Banda Aceh Bus Rapid Transit Network Improvement

April 2017

List of Abbreviations

ADB	Asian Development Bank
BAPPEDA	Regional Development Planning Department
BCR	Benefit Cost Ratio
BRT	Bus Rapid Transit
CBA	Cost Benefit Analysis
CBD	Central Business District
CDIA	Cities Development Initiative for Asia
CPI	Consumer Price Index
DAU	General Purpose Grant
DCF	Discounted Cash Flow
DISHUB	Department of Transport
DSCR	Debt Service Recovery Ratio
EIRR	Economic Internal Rate of Return
FEA	Financial and Economic Assessment
GDP	Gross Domestic Product
GoBA	Government of Banda Aceh
GPS	Global Positioning System
IDR	Indonesian Rupiah
LRT	Light Rail Transit
MoU	Memorandum of Understanding
NPV	Net Present Value
O-D	Origin-Destination
PFS	Pre-Feasibility Study
POLDA	Police
PV	Present Value
RIDF	Regional Infraastructure Development Fund
RoW	Right of Way
SEKDA	Aceh Regional Secretariat
SOE	State Owned EnteIDRrise
ToR	Terms of Reference
US$	United States Dollar
WB	World Bank

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Foreword

This Report is the result of a rapid assessment of the conditions in Banda Aceh in the context of a proposal for a BRT Lite direct service model system. It focuses on updating an earlier PFS report prepared by Government of Banda Aceh (GoBA)with a summary analysis of the raw data from the household survey and cordon counts (also undertaken by GoBA) and supplemented with supplementary field survey data obtained by the study team during this study.

Due to a limited budget, the estimates of passenger demand and potential farebox revenues have been drawn from existing boarding and alighting data obtained by the study team in September 2016, rather than from computerised demand modelling using data from the earlier household surveys and cordon counts. In addition, the unit cost rates used to estimate the project costs have been taken from earlier work on the TransJakarta system and applied to the indicative estimates of quantities for the Banda Aceh project.

With further more detailed analysis including computerised demand modelling, and with the benefit of detailed designs for the project, revenues and costs may vary from that documented in this report. The financial and economic analysis, and the assessment of the capacity of the Government of Banda Aceh to fund the project needs to be read with these factors in mind.

Finally, the study team wishes to express its gratitude to Banda Aceh and Aceh counterparts for their ongoing support and advice during the limited period of the study.

1. INTRODUCTION

This report summarises the findings of a pre-feasibility study on the proposed BRT line from the city to the University of Syiah Kuala. It is currently served by Trans Koetaradja Line 1.

1.1 Background

1. In December 2014, the city of Banda Aceh's Transportation Team produced a Pre-Feasibility Study (PFS) concerning the enhancement of the city's Bus Rapid Transit (BRT) system. This PFS was submitted to CDIA for review and comment. It was suggested that the PFS would be significantly enhanced if the city carried out an Origin-Destination (O-D) survey to provide evidence as to the likely demand for BRT services. CDIA subsequently provided advice as to how such an O-D survey mightbest be designed and implemented in early 2015 and, following this, the city of Banda Aceh funded and carried out an O-D survey in late 2015.

2. In February 2016 CDIA received a request for support from Banda Aceh's Mayor to assist the city in refining and enhancing the original PFS developed originally by the Banda Aceh Transportation Team utilizing the information provided in the PFS as well as data gathered from the O-D survey (which remains in raw data form). This report is the result of this assistance provided. It draws heavily upon the data contained in the original PFS report and provides additional inputs where required.

1.2 Objective

3. The objective of this study is to review and update the original PFS to deliver on these original goals with the principal aim being to produce a detailed strategy to support the effective implementation of a public transport network in Banda Aceh with the expectation being that a BRT system will be the central feature of such a network.

Specific questions that also need to be addressed include:

i. Based on the results of the O-D surveys and the analysis within the PFS Report, does the city of Banda Aceh really need a comprehensive new BRT system or are other alternatives – such as a simple pilot BRT corridor on the maximum demand corridor as a short/medium term solution, or an upgrading the existing labi-labi system – which is available and potentially could offer greater potential for success?

ii. For the key 2-3 corridors of maximum current and anticipated future travel demand, what are the physical constraints and opportunities offered to accommodate a future BRT?

iii. What kind of strategies, policies and both push/pull measures will be needed to facilitate the take-up of BRT services?

iv. What can be done to ensure, and sustain, the financial viability of whichever BRT system is implemented?

1.3 Report Structure

For ease of reference, the report structure is as follows.

Chapter 1: provides a brief summary of the background and the objective for ongoing context purposes.

Chapter 2: provides short profile of the city of Banda Aceh to present a background demographic, land use (current and future plan), and economy context for the overall appreciation of the need for a quality urban transport system and specifically, the potential benefits to be gained from the implementation of the project.

Chapter 3: provides a review of the urban transport sector as it is at present. The results the efforts of the project team in relation to route mapping, travel time and passenger surveys is documented as well as the results of the O-D surveys (from the previous survey team) to help appreciate the overall travel demand for the city population and help guide the logic for the choice of the priority corridor as is subsequently examined by this study.

Chapter 4: provides a summary of the household interview survey and vehicle occupancy counts undertaken by Banda Aceh as a prelude to this study being undertaken. The information presented covers a range of most relevant items to help appreciate the current travel modes, cost of travel and willingness/support for improved conditions in the urban transport sector.

Chapter 5: provides a summary of the data collected by the project team in relation to the current route network, service frequencies, passenger volumes, average travel times together with passenger boarding and alighting data. This, together with the data in Chapter 4 provides a basis for the initial analysis undertaken in defining the project.

Chapter 6: provides an indicative estimate of the anticipated demand for the project upon startup and a brief summary of the assumptions applied in order to arrive at this estimate.

Chapter 7: provides a review of the existing institutional setting in which the project is being developed. It discusses the ongoing challenges to be addressed in implementing the project and the need for a specific Government unit/entity to be established to progress the matter forward. In support of this, an outline organogram is documented as a basis for the ongoig discussions which will need to be had by Government stakeholders.

Chapter 8: discusses the concept of a future urban transport strategy as a framework for the choice of a priority investment and to then provide a roadmap for the ongoing planning, investment and management actions which will be required to ensure success.

Chapter 9: discusses the priority investment and the supporting data as captured during the planning and analysis of the project team. This provides the foundation for the initial financial assessment of the project for investment consideration.

Chapter 10: presents the results of an initial scan of the financial capacity of both City and Provincial Governments to fund the capital cost of the project as well as ongoing operations and maintenance costs. Also included for ongoing reference purposes are the views expressed by potential financing partners on the matter of partnering in the financing of the project.

Chapter 11: discusses the indicative financial and economic assessment undertaken for the purposes of consideration of funding capacities and mechanisms.

Chapter 12: lists the next steps which the study team considers are required to progress the concept project towards implementation.

2. CITY of BANDA ACEH

2.1 Population

4. Based on the most up to date records, the population of Banda Aceh in 2012 was slightly under 240,000. The distribution across the nine districts making up the city is listed in Table 2.1: Population of Banda Aceh below. The most populous district is Kuta Alam with 45.115 inhabitants. This district was also the most populous in 2012.

5. On a most populous district ranking basis, the three districts (in order of ranking) are Kuta Alam, Syiah Kuala and Baiturrahman. When these are considered in a spatial context, they surround the Jl. Tengku Nyak Arief corridor from the CBD to the University Syiah Kuala Precinct as is currently being serviced by Trans Koetaradja Route 1. It helps to justify this corridor as a priority for any BRT project proposal.

Table 2.1: Population of Banda Aceh

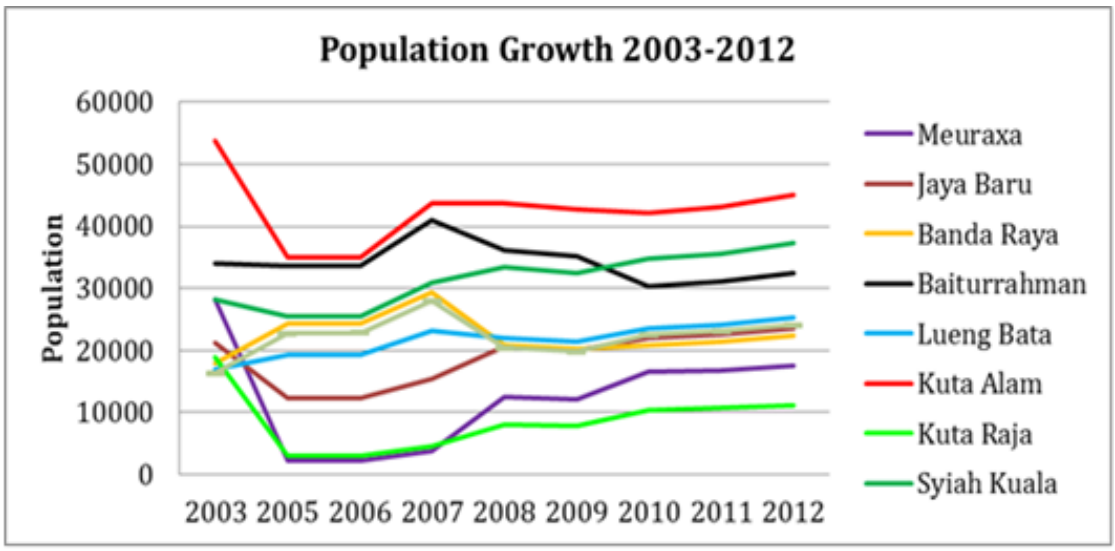
No	District	Population/Year				
		2008	2009	2010	2011	2012
1	Meuraxa	12,494	12,189	16,484	16,861	17,614
2	Jaya Baru	20,658	20,127	22,031	22,535	23,543
3	Banda Raya	20,907	20,352	20,891	21,369	22,325
4	Baiturrahman	36,124	35,153	30,377	31,073	32,463
5	Lueng Bata	22,025	21,437	23,592	24,132	25,211
6	Kuta Alam	43,792	42,664	42,217	43,184	45,115
7	Kuta Raja	8,076	7,890	10,433	10,672	11,149
8	Syiah Kuala	33,433	32,564	34,850	35,648	37,243
9	Ulee Kareng	20,409	19,865	22,571	23,088	24,121
Total		**219,659**	**217,918**	**212,241**	**223,446**	**238,784**

Source: Banda Aceh in Figures 2009-2013

6. In the context of the districts which have accommodated most of the population growth from 2008-2012, the Meuraxa district dominates with 25% of the population increase. Next is the Syiah Kuala and Ulee Kareng districts (served by Trans Koetaradja Route 1) each accounting for 18% of all population growth. Then the districts of Lueng Bata and Kuta Raja each with a 15% share of all growth account for over ninety percent of all population growth during the period. Significantly, the Baiturrahman district (central city area) which was the second most populous in 2008 has slipped to third position with a net decline of 3,600 residents during this period. This may be simply a reflection of the increases in business in this area at the expense of residences.

7. For the record, Figure 2.1 highlights the growth trends of these 8 districts. The graph shows generally a sharp decline between 2003 and 2005 for Kuta Alam and the other districts of Kuta Raja, Meuraxa and Jaya Baru which were severely impacted by the tsunami. While they have recovered part of their previous population levels, it is assumed that due to restrictions (actual or implied), it is not likely (except for Kuta Alam) that these will accommodate a high proportion of the population of Banda Aceh in the future.

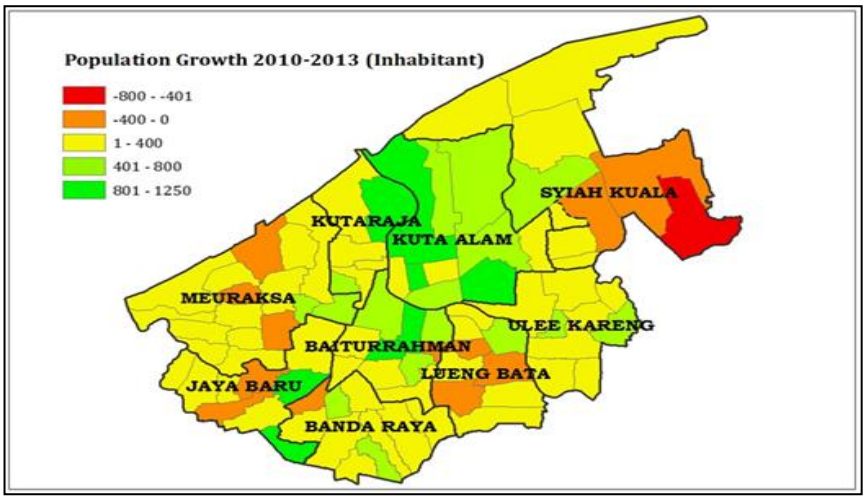
Figure 2.1: Population Growth 2003-2012



Source: **Banda Aceh in Figures 2003-2013**

8. In the context of the anticipated future population growth pattern and the impact this will have on the future urban footprint (subject to adequate land use planning and controls), it can be anticipated that a continuing intensification of population in Kuta Alam, parts of Syiah Kuala and Ulee Kareng in the north east. Furthermore, it is also anticipated that Luang Bata, Banda Raya and Jaya Baru will see an intensification of business activities and population in the southern and south western parts of the city. This is a basis for the future urban structure plan as has been prepared by Banda Aceh (see Figure 2.3 below) for ongoing urban development management purposes.

Figure 2.2: Population Growth by District 2010 – 2013



Source: Bappeda Banda Aceh

9. Since 2010, the population in each district started to show a steady growth trend. The population in northern area has grown with Kuta Alam receiving the most growth. But, as has transpired there is no significant difference in population growth between the northern part and the southern part of the city in general. Steady population growth since 2010 in the northern area suggests that residents are returning to the same place that was once destroyed by the tsunami. Accordingly, this suggests that the strategy to limit/control the ongoing urban development in the northern part of the city has not been effective.

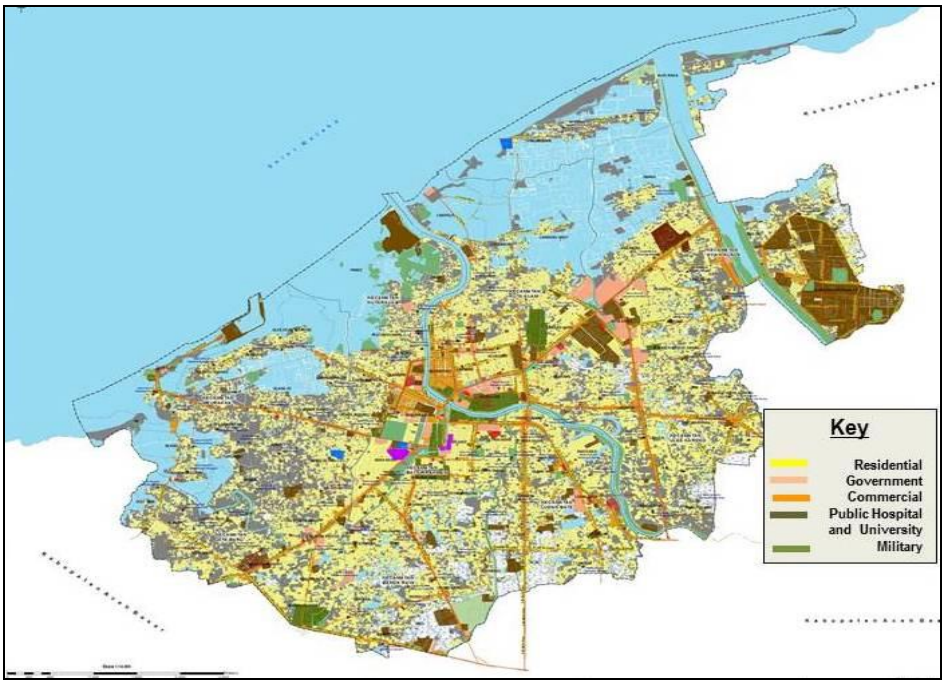
2.2 City Land Development Profile

2.2.1 Existing

10. The current landuse is shown in Figure 2.3 . It clearly shows the lasting impact of the 2004 tsunami and generally reinforces the above suggestion that the future growth of the city should be in a southerly direction. However, as has also been noted above, the plans to-date have not yet yielded the success originally intended. It is assumed that this is due to ongoing challenges faced by Government in managing urban growth.

11. As can be seen, Banda Aceh urban form is dominated by residential land use with a dominant urban centre containing much of the commercial land uses of the city. There is evidence of limited ribbon development along key arterials but this is not as dominant as in other cities in Indonesia (eg Palembang). The southern areas of the city are attracting increasing commercial and services sector developments in accordance with the city master plan. Coupled with this, the extension of the urban footprint in the south is anticipated to continue.

Figure 2.3: Distribution of Principal Land Uses



Source: Bappeda, Kota Banda Aceh

12. From a mass transport planning perspective, this will develop the future demand required for an extension of the BRT network south in the future. It augers well for viable mass transit corridors to be developed as the demand grows and the business case for such investments increases.

2.2.2 Future

13. The development of Banda Aceh City has changed drastically since the tsunami disaster in 2004. Prior to tsunami, the development of the city was to the northern seashore. However, the incredible damage caused by the tsunami has led the city government to adopt a disaster mitigation based master plan. This plan is outlined in Rencana Tata Ruang Wilayah (The City Spatial Planning/ Master Plan) of Banda Aceh City 2009-2029. Figure 2.4 illustrates this plan.

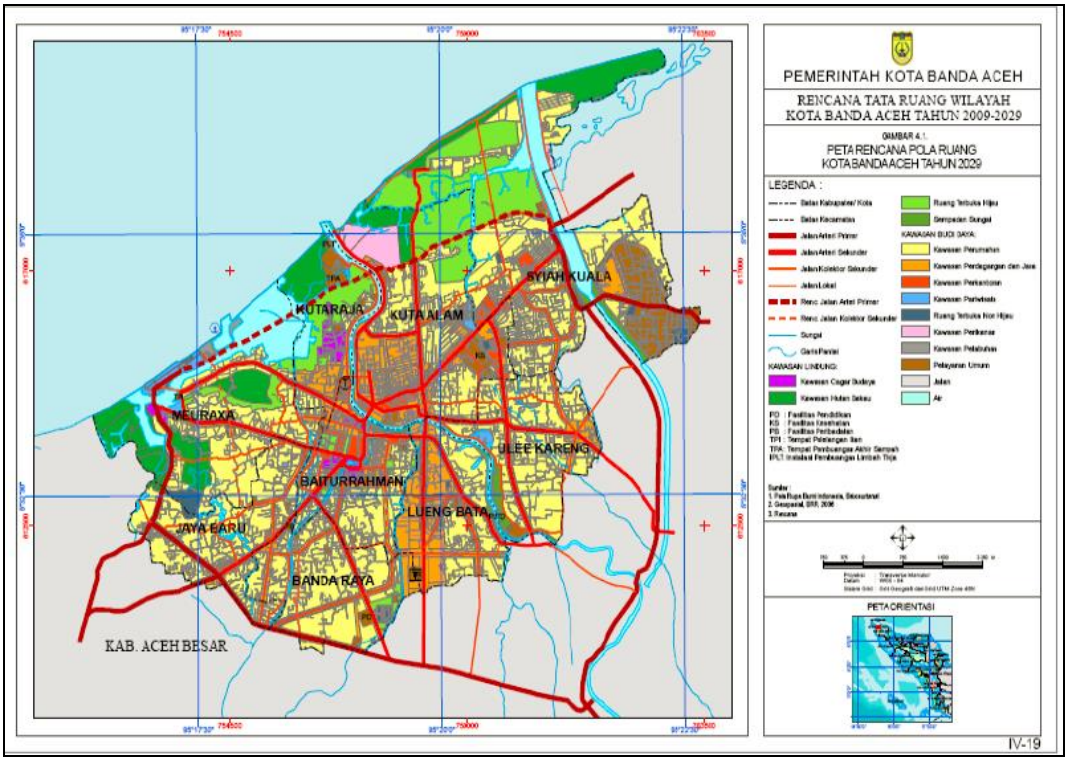
14. One of the main development strategies is to redirect the urban growth to the south so that the city residents and businesses can become more resistant to any similar disasters which may occur in the future. The government has started developing a new urban center in Lueng Bata District along with the necessary supporting infrastructure. The Government is also encouraging future urban development to focus in the area designated by the orange color in Figure 2.4. The supporting network of arterials and the ringroad to support the City's growth into the future is also outlined in Figure 2.4 and is an integral part of the spatial pattern of Banda Aceh City up to 2029.

15. The new city center to be developed in south part of the city is Lamdom and Batoh in Lueng Bata District. It is expected that the strategy can trigger the growth of commercial, service and residential areas in the new city center. This will encourage

more people to live in the south part of the city. As noted above, the new urban center has been supported by the development of new infrastructure such as a bus station, new roads, and the provision of public utilities etc. The multiplier effect of this strategy has already begun to appear with the emergence of new commercial areas being established by the private sector.

16, As is apparent in Figure 2.4, the City has planned the Banda Aceh Outer Ring Road (BORR) which surrounds the whole city, including on the northern coastal area. This road will be raised in sections to be used as tsunami mitigation infrastructure. The BORR will also connect the city with Aceh Besar Regency and several important facilities such as airport and sea port. The map of spatial structure plan of Banda Aceh City 2029 is as follows.

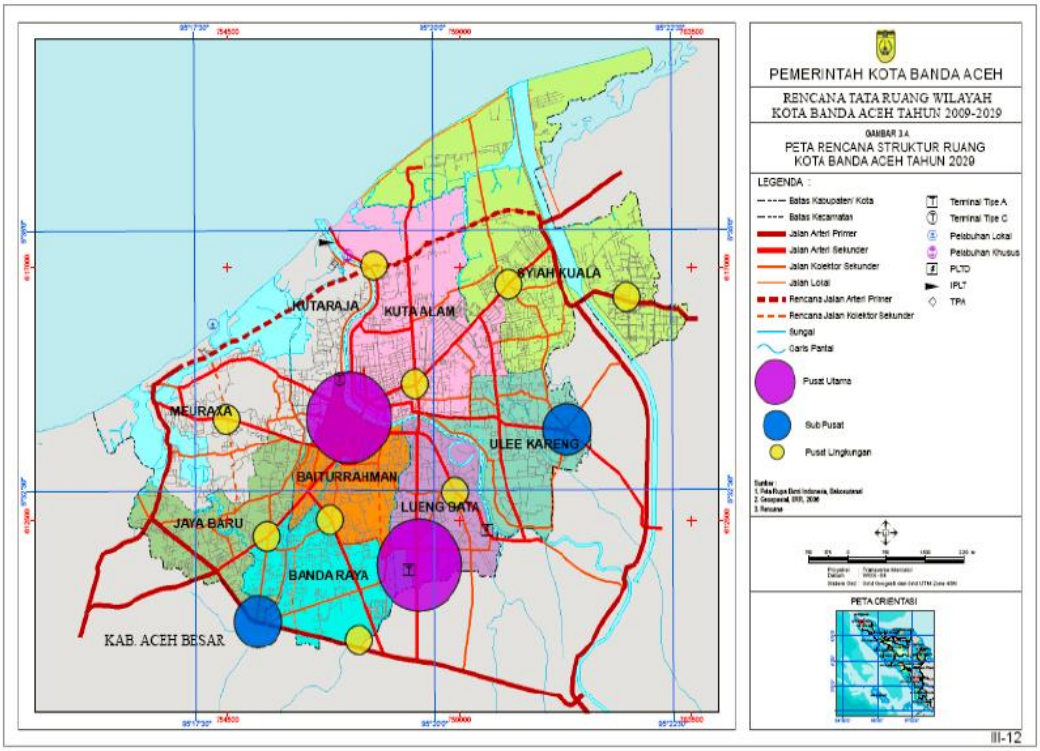
Figure 2.4: Banda Aceh Spatial Master Plan 2009-2029



Source: Banda Aceh City Master Plan 2009-2029

17. The spatial structure map (Figure 2.5) illustrates the future urban center and urban subcenter of the city in 2029. The urban centers (colored purple) are Baiturrahman District (current city center) and Lamdom-Batoh (future city center in the south). Thus, in accordance with the plan illustrated, the city will have two urban centers in the future. The urban subcenters (colored blue) are Keutapang and Ulee Kareng.

Figure 2.5: Spatial Structure Plan of Banda Aceh City 2029



Source: Banda Aceh City Master Plan 2009-2029

18. The Master Plan 2009-2029 also emphasizes the importance of sustainable public transportation development which connects the urban center and urban subcenters. The public transportation system will play a significant role in the growth of the new city center because it can trigger more people and more business to occupy this area. Currently, the public transportation to the new city center in Batoh and Lamdom is very poor eventhough the arterials serving this area are quite wide.

19. Moreover, it has been recommended by Bappeda that the new urban center area developed based on "urban village" containing a mix of land uses and is connected with the other urban areas of the City. Given the ongoing challenges in translating the master plan into reality, the City Government could consider a range of push/pull measures to guide such development[1]. In this context, the development of a viable and efficient BRT system linking the key areas of the city can (potentially) be used as a catalyst to help direct urban development in accordance with the Master Plan. Were this to transpire, it would be a first for Indonesia and could (potentially) be adopted by other cities as a means of facilitating and guiding urban development in accordance with approved Master Plans.

[1] The internationally recognized mindset previously used for the Orenco transit oriented development community (Portland, Oregon) of “build it and they will come” is most relevant here.

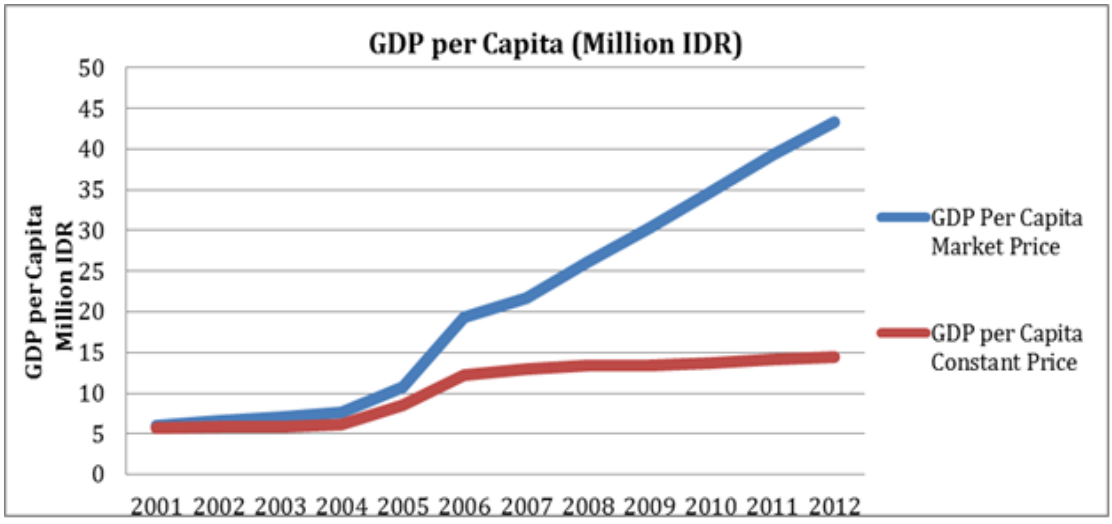
20. In summary, the spatial structure plan highlights the importance of developing an efficient and effective public transport system to optimize the accessibility of the population to these centers while minimizing the impact of omnipresent traffic congestion that has become synonymous with many cities in Indonesia. A public transport link to connect the current city center in Baiturrahman Area and Batoh-Lamdom area and other urban subcenters is required because it is estimated that, without such intervention, and the necessary supporting mobility management measures to be applied by the City and regional government, the traffic flow in this area will increase significantly in the future.

2.3 Economy

21. After the 2004 tsunami reconstruction and rehabilitation, Banda Aceh grew very rapidly as it was stimulated by the huge amount of financial aid from the world community during the reconstruction and rehabilitation process. This assisted Banda Aceh to rise again and to achieve better urban conditions than those prior to the tsunami (Rizkiya, 2012). The most visible difference is the incredible economic development and better urban design.

22. The rapid economic development in Banda Aceh resulted in a significant increase in Gross Domestic Product (GDP) per capita (Figure 2.6). The GDP per capita of Banda Aceh City based on the market price in 2012 is six times higher than those of 2004. While the GDP per capita based on constant price is three times higher than those of 2004. Banda Aceh in Figures 2013 suggests that the income per capita of Banda Aceh City based on the market price is about IDR 43 million per capita. The figure is higher than national GDP per capita which is approximately IDR 33 million per capita.

Figure 2.6: Growth in GDP per Capita – Banda Aceh



Source: Banda Aceh in Figures 2001-2013

23. So in general, the economic condition of Banda Aceh City has continued to improve as the economy has grown from year to year. The economic growth in 2012

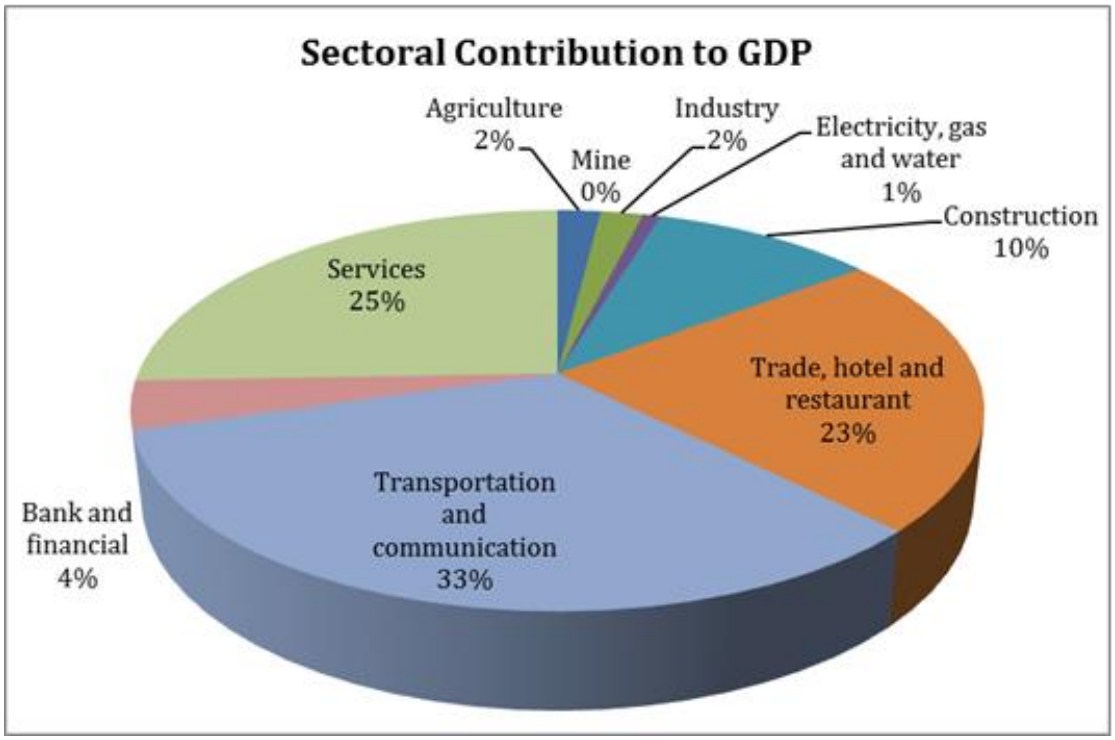
is at 6.17%. The total GDP of Banda Aceh City is IDR10,3 trillion. The GDP per capita is IDR43,4 million/ capita.

24. The significant increase of income per capita contributes to the increasing quality of life of residents. It also increases the standards of public service quality demanded by the citizens. The declining demand for the labi labi mode is a reflection of this increasing quality of live.

25. The sectors which contribute substantially to the GDP in 2012 are the transportation and communications sector (33.01%), the services sector 25.56% and the trade, hotels and restaurant sector (22.72%). This sectorial contribution to GDP is based on market prices is shown in Figure 2.7.

26. The significant increase of income per capita contributes to the increasing quality of life. The number of middle and upper class citizens in Banda Aceh City is growing significantly. It also increases the standards of public service quality demanded by the citizens, including in public transportation. On the other hand, the poor service from *labi-labi* can not fulfill the quality demanded by these citizens and with increasing wealth, residents will increasingly turn towards private vehicles. In this context, it is important that a significant improvement in the quality of public transport system is required if Banda Aceh is to avoid the impending traffic jams that characterize many other cities in Indonesia.

Figure 2.7: Sectorial Contribution to GDP Market Price



Source: Banda Aceh in Figures 2013

27. As further evidence of increasing use of private vehicles, there has been a significant decline in the number of *labi-labi* in the city in the last few years. This has had a material impact on the mobility needs of the poor at most since they are the most dominant user of *labi-labi*. As a result of the decline in *labi-labi* services, and based on the analysis of validation survey of TNP2K poverty data of Banda Aceh, the motorcycle ownership among the poor household in every district in Banda Aceh is between 63-84%. For the urban poor, the need for a motorcycle also reduces the proportion of expenditure they have for other primary needs, such as food, clothing and housing. From a social responsibility perspective, this also emphasizes the importance of public transportation and its significant influence to the economy and urban mobility.

3. EXISTING PUBLIC TRANSPORT CONDITIONS

Public Transport in Banda Aceh is currently in a rapid state of decline. The following sections provide relevant insights into this aspect

3.1 Labi-labi

28. Public transport in Banda Aceh is mostly served by labi-labi[2]. With the increase in affluence of the urban population, and the resultant increasing private vehicle ownership levels, the demand for labi-labi has fallen significantly. For example, in year 2000, the city was serviced by a registered fleet of 1,000 labi labi on a network of 17 routes. Today the registered number is 352 for 10 routes being operational. These routes are shown in Figure 5.1 below.

29. In addition to this decline in fleet and routes, anecdotal advice suggests that whereas in the year 2000, many of the labi-labi services during the peak period enjoyed a 100% and greater occupancy, today, the occupancy during the peak period can be as little as 30%. Moreover, the delay in waiting for passengers before departure adds to the ongoing unreliability of the services with very few residents willing to use the services.

30. Based on the observations contained in the 2014 PFS Study (referenced above), whereas in the past, a regular seat turnover during the trip enabled the 12 seater labi-labi operator to generate a fare revenue from an occupancy greater than 100%. School students were a significant source of demand and this contributed significantly to the viability of the sector. At that time, the labi-labi sector was highly profitable.

31. Today the situation has declined dramatically. While the official number of labi-labi registered is 352, the number in service at any one time is suspected to as low as 80. In addition, load factor for services (when and where they do operate)[3] is currently below 50% - even in peak periods. The typical travel pattern is from a local roadside location into the Terminal Keudah (or close to the city centre) and is partly a result of the traditional network design structure where terminals are the focal points for licensed public transport vehicles to operate from[4]. The increasingly long waiting times for passengers at (for example) Terminal Keudah contributes to the low level of service and the unreliability of those services which eventually do operate. In this regard, it is only a matter of time before demand for the labi-labi will evaporate completely.

[2] Source, PFS in mass Transportation, BAPPEDA Banda Aceh 2014.
[3] Labi Labi services operate only during daylight hours – approximately 7.00am to 7.00pm.
4 Typically owned and operated by DisHub, this provides a revenue stream for Government.

Figure 3.1: Labi-Labi

Source: Consultant

3.2 Trans Koetaradja

32. Trans Koetaradja is managed by DISHUB Aceh seeks to separate the functions of regulator and operator. DISHUB Aceh acts only as a regulator, while the services are provided by the operator as the private company. The operator provides the services in accordance with the minimum service standards (SPM) which has been determined by DISHUB Aceh. The operator has been selected through an open tender process. DISHUB Aceh monitors the quantity and quality of service of the operator, coordinating with other departments / agencies, and is ready to intervene in case of problems on the ground.

Figure 3.2: Trans Koetaradja

Source: Consultant

33. Currently Trans Koetaradja operate as ‘BRT-light’ is operating in Banda Aceh. 'BRT-lite' is designed with no dedicated lane is provided, and stations are located on curb-side. These design have several disadvantages as follow:

- No improvement on bus travel speed
- Buses will run with many obstructions such as parked-vehicle, access road and other road side friction
- Trunk-only operation, and assumes transfer at terminals and some mid-transfer station

- Low frequency bus service with long waiting time
- Curb-side stations normally invade the sidewalk space and making pedestrians difficult to walk.

