Transport Master Plan Goals							
#	**Phase**	**Timeline**	**Strategic Intervention**	**Discipline**	**Location**	**Initiatives**	**Rationale**	**Goal 1: Economic Growth**	**Goal 2: Access for All**	**Goal 3: Liveable Cities**	**Goal 4: Mode of Choice**	**Goal 5: Sustainable Future**	**Order-of-Magnitude Costs (US$)**	**Lead Party**	**Note**
1	Medium	2026-2030	Airport Express Service Proposal	Operation	Dili	• Operate 19.1 km Airport Express from Dili Airport to Tourist Information Center	• Expand the scope of urban public transport services to cover the needs of airport visitors to increase passenger convenience and facilitates the growth of the tourism industry.	✔	-	✔	✔	-	-	DNTT	-
2	Medium	2026-2030	Becora Terminal	Facility	Dili	• Construct a new, modern Becora Terminal on existing site to act as primary interchange location for Microlet services and Eastern Regional Bus routes.	• The current Becora Terminal is outdated and has not been subject to routine maintenance. It is considered unsafe by passengers. A modern facility to support interchange between regional and urban public transport services can improve network efficiency and customer experience.	✔	✔	✔	✔	✔	3,000,000	MOTC, MPW	-
3	Medium	2026-2030	Manleuana Market Terminal	Facility	Dili	• Construct Terminal at Manleuana Market to act as interchange location for Microlet services and Southern Regional Bus routes.	• Manlauana Market already acts as an informal public transport interchange; however, it lacks dedicated infrastructure. • Integrating a passenger facility with the market contributes to economic growth and improved passenger experience.	✔	✔	✔	✔	✔	2,900,000	MOTC, MPW	-
4	Medium	2026-2030	Airport Transit Hub	Facility	Dili	• Construct Airport Transit Hub adjacent airport to act as primary interchange location for Microlet services and Western Regional Bus routes.	• The development of an Airport Transit Hub will improve international connectivity (between Indonesia border and Dili Airport), while also acting as a primary interchange location between regional and urban bus services - improving network efficiency, accessibility, and customer experience.	✔	✔	✔	✔	✔	3,800,000	MOTC, MPW	-
5	Medium	2026-2030	Dili Convention Centre Interchange	Facility	Dili	• Construct on-street interchange at Dili Convention Centre to service urban bus through-routes.	• The Dili Convention Centre Interchange is currently used as an informal interchange location for a large number of microlet services that travel through this location. • However, the absence of passenger infrastructure/amenities reduces the quality of the public transport experience.	✔	✔	✔	✔	✔	200,000	MOTC, MPW	-
6	Medium	2026-2030	Tasitolu Interchange	Facility	Dili	• Construct a more formal on-street interchange at Tasitolu for microlet services	• Improve network efficiency, accessibility, and customer experience in west of Dili.	✔	✔	✔	✔	✔	-	MOTC, MPW	-
7	Medium	2026-2030	Baucau Terminal (Aldeia Samalakuliba)	Facility	Baucau	• Construct Terminal at Baucau Market to act as interchange location for microlet services and regional bus routes	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	1,300,000	MOTC, MPW	-
8	Medium	2026-2030	Lospalos Interchange	Facility	Lospalos	• Construct on-street interchange at Lospalos Bemoris to service microlet and regional bus with additional layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-
9	Medium	2026-2030	Viqueque Interchange	Facility	Viqueque	• Construct on-street interchange at Viqueque City Center to service microlet and regional bus with additional layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-
10	Medium	2026-2030	Suai Interchange	Facility	Suai	• Construct on-street interchange at Suai Market to service microlet and regional bus with layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-
11	Medium	2026-2030	Maliana Interchange	Facility	Maliana	• Construct on-street interchange at Maliana to service microlet and regional bus with layover parking	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✔	✔	✔	✔	✔	120,000	MOTC, MPW	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	**Phase**	**Timeline**	**Strategic Intervention**	**Discipline**	**Location**	**Initiatives**	**Rationale**	**Goal 1: Economic Growth**	**Goal 2: Access for All**	**Goal 3: Liveable Cities**	**Goal 4: Mode of Choice**	**Goal 5: Sustainable Future**	**Order-of-Magnitude Costs (US$)**	**Lead Party**	**Note**
12	Medium	2026-2030	Facility Operations	Institutional	Country-Wide	• Develop systems and processes for facility operations as centerpiece of institutional and regulatory reform	• Implementation of modern passenger facilities require effective management and operations to realize the benefits - as such this presents the opportunity to form the centerpiece of broader capacity building efforts.	✔	✔	-	✔	-	-	MOTC	-
