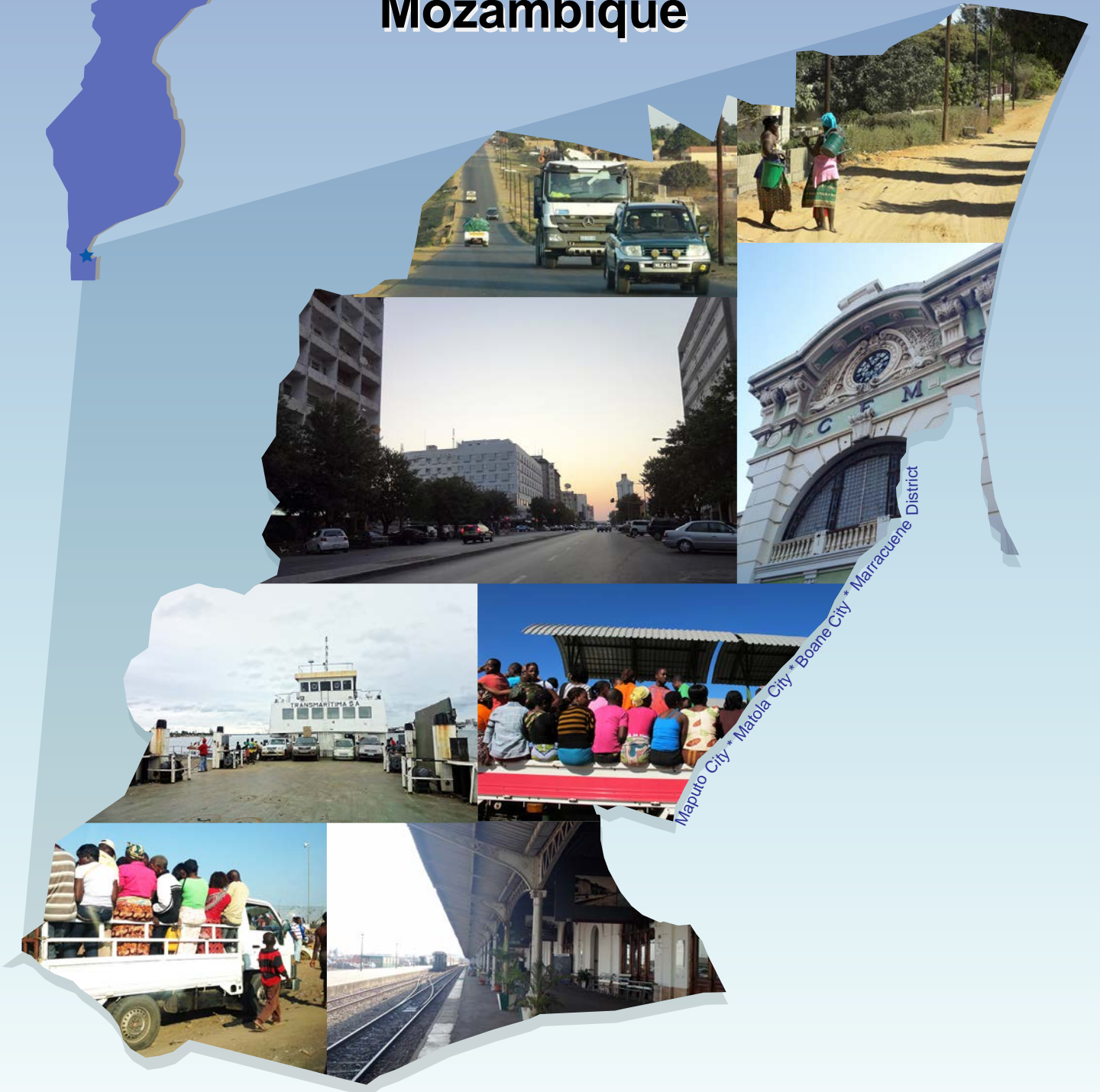




Japan International Cooperation Agency (JICA)  
Directorate of Transport and Traffic  
Municipal Council of Maputo, Republic of Mozambique