34. For tickets and payment matters the ticketing revenues are submitted to Bank BRI in a Memorandum of Understanding (MoU). Bank BRI provides a variety of equipment to support these operations. The fare charged is IDR. 1, per trip paid by using e-Money Brizzi from Bank BRI. The cost of the e-card is IDR 20,000. The fares received act as a record of the number of passengers daily, the hour of travel and the location of boarding passengers. With this model, the system will not be financially sustainable. The system needs heavily subsidy.

3.3 Feeder Bus Services

35. DISHUB Banda Aceh currently operates three (3) buses of medium size for the Feeder Bus of Trans Koetaradja corridor 1. Each of these Feeder routes is only serviced by one (1) bus. The limited fleet results in relatively long waiting times, especially for school children who use the feeder servcies to access Trans Koetaradja.

Figure 3.3: Feeder Bus Service

36. The feeder services have been planned, funded and monitored by DISHUB Banda Aceh. The Secretariat Office is in charge of monitoring the performance of the drivers, the procurement of fuel (BBM), and administrative and financial affairs. The maintenace of the feeder fleet is undertaken at the workshop DISHUB City.

3.4 Pedicab/Becak and Taxi

37. Other public transport modes are the omnipresent pedicab/becak and the taxi. At present, there 463 registered pedicab/becaks which ply the streets searching for passengers. Typically an informal operation with a point-to-point service, it is suspected that this mode has also contributed to the decline in business for the labi labi. As is the case in many Indonesian cities, this mode is often used for accessing to and from residential areas to local main arterials, terminals and even into central commercial areas. In Banda Aceh this is the typical purpose of the trip. Fares are regulated at a base level of IDR 3,000 with an additional IDR 3,000 per each km

travelled. However, as is the typical case, fares are negotiated between passenger and the operator and this highlights the capacity limitations of Government when seeking to ensure compliance with rules.

38. For taxis, while 43 are registered in the city, ORGANDA has advised Government that in effect, less than 10 taxis are operating at any one time. Such is the minimal demand for this mode. Taxis are not metered and prior to departure, the fare to be paid is negotiated and agreed upon between the driver and the passenger. Typically the taxi market is the tourist and most taxis will wait outside tourist hotels for business. There are 43 taxis in operation in the city.

3.5 Damri Bus

39. The National Bus Company, DAMRI has a fleet of six buses providing services between the Airport and the City centre.

4. HOUSEHOLD INTERVIEW SURVEY

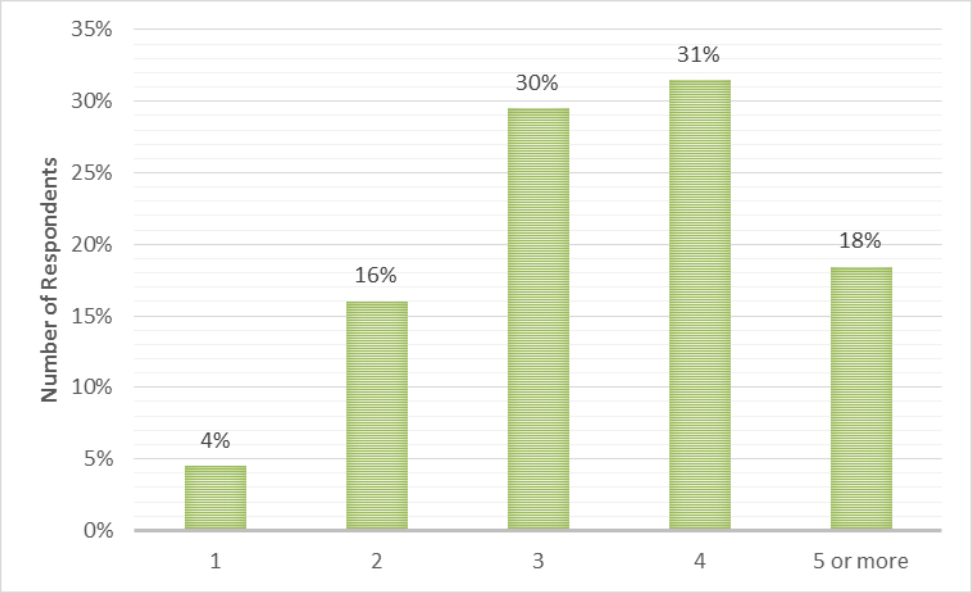
40. In 2015, the Government of Banda Aceh undertook household interviews and screen-line surveys to obtain updated information for use in subsequent urban transport studies and project preparations. The household surveys covered approximately 3,600 households and the screen-line surveys registered approximately 12,000 trips across 9 districts in Banda Aceh. This chapter summarises the information obtained from these surveys to enable a better appreciation of the current situation while considering the need for urban transport improvements generally. The data is that from the survey sample and does not represent an expansion to reflect a total city number. That task can be done during a later phase when the need for such a task is justified.

4.1 Demographics Analysis

4.1.1 Household Size

41. Based on the results of the household survey, approximately 20% of Banda Aceh households have one or two-person, 60% have three or four persons and the remaining 18% have five or more residents. Figure 4.1 shows this distribution graphically.

Figure 4.1: Household Size

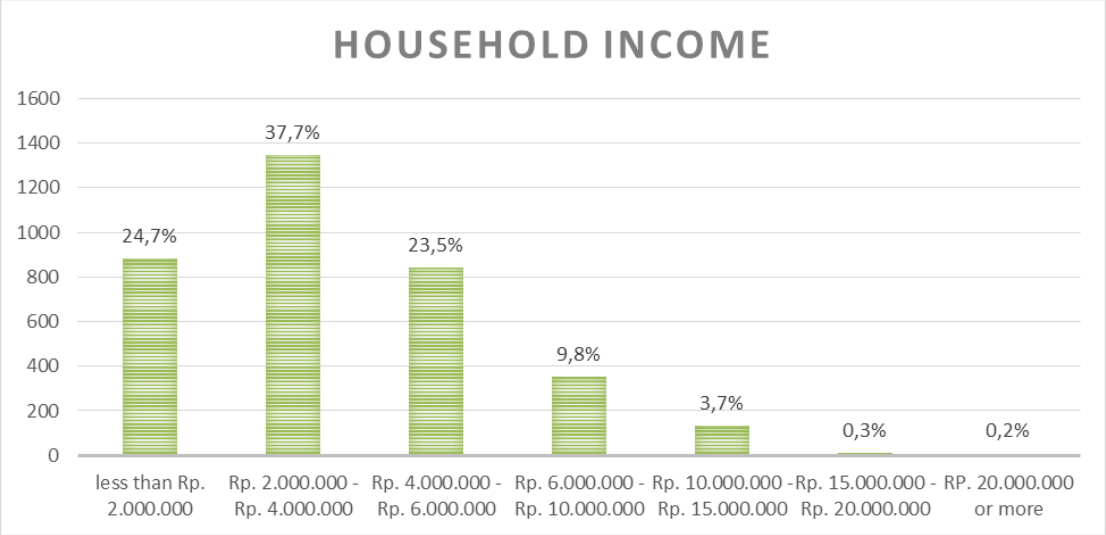


Source: Consultant

4.1.2 Household Income

42. Based on the results of the survey, the average monthly income of households in Banda Aceh is around IDR.4,100,000. As is shown in Figure 4.2, 38% of the sample households, have a monthly income of between IDR. 2,000,000 – IDR. 4,000,000. Only less than 5% of households have a monthly income more than IDR. 10,000,000.

Figure 4.2: Monthly Household Income

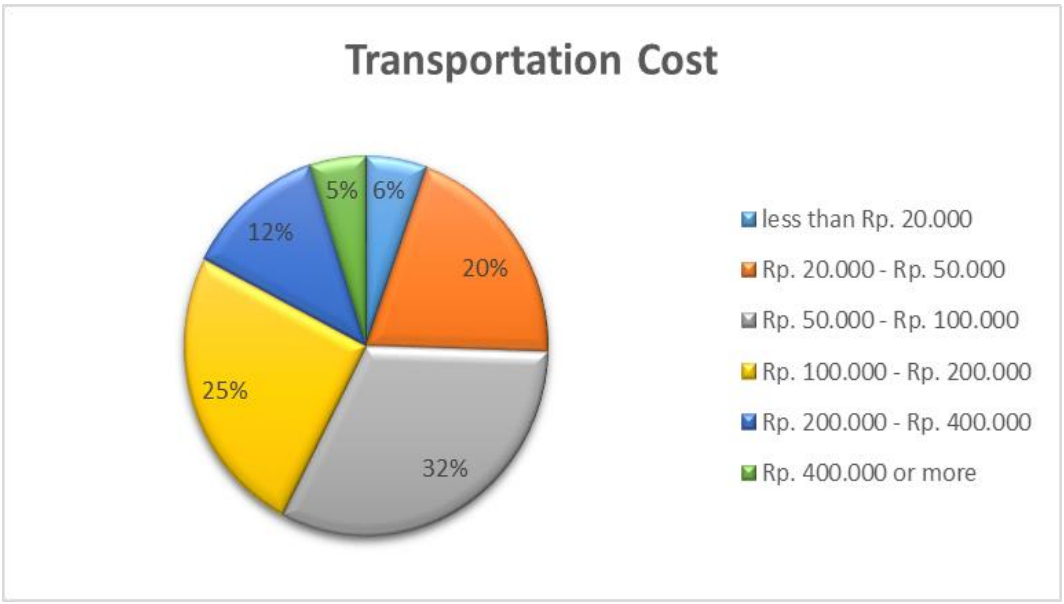


Source: Consultant

4.1.3 Cost of Transport per Household

43. The survey found that approximately 6% of households spent less than IDR. 20,000 on transportation per week. Most of households, 52%, spent between IDR. 50,000 – IDR. 100,000 for transportation in a week. Average households spending for transportation in a week is around IDR. 126,000. On the basis of an average of 22 days per month where commuting and other activities (shopping, social and recreation) are involved, this suggests an average daily cost of transport IDR 5,730.

Figure 4.3: Household Transport's Expenses per Week



Source: Consultant

44. For ongoing network planning and (potentially) fare setting policies in the future, it is important to understand the relationship between household income and transportation costs. Figure 4.4 below compares these and the following lists the key observations:

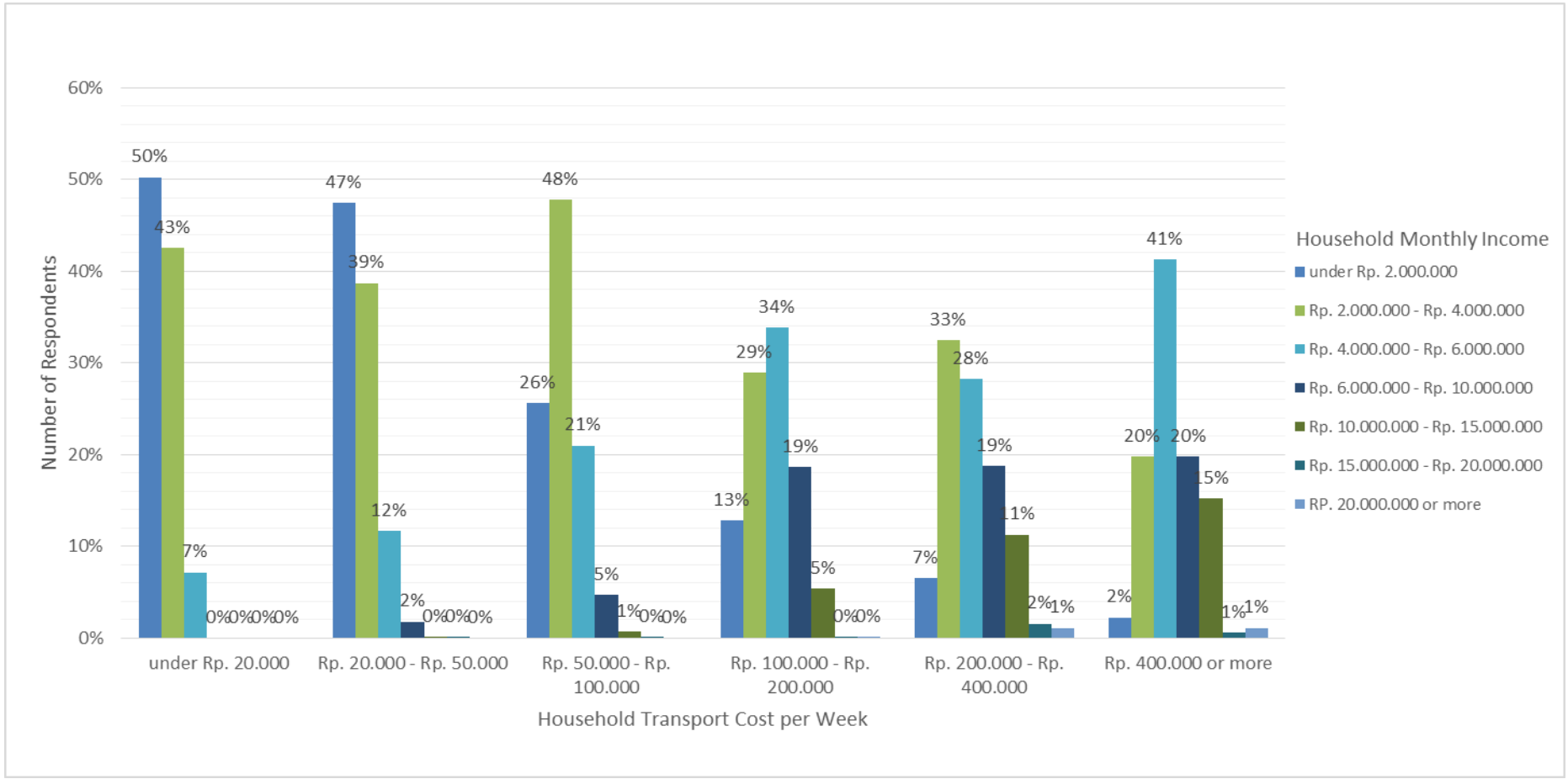
i. Households with an average income less IDR. 2,000,000 per-month, spent on average, IDR. 20,000 – IDR. 50,000 per week on transport.
ii. Households with an average income of IDR. 2,000,000 – IDR. 4,000,000 per-month, spent IDR. 50,000 – IDR. 100,000 per-week on transport.
iii. Households with an average income of IDR. 4,000,000 – IDR. 10,000,000 spent IDR. 100,000 – IDR. 200,000 per-week on transport and,
iv. Households with an average income more than IDR. 10,000,000 per-month, spent IDR. 200,000 or more per-week on transport.

45. The above observations are considered typical where with increasing income levels, increased expenditure on transport is incurred. This may be as a result of a move to private vehicle transport or/and more trips being made. In the context of this project and for Banda Aceh in the future, it is important to note that as income levels rise, the demand for urban mobility will increase.

46. It is aso important to appreciate that as this demand increases, the desire to travel by private transport will also increase[5]. In this respect, it does not automatically imply that as demand for urban mobility rises, so will the ridership of Labi-labi or Trans Koetaradja services. For this (increase public transport ridership) to occur, targeted push/pull policies will need to be enacted. Chapters 8 and 12 discuss this issue further.

[5] See: Reasons for Purchasing a Private Vehicle (car or motorcycle). Denpasar PFS Interim Report Volume I Figure 3.1

Figure 4.4: Transportation Cost Compare to Income



Source: Consultant

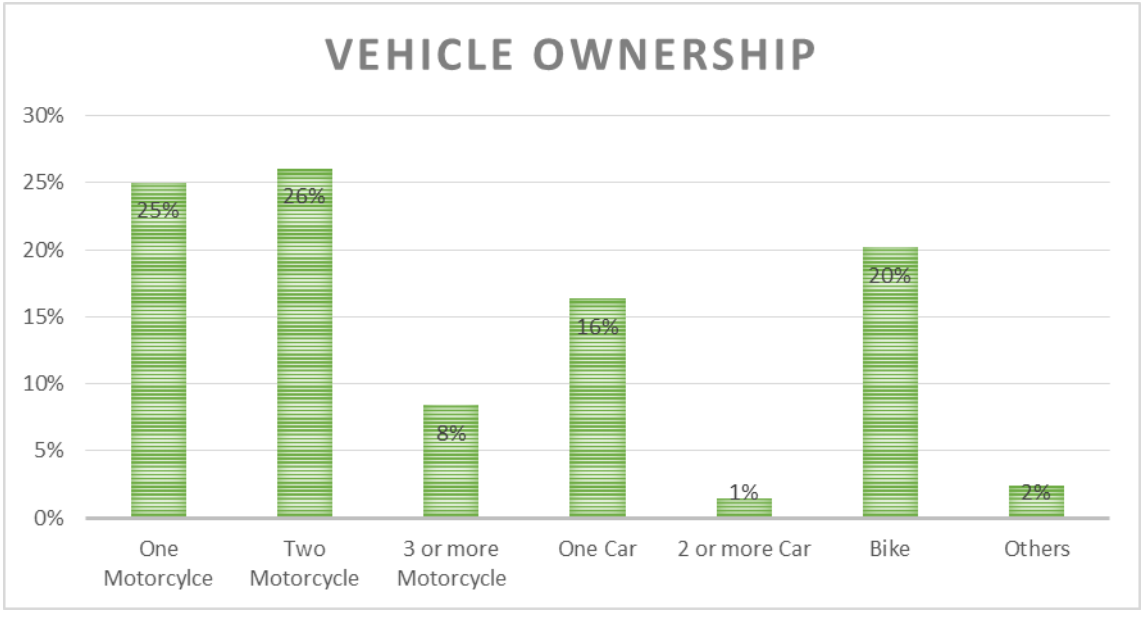
47. In addition, from the above information, it can be concluded that with an average monthly income per household in Banda Aceh of approximately IDR. 4,100, 000, an average monthly spending on transportation per household of approximately IDR. 126,000, and based on the fact that most households have more than 3 inhabitants/household, then on average, the average expenditure per person will be approximately IDR. 42,000/ week for transportation or around IDR. 6,000/day (7 days a week). This figure needs to be considered when considering the cost of ticketing price for any future improvements on public transport including BRT. Naturally, if there is a willingness to pay more for an improved system, then this figure will rise.

4.1.4 Vehicle Ownership

48. The vehicle ownership statistics, indicate that over 70% of all households own at least one vehicle. Approximately 60% of the households own one or more motorcycles and 17% of households own one or more cars for their transportation. This high level of ownership suggests an ongoing challenge for the public transport sector as, based on past experience, there is likely to be little appetite to switch back to public transport without serious push/pull policy positions being implemented in association with a complementary comprehensive community awareness campaign to help change current mindsets of the residents.

49. In support of the push/pull concept, approximately 20% of households own a bicycle, which (in the context of a non-motorised transport policy perspective) indicates a potential demand for bicycle service improvements in Banda Aceh.

Figure 4.5: Household Vehicle Ownership



Source: Consultant

50. Table 4.1 lists vehicle ownership by household income. It shows that nearly 75% of low-income households (income less than IDR. 2,000,000) own a motorcycle. In addition, the table shows an increase in vehicle ownership with increasing household income.

Table 4.1: Household Income Levels Compared with Vehicle Ownership

Vehicle Ownership	Household Income (million rupiah)						
	Under IDR. 2M	IDR. 2M - IDR. 4M	IDR. 4M - IDR. 6M	IDR. 6M - IDR. 10M	IDR. 10M - IDR. 15M	IDR. 15M - IDR. 20M	IDR. 20M or more
None	2%	2%	2%	1%	0%	0%	0%
Motorcycle	74%	67%	57%	49%	46%	43%	53%
Car	5%	14%	24%	32%	39%	39%	33%
Bike	14%	15%	17%	16%	14%	18%	13%
Others	6%	2%	1%	2%	1%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

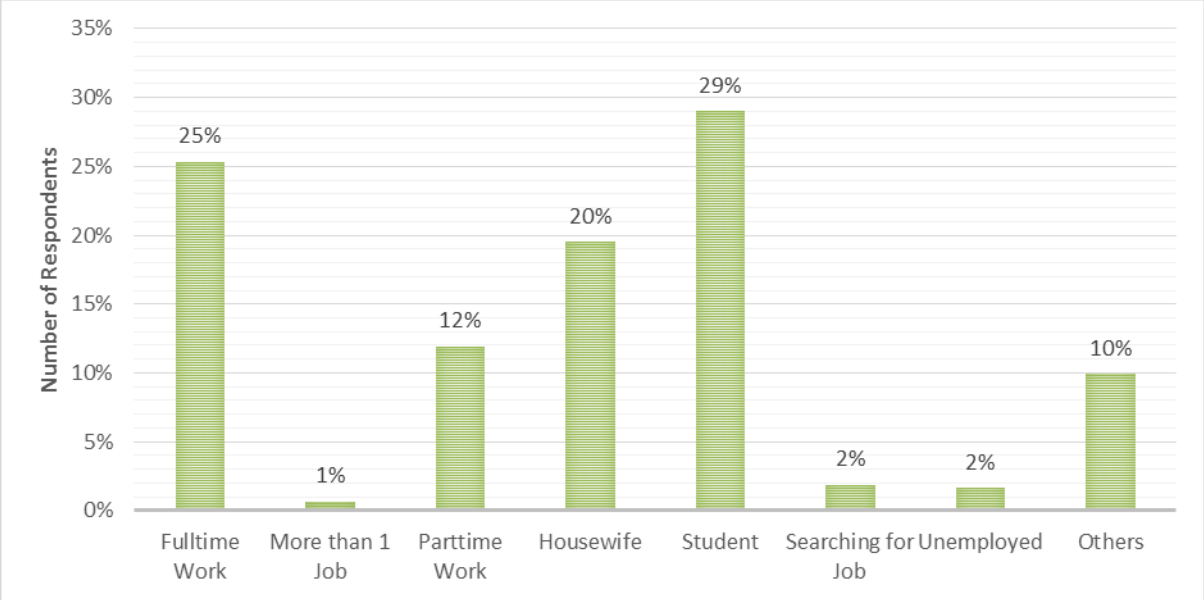
Source: Consultant

51. This direct relationship between vehicle ownership and household income suggests that as the economy develops and income levels rise, vehicle ownership levels will also rise. It is therefore a foregone conclusion that unless effective push/pull policies are implemented to manage the growing levels of congestion on the urban road network, Banda Aceh can expect to follow the trend of most other growing cities in Indonesia where traffic congestion is endemic and materially affecting the economic and health aspects of the residents of those cities. The push/pull policy concept and selected initiatives deemed necessary for Banda Aceh to deal with this is discussed further in Chapters 8 and 12 of this report.

4.1.5 Employment Status

52. The household survey revealed that 38% of household members are employed (full time work, more than on job, part time work). For those not employed, 20% were housewife, 29% were students, and another 14% advised they were unemployed (searching for a job, unemployed or other category)

Figure 4.6: Distribution of Employment Status



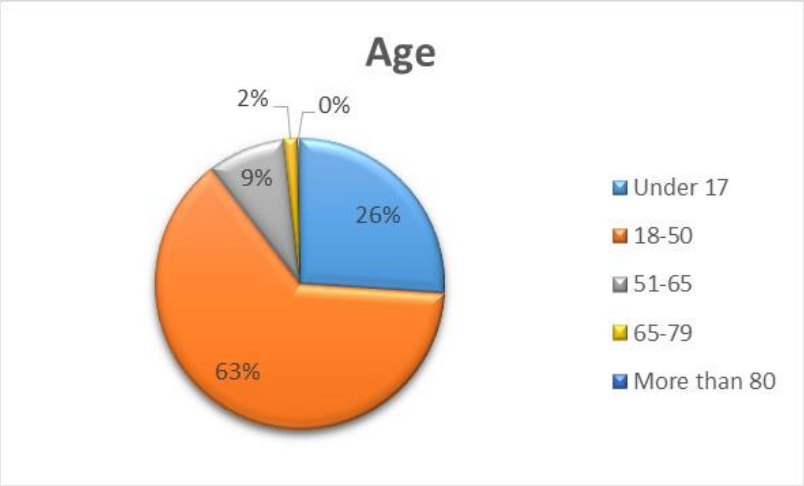
Source: Consultant

4.1.6 Age

53. Figure 4.7 below provides the distribution of household residents by age. The figure indicates that a majority of inhabitants in Banda Aceh are of an employable age of between 18-50 years old (about 63%). Younger inhabitants (under 17 years) are the second largest group (about 26%). Then, the rest about 11% of the inhabitants are older age (>50 years).

54. This simple breakdown by age provides an insight into how a push/pull community awareness program could be categorised into – for example:- (i) student awareness of the need for sustainable transport and the need to use (yet to be improved) public transport, (ii) the use of public transport to work to reduce congestion, arrive at work quicker and to reduce the inconvenience of searching for kerbside parking locations in crowded urban conditions.

Figure 4.7: Age Distribution of Respondents

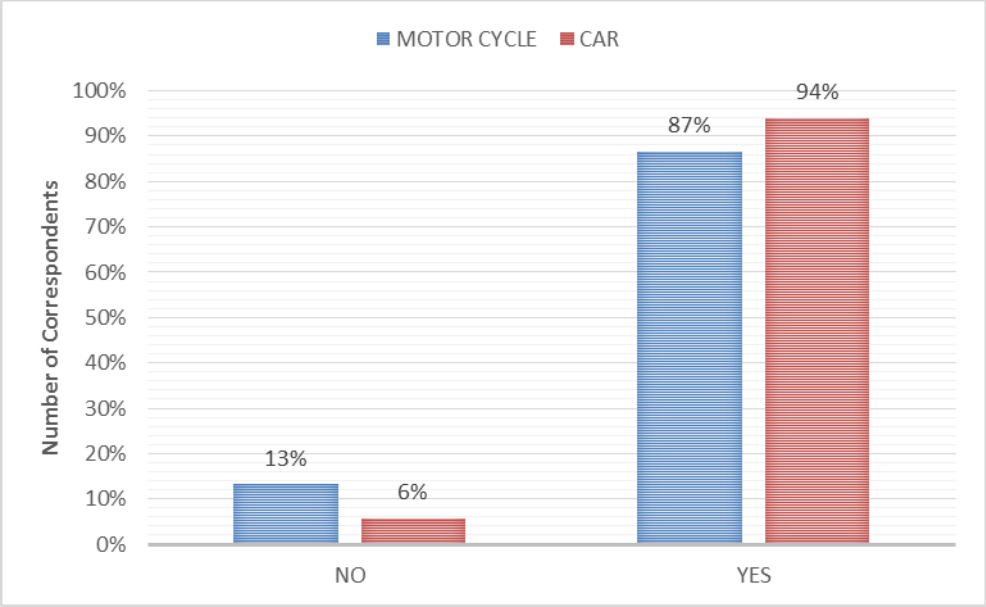


Source: Consultant

4.1.7 Driver's License Status

55. Figure 4.8 below shows the distribution of riders (cars and motorcycles riders) by possession of a valid driver's license. The figure indicates that nearly 87% of motorcycle's drivers and 94% of car's drivers have a valid driver's license. This means that 13% of motorcycle's drivers and 6% of car's drivers are driving illegally. This is a matter upon which Government may wish to address as part of a push/pull policy.

Figure 4.8: Driver's License by Vehicle Ownership

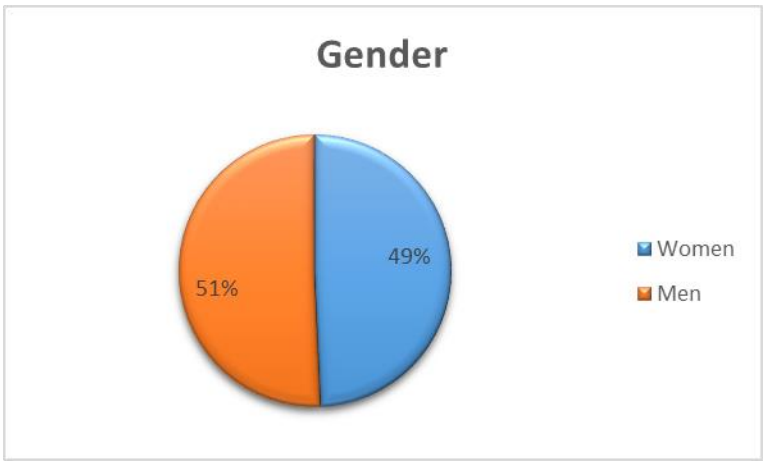


Source: Consultant

4.1.8 Gender Ratio

56. For the record, Figure 4.9 below shows the distribution of household respondents by gender in Banda Aceh. The sample indicates the male and female ratio is almost equal in Banda Aceh.

Figure 4.9: Gender Ratio



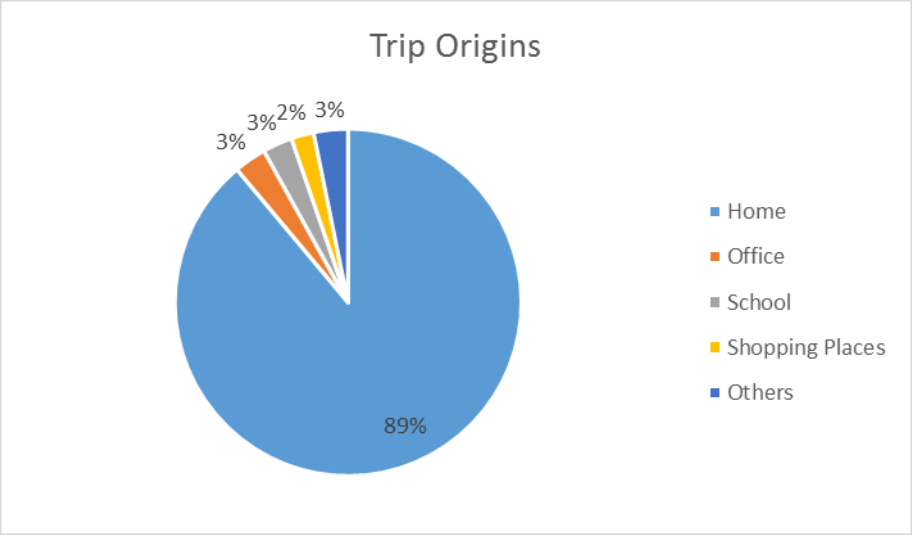
Source: Consultant

4.2 Travel Characteristics

4.2.1 Trip Origins

57. The distribution of trip origins indicate that the most common trip origins are from the home (approximately 89%).

Figure 4.10: Distribution of Trip Origins

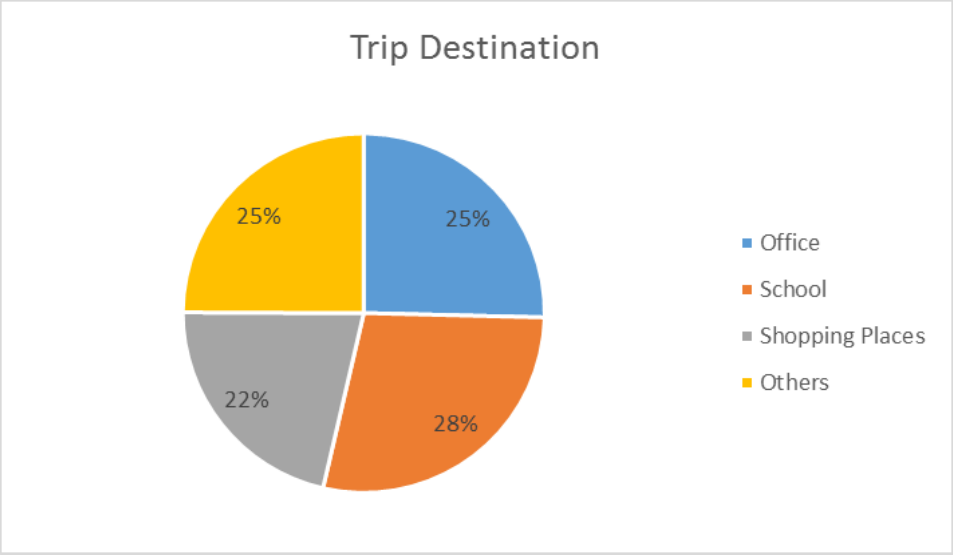


Source: Consultant

4.2.2 Trip Destinations

58. The distribution of riders (motorcycle and car drivers) by trip destination indicates that the most common trip destinations are school, office and shopping places. About 25% of the trip destination fall in the other category that include hospital, praying places and also the sports arena.

Figure 4.11: Distribution of Trip Destinations



Source: Consultant

59. Figure 4.11 above shows that over 50% of trips made by motorcycle and car driver are going to the office and school and 22% are for shopping. The future public transport improvement needs to accommodate these type of trips. In the case of Banda Aceh, Trans Koetaradja corridor 1 operates from Keudah in the CBD area, then via Jl. Tengku Nyak Arief which services offices and schools and finally to Kopelma Darussalam where the University area is located. In this context, this corridor services a range of important trip destinations.

4.2.3 Trip Purpose

60. Trip purpose is an important aspect of the travel demand market characteristics when planning urban transit systems. For this reason, the following comments are presented for future reference as Banda Aceh continues to plan for ongoing network improvements.

61. One way of defining trip purpose is based on the combined origin and destination of trips. In particular, trips defined by origin and destination can be classified into (1) Home-based Work trips (2) Home-based University Trips (3) Home-based Non-Work Trips (4) Non Home-Based Work trips, and (5) Non home-based Other trips. For the purposes of this study, the most relevant trips identified from the survey are listed in Table 4.2 and illustrated in Figure 4.12 below.

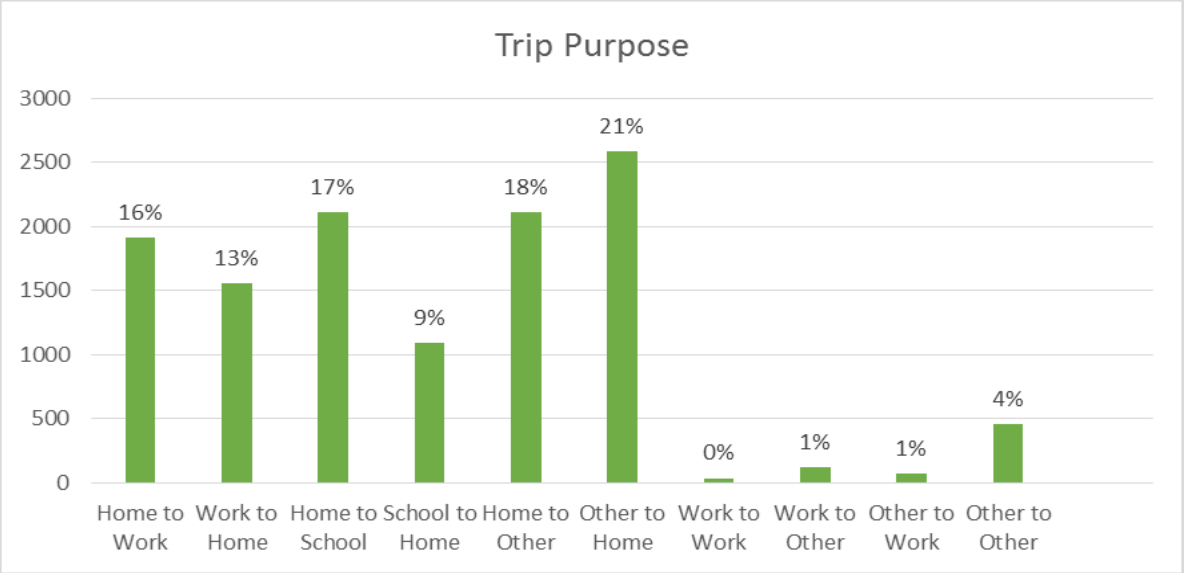
Table 4.2: Distribution of Trip Purpose

Trip Purpose		Total	
		Average Weekday Ridership	Percent
Home-based Work Trips	Home to Work	1914	16%
	Work to Home	1555	13%
Home-based School Trips	Home to School	2110	17%
	School to Home	1092	9%
Home-based Other Trips	Home to Other	2113	18%
	Other to Home	2586	21%
Non Home-based Work Trips	Work to Work	37	0%
	Work to Other	121	1%
	Other to Work	73	1%
Non Home-based Other Trips	Other to Other	461	4%
Total		**12062**	**100%**

Source: Consultant

62, The data in Table 4.2 shows 94% of survey respondents make home based trips. On a trip purpose basis, 29% are for work, 26% are for school and 39% are for other trip purposes. These will be important segments of the travel market to consider when planning for the future improvements in the public transport network.