13	Medium	2026-2030	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Invest in the professionalization of the operator sector through targeted capacity building programs	• Professionalization of the private sector is integral to the modernization of the public transport sector.	✔	-	-	✔	-	100,000	MOTC	-
14	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Enact collaborative governance between public and private sector (through an operator association) to move away from dealing with individuals	• The current operational structure makes it difficult to coordinate outcomes that are best for passengers. • Collective engagement of the operator sector on the whole offers the opportunity to achieve coordinated outcomes.	✔	-	-	✔	-	-	MOTC	-
15	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Implement more stringent requirements in the private sector (move beyond the licensing model) including requirements for service quality (punctuality, reliability, customer experience)	• Currently operators have limited quality standards imposed on them, and none around the operation of the service (only focused on vehicle safety). • As such, there is no direct incentive to maintain a high-quality service.	-	✔	-	✔	-	-	MOTC	-
16	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Undertake collective negotiation between public sector and operator association	• Collective negotiation between the public and private sectors contributes to fair and transparent decision-making and outcomes that work for each party.	✔	-	-	✔	-	-	MOTC	-
17	Medium	2026-2030	Timetable for Regional Bus and Urban Services	Operation	Country-Wide	• Implement timetabled services for both regional and microlet vehicles for regional and urban services	• Improve the punctuality and reliability of the public transport service country-wide, leading to an improved service quality for passengers.	✔	✔	✔	✔	-	-	MOTC	-
18	Medium	2026-2030	Systems and Processes	Institutional	Country-Wide	• Implement new systems and processes such as technology and management across public and private sectors, for public transport facilities and broader functions to build capacity and professionalization among both sectors	• Modern management and operational approaches can be significantly enhanced by modern technology systems and standard operating procedures to provide consistency and accountability within the public and private sectors.	✔	-	-	✔	-	-	MOTC	-
19	Medium	2026-2030	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Invest in the professionalization of the private sector through targeted capacity building programs, in terms of public transport and organizational management.	• Limited capacity in both the public and private sectors for collaborative governance around public transport – the private sector particularly will need professionalizing and organizing in order to realize collaborative governance.	✔	✔	-	✔	-	-	MOTC	-
20	Medium	2026-2030	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Establish clear frameworks outlining the roles, responsibilities, and expectations of all parties in the collaborative governance process.	• Collaboration frameworks can help prevent misunderstandings and ensure all stakeholders are working towards the same objectives.	✔	-	-	✔	-	-	MOTC	-
21	Medium	2026-2030	Public Transport Governance	Capacity Building	Country-Wide	• Government training programs to support knowledge and skills development in public transport systems and the principles of good networks.	• Current licensing terms are basic and do not incorporate broader public transport outcomes. • There is limited public transport skills within the government currently to strategize and incorporate context-specific requirements into licensing agreements.	✔	-	-	✔	-	100,000	MOTC	-
22	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Increase government budget allocation for planning and policy roles to improve the government's ability to identify and monitor service quality objectives and link these to license agreements.	• Additional funding and staffing will be required to monitor service and quality outcomes.	✔	-	-	✔	-	-	MOTC	-
23	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Collaborative Governance and Bargaining: Invest in training government and the private sector in collaborative governance and bargaining.	• There is limited capacity in the public and private sectors around public transport collective negotiation due to the current informal nature of the private sector.	✔	-	-	✔	-	-	MOTC	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