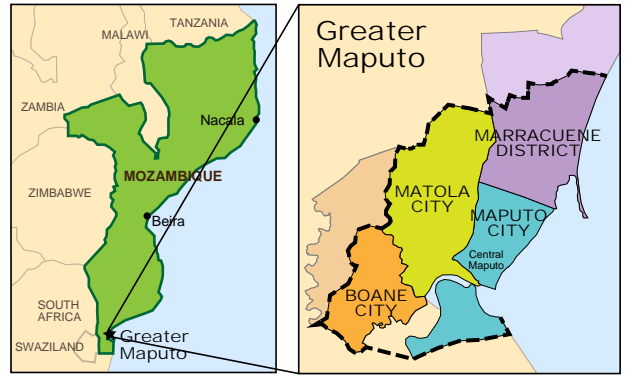


# Comprehensive Urban Transport Master Plan for Greater Maputo Mozambique

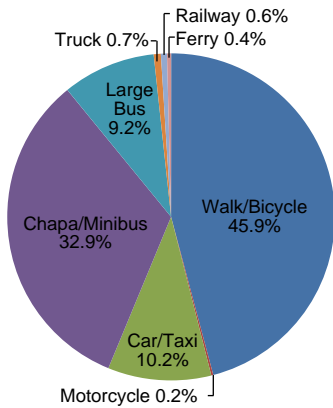


# GREATER MAPUTO

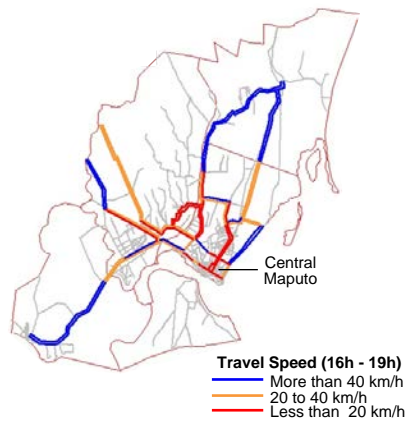
- ❖ The economy in Mozambique has been robust during the past decade. With the expected inflow of investments and returns from projects, economic growth is expected to accelerate in the medium term. Population in the Greater Maputo Area is expected to increase from 2.2 million in 2012 to 3.7 million in 2035.
- ❖ The Study area is "Greater Maputo" shown on the right and these areas have strong economic linkages. Central Maputo has offices and commercial buildings, and in Matola, there are manufacturing industries. Maputo and Matola absorb most of the labor force with outer areas also undergoing residential developments. The Urban Transport Master Plan needed to consider the entire Greater Maputo area as one complete metropolitan entity.



## Existing Modal Split in Greater Maputo



## Existing Travel Speed in Greater Maputo



- ❖ The traffic in Greater Maputo is dominated by cars and chapas (mostly 15-25 seat minibuses), making the overall transport system inefficient with the low use of conventional buses (see the existing modal split).
- ❖ The traffic capacity of arterial roads in urban areas has been saturated during peak hours (see the travel speed) especially between Maputo and Matola (East-West Transport Axis) and toward north from Maputo City Center (North-South Transport Axis).
- ❖ There are an insufficient number of arterial roads that are complementary to national roads or other existing arterial roads. Furthermore, a considerable length of major roads remains unpaved. There is also a significant need for increasing traffic capacity to meet the growing travel demand between Maputo City Center and suburbs.
- ❖ There are various traffic bottlenecks (e.g., major intersections) causing an excessive loss of transport capacity, some of which are also identified as traffic accident hotspots. These bottlenecks need to be urgently improved.