Figure 4.12: Distribution of Trip Purpose



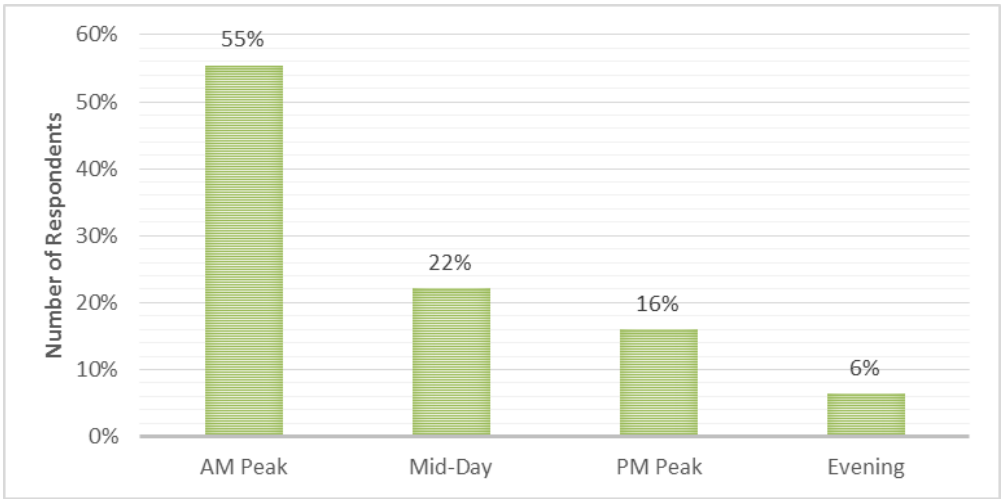
Source: Consultant

63. In addition, as most (94%) of the trips start and finish from home, it will be important to ensure that ultimately the future public transport network improvements focus on linking the residential areas with employment, education and retailing precincts. In this context, the BRT Direct Service concept has specific relevance as it goes beyond the BRT corridor to service residential areas and links them back to the above mentioned land uses. This is discussed further in the next chapter.

4.2.4 Time of Day

64. The distribution of trips by time of day indicates that the majority (55%), are made in the morning or AM peak, while about 22% make their trip during mid-day. The remaining households make their trips during PM peak period (16%) and evening (6%).

Figure 4.13: Distribution by Time of Day



Source: Consultant

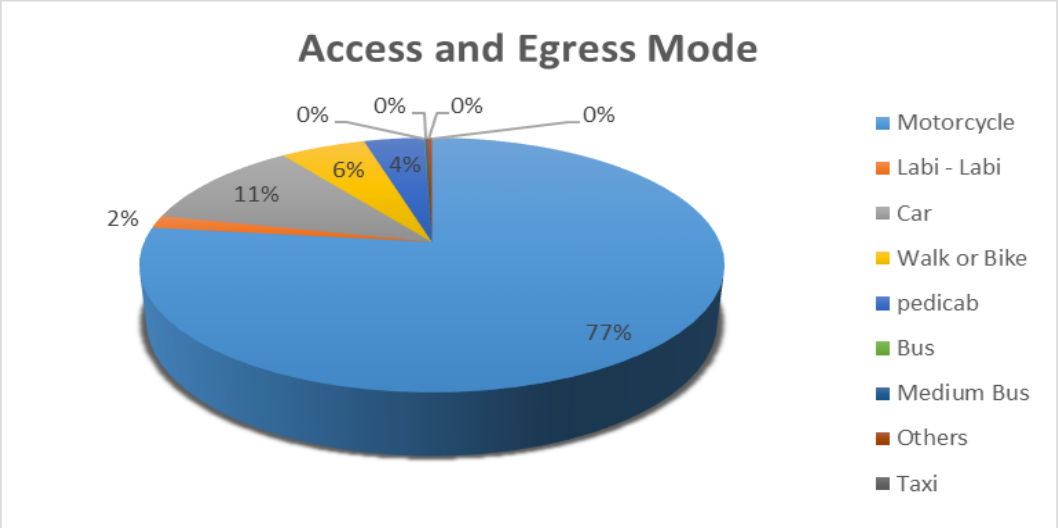
65. Most trips made in the AM peak period (6:00-9:00) are to the work office or school. As shops in Banda Aceh normally open after 10:00 am, shopping trips will be made from late morning (11:00am-2:00pm) for shopping and lunch purposes. Most of the schools also finish around this time while office closures correspond with the PM-Peak period (4:00pm-7:00pm).

66. It is to be noted that AM and PM peak trip figures are very different. This is because the school time, while commencing during the AM peak period, finishes before 2:00pm. The extent of the variation between the peak periods shows that students have a significant contribution to the trips pattern in Banda Aceh.

4.2.5 Mode of Travel

67. Figure 4.14 below presents the mode used for the survey respondents travel. Motorcycle is the most dominant mode, accounting for approximately 77% of all trips. In the context of the future capacity of an improved public transport network to capture some of this motorcycle market, it will be a significant challenge due to (i) the door to door convenience of the motorcycle, (ii) the ability of motorcycles to avoid being stuck in traffic congestion, (iii) the current mindset of “travel independence” this mode offers to the user. For these reasons, the need for effective push/pull policies will be required for public transport to make a discernible impact on the traffic and urban mobility of Banda Aceh. These aspects are discussed in subsequent chapters.

Figure 4.14: Current Mode Used



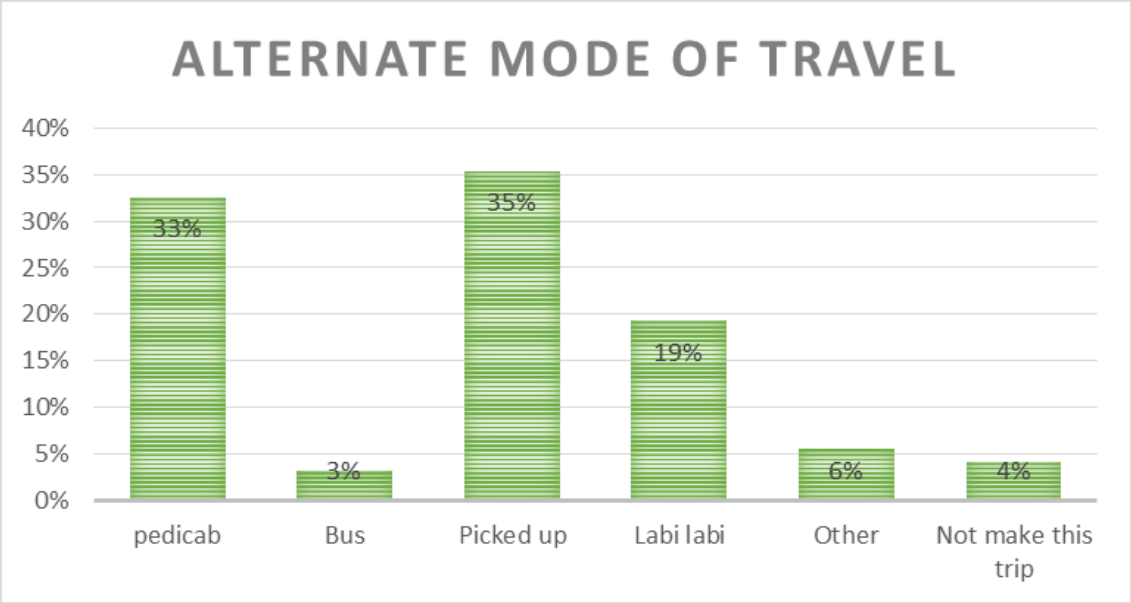
Source: Consultant

4.2.6 Alternate Travel Arrangements

68. The survey asked respondents on their alternative travel arrangements in the event that they were not able to drive a car or motorcycle. This was to help ascertain (amongst other matters) the likelihood of public transport being the first alternative choice for the trip. The results in Figure 4.15 below show that of respondents who did not have access (as a driver) to make a one-way trip, 35% will travel as a private vehicle passenger with someone else driving. Furthermore, the survey revealed that 21% will choose to use public transport, bus or labi-labi, approximately 33% will use pedicab to make this trip, 6% will choose another mode and 4% of respondents said they would not make this trip. From the Figure

4.15 below, it shows that in the absence of a private vehicle and if conditions of public transport remain the same, only 21% of the respondents will use public transport.

Figure 4.15: Alternate Travel Arrangements



Source: Consultant

4.3 Household Travel Characteristics and Modes Used

69. This section compares the demographics of Banda Aceh household across the mode types. The demographics include household size, household income, vehicle ownership, vehicle availability, employment status, age, and valid driver's license status. The purpose of this is to help further appreciate the relationship between the range of factors when considering improvements to the public transport network going forward.

4.3.1 Household Surveys (O-D) - Demographics

a. Household Size

70. This table below lists the household size against mode choice. Four or more person households dominated in all mode alternatives. This implies that to be successful, future public transport improvement needs to be family friendly. The implications of this in respect of public transport are that stations/stops need to be conveniently located, accessible and the quality of both fleet and service levels need to be good.

Table 4.3: Household Size by Service Type

Household Size	Percent							
	Pedi Cab	Bus	School Bus	Walking	Labi labi	Others	Car	Motorcycle
1	6%	0%	0%	6%	5%	10%	2%	5%
2	17%	0%	33%	19%	23%	30%	9%	16%
3	22%	20%	0%	24%	27%	20%	22%	29%
4 or more	55%	80%	67%	51%	45%	40%	67%	50%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Consultant

b. Household Income

71. Table 4.4 below presents the distribution of household income by mode. The table indicates that households (ie families) which have a combined monthly income under IDR. 2,000,000 usually take public transportation such as pedi cab, bus, school bus, labi labi or others and walking. As income levels increase, there is a noticeable reduction in the use of public transport and demonstrates the impact of the rapid rise in private vehicle ownership once the IDR10 million per month income level is reached. This is nothing new in the Indonesian context and it reinforces the fact that unless targeted push/pull policies are implemented and maintained, the future market for public transport will continue to decline.

Table 4.4: Household Income by Mode Used

Household Size	Percent							
	Pedi Cab	Bus	School Bus	Walking	Labi Labi	Others	Car	Motorcycle
Under IDR. 2.000.000	51%	40%	33%	48%	59%	50%	2%	28%
IDR. 2.000.000 - IDR. 4.000.000	34%	20%	33%	38%	23%	20%	23%	42%
IDR. 4.000.000 - IDR. 6.000.000	12%	20%	33%	6%	14%	30%	35%	22%
IDR. 6.000.000 - IDR. 10.000.000	3%	20%	0%	7%	5%	0%	24%	7%
IDR. 10.000.000 - IDR. 15.000.000	0%	0%	0%	1%	0%	0%	14%	1%
IDR. 15.000.000 - IDR. 20.000.000	0%	0%	0%	0%	0%	0%	1%	0%
IDR. 20.000.000 or more	0%	0%	0%	0%	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Consultant

c. Vehicle Ownership

72. Table 4.5 below lists the distribution of household vehicle ownership by mode. In this survey, some of households of Banda Aceh own more than one vehicle types. Households which have a motorcycle maybe also have car and bicycle. From the survey, even though having a car available, some respondents still chose to use public transport. However, care must be taken when examining this data as for those households with more than one vehicle may also have students or other non-licensed members of the family who will use public transport, even on an intermittent basis.

Table 4.5: Household Vehicle Ownership by Mode Used

Vehicle Ownership	Percent							
	Pedi Cab	Bus	School Bus	Walking	Labi - labi	Others	Car	Motorcycle
None	2%	0%	0%	4%	1%	0%	0%	0%
One Motorcycle	36%	6%	0%	30%	2%	2%	14%	32%
Two Motorcycle	12%	6%	33%	26%	1%	1%	15%	35%
Three or more motorcycle	4%	6%	0%	10%	0%	0%	6%	11%
One Car	5%	76%	67%	1%	87%	89%	48%	0%
Two or more car	0%	6%	0%	0%	9%	6%	4%	0%
Bike Cycle	9%	0%	0%	21%	1%	1%	11%	20%
Others	33%	0%	0%	9%	0%	1%	1%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Consultant

d. Employment Status

73. Based on the survey, the employment status distribution of public transport users and those using others mode is significantly different. Respondents which are full time workers generally use bus and private car for commuting. It is to be noted that the reference to the bus mode here is not referring to a public transportation bus but a bus that has been provided by the company for which the respondent works. Table 4.6 shows that those "not-employed" (mostly students) respondents generally use school bus, walk or travel by Labi-labi.

Table 4.6: Employment Status by Service Type

Employment Status	Percent							
	Pedi Cab	Bus	School Bus	Walking	Labi Labi	Others	Car	Motorcycle
Employed Full-time	33%	100%	0%	7%	13%	32%	65%	36%
Employed Part-time	17%	0%	14%	9%	7%	14%	19%	17%
Not Employed, Not Retired	48%	0%	86%	80%	78%	54%	15%	46%
Retired	2%	0%	0%	3%	2%	0%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Consultant

e. Age

74, Table 4.7 below provides a summary of the age profile of different modes used by respondents. As can be expected, the table shows that those under 17 years old (ie students) will usually take the school bus or walk. Other than this age bracket, the 25-54 years old population dominate almost all of vehicle types – that is, there is no significant preference for one mode over the other for this demographic.

Table 4.7: Age by Mode Type

Age	Percent							
	Pedi Cab	Bus	School Bus	Walking	Labi Labi	Others	Car	Motorcycle
17 years and under	6%	0%	38%	20%	16%	14%	2%	10%
18-24 years	7%	0%	31%	11%	15%	14%	3%	19%
25-54 years	71%	80%	25%	57%	61%	61%	80%	65%
55-64 years	12%	0%	0%	8%	5%	11%	12%	5%
65+ years	4%	20%	6%	5%	2%	0%	2%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Consultant

f. Gender

75. Table 4.8 below provides information about gender by service type for ongoing planning purposes. Based on the survey, females dominate the public transport modes such as school bus, Labi-labi, Pedi Cab or walk. A greater proportion of males are found to be using car or motorcycle than females. This might because more males have direct access to motorised vehicles than females. Frequent observations of underage male motorcycle drivers would seem to validate this assumption. From an ongoing gender equality perspective, and based on the dominance of the public transport market by females, in the future ongoing improvements to the public transport network, including BRT, will help women to have a more comfortable, easier to access and safer travel experience.

Table 4.8: Mode Used by Gender

Gender	Percent							
	Pedi Cab	Bus	School Bus	Walking	Labi Labi	Others	Car	Motorcycle
Men	42%	100%	50%	29%	21%	61%	76%	57%
Women	58%	0%	50%	71%	79%	39%	24%	43%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Consultant

4.3.2 Time of Travel

76. This aspect of the travel market is included due to the dominance of vehicular travel in the AM peak period compared to the PM peak. The reason for this variation has been discussed earlier.

77. In accordance with Figure 4.13 below, most of trips were undertaken in the AM peak period. With school finishing before 2.00pm, the volume of trip making declines significantly during the early afternoon period. In addition, as public transport services generally finish at 6.00pm, trip making after this time reduces significantly.

Table 4.9: Distribution of Time of Day by Service Type

Time	Percent							
	Pedi cab	Bus	School Bus	Walking	Labi Labi	Others	Car	Motorcycle
AM Peak	43%	33%	70%	46%	46%	44%	45%	46%
Mid	36%	33%	25%	36%	41%	32%	17%	22%
PM Peak	18%	17%	5%	14%	13%	20%	31%	25%
Evening	3%	17%	0%	3%	0%	4%	6%	6%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

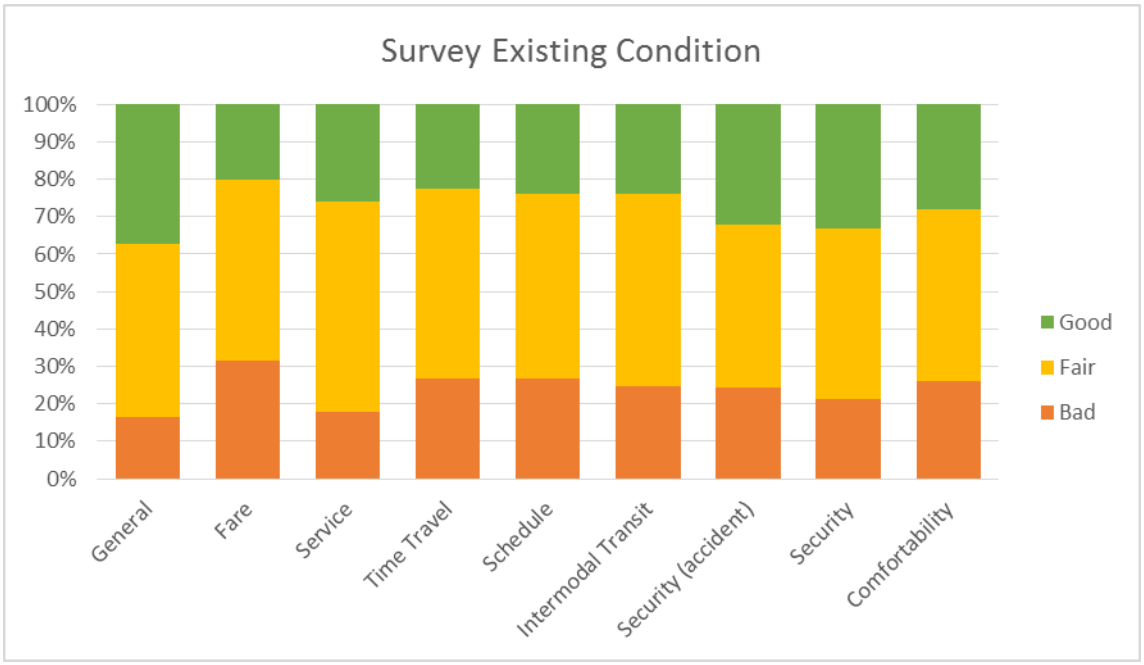
Source: Consultant

4.3.3 Public Assessment of Existing Conditions

78. Residents were asked their views on a range of aspects of the existing public transport conditions. The purpose of this is provide an indication of what areas of improvement need to be targeted should improvements to the public transport sector be

contemplated. Figure 4.16 below summarises the results of this aspect of the survey and indicates areas where improvements are best able to capture the ongoing support of the existing travel market in the future.

Figure 4.16: Public Assessment of Existing Public Transport Conditions

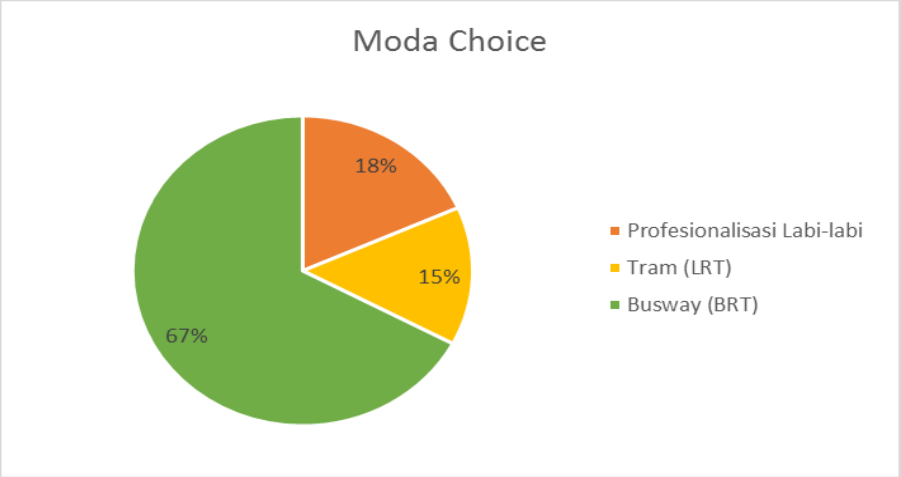


Source: Consultant

79. From the data provided by Banda Aceh government, there has been a significant decrease in passenger demand for public transport in recent years. This has resulted in a decline in the number of Labi-labi in operation from a registered fleet 1,000 in the year 2000 to only 352 today. The public assessment of the existing conditions of using Labi-labi in Figure 4.16 above, clearly illustrates the reasons behind this decline in demand.

80. When asked to make a choice between the three mode improvement options of professionalising the labi-labi subsector, (ii) introducing a Light Rail system or (ii) implementing a BRT system, two out of three responded in favour of a BRT. Figure 4.17 shows this and reinforces the relevance of the proposed BRT as part of the current project.

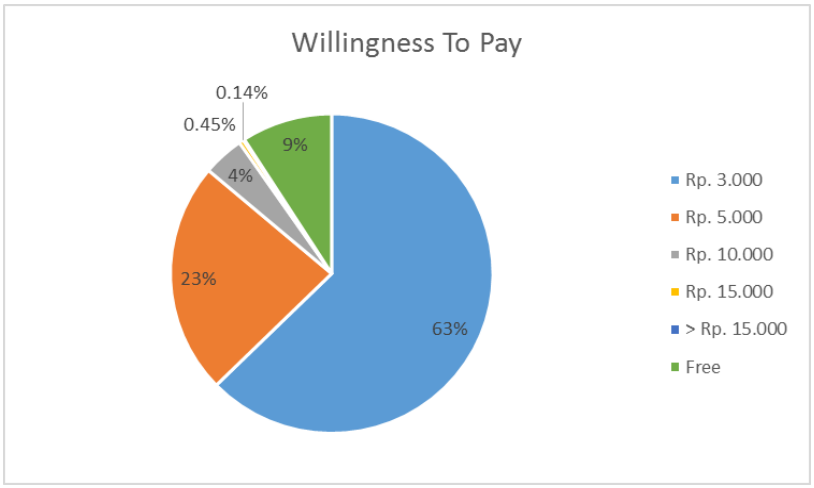
Figure 4.17: Mode Choice



Source: Consultant

81. When asked about the willingness to pay for improvements to the existing public transport system, approximately 63% indicated they were willing to pay IDR 3,000. Figure 4.18 below shows this. This is below the existing ticket for Labi-labi which is around IDR 4,000 for short distance trip. 9% of residents want free ticket for public transport, therefore, around 28% residents are willing to pay around IDR 5,000 or more.

Figure 4.18: Willingness to Pay

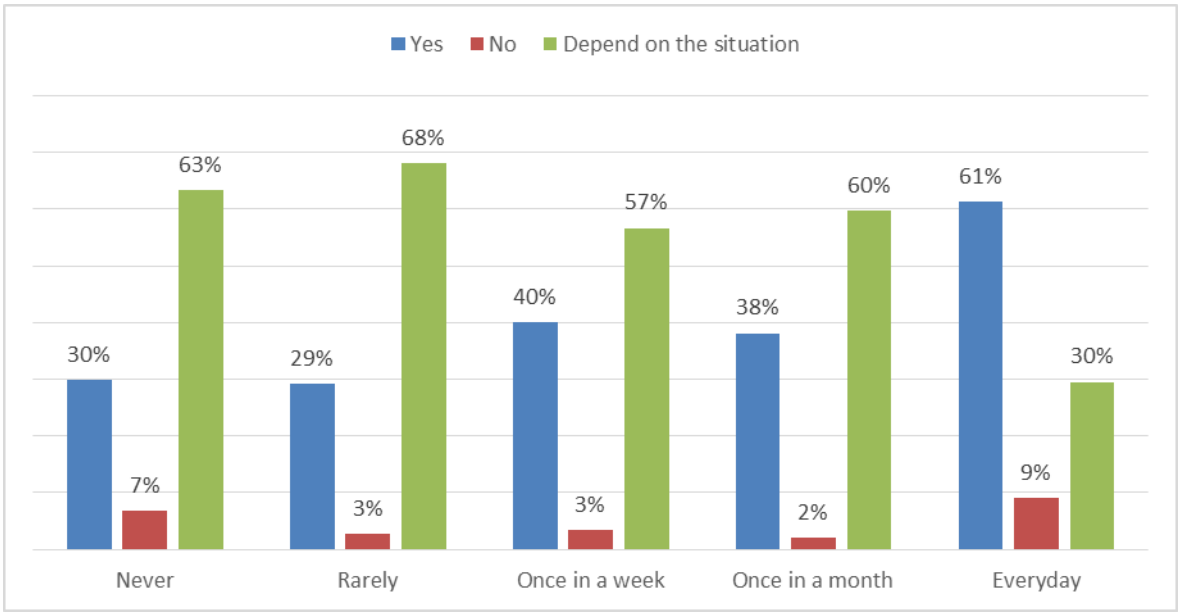


Source: Consultant

82. Although most of the residents are willing to pay IDR 3,000 per trip for public transport, however from the survey, most of them do not want the free ticket. The existing public transport improvement that provided by the government is TransKoetaradja, eventhough its free but the ridership is still low. The residents might have a perception that the improvement of public transport will be the same as what government have provided currently. With more than 28% of respondent agree to pay more that IDR 5,000, the ticket price for public transport improvement such as BRT Direct Service could be increse that the existing Labi-labi ticket, the ticket could be IDR5000 or more if the system can offer better services.

83. The survey asked residents whether they would be willing to use the BRT if it were to be introduced. The choice options offered was a “yes”, “no” or “maybe….depending on the circumstances/situation at the time”. The response to these choice options was cross tabulated against whether the respondent currently used public transport and how frequently. Figure 4.19 below shows the results of this analysis. Significantly, for those who never use public transport to those who do use public transport rarely or even as frequently as once a week, there was an appetite to use the new system. For some, there was a level of uncertainty but still, there was a level of commitment with well over half indicating that it would depend on the situation at the time. By contrast, generally less than 1 in 20 of this group of respondents indicated that they would not use the new system.

Figure 4.19: Willingness to Use New Public Transport System



Source: Consultant

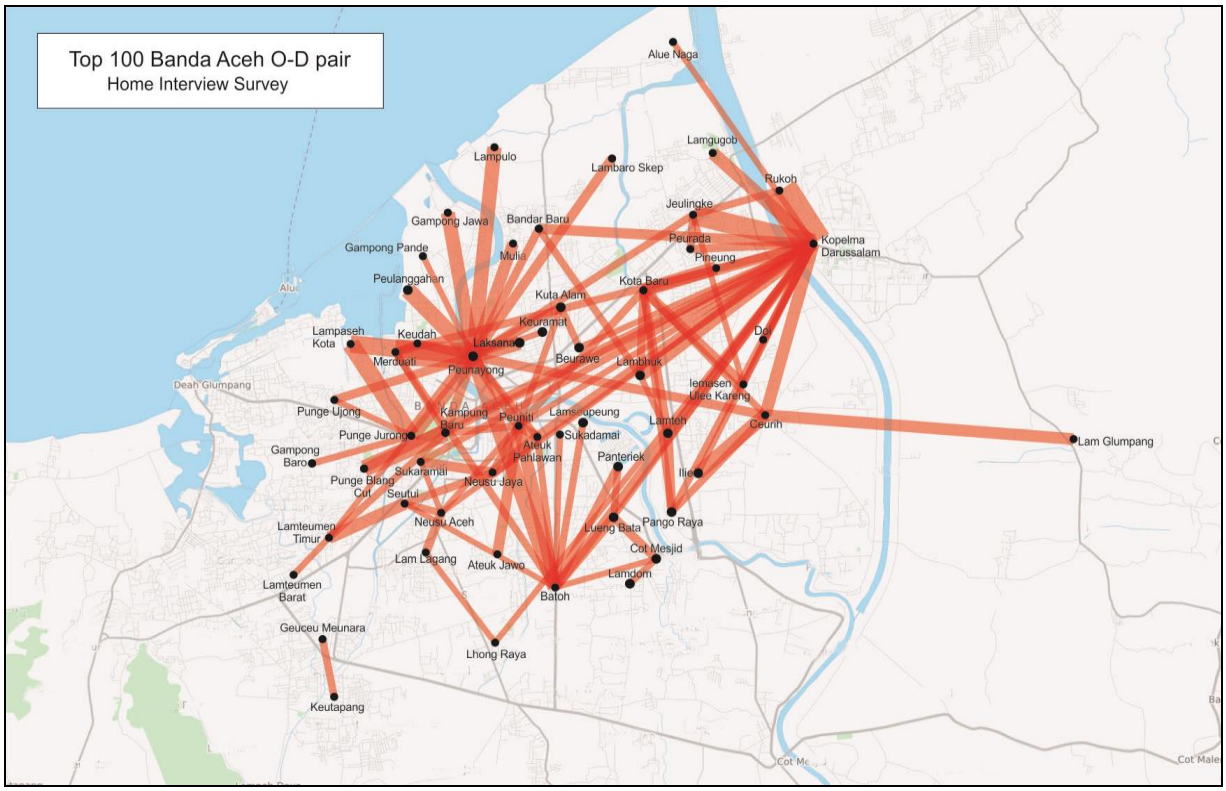
84. For those respondents who are/were regular users of the existing public transport services, there was an overwhelming appetite to use a new system if it was to be introduced. Moreover, within this segment of respondents, a further 30% suggested there may be a support for the new system but it would ultimately depend on the circumstances at the time. Interestingly, it was this category of user which recorded the highest “NO” response of all categories of users. This may be a reflection that there is a level of loyalty to existing service being used or (most likely), the respondent who is currently dependent on the existing system is so disappointed that there is no willingness to respond positively to any matter regarding public transport in the future. This assumption is based upon site visits where Labi-labi load factors are so low and the level of amenity for passengers using the mode is sufficient for passengers to have no loyalty for the public transport mode at all. In this case, it can potentially be assumed that they are waiting for the day that they become independent by owing a motorcycle or a car.

4.4 Travel Patterns – Origin and Destination data

4.4.1. Home Interview Survey

85. The home interview survey captured the trip origins and destinations of all trips made by the household residents. This Origin and Destination data has been extracted from 9 districts in Banda Aceh. It has been summarised into the most significant O-D and is shown in Figure 4.20. It shows the dominance of three principal districts of Kopelma Darussalam, Peunayong and Batoh, all of which can ultimately be served by a well-planned direct service BRT Corridor 1 system.

Figure 4.20: Desire Lines of 100 Largest O-D Pairs

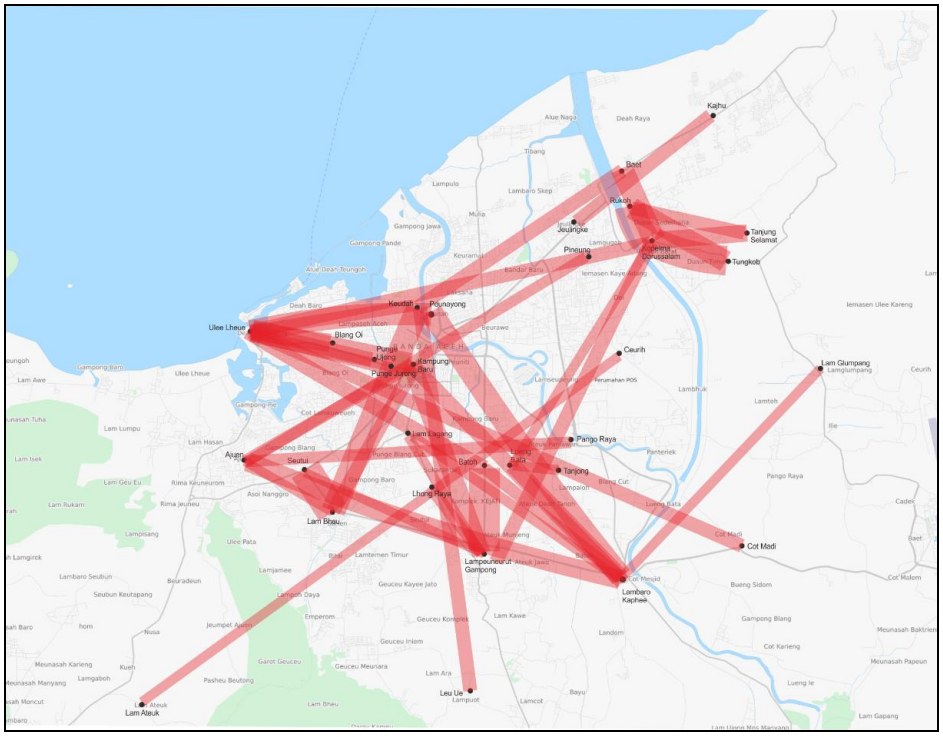


Source: Consultant

4.4.2. Screen-line Survey

86. An Origin and Destination screening survey was undertaken at 10 survey locations at the outer areas of Banda Aceh. The purpose of the surveys was to record the trips from/to Banda Aceh. The survey was conducted from 6.00am to 7.00pm on a working weekday and Figure 4.21 below shows the 50 largest O-D pairs compiled from this screenline survey. The figure shows the highest trip generation sources from outer Banda Aceh are from Ulee Lheu, Ajuen, Lampeunereut Gampong and Lambaro Kaphee. The city CBD area, Peunayong and Keudah are the highest trip destinations locations. Significantly, the eastern section of Banda Aceh which contains the area between Kopelma Darusssalam and Baet is also included in the top 50 O-D pairs but with a shorter trip distance.

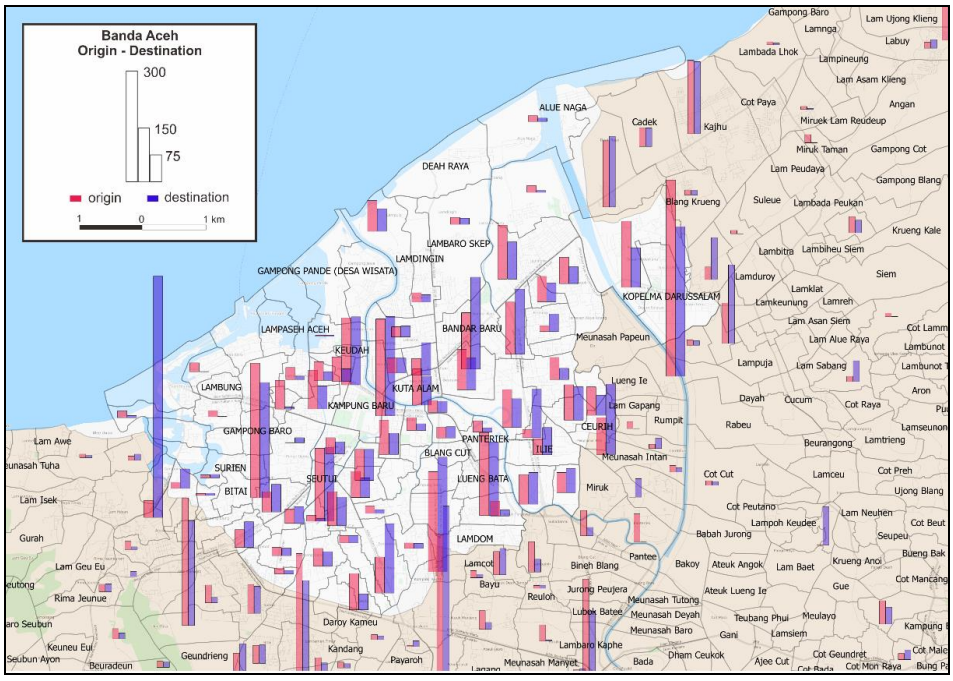
Figure 4.21: Trip Generation and Attraction Points



Source: Consultant

87. Figure 4.22 shows the data on a trip generation and trip attraction basis by specific area within Banda Aceh. It reinforces the message created by Figure 4.21 that for specific areas, trip origins and destinations are concentrated (rather than dispersed equally across the urban footprint). This provides a good environment for public transport to be a major player in servicing these trip needs.