24	Medium	2026-2030	Public Transport Governance	Institutional	Country-Wide	• Develop a thorough understanding of the legal and regulatory context in which negotiations take place.	• Legal and regulatory understanding can inform the negotiation strategy and ensure that any agreements reached are legally sound and enforceable.	✓	-	-	✓	-	-	MOTC	-
25	Medium	2026-2030	Public Transport Governance	Capacity Building	Country-Wide	• Develop capacity in understanding and responding to the interests and concerns of the operator association. This includes regular engagement with the association and its members to understand their perspectives.	• It is important that negotiations and agreements do not adversely impact the private sector, and as such stakeholder interests should be included and reflected in agreements.	-	✓	-	✓	-	100,000	MOTC	-
26	Medium	2026-2030	Public Transport Governance	Capacity Building	Country-Wide	• Develop capacity in creating clear, focused negotiation agendas. Agendas should outline the topics to be discussed, the objectives of the negotiation, and the expected outcomes.	• Ensures that negotiations are productive and targeted.	✓	-	-	✓	-	100,000	MOTC	-
27	Medium	2026-2030	Timetable for Regional Bus and Urban Services	Capacity Building	Country-Wide	• Building on momentum of skills development in previous actions, invest in government skills development in public transport scheduling and timetabling to foster the implementation of microlet timetables.	• There is limited capacity within the government currently for timetable scheduling. • It is assumed that some technical skills can be developed through the implementation of regional timetables in the short-term, with this medium-term imitative then building on that momentum.	-	✓	✓	✓	-	100,000	MOTC	-
28	Medium	2026-2030	Timetable for Regional Bus and Urban Services	Institutional	Country-Wide	• Facilitate engagement with key stakeholders throughout microlet timetabling process, including passengers, operators, and business owners.	• Ensure that timetable outcomes benefit users within the community, operators, and business owners.	✓	✓	-	✓	-	-	MOTC	-
29	Medium	2026-2030	Systems and Processes	Capacity Building	Country-Wide	• Conduct training programs on operational systems and process for effective management of public transport facilities.	• Currently limited capacity to deliver sector-wide systems and processes beyond licensing and monitoring of facilities. • Implementation of new public transport facilities will both require additional technical capabilities to be developed while also acting as a cornerstone for broader capacity and skills development.	✓	✓	✓	✓	✓	100,000	MOTC	-
30	Medium	2026-2030	Parking Strategy for Dili City	Technical Study	Dili	• Conduct a technical study on parking policies and strategies for Dili City	• Comprehensive parking management strategy to fully inventory parking patterns, illegal parking on the sidewalks, then identify city-wide parking restrictions, parking payment systems, areas for off-street lots, etc. to improve performance of public transport services.	✓	-	✓	-	✓	300,000	MOTC	-
31	Medium	2026-2030	City-Wide Traffic Improvement Study	Technical Study	Dili	• Conduct a technical study on traffic management system and improvement plans for Dili City	• Comprehensive traffic study would identify causes of congestion and recommendations to optimize traffic in Dili which will result in improving reliability and performance of public transport services.	✓	-	✓	-	✓	500,000	MOTC	-
32	Medium	2026-2030	Technical Study on Fares and Ticketing System in Public Transport	Technical Study	Country-Wide	• Conduct a technical study to formulate a roll-out plan for introducing a new ticketing system for Timor-Leste's public transport system.	• Modern ticketing system will improve efficiency and attractiveness of public transport system. • A gradual transition of the ticketing system is necessary together with implementation of standardized scheduling of public transport services and an enhanced passenger information system.	✓	✓	-	✓	✓	400,000	MOTC	-
33	Medium	2026-2030	Active Mobility Study	Technical Study	Dili	• Conduct a technical study on active mobility to create a safe, inclusive walking environment for all	• Walking is the start/end mode of every trip, and it is essential to create a safe, inclusive walking environment for all groups of society (including elderly, children, disabled people) to encourage modal shift from private vehicles to sustainable travel options such as public transport.	✓	✓	✓	✓	✓	300,000	MOTC	-
34	Medium	2026-2030	Dili Urban Transport Modernization Study	Technical Study	Dili	• Conduct a study to modernize and improve a city-wide bus-based public transport system,	• Transition to a modern bus-based system involves potential phase-out of existing microlet services (both vehicles and operators/drivers). The modern	✓	✓	✓	✓	✓	500,000	MOTC	