Unpaved streets to residences in the northern area of Maputo City



CFM Maputo Station



Chapa (front) and TPM Bus (behind)



Parking Control Device for parking system in Maputo City Center

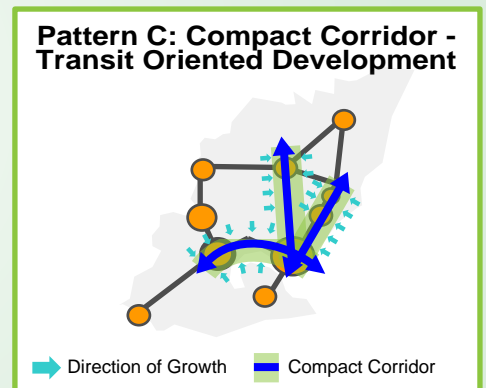
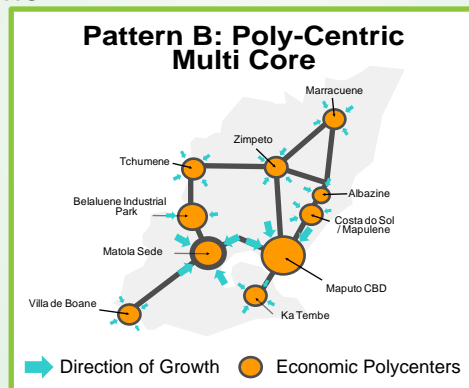
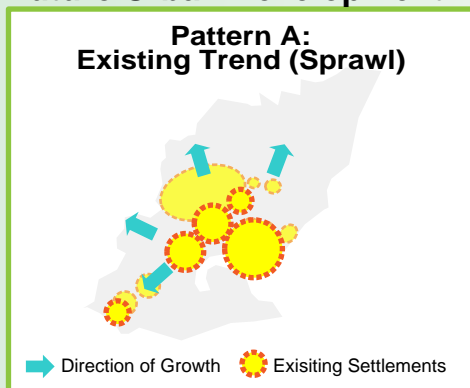
# Urban and Land Use Planning

- ❖ To date, although an urban structure plan for Maputo City and another for Matola City exist, there is no effective urban structure plan targeting the entire area of Greater Maputo. Therefore, the study set out urban development strategies and scenarios for Greater Maputo as one of the bases for urban transport master planning. The urban development vision set forth and agreed upon is:

## “Socially and Environmentally Sustainable International Gateway Capital”

- ❖ To achieve the urban development vision, three core strategies: 1) Multiple Core Urban Structure, 2) Sustainable Economic Development, and 3) International Capital for Culture were set forth, and the following three scenarios of future urban development pattern and corresponding transport network characteristics were identified, with Pattern C selected for master plan development.

## Future Urban Development Pattern



## Transport Network Options

**Conventional Buses and Chapas Based System (Scenario A Network)**

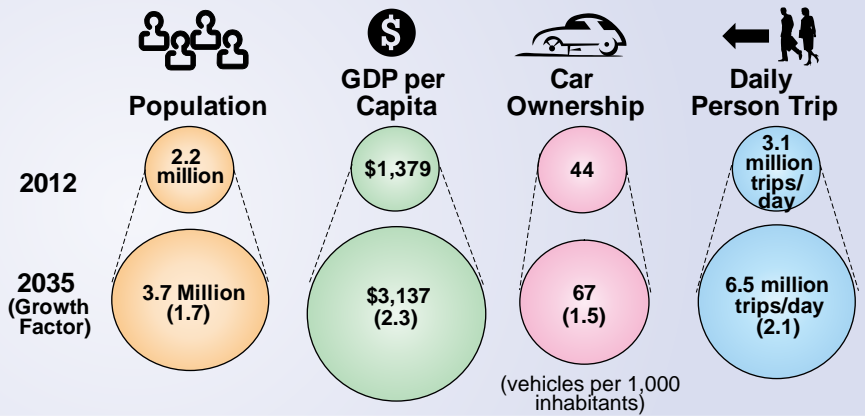
**Road Based Mass Transit System (mainly BRT) (Scenario B Network)**

**High Capacity Mass Transit System by Rail and BRT (Scenario C Network)**

BRT: Bus Rapid Transit

# Socio-Economic Indicators

❖ The expected growth in population and GDP per capita, the resultant growth in car ownership and daily person trip totals from 2012 to 2035 have been forecasted.