Figure 4.22: Trip Generation and Attraction Points



Source: Consultant

4.5 Conclusions

88. From the above observations, it is readily apparent that there is a lot of highly relevant baseline data available from the survey and that it will be of great value to Banda Aceh when planning for network improvements and determining the effectiveness of future push/pull policies. For the purposes of this study, the most relevant conclusions to be drawn from the discussion in this chapter are:

i. Average household spending on transport per week is approximately IDR126,000. Based on the fact that most households have more than 3 inhabitante/household, then the average, weekly expenditure will IDR 42,000 or approximately IDR6,000 per person per day. This will be an important figure to consider when determining fare levels for the improvements in the network.

ii. The survey recorded approximately 70% of all households owning at least one vehicle. Furthermore, the motorcycle is used for approximately 77% of all trips. This suggests an ongoing challenge to capture a reasonable market share for new public transport network improvements. It underscores the need for complementary push/pull policies to be implemented and complied with.

iii. With this high level of private vehicle ownership, the survey recorded an alarming high figure of illegal drivers with 13% of motorcycle drivers and 6% of car drivers not having a valid drivers license. This is a matter which POLDA may wish to address.

iv. The fact that some 20% of households also own a bicycle, suggests there is a need for NMT facilities to be part of the network improvements.

v. From a potential public transport market perspective, 38% of household members are employed and therefore commute every day and 29% of household members travel to school each day. These should be the target for network improvement plans.

vi. The survey has shown that as household income levels rise, there is a noticeable reduction in the use of public transport and demonstrates the impact of the rising levels of private vehicle ownership. This will present an ongoing challenge for Government as it addresses the traffic congestion consequences this trend generates. In this context it will need to develop and implement the correct push/pull policies as complementary measures to any public transport network improvement investments if such investments are to yield success.

vii. The survey found that generally, responsents were not impressed with the corrent public transport conditions. In this respect, over half of respondents indicated a willingness to pay IDR 3,000 or more over that currently being paid for an improved system. This speaks volumes for the desire for overall improvements to be made.

89. In summing up, from the survey concerning a willingness to shift to public transport, it can be concluded that there is a significant appetite to do so, providing there are real improvements in the system. In the context of the current project, the BRT project (as part of the overall reform of public transport in Banda Aceh) is a most relevant option to capitalise on this opportunity.

5. EXISTING PUBLIC TRANSPORT NETWORK DATA

90. In addition to the household interview survey undertaken by the Government of Banda Aceh, the study team organised additional surveys September 2016. The main objective of these surveys was to capture existing conditions of public transport, general traffic and related infrastructure in Banda Aceh for use as a baseline data to help in the development of improvements to the public transport system.

5.1 Data Collection Surveys

91. The surveys as listed in Table 5.1 were conducted on September 2016 to collect data on the field. All of the surveys were conducted in the am and pm peak hour. Boarding and alighting data was obtained by tracking passengers along the route from inside the vehicle (Labi-labi and Trans Koetaradja) using the Global Positioning System (GPS) method.

Table 5.1: Type of Surveys Conducted

Type of Survey	Activities
Public Transport	Route Mapping
	Boarding and Alighting (on-Board)
	Peak Hour Bus Frequency and Occupancy
	Public Transport Travel Speed
General Traffic	Volume Link Counts
	Car Travel Speed
Geometry	Road Right of Way cross section

Source: Consultant

92. The volume link count was recorded in two main locations, in front of the Governor's office on Jalan Tengku Nyak Arief and in the city center. The travel speed for general traffic and public transport vehicles were tracked inside the vehicle using the Global Positioning System (GPS). Right of way (ROW) measurements were only measured at those locations which represented the typical the road ROW width and conditions along the proposed BRT corridor.

5.2 Public Transport Data

5.2.1. Public Transport Routes

93. The team was able to map 10 Labi-labi routes and 1 Trans Koetaradja in Banda Aceh. All of these routes commence from Keudah bus terminal at city center and cover main roads and residential area in Banda Aceh.

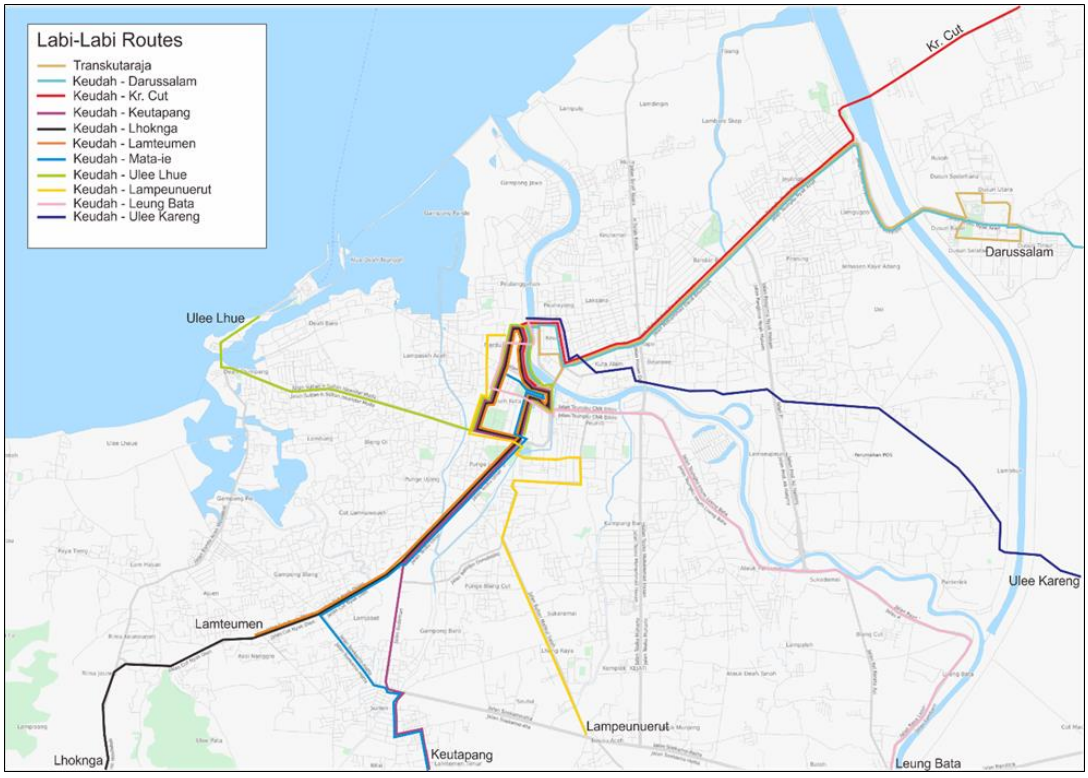
94. In Banda Aceh, Labi-labi routes names and numbers are very difficult to identify, in the field as vehicles do not display them. For this reason, the route numbers in Table 5.2 below have been allocated by the study team for ease of reference in this report

Table 5.2: List of Public Transport Routes in Banda Aceh as of September 2016

Type	No	Route	In Operation
Labi-labi	Route 1	Keudah - Keutapang	√
	Route 2	Keudah - Lhoknga	√
	Route 3	Keudah – Lamteumen	√
	Route 4	Keudah - Mata ie	√
	Route 5	Keudah – Ulee Lhue	√
	Route 6	Keudah – Lampenuerut	√
	Route 7	Keudah – Leung Bata	√
	Route 8	Keudah - Ulee Kareng	√
	Route 9	Keudah – Darussalam	√
	Route 10	Kuedah – Kreung Cut	√
Trans Koetaradja	Corridor 1	Keudah – Unsyiah University	√
	Corridor 2	Ulee Lhue – Batoh – Lambaro – Bandara	on trial

Source: Consultant

Figure 5.1: Banda Aceh Public Transport Routes



Source: Consultant

95. Figure 5.1 above shows that Labi –labi route 9 Keudah – Darussalam and Labi-labi route 10 Keudah – Kreung Cut are approximately 90% overlapping with Trans Koetaradja Corridor 1. They have similar route segments from Keudah City

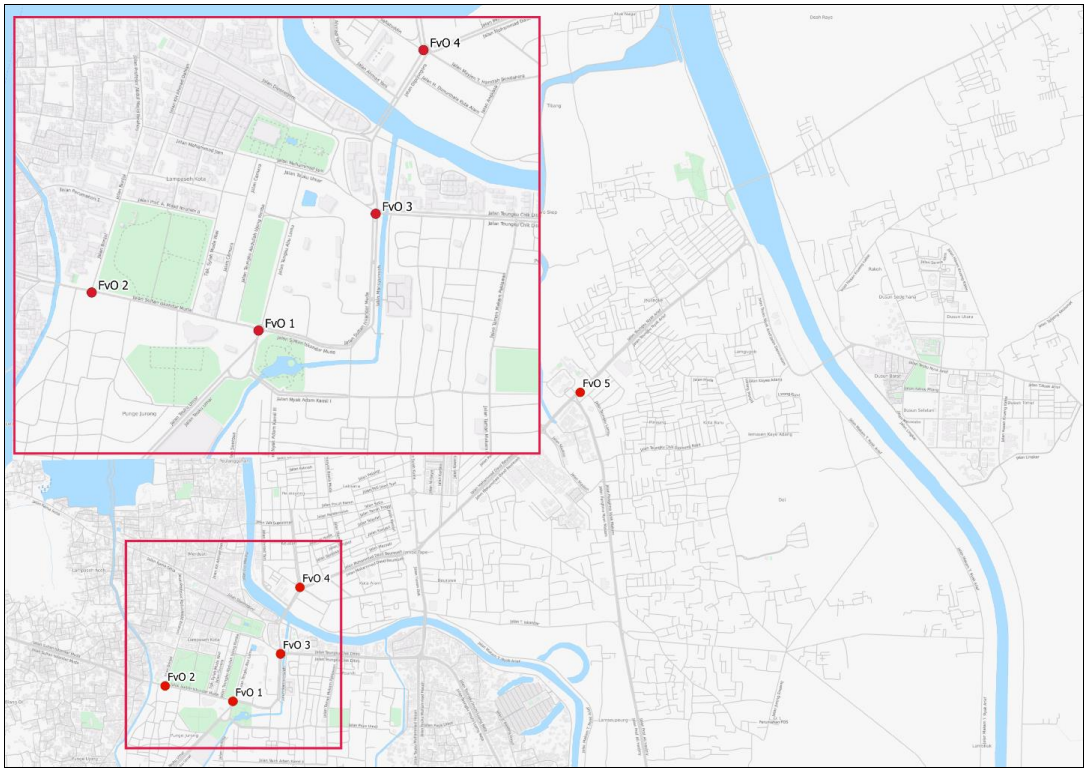
Center to Jalan Tengku Nyak Arief. From Jalan Tengku Nyak Arief, Trans Koetaradja proceeds south west to Jalan A. Yani and goes inside the University campus while route 9 goes south west to Jalan A. Yani and straight to Darussalam. Route 10 goes north west to Jalan Kreung Raya.

96. These 2 Labi-labi routes have the highest frequency and occupancy when compared to the other Labi-labi routes. This implies that this route segment has the highest passenger demand and these routes are still used by the passengers which prefer to use Labi-labi than Trans Koetaradja, even though the Trans Koetaradja is a more modern vehicle with lower fares than the Labi-labi services. The reasons for this were not surveyed but based upon experiences elsewhere in Indonesia, it may be a combination of service frequency and the fact that Labi-labi stop only where passengers wish to board or alight. This is in contrast to Trans Koetardja where buses stop at designated stops and passengers are required to walk to and from these locations. Such an arrangement is unfamiliar to the local community after decades of the *"stop on demand"* operating procedures offered by the current Labi-labi drivers and their predecessors.

5.2.2. Public Transport Frequency and Occupancy

97. The five frequency and occupancy survey locations used in this study are shown in Figure 5.2 below. These are the locations which have the highest incidence of public transport route overlapping in Banda Aceh.

Figure 5.2: Public Transport Frequency-Occupancy Survey Locations



Source: Consultant

98. Out of 10 Labi-labi routes, Labi-labi route 10 has the highest passenger volume with 88 passengers per hour in one direction and a frequency of 16 servcies. Although Labi-labi route 9 does not have the highest passenger volume, it has the highest service frequency with 30 per hour in one direction. Table 5.3 lists the service frequency and passenger volumes for all routes surveyed by the study team.

Table 5.3: Frequency and Occupancy of Labi-labi and Trans Koetaradja Routes

No	Route Name	General Hourly Maximum	
		Frequency (Bus/Hour/Dir)	Volume (Pass/Hour/Dir)
Route 1	Keudah – Keutapang	12	46
Route 2	Keudah - Lhoknga	4	28
Route 3	Keudah – Lamteumen	8	18
Route 4	Keudah – Mata ie	6	34
Route 5	Keudah – Ulee Lheue	2	0
Route 6	Keudah – Lampeuneurut	4	8
Route 7	Keudah – Leung Bata	10	54
Route 8	Keudah – Ulee Kareng	6	26
Route 9	Keudah – Darussalam	30	54
Route 10	Keudah – Kreung Cut	16	88
Trans Koetaradja	Corridor 1	8	110

Source: Consultant

99. The average frequency of Labi-labi is a respectable 10 per hour in one direction. However the average occupancy of Labi-labi is very low with only 4 passengers/Labi-labi vehicle in service. Even the average occupancy of the route with the highest passenger volume is 6 passengers/Labi-labi or about half of the capacity of the vehicle. From this, and in consideration of the rapidly declining number of Labi-labi registered for service, it is evident that the demand for this mode is rapidly disappearing. If this trend continues, soon the Labi-labi mode will cease to exist in Banda Aceh.

5.2.3. Public Transport Speed

100. Travel speed data was collected using the Global Positioning System (GPS) to record the speed of Labi-labi and Trans Koetaradja vehicles in operation. This survey was conducted at the same time as the on-board boarding and alighting survey. The results are listed in Table 5.4 and illustrated in Figures 5.4 and 5.4 below.

101. Based on the survey undertaken during the peak hour, the average speed of Labi-labi is 26 km/hour while average speed for Trans Koetaradja is 19 km/hour.

102. Due to the absence of any speed restrictions or service headway standards, Labi-labi drivers will speed up in sections where there are no passengers wishing to

board or alight. Moreover, as is typically the case for Indonesia drivers will wait at the terminus until the vehicle is full and then depart. This encourages them to stop only at locations where a passenger is hailing to board or where a passenger on board wishes to alight. In between, they will travel at speed to finish the service in order to begin loading again. During the survey, this speeding was observed and poses a danger to not only the Labi-labi passengers but also other users on the corridor.

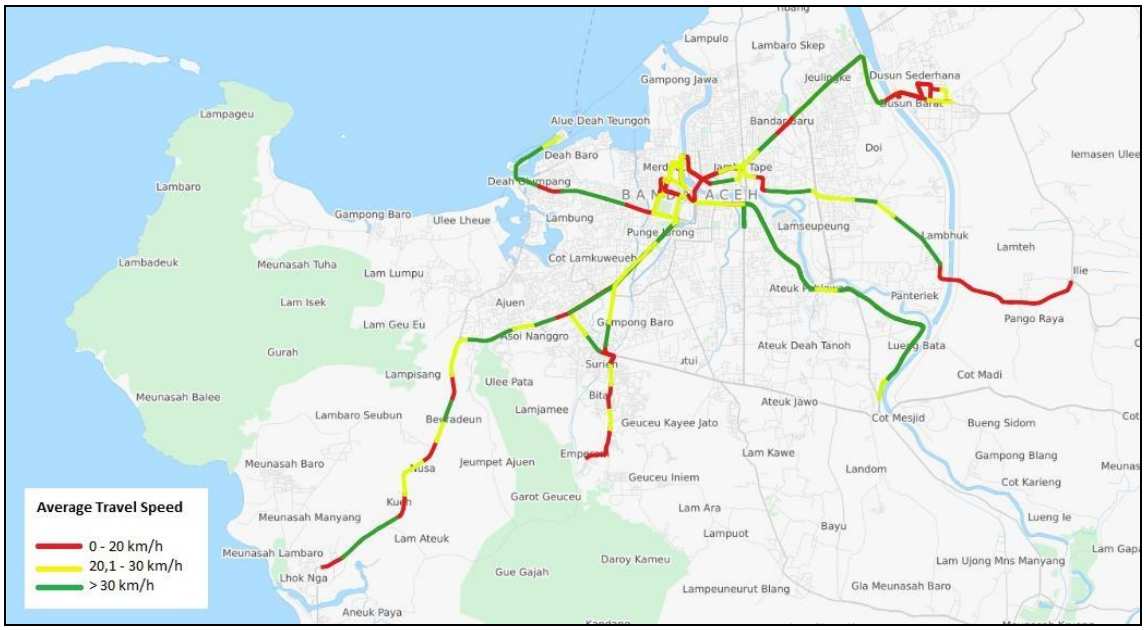
Table 5.4: Labi-labi and Trans Koetaradja Travel Speed

No	Route	Length (km)	Average Travel Time	Average Speed (km/h)
1	Keudah - Leung Bata	10,71	00:28:26	31,09
2	Keudah - kreung cut	7,72	00:25:47	22,52
3	Keudah - Darussalam	10,28	00:35:09	21,31
4	Keudah - Ulee Kareng	11,66	00:41:05	23,46
5	Keutapang - keudah	5,42	00:14:55	24,08
6	keudah - Lamteumen	5,07	00:13:25	30,41
7	Keudah - Lhok Nga	13,85	00:32:36	34,37
8	Keudah - Ulee Lehue	4,55	00:13:50	28,13
9	Keudah - Mata Ie	8,24	00:22:52	24,36
Labi Labi average travel speed				26,64
10	Trans Koetaradja	9,1	00:36:31	19,39

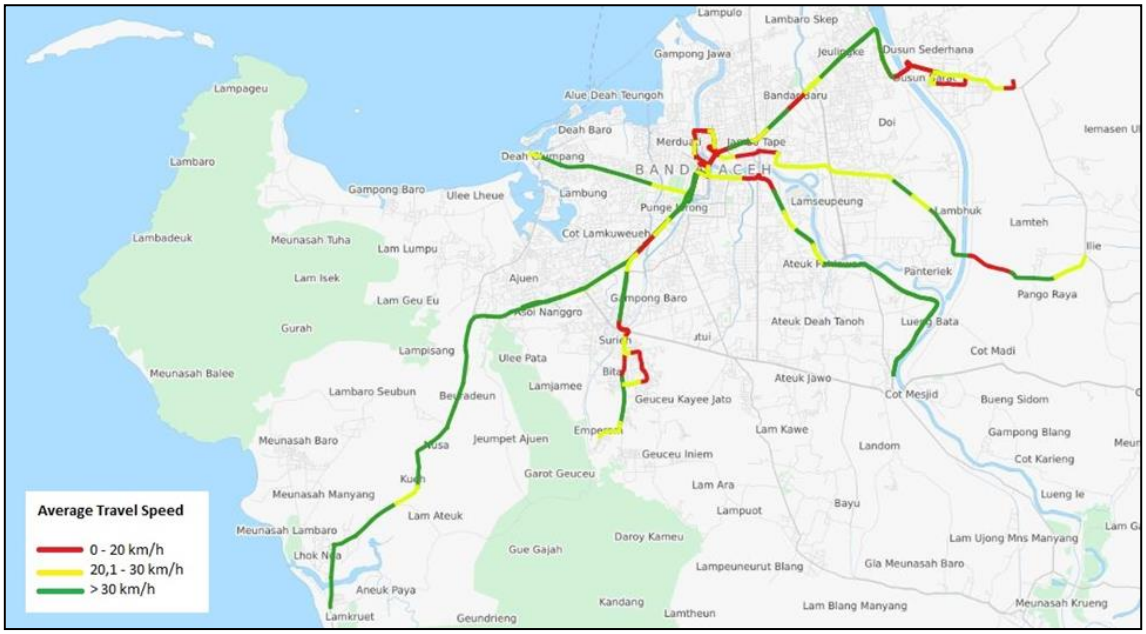
Source: Consultant

Figure 5.3: Labi-labi Travel Speed

Inbound Travel Speed – Inbound



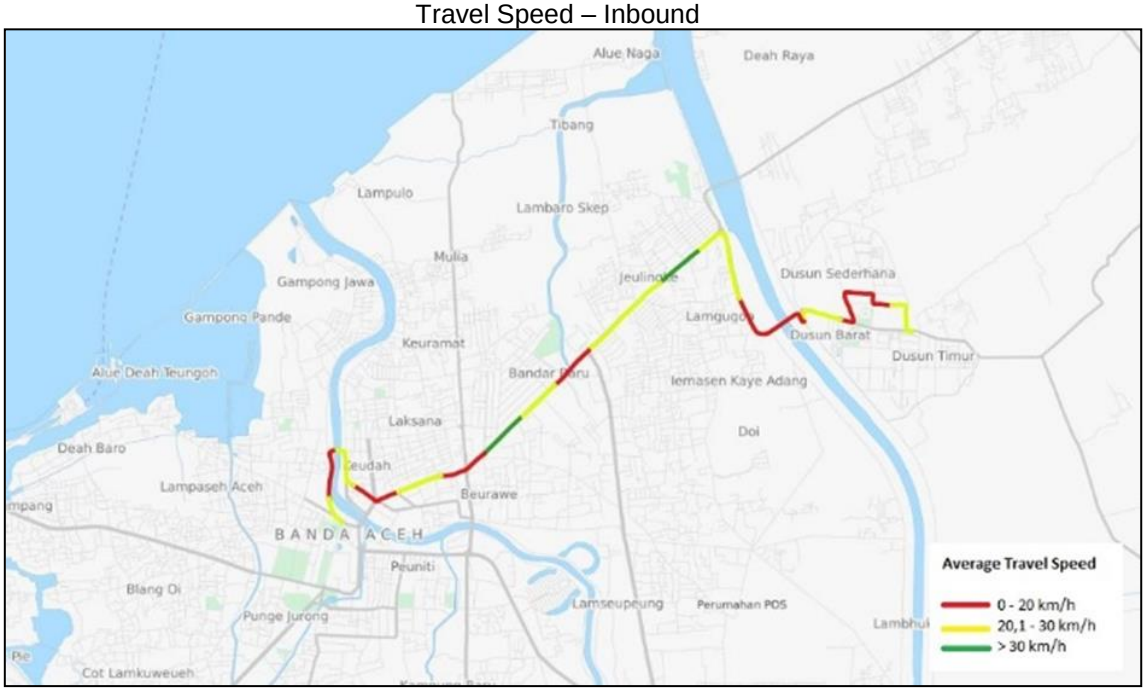
Travel Speed – Outbound



Source: Consultant

Figure 5.4: Trans Koetaradja Travel Speed

Travel Speed – Inbound



Travel Speed - Outbound

Source: Consultant

103. From the travel speed data illustrated in the figures above, it is readily apparent that the CBD and sections along Jalan Teuku Nyak Arief have low average travel speeds and reflects a problem of traffic congestion at these locations during the peak period.

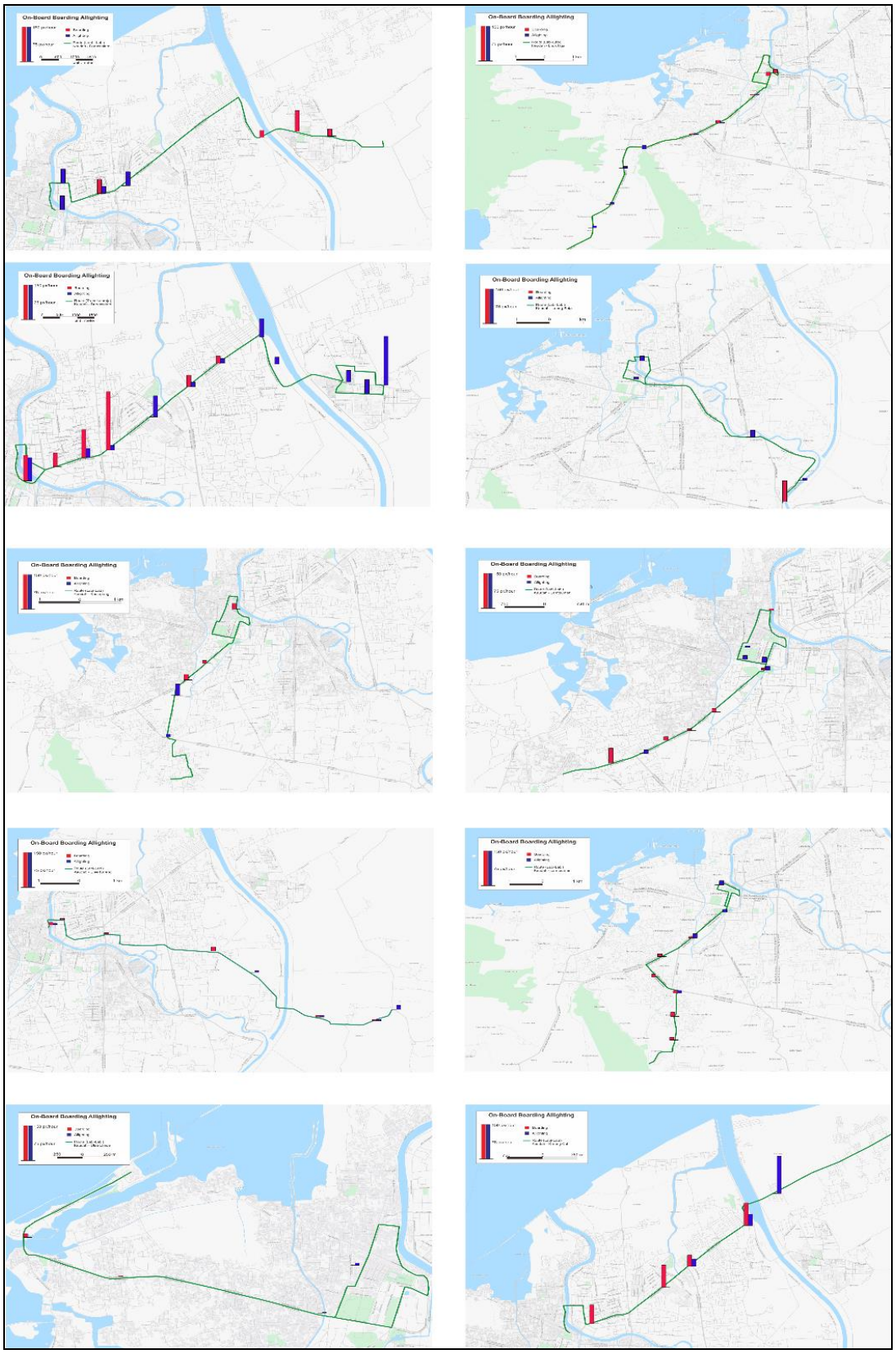
104. In the case of Trans Koetaradja, when approaching the University area, it reduces average speed to around 15 – 22 km/ hour due to the presence of students on the roadway (ie safety is paramount) and so as not to disturb the students attending lectures in the lecture rooms adjacent to the roadway.

5.2.4. Public Transport Boarding and Alighting Data

105. To capture existing public transport demand and trip patterns, on-board boarding and alighting surveys were conducted on Labi-labi routes identified in the previous section above. These boarding and alighting surveys recorded the location and number of passengers getting on and getting off the Labi-labi and Trans Koetaradja. These surveys were repeated a number of times to obtain a more representative data set for use on the project.

106. **Error! Reference source not found.** below shows the boarding and alighting profile for each route. The survey results suggest that the sections along Jl. Teuku Nyak Arief, the City Centre, Jalan Teuku Umar and Cut Nyak Dien have the highest volume of boardings and alightings.

Figure 5. 5 Boarding and Alighting Profile for each Route



Source: Consultant

5.3 Conclusions

107. From the above discussion, the following conclusions are listed belor for further consideration in the preparation of the project.

i. The proposed Corridor 1 is currently serviced by Labi –labi route 9 Keudah – Darussalam and Labi-labi route 10 Keudah – Kreung Cut and have approximately 90% of their route overlapping with the Trans Koetaradja route. Thus from a route planning perspective, the scope for a BRT Direct Service system is present.

ii. Out of 10 Labi-labi routes serving Banda Aceh, route 10 has the highest passenger volume with 88 passengers per hour in one direction and a frequency of 16 servcies. Although route 9 does not have the highest passenger volume (approximately 6 per Labi-labi in the peak hour), it has the highest service frequency with (an observed) 30 Labi-labi services per hour in one direction. This and the previous observation (above) suggests that, although public transport passenger demand is generally low across the urban area, this corridor would appear to have the highest demand and therefore a good choice for commencement of the network improvement.

iii. From the above observation, and in consideration of the rapidly declining number of Labi-labi registered for service, it is evident that the demand for this mode is rapidly disappearing. If this trend continues, soon the Labi-labi mode will cease to exist in Banda Aceh. Government will then be faced with the choice of whether to expand the Trans Koetaradja network or allow the private vehicles to take over and continue to increase congestion levels.

iv. Based on the travel speed survey undertaken during the peak hour, the average speed of Labi-labi is 26 km/hour while average speed for Trans Koetaradja is 19 km/hour. In mixed traffic conditions, this observed travel speed is quite good. For Labi-labi it is partly a result of drivers running express and (sometimes speeding) as there are no formal arrangements for regular stops to be serviced. For Trans Koetaradja, it is likely to be a combination of limited stops and the (sometimes) ability to run express due to no passengers waiting to board or alight at designated stops along the route. There are however a few sections along the corridor where congestion levels reduce average travel speed to below 20kph and these will be locations where detailed attention will (likely) be required during the detailed design phase.

6 ESTIMATE OF CORRIDOR 1 BRT DEMAND

108. This chapter provides a brief assessment of potential demand which can be anticipated upon startup. Due to the limited resources available, it is a preliminary estimate only and will need to be revisited in the subsequent feasibility and detailed design of the project preparation phase.

6.1 Existing Trans Koetaradja Demand

109. The current number of Transkoetaradja services each week was obtained from information gathered from Dishub Banda Aceh, on August 2016. 10 buses are operating in Corridor 1 every day except Sunday with only 4 buses operating on Sunday. From the peak hour survey undertaken by the study team in September 2016, the maximum frequency of Trans Koetaradja services in Corridor 1 is 10 buses per hour/direction. The average frequency is 8 services per hour/direction.

110. Based on the September 2016 passenger surveys, average weekday passenger numbers using Transkoetaradja on Corridor 1 is as follows:

i. Number of passengers in the peak period is 110 per hour/direction.
ii. Number of passengers in the off peak period is 83 per hour/direction.

111. As noted above, there are 3 routes overlapping in Corridor 1. Two routes are Labi-labi that run from Keudah to Kreung Cut and to Kopelma Darussalam. The other route is the existing Trans Koetaradja service along the proposed Corridor 1. For To help appreciate the significance of this corridor in the conytext of the proposed BRT project, Table 6.1 below lists the existing passenger demand for both public transport modes serviceing Corridor 1 during the peak hour. For the record, the average occupancy of labi-labi listed in Table 6.1 is the average of the two Labi-labi routes from Keudah to Kreung Cut and from Keudah to Kopelma Darussalam.

112. A further calculation has been made to identify the average occupancy for each mode by dividing the average total passenger demand by the average service frequency using the observed survey data (Setember 2016) at Corridor 1 in front of the Governor's office during the AM peak period. Given that this is the AM peak hour when the majority of the daily trips are made[6], the results indicate a poor result for the existing public transport system.

[6] Please refer to Figure 4.13 in Section 4.2.4 above for the details.

Table 6. 1 Existing AM Peak Public Transport Passenger Demand (Corridor 1)

Mode	Average Total Passengers/Hour/Direction	Average Service Frequency/Hour	Average Occupancy Passenger/Service
Labi-labi	142	46	4
Trans Koetaradja	110	8	14
Total	252	54	4.66

Source: Consultant

113. In addition to the Labi-labi and Trans Koetaradja modes, private cars and motor cycles operate in Corridor 1. Table 6.2 lists the private vehicle passenger demand on Corridor 1 in the AM peak, based on the results of the traffic survey undertaken by the study team in September 2016. It shows the average occupancy of 1.2 for private vehicles and highligts the potential for public transport to be able to service demand with fewer vehicles (ie reduce traffic congestion). Not withstanding the existing very low average occupancy of the existing public transport, it is still nearly 4 times more efficient than the private vehicle mode in serving travel demand along the corridor. This observation needs to be kept in mind by Government when considering how to deal with the increasing levels of congestion in the coming years.

Table 6. 2 Existing AM Peak Private Vehicle Passenger Demand (Corridor 1)

Mode	Frequency Unit/Hour/Per Direction	Average Occupancy Passenger/Mode	Total Passengers Per Hour/Direction
Private Car	1,196	2	2,392
Motor Cycle	3,740	1	3,750
Total	4,936	1.2	6,142

Source: Consultant

6.2 Assumptions Appplied and Estimate of BRT Passenger Demand

114. For the purposes of this study, the average weekday mode shift in terms of passenger numbers per hour and per direction to BRT corridor 1 in first year of opening is based on the following preliminary assumptions:

i. Labi-Labi: The current Labi-labi passenger demand in Corridor 1 is 142 passengers/hour/per direction. It is assumed that under the direct service model, these Labi-labi routes will be replaced by the BRT routes. This implies a 100% shift of passengers from Labi-labi to the BRT..
ii. Motor cycle: it is estimated that a 2% shift of passengers to the BRT. This means 75 passenger/hour/per direction.
iii. Motor vehicle (private car): it is assumed that a 2% mode shift to BRT will occur and this results in an additional 50 passenger/hour/per direction.
iv. Trans Koetaradja: All the existing passengers at 110 passenger/hour/per direction will be retained on the BRT

115. Based upon the above assumptions, the total BRT passenger demand/hour/direction is 375. When the demand from the above modes are expanded to an average daily passenger demand forecast, it is estimated that approximately 7,800 passengers will use the BRT Corridor 1 on a daily basis upon

startup. As is listed in Appendix A, the average annual passenger demand growth during the first five years of operation has been assumed at 5%. For the following six to ten years, the assumed rate has been set at 3% and for the years eleven to twenty, the assumed demand growth rate has been set at 2%. These future estimates need to be considered as initial estmates (and not forecasts), and may be amended with subsequent further analysis/demand modelling efforts.

6.3 Conclusions

116. From the above discussion, the following conclusions are listed belor for further consideration in the preparation of the project.

i. The average peak period passenger demand for Trans Koetaradja on Corridor 1 is 110 per hour/direction. For the off peak period the passenger demand has been recorded at 83 :per hour/direction. The peak hour passenger demand for Labi-labi has been observed at 143.

ii. Based on an assumption that with the introduction of the BRT Direct Service improvement, all current Trans Koetaradja and Labi-labi passengers will be absorbed by the new system and that a 2% mode shift from private car and motorcycle is achieved[7], then the average daily demand for the BRT Direct Service system on Corridor 1 could be 7,800 per day.

117. It must be noted that the above demand assumptions are preliminary. To help achieve the mode shift indicated, Government intervention is likely to be required in the form of effective push/pull policy interventions and a broad community awareness campaign to help encourage car and motorcycle drivers to begin to use public transport. These measures are discussed further in Chapters 8 and 12 below.

[7] It is noted that such a percentage mode shift can be debated on a for *and* against basis. However, experience from BRT implementation to date has shown that a mode shift is a real possibility. It is for this reason that ssome allowance has been made for this to be achieved. The matter can be considered further during the detailed design phase if there is an appetite to do by participating stakeholders.

7. INSTITUTIONAL

118. This chapter outlines the current institutional responsibilities as are relevant for the BRT project and the public transport sector. From this, the opportunities for a sustainable business model are highlighted so that Government may make the correct decision going forward. An indicative organogram is provided to further assist Government in making the necessary decision regarding progressing the project.

119. While the following sections may not be the final model adopted by Government, it is the project team's preferred model for the project, based upon the results of this early analysis. Based on this preferred model and with further deliberations, Government at both the Provincial and City level can begin to seriously consider the requirements ahead and begin to make preparations for the resources needed to transform the project concept into reality. It is in this context that the need to provide this initial concept for consideration by Government has been developed.

7.1 Institutional Responsibilities for Urban Transport

120. Law No 22, 2009 allocates the overall responsibility of planning, regulating and managing the Traffic and Road Transportation (LLAJ) sector to the national Government. For this, four key ministries are involved, including (i) Ministry of Transportation, (ii) BAPPENAS, (iii) Ministry of Public Works, (iv) Indonesian National Police. In implementing these responsibilities, the National Government agencies may delegate part of these responsibilities to the Provincial Government and/or City Government. In accordance with the Indonesian governance model, this delegation is current for Aceh and as a result, a number of Provincial Departments operate on behalf of the National Government with a level of autonomy as per Law No 11 of 2006 which conferred authority to regulate and manage the affairs of Aceh.