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
						with improved and modern contracting mechanisms that ensure supply meets demand.	public transport will include performance-based contracts, integrated fare collection systems, and streamlined service operations.								
35	Medium	2026-2030	Overarching Support for Regulatory/ Institutional Refinements	Institutional	Country-Wide	• Provide overarching support for institutional/regulatory refinements	• This covers various institutional/regulatory initiatives proposed in the medium term.	✓	✓	✓	✓	✓	250,000	MOTC	
												Total	**14,530,000**		

Table 9.6: Long-Term Indicative Investment Plan (2031-2035)

								Relevance to Overarching Public Transport Master Plan Goals							
#	**Phase**	**Timeline**	**Strategic Intervention**	**Discipline**	**Location**	**Initiatives**	**Rationale**	**Goal 1: Economic Growth**	**Goal 2: Access for All**	**Goal 3: Liveable Cities**	**Goal 4: Mode of Choice**	**Goal 5: Sustainable Future**	**Order-of-Magnitude Costs (US$)**	**Lead Party**	**Note**
1	Long	2031-2035	Airport Express Service Proposal	Operation	Dili	• Operate 71.3 km Airport Express from Dili Airport to Metinaro	• Expand scope of urban public transport services to cover needs of airport visitors to increase convenience and facilitates growth of tourism industry in connection to the development of new urban area in Metinaro.	✓	-	✓	✓	-	-	DNTT	-
2	Long	2031-2035	Dili Port Interchange	Facility	Dili	• Construct Dili Port Interchange adjacent to port to act as primary interchange location for Microlet services	• Improve network efficiency, accessibility, and customer experience near Dili Port.	✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
3	Long	2031-2035	Ulmera Interchange	Facility	Dili	• Construct on-street interchange at Ulmera to service urban bus through-routes	• Improve network efficiency, accessibility, and customer experience between Dili and outside of Dili, thus resulting in enhanced regional connectivity.	✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
4	Long	2031-2035	Tibar Interchange	Facility	Dili	• Construct on-street interchange at Tibar to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
5	Long	2031-2035	Hera Interchange	Facility	Dili	• Construct on-street interchange at Hera to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
6	Long	2031-2035	Wenunuc Interchange	Facility	Dili	• Construct on-street interchange at Wenunuc to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
7	Long	2031-2035	Metinaro Interchange	Facility	Dili	• Construct on-street interchange at Metinaro to service urban bus through-routes		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
8	Long	2031-2035	Aileu Interchange	Facility	Aileu	• Construct on-street interchange at Aileu to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
9	Long	2031-2035	Maubisse Interchange	Facility	Maubissa	• Construct on-street interchange at Maubisse to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
10	Long	2031-2035	Manatuto Interchange	Facility	Manatuto	• Construct on-street interchange at Manatuto to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
11	Long	2031-2035	Same Interchange	Facility	Same	• Construct on-street interchange at Same to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
12	Long	2031-2035	Ainaro Interchange	Facility	Ainaro	• Construct on-street interchange at Ainaro to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
13	Long	2031-2035	Liquica Interchange	Facility	Liquica	• Construct on-street interchange at Liquica to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
14	Long	2031-2035	Batugade Border Interchange	Facility	Batugade	• Construct on-street interchange at Batugade Border to service microlet and regional bus with additional layover parking to serve both inter or inner country travel		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
15	Long	2031-2035	Batugade Interchange	Facility	Batugade	• Construct on-street interchange at Batugade to service microlet and regional bus		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
16	Long	2031-2035	Ermera Interchange	Facility	Ermera	• Construct on-street interchange at Ermera to service microlet and regional bus with additional layover parking		✓	✓	✓	✓	✓	120,000	MOTC, MPW	-
17	Long	2031-2035	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Invest in training sessions on the various aspects of franchising and contract models in PT – including how various models are structured, the principles of competitive tendering and contract management	• Prepare operators to be competitive for future franchising and contracting models as the public transport system modernizes.	✓	-	-	✓	-	100,000	MOTC	-
18	Long	2031-2035	Legal and Regulatory Framework Development	Institutional	Country-Wide	• Develop or refine the legal and regulatory frameworks necessary to support franchising and competitive tendering	• Establish the necessary legal and regulatory frameworks to support the coordinated operation of a modern public transport system.	✓	✓	-	✓	-	-	MOTC	-