121. In the context of this project, and at the Aceh level, the Governor is the apex decision making authority in association with the Aceh regional House of Representatives (DPRA). Under this, the key relevant Provincial Government entities with a direct involvement in the transport sector (and by implication the project) are:

(i) Aceh Regional Secretariat (SEKDA), acting on the advice and guidance of the Governor, the SEKDA is the apex individual decision maker at the Provincial Level under the Governor. For significant decisions which are likely to have a material impact (such as this project), consultation with and obtaining advice/direction from SEKDA is an accepted established process.
(ii) Regional Development Planning Board (BAPPEDA), is an entity with delegated roles from the national level. A coordinating agency covering general urban development and major urban infrastructure projects, it is a key player in obtaining support for investment in this project, particularly if a sovereign or sub-sovereign loan/grant/financial support is being sought for project preparation and financing purposes.
(iii) DISHUB (Transport Department) is also a key player as it has direct responsibility for public transport permit issue and renewal, vehicle

inspections and issuing of the annual roadworthy certificates. It also operates the weighbridges and performs other roles which, although may not be directly related with the BRT project, nevertheless confirms the central role this institution plays in the public transport sector. At present, DISHUB are managing the Trans Ketaradja operation in response to a fleet of modern buses which have been donated by the Ministry of Transport as part of an ongoing annual program of supply of buses to cities to assist with the growing need for improved public transport systems.

(iv) Regional Road Agency (Bina Marga), is the effective custodian of regional roads and (potentially key arterials through urban areas, should this be a designated link in the regional road network). In the context of this project, the focus of the BRT Corridor 1 on Jalan Teuku Nyak Arief indicates this may be the case and as such, Bina Marga may need to be involved. This will need to be discussed during the next phase of the project to confirm matters.

(v) Public Works, is responsible for much of the public infrastructure (including aspects of road design/construction, maintenance as well as complementary works such as landscaping, footpaths/drainage/lighting etc). As is the case with Bina Marga, while the involvement of this agency is likely to be required, actual discussions during the next phase of the project preparation will be required to confirm this.

(vi) Polda (police) are responsible for the issuance of drivers licenses, traffic management and the issuance of traffic infringements. As such, they will have an important role in the ongoing management of the general traffic on the BRT corridor so that safe passenger conditions are maintained and that motorised vehicle drivers obey current and new signage which is BRT specific.

122. At the city level, the overall decision making process and institutional landscape is similar to that at the Aceh level. WaliKota, in association with the elected representatives (DPRK) is the apex decision maker. Therefore DISHUB Kota, Public Works and POLRES will be the key institutions involved in the project going forward. They essentially complement the roles outlined above for the Provincial Institutions and in this sense, there is no need to repeat the roles in this text. Naturally, the Finance and Revenue departments of both the Province and City will also be involved as the project will require funds for capital expenditure as well as operating subsidies for (at least the short to medium term).

123. Since the ultimate network plan as has been indicated in Figure 9.1 below, is likely to extend outside the city boundary, both Province and City will have an ongoing role to play in the project. So in summary, the key institutions at both the Provincial level and at the City level will be those summarised above. Should a specific “management entity” need to be established for the BRT project (and in time, the broader network), then in the interests of all parties currently having a role in the urban transport sector, it is these institutions which should come together/contribute to the ownership and ongoing management of the project. It is in this context that the discussion which follows is presented for consideration.

124. When the necessary decision to proceed with project preparation into the next phase is taken, then a more detailed assessment of the specific contributions required from these institutions can be made. In the meantime, and in consideration of the challenges described in Section 7.2, some preliminary thoughts on a project management model are outlined in Section 7.3 for initial consideration by Government.

7.2 Institutional Priorities/Challenges for Urban Transport

125. While there is an abundance of institutions available to develop, fund and manage the project, the experience from cities elsewhere in Indonesia demonstrates that the task of transition from an essentially private sector managed and operated public transport system to a well designed and managed system where the goal of achieving a sustainable modal share of the urban travel market to have a material impact on rising congestion levels is an ongoing challenge.

126. For Banda Aceh, the challenge of a unified Provincial and Kota team to influence and guide the labi labi sub-sector towards a modern fleet operation in order to arrest the decline in the mode share is the greatest challenge. Engaging with the Ministry of Transport, BAPPENAS and Ministry of Finance at the Federal level will also be required for financial and ongoing institutional support. So this will also be a challenge to overcome.

127. The importance of addressing these challenges cannot be overstated as the ultimate need for a direct service BRT service model (as is proposed) will require a significant change. This is so that in time, the entire urban population may benefit from the investment in the BRT. In return, this has the ongoing advantages of (i) retaining employment levels for the labi-labi dwindling market share, (ii) transforming the mindset of the travelling public from using public transport as a last resort, to a mode of first choice (at least during heavily congested times), (iii) reducing the congestion cost impact on annual GDP and, (iv) reducing the environmental impacts of emission levels from the urban transport sector.

128. To achieve this, there will need to be a decision by Government that the existing arrangements whereby the private sector is essentially determining the direction and standards of service provided to the public will need to be changed to one where Government has an ongoing oversight role in the delivery of services into the future. This is largely consistent with the Governance model in many developed countries across the world and is one which is considered best able to effectively manage the sustainability of the sector in the best interests of the travelling public. However, for Indonesia, this remains an item of reform which (apart from TransJakarta) has not been abe to be achieved todate. So this needs to be the first item on the agenda for Banda Aceh.

129. Accordingly, the challenge for Kota and Aceh is to develop a unified mindset and the necessary resources and have this confirmed at the Provincial Governor and Wali Kota level to:

i. Agree on the development of the BRT project as the start of the urban public transport reformation and modernisation process,

ii. Begin meaningful liaison with ORGANDA to engender the mindset of the need for significant change within the labi-labi sub sector interests.

iii. Secure support from the Ministry of Transportation for a bus design which is capable of being relevant for a direct service model in Banda Aceh[8].

iv. Begin a meaningful discussion to commence the formation of a dedicated unit for the ongoing management of the investment going forward. Such a unit could be the basis upon which the Government assumes a greater level of oversight and direction for the urban transport sector in the future.

130. In relation to the above, there will need to be a realistic appreciation of the costs involved and the need for an inclusive approach to the reform process – both at the private sector and Government sector levels. As has been demonstrated elsewhere in Indonesia and overseas, it is the human elements (rather than the technological/infrastructure elements), which are the ongoing barriers to reform. In this respect, the workshop held in December to address this and other matters was (for a number of reasons) not able to reach consensus on the next steps to be taken.

131. In this respect, further consideration by Government counteIDRarts will be necessary to confirm the above matters, or alternatively to confirm alternative arrangements necessary if the project is to be advanced in accordance with likely requirements of potential investment partners.

7.3 Managing the Preferred Business Model

132. Management of the BRT Lite Direct Service system should be on the basis of allocating the risks to the party which is best able to manage them. Typically, this results in a PPP between Government and a number of private sector entities.

133. In this context, the role of Government should be focussed on the policy, planning, implementation, ownership of the infrastructure required for the system and overall oversight of the system going forward. This is a typical model used across the world.

134. For the private sector, the transition from competition “in the market” to competition “for the market” is required to move forward with the reform process. This implies a competitively tendered multi-year service contract (for bus services, ticketing and back of office service, cleaning and minor maintenance, communications, and other roles as required).

[8] Include discussion on passenger entry on both sides, low floor and a size which will be suitable for some of the narrower roads of Banda Aceh city.

135. For the bus service provider, a multi-year contract on a per kilometre rate is negotiated with the preferred tenderer. For the ticketing and back of office service provider, a percentage of fare box revenue is normally the negotiated rate for such a service. For minor maintenance, cleaning and other required services, the specific contract conditions can be on an agreed hourly rate with any component replacements being charged at cost.

136. Again, this is a common business model used for BRT systems across the world and will be familiar to those in Banda Aceh who are involved with this project. In the context of managing this project, the need for reform of the urban transport sector is the first priority as this will have a material impact on the financial and economic sustainability of the BRT Lite Direct Service project being proposed. Then in time, when additional corridors are proposed for implementation as a BRT Lite Direct Service, the need for such reform will again be reinforced. Therefore, the need for such reform is apparent in both the short, medium and longer term context.

137. The essence here will be ensuring compliance with agreed positions, whether they be regulatory, in accordance with agreed service contract conditions, or as per the strategic priorities of Kota in relation to the broader matter of urban mobility. For this to be achieved, a proactive and transparent working relationship will need to be developed with the existing transporter interests so that all parties feel included in the upcoming transformation process. Only when that has been achieved can the matter of effective governance be contemplated.

138. The current capacity of DISHUB in managing the Trans Koetaradja operation is limited. Currently 12 staff are assigned to the task however these staff members still have other responsibilities to perform within DISHUB. Coupled with the limited ability for these staff to go beyond their immediate areas of responsibility, the effectiveness of the unit in influencing future directions for Trans Koetaradja is very limited (if it even exists). This is not a good position to be in and underscores the need to reassess the broader institutional requirements to ensure a dedicated and effective team for the BRT Lite project in the future. Once the broader requirements are appreciated, then the focus can be directed to the entity responsible for the day to day contact with the BRT Lite project.

7.4 Supporting Institutional Landscape Requirements

139. To begin to understand this broader requirement, the Government partners identified earlier in this section will need to establish a close working relationship with each other so that all work as a single team for a common objective. In this regard, an MOU with an accompanying Business Procedures Manual may be an option to consider in order to generate the “glue” required to bind the minds of the Government agencies as one. The task of reformation of the existing transporter interests will be a challenging one and in this respect, Government will need to be both knowledgeable in what it is seeking as the end result in this process and united in order to achieve the result. If left to an individual Department, the chances of achieving success are much less than if a whole of Government approach is applied.

140. As is the case with most tasks of reformation of the urban transport sector where current practices have been in operation for many years, change will often be difficult to achieve. For this reason, Government will need to be patient, consultative, understand the realities of the financial impacts of reform, and then be prepared to discuss and agree on options which will help achieve a win-win result for all parties, especially the broader community. While for Government, this benefit may be more of a broader improvement for the general community (economic, social, environmental), for the transporter interests, the focus will be on financial impact, both in the immediate future as well as longer term.

141. Other matters such as community consultation, traffic management plans for the corridor during the construction of the infrastructure for the BRT Lite, fleet procurement and the training of drivers for a median and kerbside operation will all require the active involvement of Government. These will all need to be included in the program of activities going forward once the support from local Parliament for the project has been received and the decision to actually proceed with the project has been taken by Government.

142. As can be readily appreciated from the above discussion, the task ahead for Banda Aceh will not be an easy one. An effective institutional model will be essential if there is to be any chance of success.

143. Other cities have established a separate urban Transit Authority with a whole of sector responsibility for this role. In the context of Banda Aceh, this option is seen as a last resort and should be considered only if the above referenced governance model is not successful. For Banda Aceh, the establishment of a BLUD within DISHUB Province but which is ultimately answerable (through Kepala Dishub) to a unified whole of Government Management Committee which in turn, has the required influence to ensure (i) financing is made available at the legislature level, (ii) the relevant liaison with the National Ministeries is maintained and, (iii) decisions involving more than one government agency can be made as and when required, is considered the preferred course to follow.

7.5 Institutional Requirements to Implement and Manage the Project

144. By now, it will be readily apparent that the pathway to success for this project will not be an easy one. In this respect, there will need to be a decision by both City and Provincial Governments to form a single entity with the responsibility, financing and human resources to (i) coordinate the procurement/construction of the project and, (ii) manage, monitor and report on the project in the years ahead. For this, such an entity should have the support and relevant policy policy guidance from the broader Government structure at the Provincial and City level. As has been highlighted above, the involvement of the Ministeries from Jakarta will also be of benefit in successful implementation and management of the project.

7.3.1 Whole of Government Approach

145. In this respect, Figure 7.1 outlines the broader institutional landcape considered necessary to achieve success for the project. Given the decision making processes and current culture of Governance in Indonesia, this “whole of government” landscape requirement is considered necessary. A brief explanation of this is as follows:

i. At the upper level of the “governance tree”, the Provincial and City Legislature, together with Governor and Wali Kota are involved. This is because ultimately,there will be decisions required dealing with financial, legal and legislature matters.

ii. Due to the (often) very busy schedule of Governor and Wali Kota, it is likely that SEKDA will be in the best position to deal with most individual decisions required. For this reason, this position has been identified as a key conduit for consultations at the National and at the Provincial / Kota level.

iii. Under this level is an entity referred to as Banda Aceh Urban Transport Management Committee. This is a committee comprised of the heads and senior decision makers from those Government Departments at City and Provincial level. For example, Kepala DISHUB, Department of Finance, Department Tourism, POLDA, Kepala PU, ORGANDA Representative, Chamber of Commerce, Memeber of Legislature, Representative of Transport Forum together with SEKDA (or SEKDA delegate), as the Chairman would be a good start.

iv. This Management Committee would liaise with all levels of Government on matters of strategic relevance for the BRT Lite project. Such matters could involve multi year budgets, access to National, Provincial and Kota roads for infrastructure works, policy formulation and agreement, implementation of push/pull initiatives to support the project.

v. The day to day responsibility for the project would rest with DISHUB Province and to ensure seamless harmony with the responsibilities of other agencies likely to be impacted by the project, the Management Committee will be the ideal forum to address all decisions and to reach concurrence on any relevant matter requiring cross agency support.

7.3.2 BRT lite Direct Service Management Entity

146. For the day to day oversight and management of the service contracts etc, a dedicated unit (BLUD) within DISHUB Province is recommended. An outline organogram of the BLUD is shown in Figure 7.1. A BLUD is recommended so that it has at least some capacity to undertake commercial decisions in the best interests of the travelling public and in accordance with sound financial management principles.

147. Typically such entities contain a board of management and to which the various groups of skill sets required for the project report to. For the purposes of this

project, four essential skill sets are considered necessary for the initial set up of the entity. As Figure 7.1 illustrates, these are (i) Policy Planning and Construction/Engineering (for development of the projects, infrastructure procurement, maintenance and system expansion), (ii) Operations and Market Development (for management of a range of service contracts, community consultation/awareness and reporting on passenger matters), (iii) Financial and Legal (for payment of accounts/contracts and all related legal matters, and (iv) Admin and HR matters for all staff recruitment and training matters)[9].

148. A brief summary of anticipated positions required for the BLUD is as follows:

i. At the head (Kepala) of the BLUD will be a suitably qualified specialist (preferably) from the private sector. This is to help maintain a focus on delivery of the areed KPIs for the project going forward. Reporting to the Kepala will be the heads of the following four sections of the BLUD:

   a. Policy Planning and Construction (PPC):- responsible for the development of policy and planning, project preparation and ultimately procurement.

   b. Operations and Market Development (OMD):-responsible for monitoring service contract compliance and associated community consultations, engagements and awareness programs to help deliver the market for the projects implemented.

   c. Finance and Legal (FL):- responsible for all financial payments for project procurement, all service contract payments (bus, ticketing, maintenance etc), salaries and overheads. Also responsible for all legal matters relating to contracts and other matters which may arise from time to time.

   d. Administration and HR (A&HR):- responsible for staff recruitment and inductions, staff training and reviews, contractor training (for contract compliance reporting purposes).

ii. For these four operational sections, the following skill sets and (potential) source of personnel are provided for ongoing discussion and consideration by Government Banda Aceh. The numbers are for the current project and may be expanded when additional projects are being implemented. The staff are

[9] Should Banda Aceh wish to follow up on this further, the SP2J model responsible for the Palembang TransMusi operation would be a good entity to consult with, to gain an understanding on how it may work.

for professional personnel only. Additional support staff can be provided by the nominated Departments.

a. Section PPC:- 1 Section Manager, 1 urban transport policy and planning specialist 2 design engineers, I construction and maintenance quality assurance engineer. Each professional shall have at least 10 years practical experience and possess qualifications from a recognised University. Preference will be given to those with specific experience in BRT or similar urban transport projects. Total of 4 professionals plus 1 Section Manager (5 professionals).

   Section Manager to be recruited (preferably) from the private sector. Urban policy/planer can be procrured from DISHUB or BAPPEDA or Pemirentah Kota. Design and quality assurance engineer can (potentially) be sourced from PU or other Department.

b. Section ODM: 1 Section Manager, 3 bus service contract monitoring staff, 1 emergency response officer, 2 passenger/KPI reporting staff, 2 public compliance staff. Each staff shall posses as a minimum, a secondary education certificate, display a demonstrated commitment for attention to detail and accurate recording. Total of 8 professional staff and 1 Section Manager

   The Section Manager needs to have experience in managing field teams and compiling accurate data and reports. Staff can be recruited from DISHUB or other Departments as necessary or from the private sector. The exception is the emergency response officer who should ideally be from POLDA or POLRES.

c. Section F&L: 1 Section Manager, 2 financial accountants, 1 book keeper, 1 legal advisor. For this section, 4 professionals and 1 Section Manager.

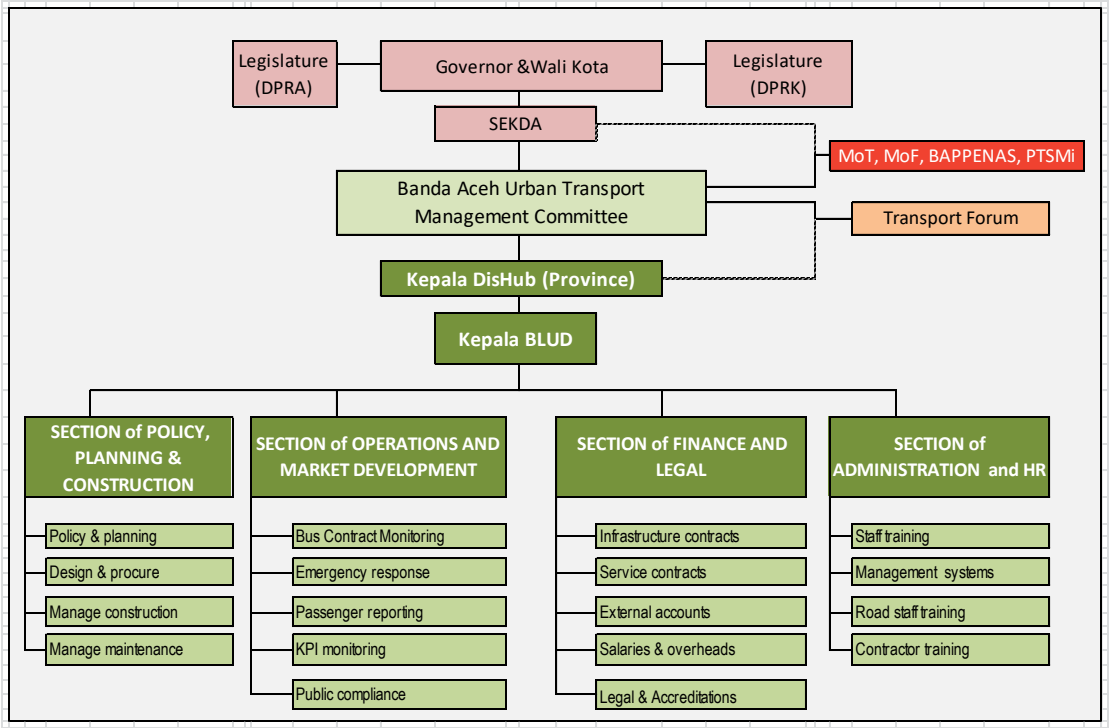
   The Section Manager needs to have accounting qualifications from a recognised university, as do the 2 financial accountants and the book keeper. The legal advisor requires specific qualifications and experience with contracts. All can be recruited from supporting Government departments if needed.

d. Section A&HR: 1 Section Manager, 1 staff trainer and 1 assistant, 1 Management Systems Specialist, 1 Road Staff Trainer and 1 assistant, 1 contractor trainer. For this section, 6 professional staff and 1 Section manager will be required.

   The team members for this section will need to have relevant experience in training and HR development systems. Typically these may neeed to be sourced from the private sector as such roles may not exist in Government departments. It may even be necessary to

employ the services of a “train the trainer” organisation to help the team develop the necessary skills required.

Figure 7.1: Institutional Landscape supporting the BLUD[10]



149. In summary, the initial professional staff establishment of the BLUD is estimated to be 26. This includes Kepala (Head of Transport Department at the Provincial level). With support staff, this may rise to between 33 and 35 staff in total. This is an initial assessment and should be used as the starting point for discussions regarding progress towards establishing the BLUD as part of the BRT Lite project.

7.6 Summary

150. The above matters are considered the basis upon which the BRT Lite Direct Service system project will ultimately succeed or fail. In this respect, the appetite from Government of Aceh and Banda Aceh to support the above governance processes as outlined in Figure 7.1 will be necessary. As there is likely to be a dependence on funding from the National Government level or IFI, it is anticipated that the BLUD will be aligned principally to DISHUB Province.

To begin the process, discussions need to commence between all parties to be involved so that a work program can be developed and used as a basis for guiding the efforts forward in a well-structured and focussed manner.

[10] Note, DPRD is the Aceh Regional House of Representatives and DPRK is the City Government whose members are also eected via a general election.

151. The above outline organogram concept for a BLUD with an initial establishment of between 33 and 35 is provided to assist the Governments of Banda Aceh and Aceh in their initial dicussions, should they wish to advance the project further. It is considered that ultimately a dedicated BLUD within Government be formed in accordance with the above guidelines if funding from partner sources is to be successful.

8. A FUTURE URBAN TRANSPORT STRATEGY

152. The future strategy is based on a transformation of the existing Trans Koetaradja and feeder services into a well-functioning BRT system. For the purposes of this project, and as an introduction of the BRT Direct Service concept to Banda Aceh, the following discussion provides the basis of the pilot project for such a program of reform.

8.1 Recommendation for BRT in Banda Aceh

153. In Banda Aceh, Trans Koetaradja is designed with 'BRT-lite' concept. Significantly most instances of ‘BRT-lite’ as have been introduced in other cities in Indonesia have failed to deliver BRT benefits, such as higher speed and more reliable travel times. A large part of the problem has been the inability of Governments to take the necessary decisions to enact the transformations required. As a result, the BRT –lite systems operate in general traffic and require heavy subsidies.

154. Partly as a consequence of the ongoing operating subsidies and the minimal imapct a BRT-lite has on reducing traffic, it is strongly suggested that 'BRT-lite' design should not be considered in any future BRT design in Banda Aceh. ‘Full BRT’ or BRT with a segregated priority lane is recommended for Banda Aceh. To assist Government appreciate the benefits to be captured and help encourage the correct decision to be made, the following provides some insights into the matter.

i. A BRT system provides priority to public transport passengers. It can also greatly improve conditions for mixed traffic by solving the problem of bus stop congestion at kerbside stop locations.
ii. BRT has successfully changed the public transport system from unregulated to a regulated one with noticeable benefits for the travelling public.
iii. BRT infrastructure should be built in a corridor where demand is high and traffic congestion is bad. This will generate the greatest level of benefit.
iv. BRT has been shown to generate a mode switch from private vehicles doe to the superior speed and reliability of using the BRT.
v. BRT buses can operate inside and outside the dedicated BRT corridor, allowing a rapid citywide coverage for the system. This is the essence of the Direct Service model.

155. The concept of BRT-lite vs BRT is based upon a range of design and operational matters. Based on the international BRT standard. a scoring system exists to evaluate and compare them. Table 8.1 lists some of the elements covered in this scoring process.

Table 8. 1 Comparison between BRT-lite and BRT

Item	BRT Lite /Existing Trans Koetaradja	BRT
Corridor	No dedicated lanes	Dedicated bus lanes
Station placement	Curb-side station	Median station
Station Size	Small capacity bus shelter (1-2 meter wide, 5 meter long)	High capacity station (minimum 3-4 meter wide and 30 meter long)
Bus Floor Height	High Floor	High Floor and Low Floor (level-platfrom boarding)
Passenger access	No safe and comfortable access provided	Safe access facilitated through zebra crossing or pedestrian bridge
Ticket payment	On-board payment	Pre-board payment at BRT station, on-board payment off BRT corridor

Source: Consultant

8.2 BRT Design Principles

156. BRT components are illustrated in **Error! Reference source not found.** below. The essential components shown in this picture are all proposed for the Banda Aceh BRT project, and (for project costing purposes) in accordance with international BRT design standards.

Figure 8. 1 Elements of BRT

Source: Consultant

8.3 BRT Operational System Concepts

157. Currently, there are three operational system concepts for BRT. The first is trunk only system (close system), where BRT buses operate exclusively on a dedicated corridor without any integration with feeder servcies. The Lahore and

Islamabad MetroBus systems and the original Transjakarta system are examples of this.

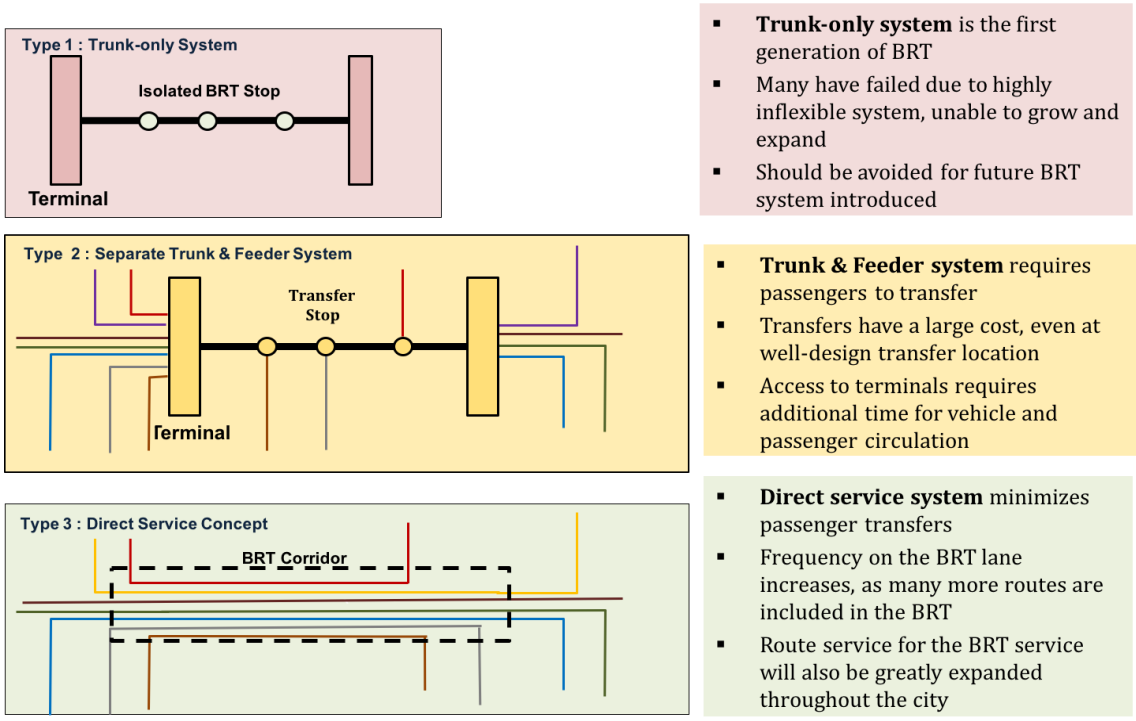
158. The second is trunk and feeder system, where BRT buses can run along the BRT corridor and provide a terminal integration with complementary feeder services. In this case, passengers are required to change buses for transfer from feeder services to the BRT trunk service. The original Curitiba system was based on this concept.

159. Third is direct service system, where BRT buses can run along the BRT corridor and beyond the corridor. This will enable passengers to access the BRT from outside the corridor, without the need to transfer to other buses once they are in the BRT system. The Brisbane Busway is an example of this.

160. These concepts are illustrated in Figure 8.2 below. Benefits of having direct-service BRT include:

i. Minimized transfers between trunk and feeder services
ii. Reduced passenger end-to-end journey time
iii. Avoids the need for a large (and costly) transfer terminal at the end of corridor
iv. Able to increase the coverage of the BRT services, without the need to build costly infrastructure across the city corridors.
v. Flexibility in operation to offer more options for direct services to passengers.

Figure 8. 2 BRT Operational Model Comparison



8.4. Labi-labi transformation

161. One of the most significant challenges facing Banda Aceh Government is the task of engaging with and transforming the labi-labi sub sector. As has been noted

earlier, the travelling public has demonstrated an unwillingness to use this mode and this has essentially confirmed the need for urgent reformation in order to survive into the future. It is in this context that the transformation of the labi-labi mode into a more modern and relevant option for the general public is seen as obligatory.

162. This labi-labi sub sector needs to be absorbed into the future BRT Direct Service model across the number of BRT corridors to be provided for the entire urban and peri-urban area. This means that labi-labi fleet will need to be replaced with larger and more comfortable buses to be able to compete with the relative convenience of private transport. With this, additional finance may be required and will not doubt be a key item raised by the private transporters during the first meeting with Government. Therefore, an outline plan needs to be prepared in readiness for this.

163. An option for this issue can be the concept of multi-year contracts provided by Government where the business model (or a variant thereof) as discussed before is used as a starting point in the discussions to be held. This will provide some relief for those in the labi-labi sub sector whose livelihood it depends. In this respect, it would be most useful for Government to have accurate information on who is currently operating and who (ie labi-labi owner) is not operating[11]. This will assist in arriving at a realistic plan for the fleet transformation process.

164. Ultimately, Government will need to develop a schedule timeline for the achievement of specific progress on the transformation process. For instance (i) completion of comprehensive consultation with labi-labi interests and a confirmation that all parties are made fully aware of the opportunities and challenges awaiting them, (ii) reach formal agreement on a schedule of transformation, (iii) agree on financial matters associated with this transformation (this includes a realistic assessment of which labi-labi vehicles are actually operating as a business and which are not), (iv) implement the first phase of the transformation process (eg contract tendering for BRT direct services), (v) negotiations on the actual process (incl financing) and timing of the transformation of the fleet, (vi) other matters (such as Local Parliament approvals) which will arise during the preparations for the transition process.

165. In this respect, the suggestions discussed above are most relevant and are recommended to be used as a basis for a commencement of the process required going forward.

8.5. Linking Mass Transit and Land Use

166. While this concept is widely known and understood, realising the benefits are often not a simple task. For Banda Aceh, the future Spatial Structure Plan illustrated

[11] Refer Section 3.1 where despite 352 labi-labi being registered, only an estimate of 80 are operational

in Figure 2.5 is a sound basis for this concept, only time will confirm whether the intent of this plan becomes a reality. I this respect, (and as has been required in Cities overseas), a strong policy of adherence to this plan will be required if it is to become a reality.

167. In this respect, Government must be prepared to enter into meaningful consultations with the land development interests and the general public to advise them of this future direction and also to advise that future approvals will be made only if compliance with this Structure Plan is achieved. For this, (in Cities elsewhere in the Asian context), the previously reported potential conflicts of interests between decision makers and developers will need to be dealt with for this principle to be implemented.

8.6 Supporting Policies

168. International experience dealing with urban traffic congestion includes (i) car free days, (ii) car free zones, (iii) congestion charging, (iv) aggressive parking charges, (v) limitations on vehicle registration etc. For Banda Aceh, many of these appear impractical in the short term for two basic reasons. First, there is little alternative to the convenience and accessibility of the private vehicle (car and motorcycle) and second, the institutional will to bring about a proactive approach to urban mobility management has yet to be demonstrated. In this respect, the following push/pull policies are considered most relevant for Banda Aceh in the short term.

169. For implementation of BRT Corridor in Banda Aceh, the following needs to be considered and addressed as a matter of priority:

i. The philosophy of dedicated lane priority BRT vehicles along the corridor over all other traffic (other than emergency vehicles - ambulance and fire brigade vehicles in service).
ii. Passenger access to the median based stations are provided with priority so that it becomes a mode of choice,
iii. Fleet acquisition based on the needs of the corridor and (in future) the broader network. This is in contrast to the existing fleet of Trans Koetaradja,
iv. The policy of meaningful engagement with the labi-labi sub sector to identify opportunities and processes for transformation going forward,
v. A policy of meaningful consultation with private sector banking interests to engender support for the future financing of bus fleets for the private operators
vi. A policy of transparency so that the community support can be captured.
vii. A policy of ensuring current laws and regulations are adhered to, especially the underage students driving motorcycles to school and elsewhere.

170. While these policies are likely to be quite familiar to all stakeholders, the concept of a BRT Project Champion is considered an essential policy position which must be taken by Government. Experience has shown time and time again, that without a Project Champion, projects of significance are most likely to fail because the necessary clear decision making and government influence as the required driver of change is missing. The inability to decide on a number of relevant project matters at the second project workshop in December 20 supports this view. For the project to succeed, it is considered essential that as a whole of government policy position, a

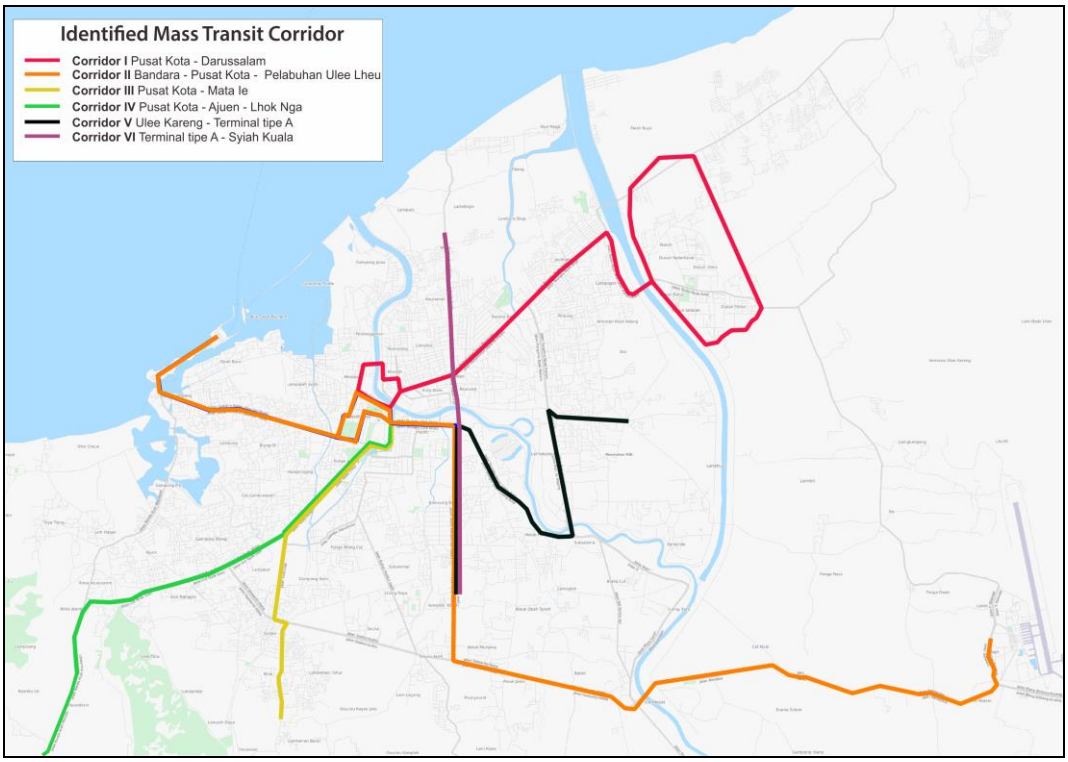
project Champion be identified to provide the necessary momentum for the project to succeed.

9. THE PRIORITY INVESTMENT

9.1 Corridor Indentified in PFS

171. In 2015, the Planning Department of Banda Aceh identified 6 mass transit corridors in Banda Aceh, and recommended Corridor 1, (which runs from Keudah to the University of Syiah Kuala) as the recommended corridor to be built in the first stage of a BRT project. The corridor options identified in that earlier PFS provides sound information on the major movements in Banda Aceh, and highlights the need to accommodate those movements in the BRT plan being developed in this project.

Figure 9.3: Mass Transit Corridors Identified in the Earlier PFS



Source: Consultant

9.2 BRT Corridors and Corridor 1 Analysis

9.2.1 Items Considered in Determining the Preferred BRT Alignment

172. From a review of the earlier PFS study, and from the meeting attended by the consultant team, representative from CDIA and the Banda Aceh City Government, it was subsequently agreed that Corridor 1 of Trans Koetaradja is to be developed as a BRT corridor. In support of this decision, the following matters were taken onto account.

i. Road right-of-way (RoW) along the corridor
ii. Demand coverage of the corridor
iii. Practicality of construction

iv. Quickest option to build compared to others
v. Impact on the area – a postitive rather than a largely negative impact.
vi. Traffic conditions able to accommodate a BRT without excessive disruptions

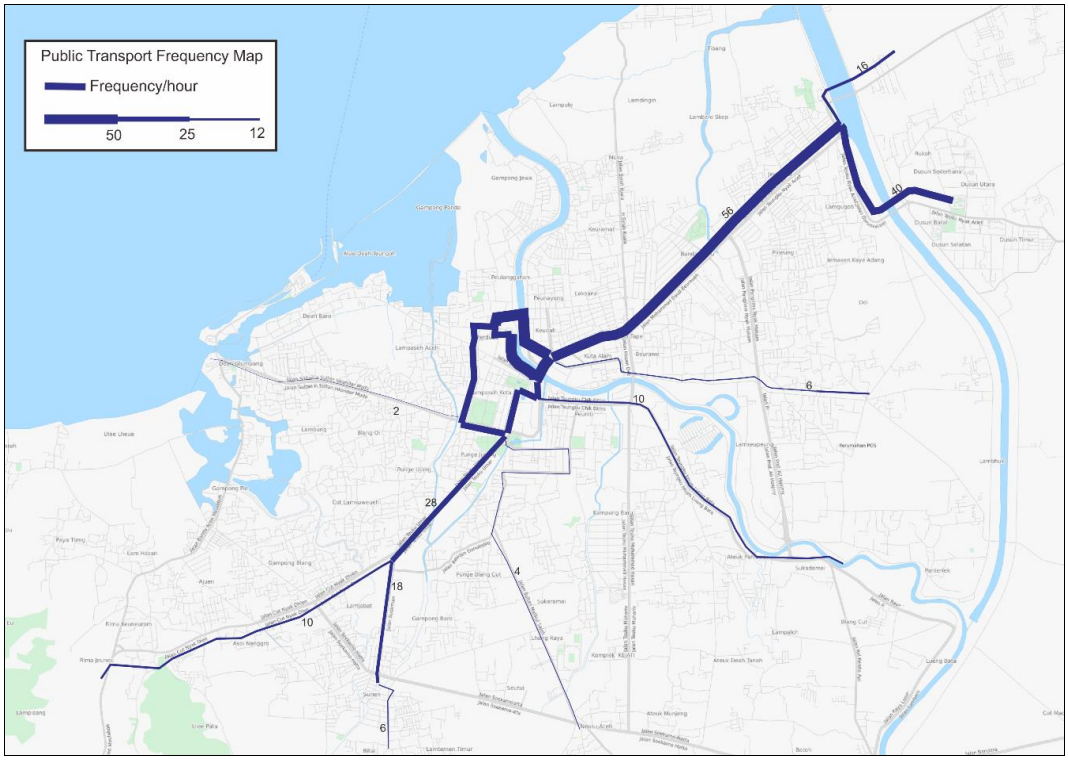
9.2.2 Criteria for Corridor Selection

173. In agreeing to Corridor 1 City Center to Kopelma Darussalam as the initial BRT alignment option for Banda Aceh, the following considerations were taken into account:

a. Highest public transport frequency at present

174. Ultimately, public transport service frequency is an indicator of public transport mode share in a city. In many Indonesian cities increasing private mode share has resulted in a decline of the public transport service frequency and with it, a continuing decline in mode share. To address this unsustainable trend, cities which have been successful have upgraded the conditions of public transport and at the same time introduced push policies to reinforce the need to use the public transport being provided. For Banda Aceh, these two aspects remain largely unaddressed.

Figure 9.4: Banda Aceh Labi-labi Frequency Map



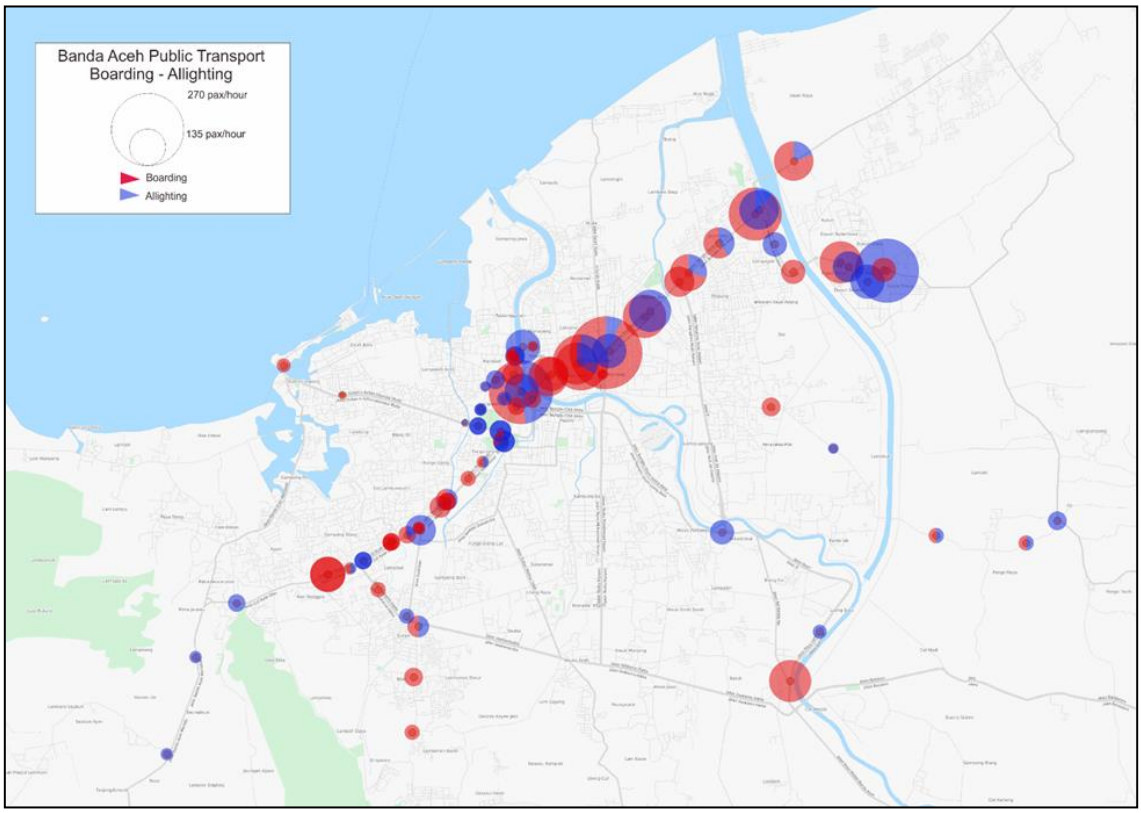
Source: Consultant

175. Figure 9.2 above illustrates peak hour frequency of the public transport network in Banda Aceh. Based on the survey, the segment along Jalan Teuku Nyak Arif has the highest frequency of 56 public transport/hour/direction when compared to other road segments in Banda Aceh. For much of this network, the mode is labi-labi.

b. Highest public transport demand

176. Figure 9.3 shows individual passenger boarding and alighting activity of the current public transport services in Banda Aceh. The data is shows the volume of boardings and alightings at specific locations on specific routes of the network.

Figure 9.5: Individual Boarding and Alighting Locations



Source: Consultant

177. The large circle shown in city center area around Masjid Raya Aceh and Jalan Teuku Nyak Arief is a reflection of high volumes of passengers alighting and boarding at those locations.

c. Road width – suitability for a BRT

178. Road right of way segments along Corridor 1 have sufficient width to build a dedicated median lane for the BRT. Table 9.1 contains the data from the five sites segments measured. The exception is the segment at Jalan Cut Meutiah which has road width of 15 meters and will need a special design to accommodate a BRT lane.

Table 9. 1 Road Segment width along BRT Corridor 1

Road Segment	Road Width (meters)
Jl. Cut Meutiah	15
Jl. Tengku Panglima Polem	29
Jl. Tengku Daud Beureuh	29
Jl. Tengku Nyak Arief	22
Jl. Jend. Ahmad Yani	22

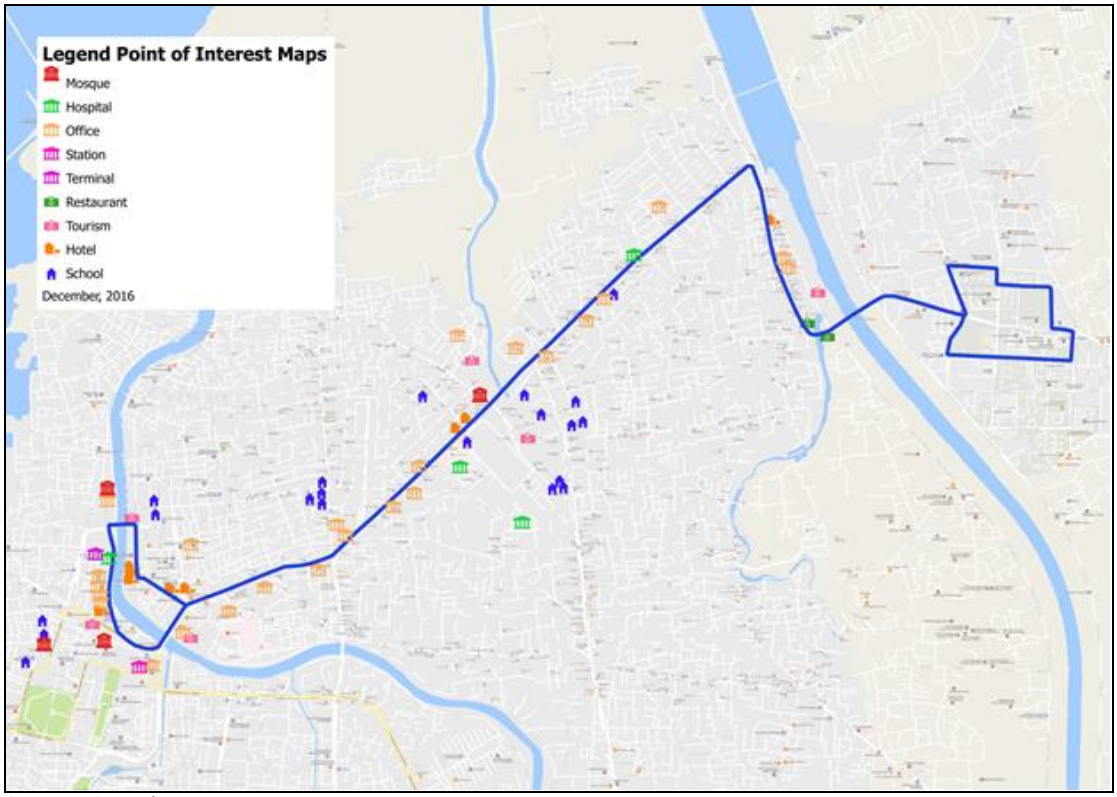
Source: Consultant

d. POI (Points of Interest – land use) along the corridor

179. The proposed BRT Corridor 1 starts from Keudah City Center district which is the Central Business District and which hosts a number of businesses retail shops, hotels, residences and the city bus terminal. As is shown in Figure 9.3 above, it is a key attractor and generator of public transport passenger trips.

180. From city center, the corridor continues eastward, passing along Jl. Teuku Nyak Arief which servcies schools and offices along this road segment. It ends at Kopelma Darussalam district which has a high density residential precinct and the University of Syiah Kuala. These locations along the proposed BRT corridor generate and attract a significant number of trips.

Figure 9.6: POI along Proposed BRT Corridor 1



Source: Consultant

e. Origin & Destination (O-D) Data

181. From the household and screen line surveys undertaken by the Governement of Banda Aceh, it is apparent that Kopelma Darussalam and Peunayong attract and generate the largest concentration of trip origins and destinations in Band Aceh. Figure 4.20 shows that the highest east-west O-D pair is between Kopelma Darussalam (east) and area around Peunayong (west). The proposed BRT corridor accommodates this proflific movement O-D pair.

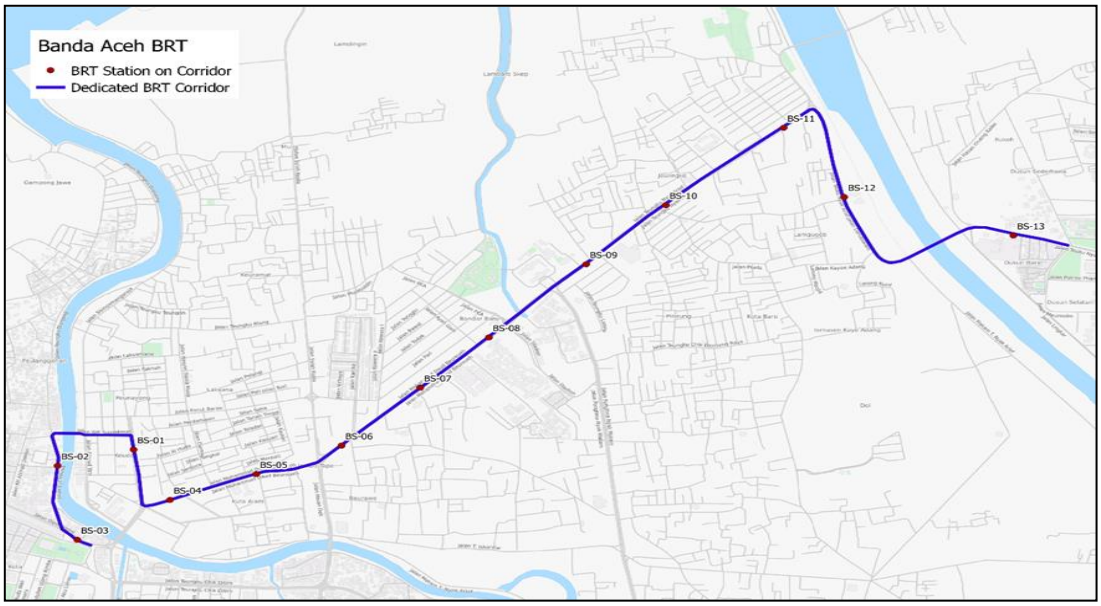
9.2.3 Corridor 1 Alignment Description

182. Based on the logical criteria of focusing on where the majority of passenger demand currently exists, the recommeded BRT corridor alignment option starts from city center area at Jalan Tengku Panglima Polem to Jalan Supratman and passes Keudah bus station and onto Jalan Cut Meutiah where it continues to Masjid Raya Aceh. From Jalan Cut Meutiah it proceeds to Jalan Tengku Daud Beureuh passing over the bridge at Jalan Pangeran Diponegoro. From Jalan Tengku Daud Beureuh it proceeds directly to Jalan Tengku Nyak Arief and ends at Jalan Jenderal A. Yani just before reaching the University of Syiah Kuala gate.

183. Most of the corridor route is currently served by the Trans Koetaradja route. It is anticipated that some minor modifications to existing route will be made in the CBD area. Furthermore, BRT Corridor 1 is proposed to end at Jalan A. Yani.

184. The Corridor 1 alignment option has total length of 8.5 kilometers and 13 BRT stations. The distance between stations is planned for approximately 500 – 800 meters depending on the passenger demand.

Figure 9.7: Banda Aceh Dedicated BRT Corridor Phase 1



Source: Consultant

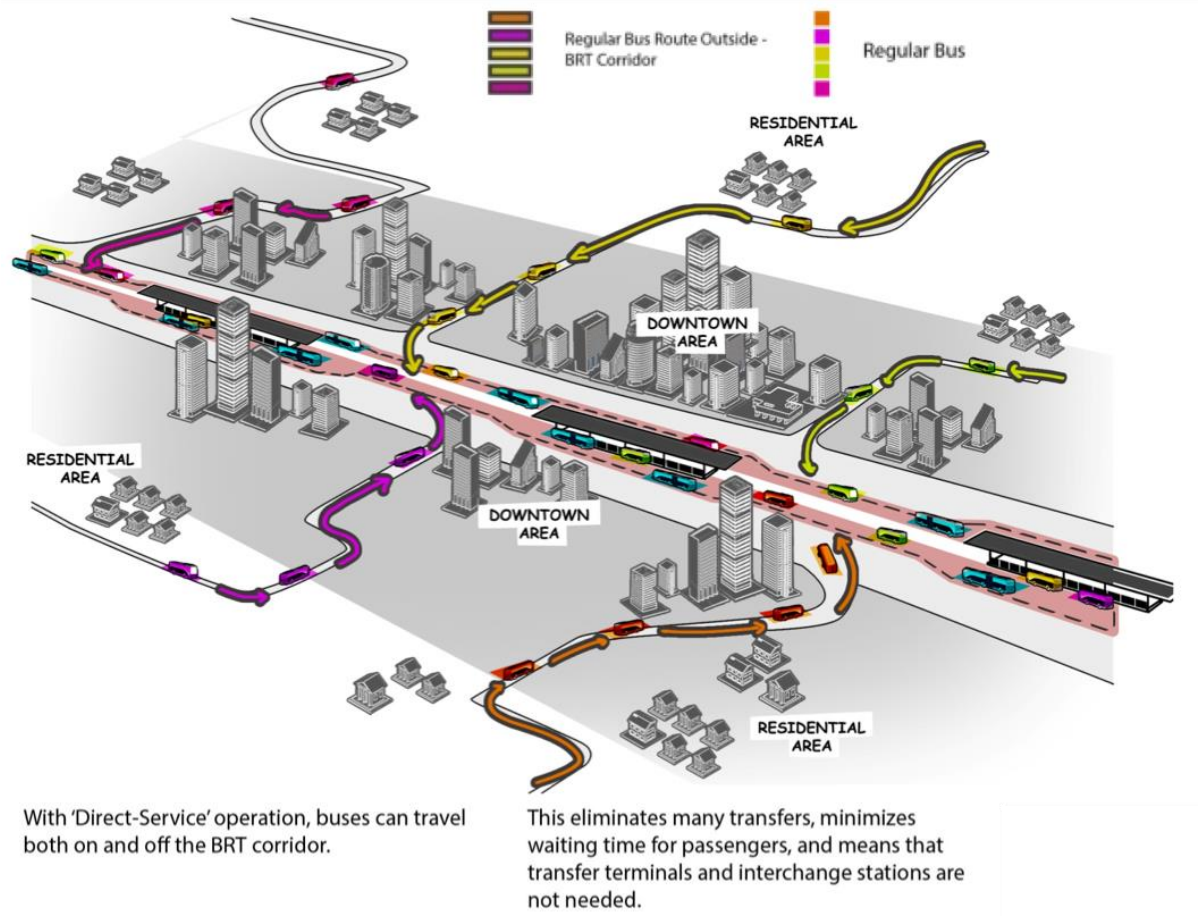
9.3. BRT Direct Service Operational Model and Routes Selection

9.3.1 Operational Model

185. For Banda Aceh BRT, a 'Direct Service' operational model is proposed, where the BRT buses can run along the BRT corridor and beyond the corridor to serve adjoining catchment areas. Based on the origin and destination data, the origins and destinations of Banda Aceh residents are not simply confined to the proposed BRT corridor. Thus, the Direct Service system will enable passengers to access the BRT from outside the corridor, without the need to transfer to/from other buses. In this context, the concept that the labi-labi fleet can provide a feeder service

to the BRT is not supported[12]. In this system, labi-labi service and routes will be part of the BRT. Figure 9.6 below illustrates this concept.

Figure 9.8: Illustration of BRT 'Direct Service' Operation Concept



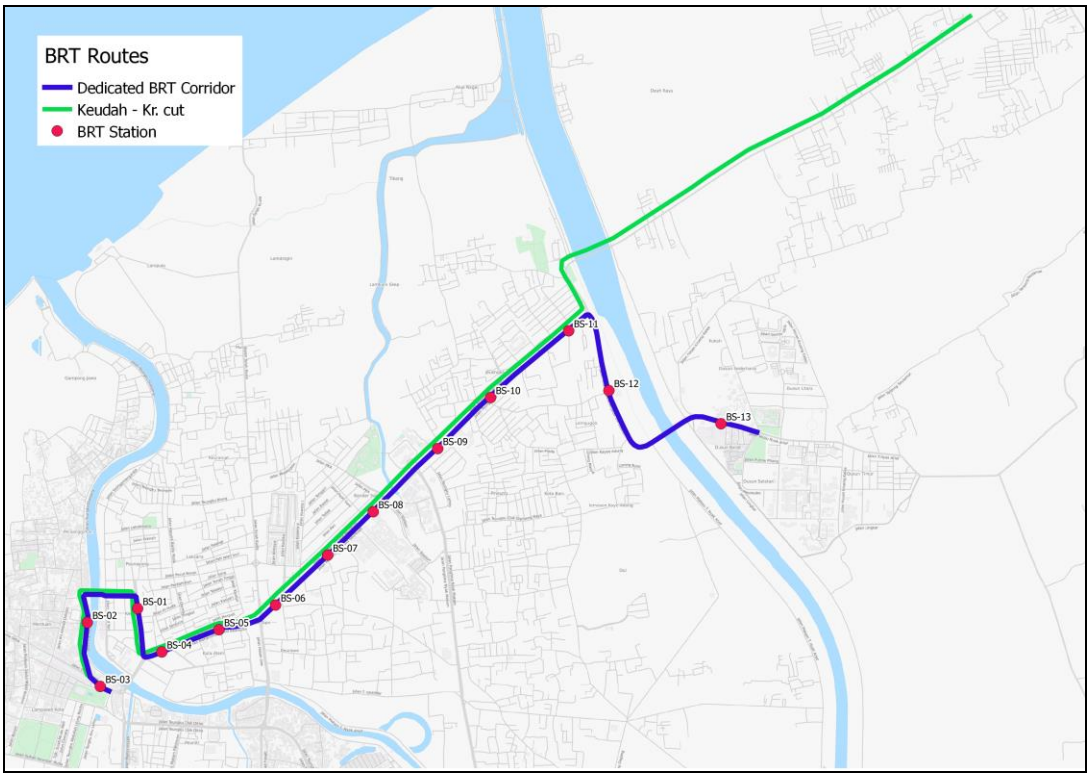
9.3.2 Route Selection

186. The basic approach for introducing Direct Service model is to analyze the existing public transport routes to see the possibilities of transforming them into BRT system and suggest modifications on some portions of the routes.

187. Based on those existing routes which overlap with proposed BRT corridor alignment, 2 Labi-labi routes and 1 Trans Koetaradja route were selected as BRT routes. For the purposes of this study, Route Keudah to Kreung Cut is called route (1A), route Keudah – Darussalam is called routes (1B) and routes Trans Koetaradja (Keudah – Unsyiah) is called route (1C).

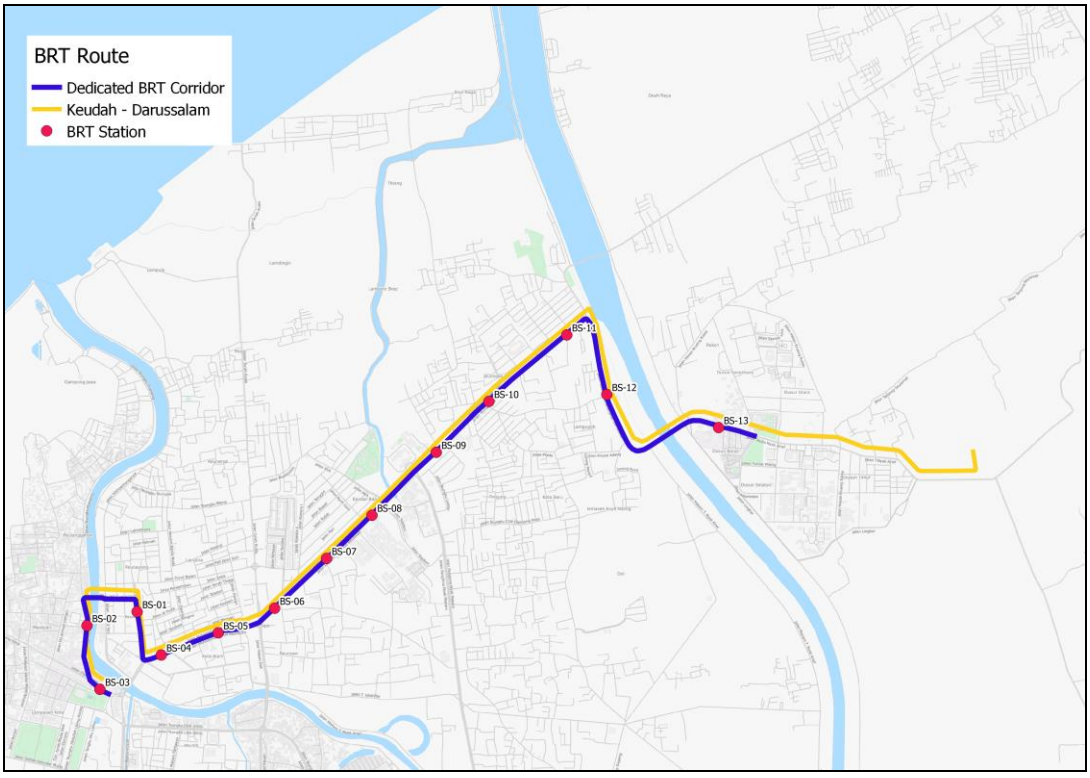
[12] In this context, reference is made to the failed angkot feeder service to the Trans Sarbagita system in Denpasar. That experience should not be repeated here.

Figure 9.9: Route 1-A Keudah - Kreung Cut



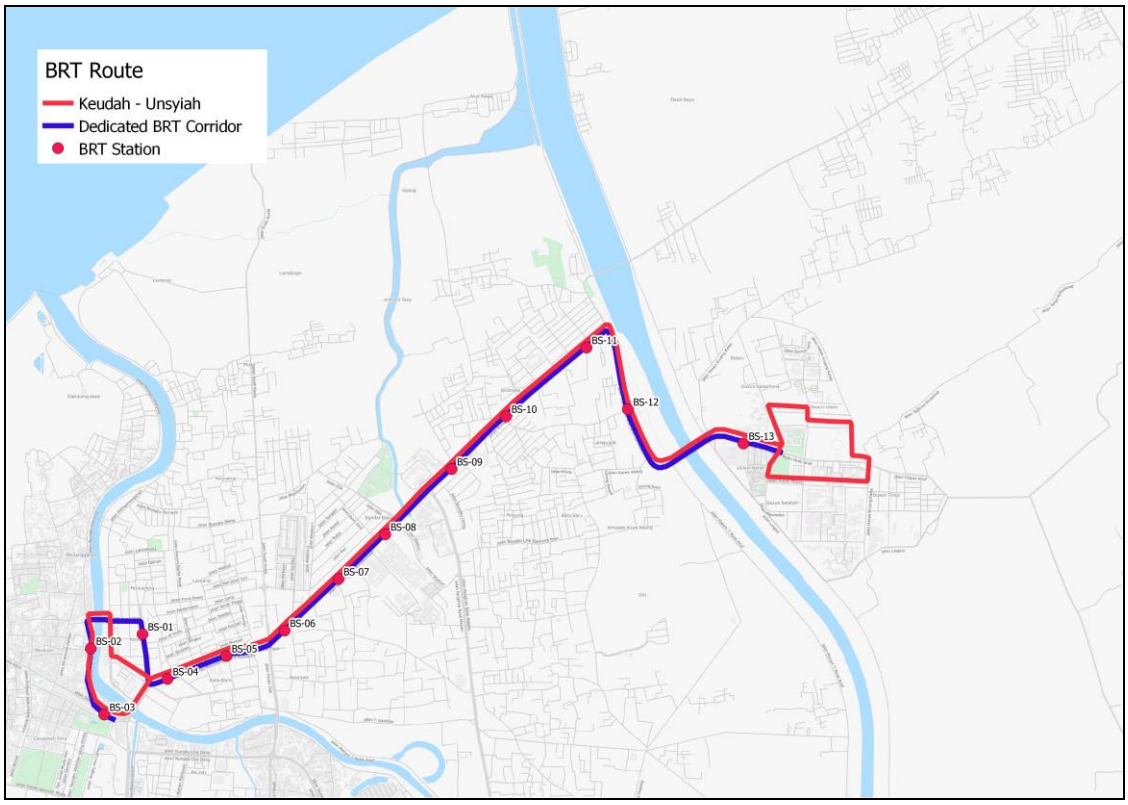
Source: Consultant

Figure 9.10: Route 1-B Keudah – Darussalam



Source: Consultant

Figure 9.11: Route 1-C Keudah - Unsyiah



Source: Consultant

188. An example of a direct service operation can be seen from Figure 9.7 – Figure 9.9 above. From Figure 9.7, BRT route 1A from Kreung Cut to Keudah city center, BRT buses run off-corridor along Kreung Cut road. When passing Jl. Teuku Nyak Arief where overlapped with BRT corridor, BRT buses run inside the BRT corridor starting from BRT bus station number 11 (BS-11) to BRT bus station number 1 (BS-01). This BRT buses have flexible operation inside and outsid BRT corridor.

9.4. BRT Route Area Coverage

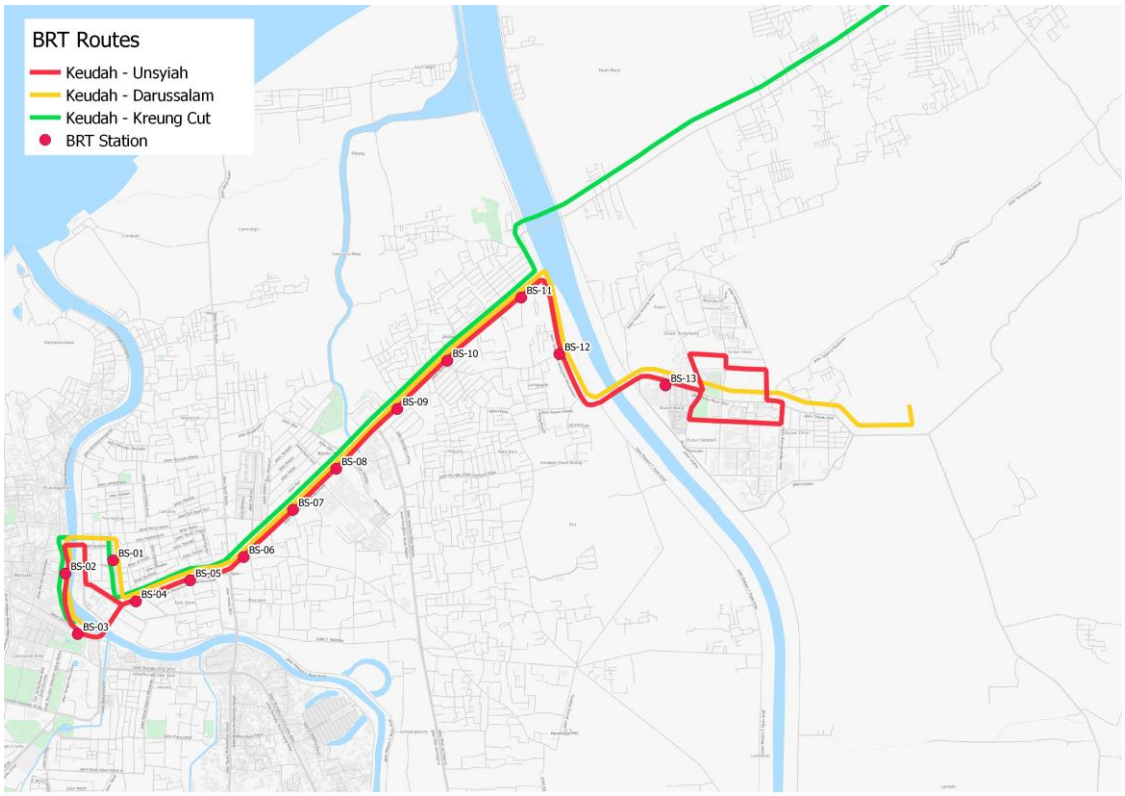
189. The BRT corridor length is 8.5 kilometers, however, with these 3 routers, its total length is 18.6 kilometer, with 8.5 kilometer operating inside the BRT corridor, and 10.1 kilometers off-corridor on the surrounding road network. The BRT buses operating on direct-service model will join and leave the corridor from the median of the BRT corridor. Table 9.2 lists the kilometres involved and Figure 9.10 shows this.

Table 9. 2 Details of Proposed BRT Routes

Route Number	Route Name	Route Length (km)	Inside Corridor BRT (km)	Outside Corridor BRT (km)
Route 1A	Keudah - Kreung Cut	10.5	6.28	4.22
Route 1B	Keudah - Darussalam	10.4	8.40	2
Route 1C	Keudah - Unsyiah	11.6	8.26	3.34

Source: Consultant

Figure 9.12: All Three BRT Routes Coverage



Source: Consultant

9.5 Off Corridor Bus Stops

190. Off-corridor bus stops are required outside the BRT corridor segments so that the BRT buses can pick up and set down passengers. For the 3 direct-service routes, 17 off-corridor bus stops are proposed.

191. Around Krueng Cut and Darussalam, the existing bus stops are not suitable for the proposed Direct Service. Accordingly, new bus stops will need to be provided at intervals of between 300 to 500 metres, having regard to location and the physical capacity needed to carter for anticipated demand levels (particularly at the University). When detailed design is being undertaken, the actual bus stop locations and size requirements can be considered further.

Figure 9.13: Off-Corridor BRT Bus Stop Design at University of Syiah Kuala

Before

After

Source: Consultant

9.6 BRT Vehicle and Infrastructure Improvement

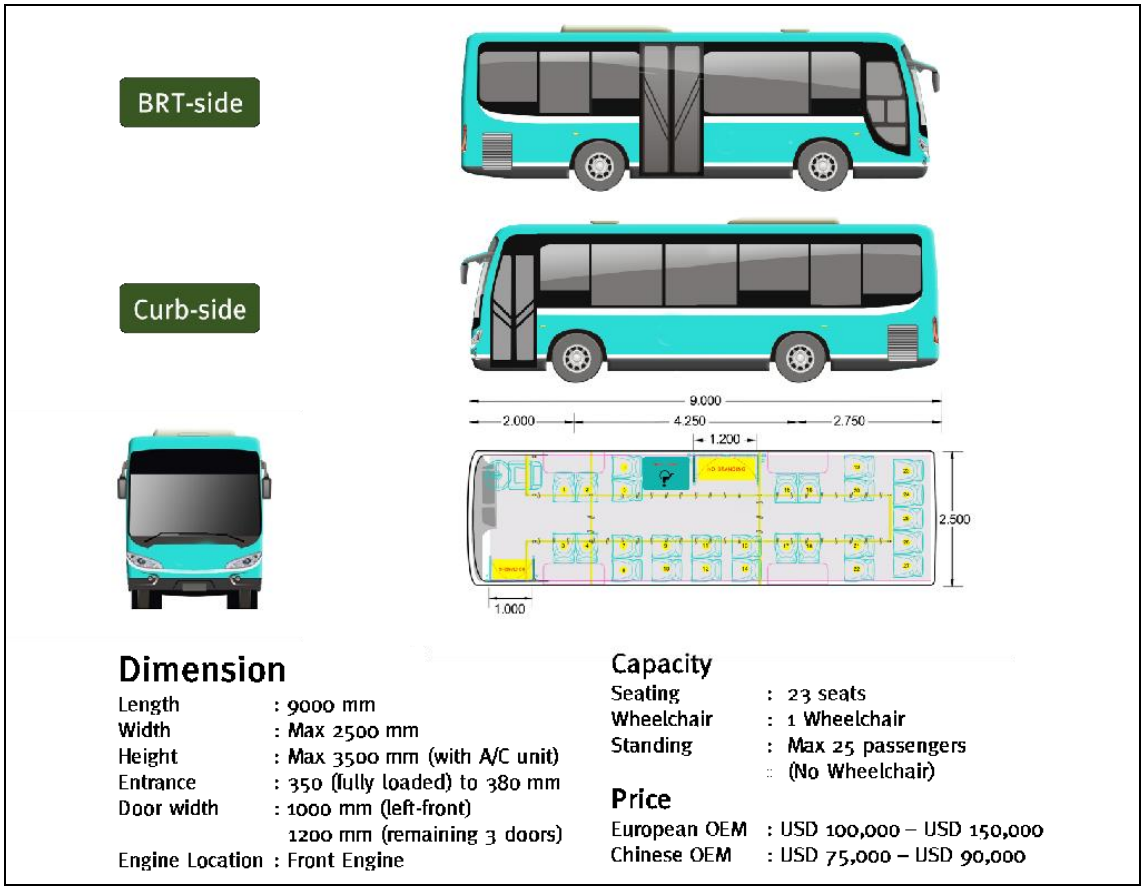
9.6.1 Vehicle Design Configuration

192. Two types of buses are proposed for the Banda Aceh BRT. These are 9-meter buses and 12-meter buses. With Direct Service BRT operations, the BRT buses will be passing onto the (often) narrower roads outside the corridor, such as

Jalan Teuku Glee Iniem and Jalan Krueng Raya. In this case, 9-meter buses with a 2.2-2.5-meter width would be more appropriate to operate. The 12-meter bus is needed for the median operation on the BRT corridor. Figures 9.12 and 9.13 illustrate this.