								Relevance to Overarching Public Transport Master Plan Goals							
#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future	Order-of-Magnitude Costs (US$)	Lead Party	Note
19	Long	2031-2035	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Develop the capacity of local operators to participate in competitive bidding. This can include training on preparation of proposals/bids, understanding contract requirements, and the implications of contract obligations	• Ensure that operators are informed and able to participate in modern bidding processes for public transport service operations.	✓	-	-	✓	-	-	MOTC	-
20	Long	2031-2035	Training on Vehicle Procurement	Capacity Building	Country-Wide	• Invest in training programs for government officials on the principles and best practice of vehicle procurement. This includes understanding specifications, procurement processes, and negotiating contracts with vehicle suppliers	• Prepare the Timorese government for future modernization of the public transport fleet and establish capacity for bulk procurement.	✓	-	-	✓	✓	100,000	MOTC	-
21	Long	2031-2035	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Invest in training sessions on the various aspects of franchising and contract models in public transport – including how various models are structured, the principles of competitive tendering and contract management.	• Current capacity is very limited; however, it is assumed that some capacity will be developed over time through actions in the short and medium terms.	✓	✓	-	✓	-	100,000	MOTC	-
22	Long	2031-2035	Professionalization of Private Sector Operators	Institutional	Country-Wide	• Develop or refine the legal and regulatory frameworks necessary to support franchising and competitive tendering.	• Current legislative and regulatory frameworks are not clear enough on franchising/contracting of public transport service operations.	✓	-	-	✓	-	-	MOTC	-
23	Long	2031-2035	Professionalization of Private Sector Operators	Capacity Building	Country-Wide	• Develop the capacity of local operators to participate in competitive bidding. This can include training on preparation of proposals/bids, understanding contract requirements, and the implications of contract obligations.	• Competitive bidding processes are most successful when the private sector can develop strong proposals and have adequate capacity to deliver them. • Local firms should be included and considered in these processes to maximize local benefit.	✓	✓	-	✓	-	100,000	MOTC	-
24	Long	2031-2035	Modern Vehicle Procurement	Capacity Building	Country-Wide	• Build capacity in managing vehicles post-purchase. This includes understanding maintenance requirements, lifecycle cost analysis, and replacement planning.	• Ensures a sustainable an ongoing high-quality system, not a 'once off' purchase that deteriorates over time and then cannot be replaced.	✓	-	-	✓	✓	100,000	MOTC	-
25	Long	2031-2035	Modern Infrastructure and Maintenance	Capacity Building	Country-Wide	• Conduct training programs on modern infrastructure planning, implementation, and maintenance. This includes understanding the lifecycle of infrastructure assets, modern maintenance techniques, and the cost impacts.	• Current capacity is limited, and existing public transport assets are not maintained.	✓	-	✓	✓	✓	100,000	MOTC, MPW	-
26	Long	2031-2035	Modern Infrastructure and Maintenance	Institutional	Country-Wide	• Adopt standards for public transport infrastructure to guide the construction and maintenance of public transport.	• Current capacity is limited, and existing public transport assets are not maintained.	✓	✓	✓	✓	✓	-	MOTC, MPW	-
27	Long	2031-2035	Modern Infrastructure and Maintenance	Capacity Building	Country-Wide	• Build capacity in procurement and contract management for public transport projects specifically, working with the National Procurement Commission (NPC).	• The NPC has broad experience over a range of infrastructure sectors however there has been limited procurement of public transport-specific assets.	✓	-	-	✓	-	100,000	MOTC, MPW, NPC	-
28	Long	2031-2035	Modern Infrastructure and Maintenance	Institutional	Country-Wide	• Establish regular, preventive maintenance programs for public transport infrastructure. This should include post-purchase asset management of vehicles.	• Contributes to the ongoing sustainability of high-quality assets that deliver an attractive public transport system for users.	✓	✓	✓	✓	✓	-	MOTC, MPW	-
29	Long	2031-2035	Digitization	Institutional	Country-Wide	• Provide training to public sector officials on the use and benefits of digital technologies in managing and optimizing public transport.	• The only current application of digital technologies within the public transport system is a database managed by DNTT for storing vehicle registrations. • There is no existing capacity for applying digital technologies for service delivery, planning or optimization of the network.	✓	-	-	✓	-	-	MOTC	-
30	Long	2031-2035	Digitization	Institutional	Country-Wide	• Establish partnerships with technology providers who can supply the tools and expertise necessary for implementation.	• The transfer of expertise and knowledge, such as from international implementation, can accelerate	✓	-	-	✓	-	-	MOTC	-

#	Phase	Timeline	Strategic Intervention	Discipline	Location	Initiatives	Rationale	Relevance to Overarching Public Transport Master Plan Goals					Order-of-Magnitude Costs (US$)	Lead Party	Note
								Goal 1: Economic Growth	Goal 2: Access for All	Goal 3: Liveable Cities	Goal 4: Mode of Choice	Goal 5: Sustainable Future			
							the learning curve in Timor-Leste on digital technologies.								
31	Long	2031-2035	Digitization	Capacity Building	Country-Wide	• Build capacities in collecting, managing, and analyzing the large amounts of data that digital technologies can generate.	• Data generated from public transport system operations provides a robust evidence base for the ongoing improvement of the network.	✓	-	-	✓	-	100,000	MOTC	-
32	Long	2031-2035	Digitization	Institutional	Country-Wide	• Conduct pilot projects to test different technologies before rolling them out at scale.	• This allows benefits and challenges to be understood, and parties to make any necessary adjustments ahead of scaling up initiatives.	✓	-	-	✓	-	-	MOTC	-
33	Long	2031-2035	Digitization	Capacity Building	Country-Wide	• Develop capacities in cybersecurity to protect the integrity of digital systems and the privacy of users.	• Cyber-attacks are a major risk associated with the implementation of digital technology. • Given the management of public data, it is important that this data is adequately protected for the benefit of the community.	✓	-	-	✓	✓	100,000	MOTC	-
34	Long	2031-2035	Safeguard Monitoring	Monitoring	Country-Wide	• Monitor and measure the progress of the project implementation (i.e., terminal development/improvement) to ensure compliance with ADB safeguards policy and procedures	• Ensuring compliance with environmental and social safeguards (including gender, settlement, indigenous people) will bring benefits to the affected residents and community located in the project areas.	-	✓	✓	-	✓	500,000	MOTC	-
35	Long	2031-2035	Overarching Support for Regulatory/ Institutional Refinements	Institutional	Country-Wide	• Provide overarching support for institutional/regulatory refinements	• This covers various institutional/regulatory initiatives proposed in the long term.	✓	✓	✓	✓	✓	250,000	MOTC	-
36	Long	2031-2035	Introduction of Intercity Transport between Dili and Metinaro	Operation	Dili	• Connect Dili city center and a planned administrative city Metinaro by introducing a direct public transport system to enhance regional connectivity along this key northern corridor.	• The development of Metinaro as a new administrative city will generate travel demand to/from Dili and providing newer and higher capacity public transport vehicles will contribute to improving the livelihood of people and enhancing economic activities along the corridor	✓	✓	✓	✓	✓	-	MOTC	US$2.7 million was assumed for procurement of 6 diesel buses for Intercity Transport (Dili-Metinaro) in Dili Urban Master Plan Update. Further assessment on the feasibility of the new bus system is required.
												Total	**3,450,000**		