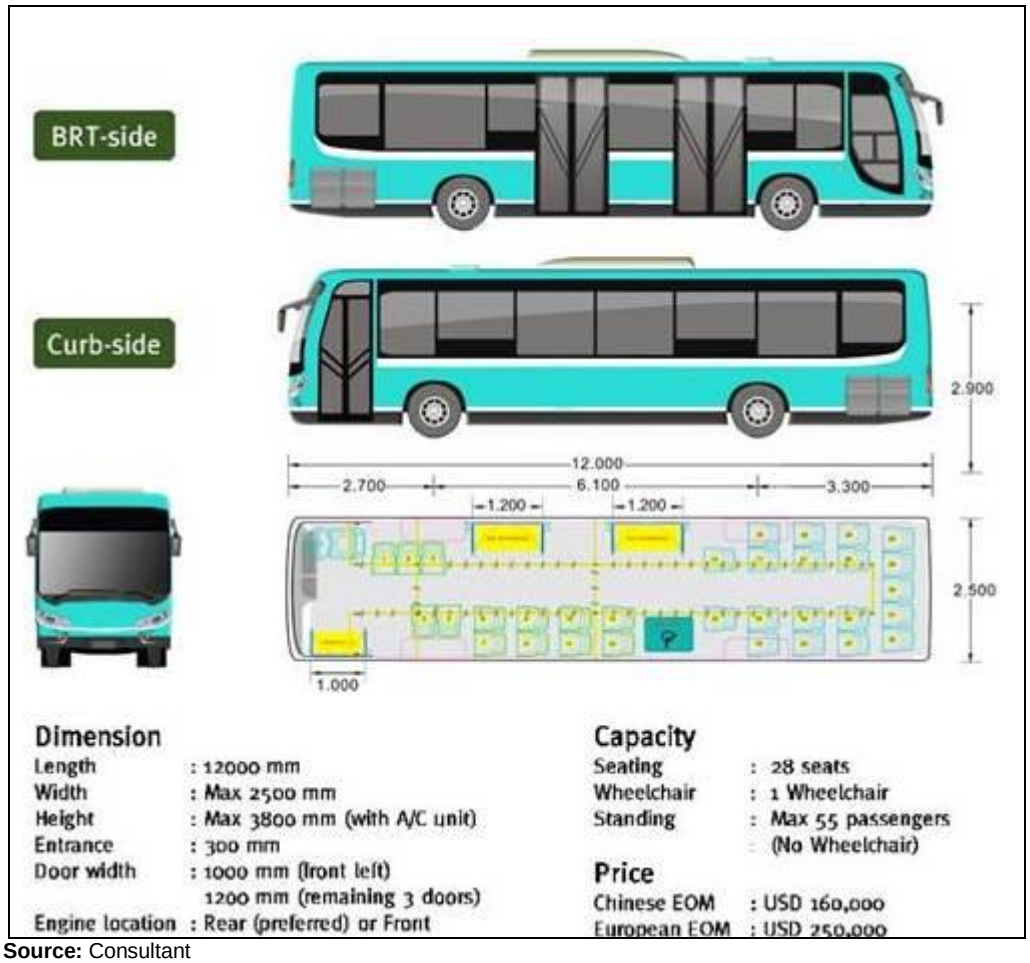
193. With Direct Service buses serving both the BRT corridor and off-corridor, they will need to have doors on both sides, and a low-floor entrance (30-35 cm) to ensure easy access from the curb side onto the bus.

Figure 9.14: Bus Configuration (9m)



Source: Consultant

Figure 9.15: Bus Configuration (12m)



Source: Consultant

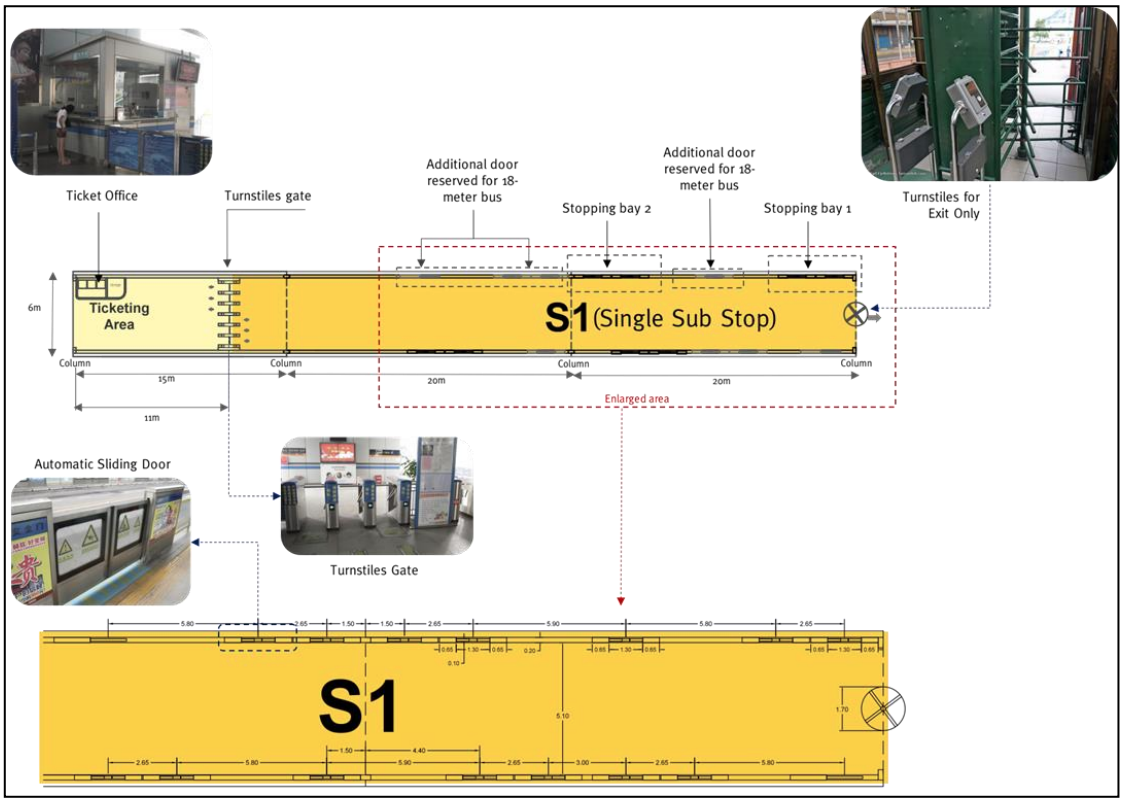
9.6.2 Station Design

194. For ongoing reference purposes, when designing the BRT station concept, the following key design features need to be considered:

i. High capacity stations
ii. Wide and comfortable stations
iii. Safe and weather-protected stations
iv. Universally accessible
v. Good passenger circulation

195. For Banda Aceh, most of the stations can be designed as one sub-stop since the demand is modest. In this context, no passing lanes at stations are likely to be required at the initial stage of operation.

Figure 9.16: BRT Station Design for Banda Aceh – 1 Sub Stop (55 meter length)



Source: Consultant

9.6.3 Station Access

196. Passenger access to stations is important as it is the basis upon which the station is connected to the surrounding area. While grade separated access is required in larger cities with wide arterials and significant traffic, for Banda Aceh, it is considered that at-grade zebra crossings will be appropriate. The reasons for this viewpoint include the relatively low demand, less traffic on the corridor which is manageable with signalized crossings and costs.

Figure 9.17: At-grade Zebra Crossing Access at BRT Station in China

Source: Consultant

9.7 Proposed BRT Station Locations, Cross Section and Design

9.7.1 Stations

197. There are 13 median based BRT stations proposed for the proposed BRT corridor and 17 curb side stations for the off-corridor sections. Tables 9.3 and 9.4 list these for ongoing reference purposes. Figures 9.16 and 9.17 illustrate them.

Table 9. 3 BRT Corridor 1 Station Locations

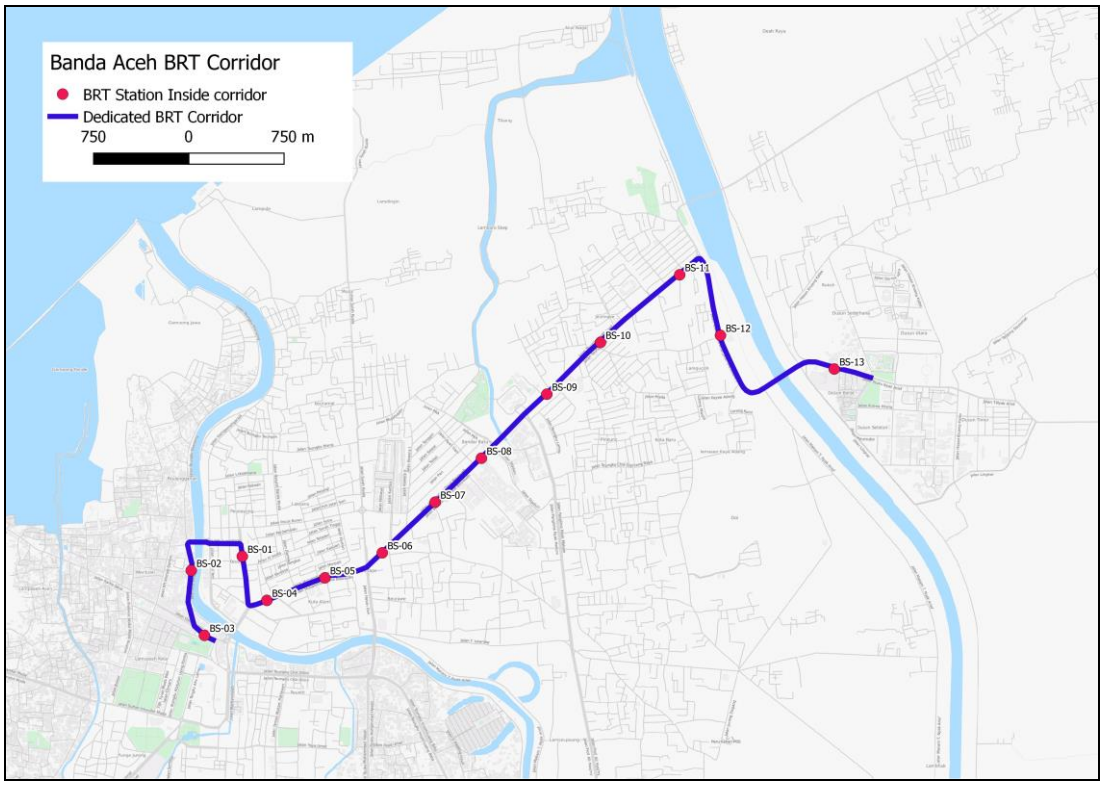
No	Name	Address	Building Nearby
BS 1	Panglima Polem	Jl. Tengku Panglima Polem	Dewantara Kopi
BS 2	Terminal Keudah	Jl. Cut Meutiah	Terminal Keudah
BS 3	Mesjid Raya	Jl. Diponegoro	Mesjid Raya
BS 4	Kejaksaan Tinggi	Jl. Tgk Daud Beureuh	Kejaksaan Tinggi
BS 5	Bulog	Jl. Tgk Daud Beureuh	Bulog
BS 6	Koramil	Jl. Tgk Daud Beureuh	Koramil
BS 7	RS Uza	Jl. Tgk Daud Beureuh	Wisma Lampriet
BS 8	Mesjid Al Makmur	Jl. Tgk Daud Beureuh	Mesjid Al Makmur
BS 9	Kantor Gubernur	Jl. Teungku Nyak Arif	BKKBN Kantor Gubernur
BS 10	RS Ubudiyah	Jl. Teungku Nyak Arif	RS Ubudiyah
BS 11	Simpang Mesra	Jl. Teungku Nyak Arif	RM Cibiuk Banda Aceh
BS 12	Peukan Lamnyong	Jl. Teungku Nyak Arif	Peukan Lamnyong
BS 13	SD N 82	Jl. A. Yani	SD N 82

Table 9. 4 Station Detail Information off-BRT Corridor

No	Name	Address	Building Nearby
CS 01	Peunayong	Jl. Jend. Ahmad Yani	Manulife Insurance
CS 02	Asrama TNI	Jl. Sri Ratu Saifuddin	Asrama TNI
CS 03	Lapangan Unsyiah	Jl. Tgk Cik Di Lamnyong	Lapangan Unsyiah
CS 04	Teknik Unsyiah	Jl. Putrof Phang	Teknik Unsyiah
CS 05	Dusun Timur	Jl. Darussalam / Jl. Tgk Glee Iniem	Dusun Timur Perumahan Dosen
CS 06	Unsyiah	Jl. Darussalam / Jl. Tgk Glee Iniem	Komplek Perumahan Turki dan BI
CS 07	Komplek Madrasah 1	Jl. Darussalam / Jl. Tgk Glee Iniem	Komplek Madrasah Islam Tungkob
CS 08	Komplek Madrasah 2	Jl. Darussalam / Jl. Tgk Glee Iniem	Komplek Madrasah Islam Tungkob
CS 09	Mesjid Jamik	Jl. Darussalam /Jl. Tgk Glee Iniem	Mesjid Jamik
CS 10	Lapangan Tugu	Jl. Darussalam / Jl. Tgk Glee Iniem	Lapangan Tugu
CS 11	Pasca Sarjana	Jl. Hamzah Fansuri	Fakultas Ekonomi D3 Unsyiah
CS 12	Jeulingke	Jl. Laksamana Malahayati	Perumnas Jeulingke
CS 13	Krueng Raya	Jl. Laksamana Malahayati	Gudang Depo Aceh PT. Indomarco
CS 14	Kantor Pos	Jl. Laksamana Malahayati	Bank Aceh - Cadek
CS 15	Laksamana Malahayati	Jl. Laksamana Malahayati	Bakso Nanggroe
CS 16	Simpang Kajhu	Jl. Laksamana Malahayati	Simpang Kajhu
CS 17	LP Kajhu	Jl. Laksamana Malahayati	LP Kajhu Besar

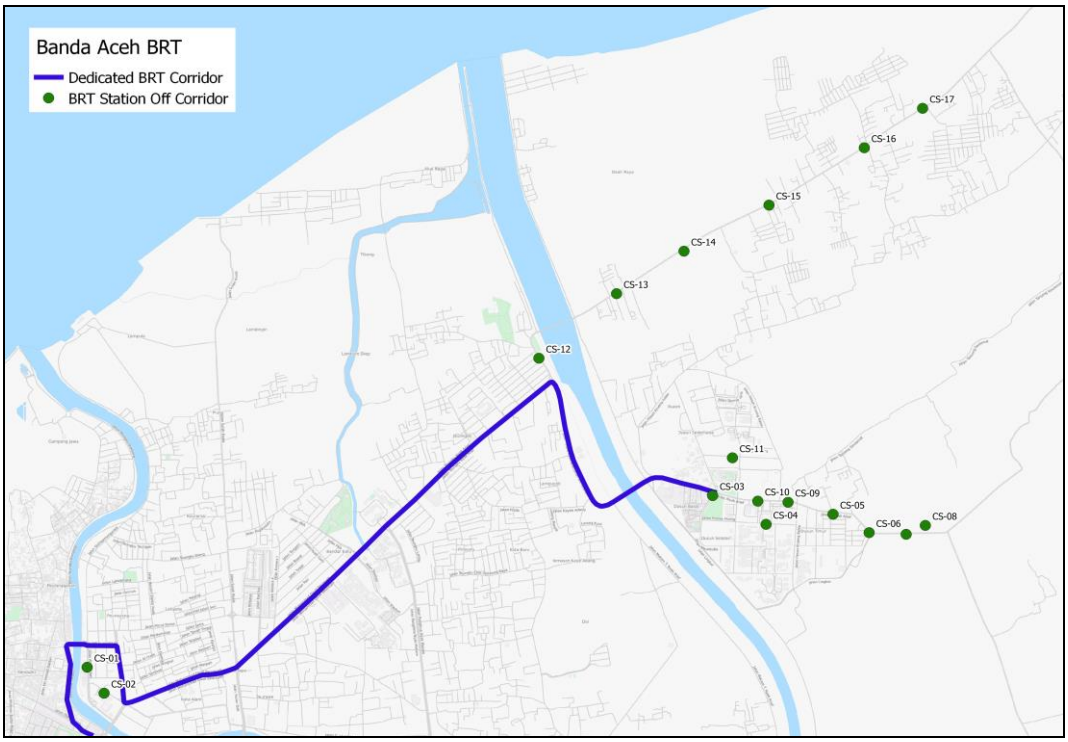
Source: Consultant

Figure 9.18: Corridor 1 BRT Station Location Map



Source: Consultant

Figure 8.19: Off-Corridor BRT Stop Location Map



Source: Consultant

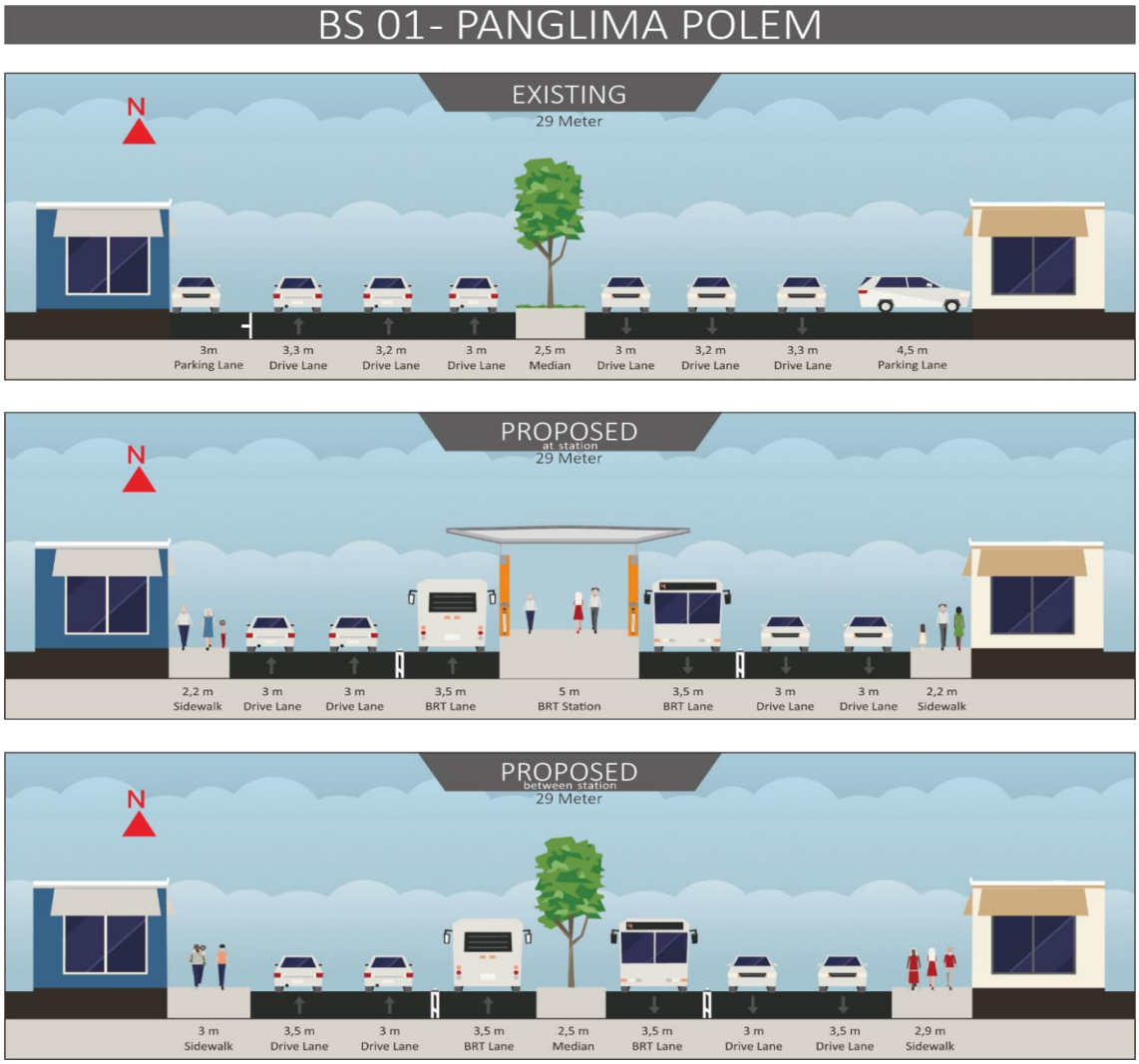
9.7.2 Typical Cross Section

198. The following images in Figures 9.18 to 9.22 show the station placement and typical cross section for selected stations along the corridor. For the purposes of this initial PFS, these can be taken as being representative of the station sitings an cross section conditions along the entire BRT corridor.

Figure 9.20: BS 01 Panglima Polem Proposed Station Location

Source: Consultant

Figure 9.21: BS 01 Panglima Polem Proposed Road Alignment Design

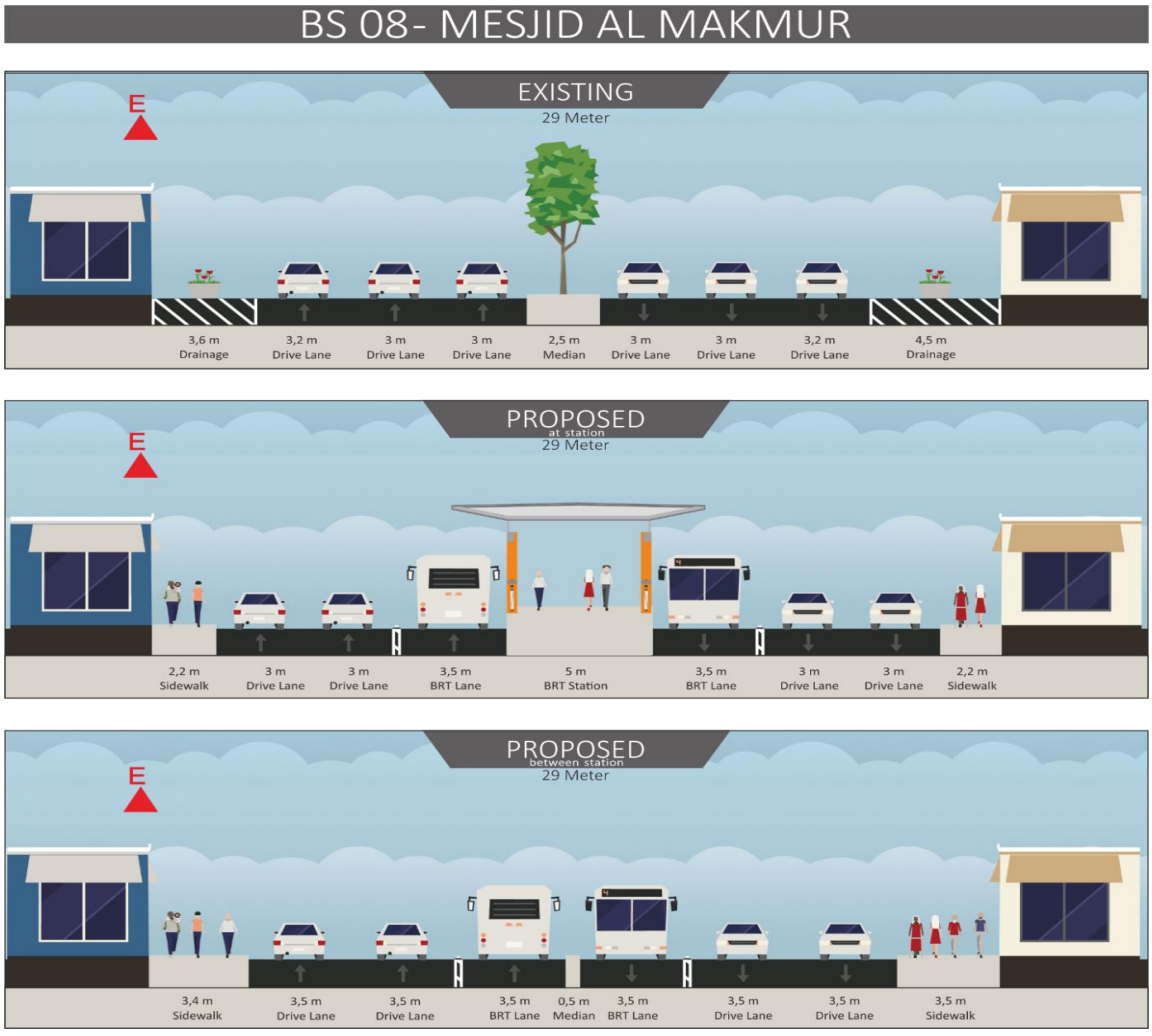


Source: Consultant

Figure 9.22: BS 08 Masjid Al Makmur Proposed Station Location

Source: Consultant

Figure 9.23: BS 08 Masjid Al Makmur Proposed Road Design



Source: Consultant

Figure 9.24: Image of BRT Station at Masjid Al Makmur

Before

After

Source: Consultant

9.8 BRT Business Model

9.8.1 Operational Plan and Fleet Requirements

199. The fleet requirements for the BRT has been determined by the demand, the future round trip travel time and the predicted average BRT service headway. For the BRT project, it has been assumed that the average speed on the BRT corridor is 25 km and at the off corridor operating speed is 20 km with the minimal headway on each route being 6 minutes. Based on these conditions, the total fleet needed for Banda Aceh BRT is 29 units. **Error! Reference source not found.** below lists this.

Table 9. 5 Fleet Requirements

Routes	Route	Route Length (km)		Bus Size (m)	Fleet
		On-corridor	Off-corridor		
Keudah - Kreung Cut	**1A**	5.52	2.2	9	8
Keudah - Darussalam	**1B**	8.2	2.0	9	10
Trans Koetaradja	**1C**	8.2	2.6	12	11
Total Fleet Required					29

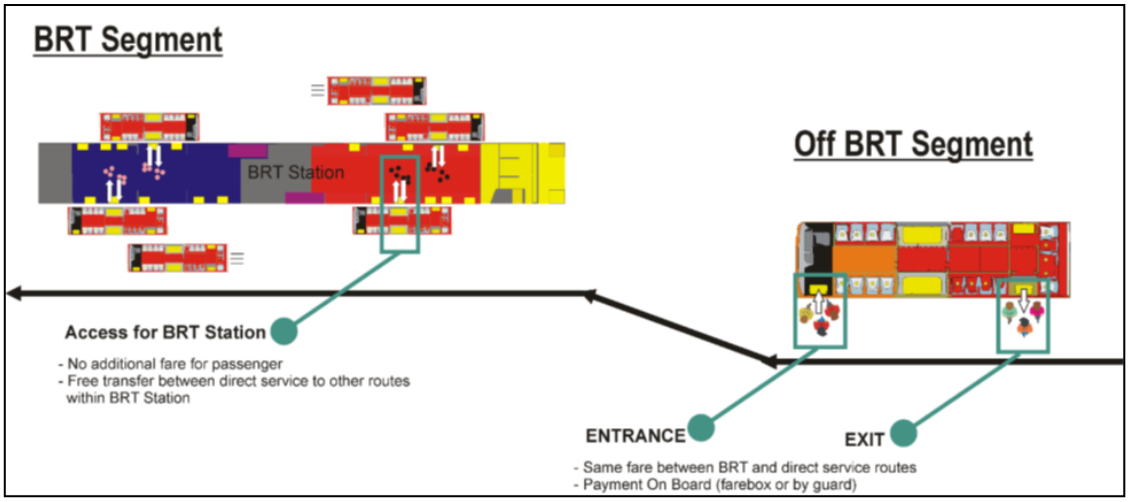
Source: Consultant

200. A flexible operation the averahe service headways can vary according to the number of routes operating along that section of the project. For example, the mid sections on the University road could have a bus frequency of 29 buses per hour per direction, whereas on the off-BRT corridor segment at Kreung Cut may only have a frequency of 8 buses per hour per direction

9.8.2 Payment Mechanism

201. For the Direct Service operation proposed, fare payment can be made upon boqrding a bus at a curbside location and off bus when boarding via a median station. Figure 9.25 illustrates this.

Figure 9.25: BRT Fare Payment Mechanism



Source: Consultant

202. A single fare is proposed with a continuation of the BRIZZI card ticketing system to avoid cash transactions. This implies a tap on arrangement when accesing median stations or when accessing buses from the curb side.

9.9 Estimate of BRT Infrastructure Cost

203. Due to the limited resources for the project, an assumption of 1.5 million US$ per/km has been used for cost calculation of the BRT infrastructure. This assumption is based on the consultant's previous work on the BRT for Transjakarta with some reductions due to a smaller station size and at grade passenger access for the Banda Aceh project.

204. For the 8.5 km dedicated BRT lane, the cost of BRT construction is estimated at US$12.41 million. This cost includes construction of BRT stations, the BRT median lane, and complementary footpath improvements along the BRT corridor. Table 8.6 summarises this. No estimate has been made of costs associated with off-corridor infrastructure development and accordingly these are not included in Table 9.6

Table 9. 6 Estimated Cost of BRT Construction

No	Component	IDR	USD	Percentage
1	Road Engineering	47,257,928,381	3,539,920	28.51%
2	Pedestrian Access	20,603,953,280	1,543,367	12.43%
4	Greenery	129,817,462	9,724	0.08%
5	Street Light	169,298,693	12,682	0.10%
6	Water Drainage	1,731,910,515	129,731	1.04%
7	Traffic Engineering (Road Marking and Traffic Signal)	1,800,098,587	134,839	1.09%
8	BRT Station	27,790,535,314	2,081,688	16.77%
9	BRT Station Power Supply and Lighting	2,436,578,536	182,515	1.47%
10	BRT Station Drainage and Fire Protection	83,878,433	6,283	0.05%
11	BRT Station Ventilation and Air Conditioning	97,006,640	7,266	0.06%
12	On-Station BRT ITS System	23,451,665,359	1,756,679	14.15%
13	Passenger Information System	1,436,015,701	107,567	0.87%
14	Traffic Organisation during Construction	1,889,494,344	141,535	1.14%
15	Traffic Surveillance Control	9,246,818,756	692,646	5.58%
16	Project Inderect Cost and Expences	27,625,000,000	2,069,288	16.67%
	Total	**165,750,000,000**	**12,415,730**	**100%**

Note: Exchange rate IDR13,350 = UDS$1. **Source:** Consultant

205. The cost calculation above does not include bus procurement costs. This is because fleet is often funded by operators in return for a multi year contract to Government in accordance with the recommended business model as discussed above. In the context of a business case for public infrastructure expenditure, the

fleet costs are generally omitted from this calculation. Such is the case in this instance.

9.10 Future Phase Corridor Implementation

206, Corridor 1 Keudah – Kopelma Darussalam is the first recommended BRT corridor to be implemented. Based on the origin and destination data, public transport frequency and demand, Corridor III Keudah – Mata Ie combined with Corridor IV Keudah – Lhok Nga which have more than 50% overlapped alignment is recommended to be implemented for the next BRT implementation phase[13]. These suggestions are based on the following:

i. There are high density residential areas along this corridor.

ii. Based on the existing public transport service levels, this corridor is the second highest in Banda Aceh and by implication (see next paragraph), is assumed to have the next highest demand. For reference purposes, the existing public transport frequency levels can be viewed in Figure 9.2 above.

iii. In addition to the segment along Trans Koetaradja corridor 1, and from the boarding and alighting survey taken for this study, Jalan Teuku Umar and Cut Nyak Dien (south west of the CBD) have a high number of passengers boarding and alighting on the four routes which travel along this segment (see Figure 9.3 for reference).

iv. Finally, based on the O-D data, the area along this corridor is the 10 largest origin and destination for Banda Aceh residents. It therefore has an important role to play in any future mass transit system developed for the city.

[13] Other corridors can then be considered as candidates for BRT network improvements based upon a more detailed analysis of the O-D data in Figures 4.20 and 4.21 in Chapter 4 of this report.

Figure 9.26: Top 10 Origin and Destination Locations in Banda Aceh

Source: Consultant

10. POTENTIAL FINANCING SOURCES

10.1 Introduction

201. This chapter comprises a high level scan of recent trends and characteristics of Budget Income and Expenditure of Kota Banda Aceh (City Government) and Pemerintah Aceh (Provincial Government) from 2013 to 2015 to help assess potential sources of financing for the project.

202. This scan addresses the project ToR requirement to determine whether there is sufficient capital funding for the project implementation of the pilot BRT Corridor 1 and annual recurrent funding for operations, maintenance and possible interest payments from loans for construction (if applicable) from City, Provincial and/or Central Government financing sources and, if so, to determine how such funds can be accessed. A commentary is also provided regarding the likelihood of the project attracting funding from International Financial Institutions (IFIs).

203. The scan should be read in conjunction with the financial and economic assessment (FEA) in Chapter 10 which provides preliminary capital and recurrent costs, and financial modelling results for the BRT Corridor 1 project. It is expected that these costs and results will be further defined for the project as it progresses towards detailed design and construction. Therefore, the following discussion and assessment of potential sources of funding should also be treated as preliminary given the high likelihood of future changes to both project costs and demand modelling results.

10.2 Financial Capacity of Kota Banda Aceh (City Government)

204. The primary data used to assess financial capacity and sustainability has been sourced from the Kota Banda Aceh Budget papers 2013 to 2015 *(Laporan Hasil Pemeriksaan BPK RI Atas Laporan Keuangan Permerintah Daerah Kota Banda Aceh).* For the purpooses of this review, the actual Income and Expenditure *(Realisasai)* data is the most accurate representation and is the record of the actual receipts and expenditures of the preceding year's Budget period. The difference between Income and Expenditure is the operational shortfall or surplus that provides an annual health check of the City Government's fiscal performance (see table below for Income and Expenditure over the period 2013 to 2015).

205. The primary features and conclusions for Income (*Pendapatan*) in the latest 2015 Budget year are as follows:

i. Total Income for 2015 is IDR 1,218B[14] comprising Local Income (i.e. taxes, charges, fees etc) of IDR 210B (17% of total Income), and Transfer Income (i.e. from Central Government and Provincial Government) of IDR 809B (67% of total Income). Local Income is raised directly by the City Government while Transfer Income sources are external to the City Government

[14] For the purposes of this chapter, B refers to billion.

ii. In terms of total Transfer Income, the Central Government contributes IDR 680B (56% of total Income) to the Kota Government mainly through the Dana Alokasi Umum (General Allocation Fund)

iii. Another source of funding are transfers from the Provincial Government that account for IDR 129B (11% of total Income) to the City Government

iv. The percentage break-up of Income has been very consistent over the past 3 years except for Provincial Transfers in 2015 that included a one-off transfer of IDR 117 B noted as financial assistance from the Governments of other provinces (*Bantuan keuangan dari pemerintah daerah provinsi lainnya);* the Provincial Transfer is consistently recorded as IDR 11B over 2013 to 2015

v. When combined, the Transfer Income from both the Central Government and the Provincial Government of IDR 939B compared total Local Income of IDR 210B highlights the dependence of the City Government on external transfer Income as opposed to taxes and other city fees and changes for the funding of capital projects and recurrent operational expenditures.

Table 10.1: Kota Banda Aceh Income and Expenditure 2013 to 2015

Kota	2013		2014		2015	
	IDR B	%	IDR B	%	IDR B	%
Total Income	928		1,134		1,218	
Taxes, Fees and Charges	129	14%	171	15%	210	17%
Provincial Govt Transfers	11	1%	11	1%	129	11%
Central Govt Transfers	631	68%	685	60%	680	56%
Total Expenditure	893		1,083		1,156	
Operating	770	86%	876	81%	934	81%
Capital	123	14%	208	19%	221	19%
Surplus/(Deficit)	22		37		62	

Source: *Laporan Hasil Pemeriksaan BPK RI Atas Laporan Keuangan Permerintah Daerah Kota Banda Aceh 2013, 2014 & 2015*

206. On the Expenditure (*Belanja*) side, this review of the 2015 Budget focusses on the segmentation of Operation and Capital expenditures and has identified the following features and conclusions:

i. Total Expenditures for 2015 are IDR 1,155B comprising primarily recurrent Operational Expenditures (i.e. Salaries and Wages, purchases of Goods and Services, Grants etc) at IDR 934B (81% of total Expenditure) and Capital Expenditures (i.e. works and infrastructure projects) at IDR 221B (19% of total Expenditure).

ii. In terms of Operational Expenditures, Salaries and Wages alone accounts for IDR 567B (61% of total Operational Expenditure) while the purchase of Goods and Services accounts for IDR 312B (33% of total Operational Expenditure)

iii. The above scan highlights that the Budget emphasis is concentrated on providing Salaries and Wages to Kota Government workers and the Goods

and Services needed to support their duties to the amount of IDR 879B with approximately IDR 221B of the City Government Expenditures available to fund the full range of civic infrastructure projects.

207. It is noted for the period 2013 to 2015, there have been funds carried forward in the form of an unspent surplus from the previous year ranging from IDR 22B in 2013 to IDR 62B in 2015 respectively that have also contributed positively to the City Government's annual financial position (see Table 10.1 above).

208. The primary conclusions from this scan of the City Government's budgets are as follows:

i. Under the existing budgetary arrangements, the City Government could not fully fund the BRT Corridor 1 project with a construction cost of IDR 166B given that its total capital outlays in 2015 are IDR 221B
ii. It may be possible for the City Government to fund up to around IDR 55B or 25% of the construction costs from its budget. Budgets sources may include using all or part of the Budget surplus (up to IDR 62B in 2015) and redirecting expenditure at the expense of other capital projects; otherwise the City Government would have to seek a loan in the absence of any other contributor whether in the form of an equity provider or as a grant
iii. For recurrent funding, the City Government only receives IDR 210B or 17% of total Income in Local Income which is a very limited income source; in addition, the City Government spent IDR 939B in Operational Expenditure in 2015 primarily on wages and salaries and goods and services. Taxes, fees and charges etc would have to be raised or expanded and/or savings would have to be found from this Operating Expenditure in the event of a subsidy being required for the BRT Corridor 1 operations and maintenance
iv. Notwithstanding this, there is a recent history of Budget surplus over the past 3 years including IDR 62B in 2015 that would be sufficient to cover some operating subsidy for the BRT if the daily passenger demand forecasts suggested in Chapter 5 above were not achieved and resulted in a shortfall in fare box revenue.

10.3 Financial Capacity of Aceh Provincial Government

209. The financial capacity and sustainability of the Aceh Provincial Government has been sourced from its Budget Papers 2013 to 2015 (*Pemerintah Aceh Laporan Realisi Anggaran Pendapatan Dan Belanja 2013, 2014 and 2015)*. The table below lists this for Income, Expenditure and Surplus/Deficit over the 3 year period.

210. From the outset, it is noted that the Provincial Government's Income and Expenditure are almost 10 times larger than the same items for the City Government thereby suggesting that the Provincial Government has a greater financial potential to contribute to the funding of the BRT Corridor 1 construction and annual recurrent operating and maintenance costs. It is also acknowledged that the Provincial Government has a significantly wider geographical scope and larger population base than the City government to support with its budget funding.

211. The primary features and conclusions for Income for the Provincial Government in the 2015 Budget year are as follows:

i. Total Income for 2015 is IDR 11,680B comprising Provincial taxes at IDR 1,172B (10% of total Income) and Transfer Income from the Central Government under the Special Autonomy Transfer comprising IDR 7,057B (60% of total Income)
ii. The Special Autonomy Transfer is due to cease in 2028 and would likely be replaced by some other form of Central Government transfer given that it is the dominant income source for the Aceh Province
iii. The percentage break-up of Income in 2015 is representative of the previous years of 2013 and 2014.

Table 10.2: Aceh Provincial Government Income and Expenditure 2013 to 2015

Provincial	2013		2014		2015	
	IDR B	%	IDR B	%	IDR B	%
Total Income	10,672		11,606		11,680	
Taxes	752	7%	1,030	9%	1,172	10%
Special Autonomy Transfer	6,233	58%	6,824	59%	7,057	60%
Total Expenditure	11220		12,045		12,135	
Operating	8438	75%	5,930	49%	6,260	52%
Capital	1650	15%	2,407	20%	2,025	17%
Surplus/(Deficit)	(549)		(439)		(455)	

Source: *Pemerintah Aceh Laporan Realisi Anggaran Pendapatan Dan Belanja 2013, 2014 and 2015)*

212. The scan of the Provincial Government's Expenditure in the 2015 Budget has identified the following features and conclusions:

i. The Capital Expenditure budget of IDR2,205 is 10 times larger than the same item for the City Government.
ii. Total Expenditures for 2015 are IDR 12,135B comprising primarily recurrent Operational Expenditures (i.e. Wages and Salaries, purchases of Goods and Services, Grants etc) at IDR 6,6260B (52% of total Expenditure) and Capital Expenditures (i.e. works and infrastructure projects) at IDR 2,205B (17% of total Expenditure). The remaining 31% of Total Expenditure is allocated to Transfers in the form of Financial Assistance to Kota and other Aceh Districts
iii. In terms of Operational Expenditures, Salaries and Wages accounts for IDR 912B (15% of total Operational Expenditure) while the purchase of Goods and Services accounts for IDR 3,302B (52% of total Operational Expenditure). The remaining 33% of Operational Expenditure is allocated to Grants.

213. Over the period 2013 to 2015, the Provincial Government has overspent its annual Budget ranging from IDR 549B in 2013, IDR 439B to IDR 62B in 2015 respectively. This eliminates the possibility of using unspent Budget funds for the BRT Corridor 1 construction costs (see Table 10.2 above).

214. In the context of this project, the following conclusions are made from the scan of the Provincial Government's Budget documents:

i. The Provincial Government does have the financial potential to fund the BRT Corridor 1 project (construction cost of IDR 166B) fully or in part, given that it's total capital outlays in 2015 are IDR 2,205B. In this case, some redirecting of its capital outlays from other infrastructure sectors would have to occur
ii. For recurrent funding, assuming that there are no increases and/or new taxes, fees and charges, the Provincial Government would have to find savings in its Operational Expenditure in the event of a recurrent subsidy being required for the BRT Corridor 1 operations and maintenance
iii. The Budgetary situation post 2028 could change since the Special Autonomy Transfer, currently at IDR7,075B or 60% of total Income of the Province, is due to terminate in 2028.This could create a major funding gap for the Province
iv. The overspending by the Provincial Government over the past 3 years means that there are no surplus funds which could be directed to the construction of the BRT Corridor 1 projects and later to providing a recurrent operating subsidy if the assumed daily passenger demand forecasts and fare box revenues are not realised.

10.4 Other Potential Funding Sources

215. The extent of funding in terms of equity, loans and/or grants which may be sought from international financial institutions, financial intermediaries and the National Government will be dependent on such factors as the national significance of the project, capital costs, the project's risk profile and Government of Indonesia (GOI) regulations.

216. Sub-national borrowing at the City Government and Provincial Government level is permitted with regulations in place that impose conservative restrictions to regulate sub-national borrowing consistent with international standards. The Ministry of Finance (MoF) restricts sub-national borrowing to the lowest value of four 'binding' norms. These are: (i) outstanding loans plus proposed loans should be less than 75 percent of the previous year's general revenue; (ii) the debt service coverage ratio (DSCR) should be at least 2.5; (iii) the loan value should not exceed the maximum allowed deficit; and (iv) total debt service should not exceed 20 percent of the sum of the general purpose grant (DAU) and revenue sharing transfer (DBH) so as to ensure adequacy in case of the need for the National Government to become involved.

217, In addition, the ability to significantly leverage private finance for long-term financing for local public infrastructure investment is not supported by private banks. The state-owned infrastructure finance company, PT Sarana Multi Infrastruktur (Persero) (PT SMi), has loan programs that fill the local infrastructure financing gap (see also below). The Aceh Provincial Government is currently debt free while the City Government has a very small debt that will be fully paid in 2017. In this context, were PTSMi to agree to a loan facility, the debt free status of Aceh Kota and Provincial Government would be able to support it.

218. It is also noted that Regulations have been amended recently to enable subnational governments such as the City and Provincial Governments to issue

municipal bonds for urban infrastructure. Subnational government budgets (APBD) can only be used to pay for small-scale projects or marginal improvements in basic services that take less than one year to complete, due to government budgetary rules.

219. The following provides a summary of the funding sources that were approached regarding providing support for the BRT Corridor 1 project:

i. BAPPENAS: In its capacity as the Central Government's national planning agency BAPPENAS was approached to ascertain its interest and potential to provide a grant through the national budget process (APBN). The indicative "off the record" response was the BRT Corridor 1 project was not significant enough in terms of the national interest and therefore BAPPENAS would more than likely not be willing to fund the project fully or partly. From a Central Government perspective, the Department of Transportation *(Departemen Perhubungan)* has provided the current fleet of TransKoteaRadja buses and this arrangement is more than likely to continue as the bus fleet is increased for the BRT Corridor 1 project.

ii. Asian Development Bank (ADB): While the ADB is sponsoring this study in conjunction with CDIA, the project is considered too small in capital cost for sole financing as an individual project. Notwithstanding this, there is some limited scope for packaging the project along with other BRT/urban transit projects being considered for other major Indonesian cities.

iii. World Bank (Jakarta Office): Enquiries revealed a similar "no" position considering the small size of the project and also that the project lacked any national significance. The World Bank advised that it is currently addressing the financing of small to medium infrastructure municipal projects through its funding packge to PT Sarana Multi Infrastruktur (Persero) ("PT SMI") to deliver the Regional Infrastructure Development Fund (RIDF).

This Capital Support for RIDF provides up to IDR 5.4T (USD 400M) for PT SMI to operate RIDF as a financial intermediary lending business line, to provide senior debt to subnational governments in Indonesia for economically viable infrastructure projects. In addition, the RIDF has a Project Development Facility (PDF) with the objective of building a project pipeline for RIDF by supporting subnational governments in project identification, planning and preparation while ensuring that subprojects are consistent with the required technical, financial, economic, social and environmental appraisal standards of the RIDF.

iv. PT SMi: This company is a state-owned enteIDRrise (SOE) which is solely owned by the Government of Indonesia (GoI) through Ministry of Finance (MoF). Its main business is in providing financing for the infrastructure sector in Indonesia. It operates under a limited liability structure with the ability to build capital, leverage and blend market financing. As an infrastructure financing company, PT SMI's operational activities are compliant with Minister of Finance Regulation No. 100/PMK.010/2009, which among others,

regulates the scope of financing projects covering transportation and other infrastructures approved by the MoF.

PT SMi has indicated that the BRT Corridor 1 project is a potential candidate for loan funding since it is a low capital cost municipal project that PT SMi is targeting. However, PT SMi would have to undertake its own assessment of the project against its funding guidelines to determine eligibility. Then if appropriate, it would proceed to negotiate commercial loan conditions with the Kota Banda Aceh and/or the Aceh Provincial Government. PT SMi has displayed a strong interest in the BRT Corridor 1 project throughout this study. In this respect, PT SMi sent two representatives to the workshop in Banda Aceh on 20 December 2016 to obtail an update on the findings of the draft study report and to participate in the workshop. From this, it is anticipated that PT SMi may give further consideration to the project when the final report is released.

10.5 Conclusions

220. The financial scan indicates that there is capacity from the Provincial and City Governments to co-fund in full, or in part, the IDR 166B construction costs of the BRT Corridor 1 project. However, for it to become a reality, there has to be a demonstration of political commitment and will of both governments to allocate capital funds in their budget processes to move this project from the planning stage to detailed design, construction and operation.

221. If partial funding is committed from the City and Provincial Governments, additional funds (loan) may be available from PT SMi under the RIDF or similar programs. Such funding would be subject to PTR SMi's assessment of the BRT Corridor 1 project and also to the City and/or Provincial Governments agreeing to the commercial conditions of any loan arrangement. There is also capacity for both governments to provide recurrent funding to cover annual operational costs and maintenance.

222. The major financial unknown and risk at this stage of the planning process, is the extent of the annual operating deficit if the indicative passenger forecast BRT outlined in this report passenger demand is not achieved for the project.

11. INDICATIVE FINANCIAL & ECONOMIC ASSESSMENT

223. This chapter provides the financial and economic assessment (FEA) results for the pilot BRT Corridor 1 project. The FEA has been undertaken using Cost Benefit Analysis (CBA) modelling comprising Discounted Cash Flow (DCF). The major modelling assumptions used for the FEA are as follows:

i. The BRT Corridor 1 project is estimated to cost IDR165.7B (USD12.4M)
ii. Recurrent costs (i.e. operating and maintenance) are estimated at IDR8.4B per annum or approximately 5% of construction costs
iii. The discount rate for the project Case is 12% and the sensitivity test at 8%
iv. The assessment period in the CBA is 20 years post construction
v. Daily passenger demand has been calculated at approximately 7,800[15].
vi. For the purposes of this initial estimate, passenger demand annual growth rates assumed are 5% for first five years of operation (2018 to 2023), then 3% per annum for 2024 to 2028) and 2% per annum thereafter to 2037.

224. While the FEA results provide quantitative results at the pre-feasibility study level to guide decision making, from a socio-economic perspective the project will also deliver city and community benefits through the following:

i. Improving transport efficiency (i.e. travel time savings, reduced vehicle operating costs, reduced congestion, enhanced road safety) for the corridor users
ii. Improving journey time reliability in the corridor so that it will enhance the functioning and livability of Banda Aceh communities
iii. Providing modern BRT infrastructure and buses to the transport disadvantaged and other BRT users in Banda Aceh allowing for better accessibility to the city centre, education (i.e. schools and university), religious and other community facilities in the corridor
iv. Provide environmental benefits of air quality, better public health and amenity and also road safety improvements along the corridor
v. Providing wider economic impacts to the city potentially acting as a catalyst for commercial development in the corridor.

Appendix A lists additional details of these items for ongoing reference purposes.

225. In addition, in the longer term public transit projects become more important as a city grows. This is very applicable to Banda Aceh and a modern BRT public transit system, as proposed for Corridor 1, will serve more discretionary passengers (people who have the option of both driving and using the BRT), and so provides

[15] Please refer to Chapter 6 for an explanation of the derivation of this estimate.

more benefits by reducing traffic problems in the existing congested corridor and supporting more efficient land use patterns.

11.1 Financial Assessment

226. The financial assessment has been undertaken to compute the project's financial performance indicators to assess the project's profitability and to verify the project financial sustainability over the duration of the assessment period; in this case 20 years' post construction. Cash inflows and outflows used in the modelling are described in the FEA Assumption Table below.

227. As a general rule, the financial assessment is carried out from the point of view of the infrastructure proponent. For the BRT Corridor 1 project, it is assumed that the owner and operator are the same entity (combined Kota and Provincial government entity) and therefore a consolidated financial assessment covering both owner and operator has been done.

228. The financial assessment has been carried out in constant (real) prices with the prices fixed at a 2017 base year. The use of current (nominal) prices that have been adjusted by the Consumer Price Index (CPI)] is not supported in urban transit FEA where forecasting of CPI over a 20-year assessment period is fraught with serious modelling danger (the same assumptions has been adopted for the economic assessment). The project's revenues are defined as the 'cash in-flows directly paid by users for the goods or services provided by the operation, such as charges borne directly by users for the use of infrastructure, sale or rent of land or buildings, or payments for services. In the case of the BRT Corridor 1 project, these revenues have been confined to fare box revenues although it is acknowledged that the project could be the catalyst for the sale or rent of government owned land in the corridor (e.g. the Keudah Terminal site adjacent to the Banda Aceh CBD).

229. Transfers or subsidies, that is transfers from Kota and/or Provincial government budgets, and financial income and payments (e.g. interests on project related loans) have not been included within the operating revenues and costs respectively for the financial assessment calculations of financial profitability because they are not directly attributable to the project operations.

230. Table 11.1 provides the results of the financial modelling for BRT Corridor 1 covering costs (i.e. capital construction costs, operating costs and infrastructure maintenance costs) and the fare box revenue that is attributed to forecast passenger demand for an assessment period of 20 years after proposed construction (assumed to be year of 2017).

Table 11.1: Financial Assessment Results for Corridor 1
(12% Discount Rate, 20 Year Benefit Assessment Period)

Item	Fare IDR 5,000		Fare IDR 3,000	
	IDR B	USD M	IDR B	USD M
Total Costs *(construction costs, operating and maintenance costs)*	**204.1**	**15.3**	**204.1**	**15.3**
Recurrent Costs *(annual operating and maintenance costs)*	**56.1**	**4.2**	**56.1**	**4.2**
Fare Box Revenue *(assumes a flat fare per passenger trip)*	**109.8**	**8.2**	**59.1**	**4.4**
Net Present Value (NPV)	**(94.4)**	**(7.1)**	**(145.0)**	**(8.9)**
Benefit Cost Ratio (BCR)	**0.54**	**0.54**	**0.29**	**0.29**
Annual Subsidy *(20-year average of recurrent costs minus fare revenue)*	**2.7**	**0.208**	**0.145**	**0.011**

Source: Consultant

231. A discount rate of 12% has been adopted for the project case in accord with ADB guidelines although it is acknowledged that the prevailing interest rate environment in Indonesia is well below this discount rate. It is noted that the Bank of Indonesia's 10- year bond rate is approximately 8%.

232. The key highlights from the financial assessment for Corridor 1 are as follows:

With a Flat fare of IDR 5,000

i. At a single flat fare of IDR5,000 and adopting the ADB discount rate of 12%, Corridor 1 is financially unviable with a BCR of 0.54 and a negative NPV of IDR94.4B (US$7.1M) over the 20 year assessment period
ii. This represents an annual operating surplus (fare box revenue minus annual operating costs and maintenance) of IDR 2.7B (US$208,000) per annum over 20-years excluding interest repayments for loans on construction costs if applicable
iii. Even adopting a lower discount rate of 8% (representative of the current long term bond rate in Indonesia) would only raise the BCR to 0.67 and a negative NPV of 75.7B (US$5.7M) still rendering the project financially unviable at this lower discount rate hurdle
iv. At the 8% discount rate, the annual operating surplus (fare box revenue minus annual operating costs and maintenance) is estimated at IDR 3.9B (US$291,000) per annum excluding interest repayments for loans on construction costs if applicable

With a Flat fare of IDR 3,000

i. At a single flat fare of IDR 3,000 and adopting the ADB discount rate of 12%, Corridor 1 is financially unviable with a BCR of 0.29 and a negative NPV of IDR145 B (US$10.9M) over the 20 year assessment period

ii. This represents a very minor annual operating surplus IDR 145M (US$ 11,000) per annum excluding interest repayments for loans on construction costs if applicable

233. The major financial risk for the project under any fare assumptions is the forecasts of BRT passenger demand not being achieved for the project. If passenger demand forecasts targets are not achieved, fare box revenue will not meet expectations and in the absence of any other revenue source from the project may result in the need for operating subsidies from government. This aspect will need further attention during the detailed design phase of the project.

11.2 Economic Assessment

234. The CBA is the principal evaluation tool used to assess the direct economic benefits and costs of the project investment when compared to a do nothing Base Case. Key economic performance indicators are the Benefit Cost Ratio (BCR), Net Present value (NPV) and Economic Internal Rate of Return (EIRR. A BCR greater than 1 and a positive NPV indicate that the project is economically justified under the set of assumptions in the CBA. In addition, the EIRR is calculated to determine the discount rate at which the total investment project's NPV becomes zero. The CBA adopts discounted cash flows and the BCR, NPV and EIRR are determined from aggregates of the Present Value (PV) of benefits and the PV of Costs over the project assessment period that is 20 years for the BRT Corridor 1 project.

235. It is important to note that CBA modelling of urban transit projects does have limitations that are set by assumptions and the range of factors that can be expressed in monetary terms. The CBA is based on a set of predetermined project objectives, giving a monetary value to all the positive (benefits) and negative (costs) welfare effects of the intervention

236. The economic assessment results are summarised in Table 11.2 below for the following:

i. Project case for BRT Corridor 1 using the ADB specified 12% discount rate
ii. Sensitivity case for BRT Corridor 1 using a lower discount rate of 8% that represents the 10- year bond rate in Indonesia.

237, On the cost side of the CBA, the modelling for BRT Corridor 1 covers capital construction costs, operating costs, and infrastructure maintenance costs while the benefits categories that have been modelled are travel time savings, vehicle operating costs (VOC) savings, road safety savings, emission reduction savings and residual life of the BRT asset at the end of the 20- year assessment period.

Table 11.2: Economic Assessment Results for Corridor 1
(Project Case 12% Discount Rate and Sensitivity Case 8% Discount Rate, 20 Year Benefit Assessment Period)

Item	Project Case Discount Rate 12%		Sensitivity Discount Rate 8%	
	IDR Bill	USD Mill	IDR Bill	USD Mill
Costs *(construction costs, operating and maintenance costs)*	**204.1**	**15.3**	**230.0**	**17.2**
Present Value of Benefits *(Travel time savings, vehicle operating costs savings, road safety savings, emission reduction savings and residual value)*	**266.4**	**20.0**	**377.7**	**28.3**
Net Present Value (NPV)	**62.2**	**4.7**	**147.7**	**11.1**
Benefit Cost Ratio (BCR)	**1.30**	**1.30**	**1.64**	**1.64**
Economic Internal Rate of Return (EIRR)	**17%**	**17%**	**17%**	**17%**

Source: Consultant

238, The key highlights from the economic assessment for Corridor 1 are as follows:

Project Case

i. The results highlight that for the ADB discount rate of 12%, Corridor 1 is economically viable with a BCR of 1.30, a NPV of IDR62.2B (approximately US$4.7M) and an EIRR of 17% over the 20-year assessment period.
ii. Total discounted benefits are IDR266.4B (US$20M) of which Travel Time savings contributes IDR176.2B (US$13.2M) or 66% of total benefits; VOC savings contributes IDR67.7B (US$4.8M) or 24% of total benefits vehicle; and the remaining 10% of benefits are spread across road safety (5%), emissions reductions (3%) and residual value (2%)
iii. The major risks for the project on the cost side are the estimation of construction costs and recurrent operating costs while the benefits are primarily driven the passenger demand forecasts inclusive of modal shifts from labi labi and private vehicle/ motor cycle to the BRT. If passenger demand forecasts are not achieved, then the modelled economic benefits will not be realised.

Sensitivity

i. For the lower discount rate of 8%, the economic performance indicators for Corridor 1 are, as to be expected, economically better than the project case with a BCR of 1.64, a NPV of IDR147.7B (approximately US$11.1M) and an EIRR of 17% over the 20-year assessment period.

ii. Total discounted benefits are IDR377.7B (US$11.1M) over the assessment period with the percentage segmentation of benefits the same as for the project case.

239. In summary, under the range of assumptions adopted for the economic assessment, the economic performance results indicate that the BRT Corridor 1 project is economically viable with a BCR of 1.30 at the high discount rate of 12% when compared to the prevailing 10-year bond rate of 8% in Indonesia.

240. The CBA modelling process and resulting economic performance indicators are only a component of the process of evaluating the economic costs and benefits of the project and should be considered alongside the major social, environmental, planning and budgetary considerations. Such a consideration needs to be undertaken during the detailed design phase of the project when more reliable costs and revenues are available.

12.THE NEXT STEPS

241. To achieve a successful implementation and ongoing sustainable operations of the Corridor 1 BRT Lite Direct Service project, the following observations are recommended for serious consideration by Government. It is to be appreciated that the discussion and recommendations below are on the assumption that Government ***has decided to proceed*** with the project and will be undertaking detailed design at the earliest possible time with a view towards implementation soon thereafter.

12.1 Institutional

242. The need to have a commitment by Government at both Provincial and City level is considered essential if the project is to proceed and succeed. For this, a BRT Champion is required who is able to ensure the whole of government and community appetite for progressing with the project. Unless this is achieved, the task ahead will be onerous and (based upon the experience in Indonesia) the project is likely to fail. So, once this has been confirmed, progress on forming the BLUD entity (as per Figure 7.1), communications with Trans Koetaradja, labi labi, ORGANDA, the private sector and the community in general can then progress towards making the project a reality.

243. At the project workshop in December[16], a number of matters relating to project specifictions, implementation and financing were discussed.

244. From a project specifications perspective, it was agreed that low floor buses with doors on both sides will be required for the BRT project. In the event that it is not possible to upgrade the labi-labi fleet in the short term (for whatever reason) it was agreed that doors be provided on the left hand side (as per angkots elsewhere in Indonesia). On the matter of labi-labi reform, while there was general agreement on the need for it, how it may be achieved remained an unknown aspect.

245. On the broader issues of institutional funding, implementation and ongoing management of the project, Workshop participants remained undecided. In this respect, it is apparent that further consideration and consultations between and amongst Government officials is required before a decision on the project can be agred upon.

246. In view of this, the following sections discuss the various matters requiring attention and are provided to help with the ongoing discussions both within and

[16] Project Workshop at Bappeda, Banda Aceh on Tuesday 20, December 2016.

between City and Provincial Governments on the matter. It is recommended that the items discussed below form a basis upon which these discussions can progress.

12.1.1 Whole of Government Agreement

247. For this, a simple working agreement needs to be reached between Provincial and City Government to:

i. Commit to working as a unified and whole of government basis for the benefit of the project. In this regard, the establishment of a BLUD as per the arrangements discussed in Chapter 7 and illustrated in Figure 7.1 should be commenced as the immediate priority for Government.

ii. In parallel with action (i), establish a working committee to determine the specific roles and actions required in relation to (i) funding capital expenditure, (ii) revenue sharing, (iii) funding operating expenditure (including subsidies-if applicable), (iv) additional PERDA regarding traffic management policies, (v) other institutional issues such as the coordination of POLDA and POLRES in supporting the ongoing financial sustainability of the system through regulatory compliance of general traffic and lastly but not least, (vi) establish a BLUD for the purpose of implementation and management of the project.

iii. Have this agreement formalised by Gubernor, Wali Kota, Kepala POLDA and Kepala POLRES and other stakeholders as is necessary to ensure compliance.

iv. Agree on timelines for commencement of the above actions and ultimately for the securing of finance for the project.

v. Upon securing the necessary budget for the BLUD, begin the capacity development phase with the recruitment of staff and the subsequent induction activities as well as the preparation of the relevant Business Plan and Business Procedures manuals. For this, external support may be needed. In this regard, a budget allocation will need to be secured for this.

12.1.2 Labi Labi Sector Role

248. For the labi labi sector, the continuing decline in demand is a wake-up call for a transformation prior to it becoming being beyond hope. In this regard, the following steps are recommended:

i. Engage with the labi labi interests and transmit the “facts of life” regarding the imminent disappearance of any demand for the sector,

ii. Discuss options for ongoing employment of the owners and drivers

iii. Explore where opportunities for an upgraded fleet of buses (not labi labi) could be capitalised upon and funded as an ongoing business opportunity,

iv. Work with the banking and business community, and implement supporting traffic management policies to help in the transition of the labi labi to a more modern and financially viable fleet.

249. It is recognised that the above items are likely to be aspirational as far as Banda Aceh is concerned. However, for the project to become successful, these matters need to be addressed. Only when there is an appetite to do so, is there likely to be an appetite from potential partnering financing entities. In this respect, and should Government feel a strong desire to progress along this pathway, then it is strongly recommended that external assistance be procured to assist in these (often) delicate aspects of consultation.

12.1.3 Supporting Push/Pull Policies

240. There are a range of traffic management, and associated land use policies which can be used to assist the public transport sector going forward and which are listed hereunder for Government to consider as both short and longer term initiatives.

241. In relation to push policies, the list can be quite extensive. However until an appetite is demonstrated to implement such initiatives, it serves little purpose at this time to document them in detail. In this respect, the limited number of policy interventions is considered relevant for initial adoption include (i) more effective kerbside parking with relevant limitations on a spatial (eg CBD) or temporal basis (eg peak), (ii) off street parking at limited locations with complementary limitations on kerbside parking in nearby streets, (ii) signal priority given to approved public transport servces over general traffic, (iii) enforcing the regulation that underage school children shall not drive a motorcycle, (iv) increasing parking charges in areas of the city to assist in manageing demand for the (to be) reduced numbers of parking bays provided.

242. In relation to pull policies, the list can also be quite extensive. As is the case with the above limited set of policy interventions, for the pull policies, they need to be relevant for the local conditions and (especially) within the capacity of Government to adopt and implement. For this reason, initial policy interventions suggested are limited to, (i) upgrading the city bus terminal into a commercial/hotel/trip generation/attraction facility with a corresponding station for the BRT incoIDRorated into it, (ii) upgrade the corridor and implement the BRT so that there is a viable alternative to the use of the car (or labi labi), (iii) undertake effective community consultation to encourage a change in mindset from a desire to own and drive a private vehicle to one where the BRT is the mode of choice for relevant trips, (iv) promote the awarding of benefits for those using BRT on a regular basis.

243. For these to become a reality, Government should seek the assistance of specialists in to help it develop the options which are most likely to be palatable for the general community. This is a matter which the above referenced working group can consider further once it is established. But for now, the purpose of listing of these policy interventions is to provide an initial set of targets on which the working committee can focus it’s attention apon.

12.2 Project Funding

244. As is typically the case, project funding is divided into the capital expenditure elements and the operational and maintenance elements. For this, an ongoing Government liability is likely to be encountered for the short and medium term. As the infrastructure upon which the services are to be provided will span both Kota and Provincial roads, a joint funding mechanism needs to be developed.

245. Chapter 10 outlines potential sources of funding for the project. In the event that Government decides external financing assistance is required, it should begin discussions with, first PTSMi to determine what conditions neeed to be agreed upon for sugbsequent funding support. Then depending on the results of these discussions, the appropriate actions[17] can be taken to progress the matter and (hopefully) secure the funding required.

246. In case there is an element of hesitancy on this aspect, Government should consider the scenario of a “do nothing/business as usual” option so that the consequences of failing to act on this matter can be appreciated at an early stage.

12.3 Detailed Feasibility and Design

247. Upon securing a reliable source of financing, and upon reaching a decision to proceed with the project, invitations need to be sent to the market for the preparation of detailed design and business model specifications for the project.

12.4 Implementation

248. Upon receipt of the detailed design and business model specificaions, when all financial and annual budgetary matters are agreed for the multi-year business model[18] required, and when the BLUD is fully functional, then implementation can proceed with the procurement of contracts for the construction and systems procurement.

12.5 Summary

249. In summary, and as the above steps indicate, there are a number sequential processes required to secure successful implementation of the project. For this reason, it is recommended that Government focus on gaining support from a partnering financing partner as the first priority. For this, the relevant arrangements regarding a working party, the necessary agreement between City and Provincial Governments are in place and a high level City and Provincial engagement

[17] If these discussions fail to secure the necessary financing required, then discussions with other potential financing partners shoud commence.

[18] The banking sector normally requires a 7-10 year service contract for the funding of bus fleets for public transport service contracts.

commence with PTSMi as a first priority. Then the next set of steps will be determined by the outcome of these discussions.

APPENDIX A: TABLE OF ASSUMPTIONS

This is a summary table of the relevant assumptions made in relation to initial demand estimates and the FEA discussion in Chapters 6, 10 and 11 respectively.

Item	Assumption
Indicative BRT construction costs (including roadway upgrades, bus stations/shelters etc.)	The following construction costs of IDR165.7B (US$12.4M) will be expended over a 1 year cash flow. Buses are not included since they will be sourced from the existing Trans Koetaradja fleet, granted by the central government and/or funded by the new operator(s) to be contracted for Corridor 1
Prices	Costs and revenue are in current (un-escalated) 2016 prices.
Funding for financial assessment only	Two options have been modelled • Initial construction costs are assumed to be fully funded (i.e.100% equity) from Kota and Provincial governments' budgets • 30% of Initial construction costs are assumed to be funded from Kota and Provincial governments' budgets with remaining 70% to be sourced as a municipal loan; the term for the loan is 5 years that aligns with the mayoral term of office that is the usual practice for municipal loans. Total repayments on the loan over 5 years at 7.5% lending rate are IDR143.2B (US$10.7M) with IDR28.6B (US$2.145M) repaid annually.
Assessment period	A 20 year revenue assessment period has been assumed starting in 2019 and to end 2038 for Corridor 1 following the completion of construction in 2018.
Discount Rates	Separate discount rates have been adopted for the financial assessment and economic assessment • Financial assessment: A discount rate of 7.5% has been used corresponding to the current lending rate for a municipal loan • An upper discount rate of 12% has been used in accord with ADB *Guidelines for the Economic Analysis of Projects*.
Existing modal occupancy numbers in Corridor 1	Existing total passengers per hour/direction in Corridor 1 by mode are as follows - based on survey data. From this, the estimated average weekday daily figures are in (brackets): • TransKoetaradja 110 (2,288) • Labi-labi 142 (2,954) • Motor Cycle 3,750 (78,000) • Motor Vehicle 2,392 (49,754) The estimated existing total passengers per day in both directions in Corridor 1 are 132,995. This is calculated by

	adding Peak (1 hour in AM and 1 hour in PM) to Off Peak (remaining 12 hours). For example the Trans Koetaradja daily figure is Peak (110X2 hours)X2 directions+Off Peak (110X0.7X2 directions)X12 hours. In this, Off-Peak assumes 70% of the passengers). A total of 14 hours per day is assumed for the BRT operations. Then the passengers from each mode are added to arrive at the average daily figure. See also Section 5.3.
Future passenger demand in Corridor 1 in first year of operation	The average weekday mode shift in terms of passenger numbers per hour per direction to the BRT Corridor 1 system in first year of opening is based on the following: • Trans Koetaradja: All the existing passengers at 110 passenger/hour/per direction will be retained on the BRT • Labi-labi: Current demand for Labi-labi in Corridor 1 is 142 passenger/hour/per direction. It is assumed that there will be 100% shift to BRT system because the BRT system includes the 2 Labi-labi routes that overlapped in Corridor 1, and as a result, these Labi-labi services will be withdrawn. • Motor cycle: It is estimated that a 2% shift of passengers to the BRT. This means 75 passenger/hour/per direction. • Motor vehicle (private car): it is assumed that a 2% mode shift to BRT will occur and this results in an additional 50 passenger/hour/per direction. • Based upon the above assumptions, the total BRT passenger demand/hour/direction is 375. When the demand from the above modes are expanded to an average daily passenger demand forecast, it is estimated that approximately 7,800 passengers will use the BRT Corridor 1 on a daily basis in the first year of operation. See also Section 5.3 for survey based data.
BRT Corridor 1 passenger demand escalation (Yearly)	Average annual growth rates from 2018 to end of 20 year assessment in 2037 for Corridor 1 are: • 2018 to 2022 5% • 2023 to 2027 3% • 2028 to 2037 2% Growth rates are based on induced demand for the BRT and from population increases in Banda Aceh and surrounds
Road safety	No crash data is available in the Corridor and it is conservatively assumed that Road Safety benefits will be in the order of 5% of total economic benefits.

Emission reduction benefits	Value of CO2 per tonne has been assumed at IDR133,500 per tonne equivalent to EUR 34 per tonne as is used in European Union Economic Assessments.
Annualisation	Annualisation factor assumed is 300. This is the expansion factor which converts daily passenger data to annual data taking into account lower passenger demand (i.e. 50% of normal weekday demand) on 52 weekends (Saturday and Sunday) and weekday (Monday to Friday) public holidays.
BRT single trip flat fare for financial assessment only	Two fares have been have been modelled namely • A BRT single flat fare of IDR 3,000 • A BRT single flat fare of IDR 5,000.
Residual Value	No residual value has been adopted at the end of 20 years.
IDR to USD	A conversion rate of US$1 to IDR13350 has been used.
Investment decision outputs	The following CBA investment outputs have be calculated: • Benefit-Cost Ratio (BCR): Ratio of the total present value (discounted) of benefits over the present value of costs. BCR greater than 1.0 indicates that the project is economically justified to the extent that it covers costs • Net Present Value (NPV): Calculation of net value in discounted terms (i.e. discounted economic benefits less the discounted costs) over the assessment period. A positive NPV indicates that the project is economically justified to the extent that it covers costs • Financial Internal Rate of Return (FIRR): The discount rate at which the total investment project's NPV (discounted revenues less discounted costs) becomes zero, has not been recorded since FIRR will be a negative value. Economic Internal Rate of Return (EIRR): The discount rate at which the total investment project's NPV (discounted economic benefits less discounted economic costs) becomes zero.