10 Conclusion

10.1 Summary

This Timor-Leste 2023 Public Transport Master Plan contains a list of time-bound action plans and priority improvements measures for public transport services and facilities up to Year 2035. It is based on the review of the previous 2022 PTMP and updated information/data including the latest existing information, routing/network assessment, field surveys, engineering studies, costing, legal/regulatory assessment, as well as institutional capacity assessment. Three timelines for the action plan are proposed to align with the Dili 2045 Urban Master Plan as follows:

- **Phase 1 (up to 2025)** – Short-term actions/initiatives that can be adopted relatively quickly to improve service and facilities, including technical studies and operation costs for a pilot bus system, with minimal implementation timeline for infrastructure enhancements, as well as minimal modifications to existing institutional or regulatory frameworks (e.g., service and routing changes, operating protocol refinements for terminals, and formulation of design guidelines) – possibly implemented by MOTC and the Timorese Government to facilitate larger-scale investments in latter phases;

- **Phase 2 (2026-2030)** – Medium-term actions/initiatives involving more significant infrastructure enhancements requiring additional design, environmental and social safeguard, as well as land acquisition activities, as well as involving/requiring more substantive institutional and regulatory changes (e.g., new terminals in Dili, regulatory refinements to facilitate creation of a public transport authority (PTA), and capacity building to prepare for eventual contracting); and

- **Phase 3 (2031-2035)** – Long-term actions/initiatives that align with new developments and growth areas in Dili (including Metinaro), as well as continued growth in the population and workforce throughout the country, as well as more substantial changes to the regulatory/institutional framework to enable service contracting.

The total investment cost is US$35.1 million, divided as follows: (i) Phase 1 (up to 2025) – US$17.2 million; (ii) Phase 2 (2026-2030) – US$14.5 million; and (iii) Phase 3 (2031-2035) – US$3.5 million. The biggest cost item is the proposed facility improvements (including three bus terminals in Dili, one bus terminal in Baucau, one on-street interchange in Dili, on-street interchanges in regional locations, as well as 50 bus stops improvements in Dili – facility costs exclude land acquisition and compensation associated with resettlement), followed by operation of a pilot bus system in Dili, technical studies, capacity building, institutional refinement efforts, as well as monitoring (for long-term).

Thus, in overall terms, this revised public transport master plan has considered previous analyses, analysis of existing conditions on the ground, as well as forecast conditions in the future. This Public Transport Master Plan serves as a roadmap to fundamentally alter and enhance the public transport system in Timor-Leste as well as urban areas including Dili – focusing not only on service modifications to better align service with demand (to both reduce duplication of service, vehicle surplus on the road, and network inefficiencies) and simplifying/systematizing the network to make it more accessible and convenient for all types of users, but also facility improvements to create better and safer passenger waiting areas, more efficient facility operations and renewed/new infrastructure to better use existing space and accommodate future growth (and possibly conversion of microlet to buses) at terminals as well as bus stops (including first/last-mile enhancements to sidewalks and crossings).

At the same time though, the Public Transport Master Plan highlights what else needs to be “done” to achieve the service and infrastructure aspirations. As shown by a comprehensive review of the overarching regulatory and institutional framework – various reforms and refinements are needed to evolve to a facilitating environment that better plans, manages, and regulates public transport services – this ranging from new roles and responsibilities, as well as institutions, etc. The pathway to go from today to the envisioned future also requires a strong capacity building element both for the public and private sector. The estimated investment packages envisioned by phase may be contrasted with national allocated budgets to identify funding requirements and potential innovations funding approaches/mechanisms. Lastly, it is hoped that this Public Transport Master Plan can not only inspire the Government and the municipalities and various stakeholders, but also be used to identify potential synergies with other development partners and stakeholders to enhance implementation and effectiveness of such measures.

10.2 Next Steps

In terms of next steps, this Public Transport Master Plan has identified highest priority initiatives in terms of phasing and importance. Select initiatives will be taken forward for further and more detailed feasibility study – including engineering design details, environmental and social assessment, gender equality and social assessment, costing, as well as economic and financial assessment. Those priority initiatives deemed as "feasible" by the forthcoming analysis will also be supported by targeted procurement planning and support to help move the project closer to implementation.