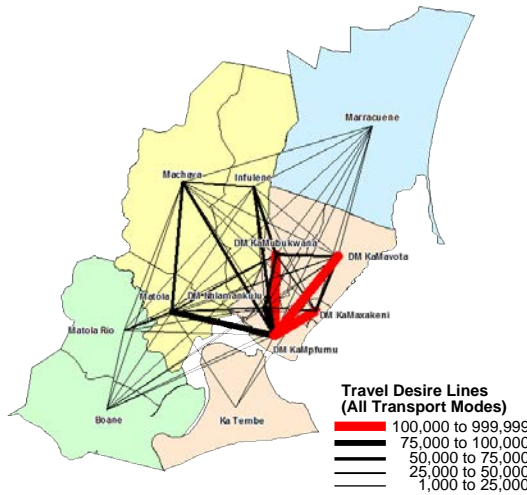
## Transport Analysis

❖ In order to formulate a comprehensive urban transport master plan with an appropriate set of development/improvement projects, the study conducted a variety of traffic surveys including the household interview survey (person trip survey). Demand modeling and traffic forecast was then carried out by using the results of these surveys. The summary results are illustrated below.

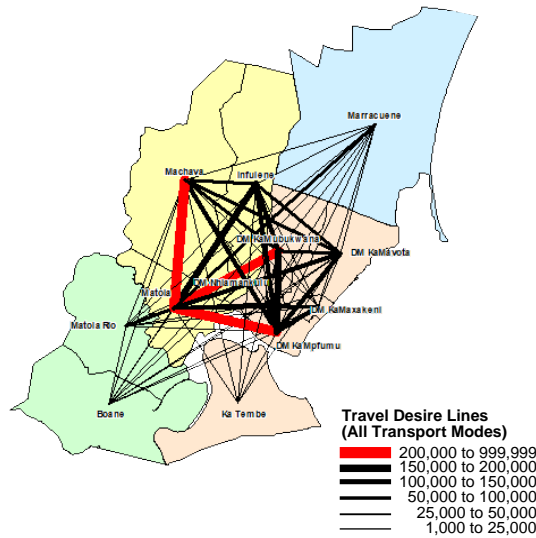
### ❖ Estimated Travel Patterns in 2012 and 2035

Present and future travel desire lines (representing the numbers of daily trips between zones) are shown below.

**Travel Desire Lines in 2012 (All Transport Modes)**



**Travel Desire Lines in 2035 (All Transport Modes)**



Roadside Origin-Destination Survey

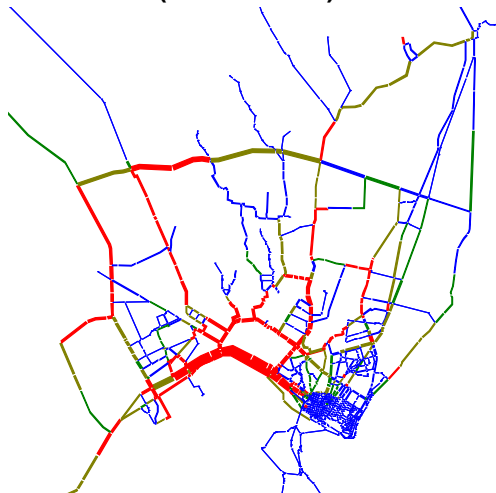


Household Interview Survey

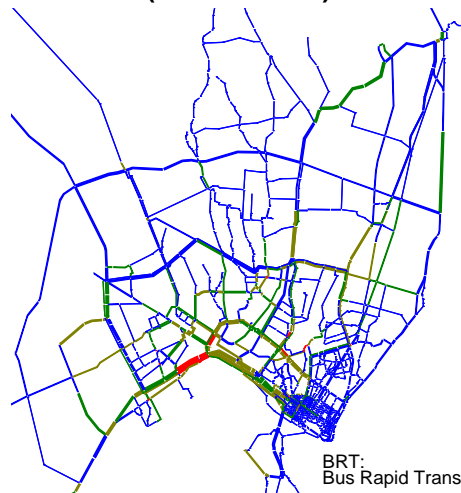
### ❖ 2035 Traffic Assignment

If no additional investment is made (Scenario A: Do Minimum), i.e., only the existing roads and those under construction are included, heavy congestion is expected on the main arterial roads by 2035 while the extent of congestion will be greatly reduced with mass transit network development especially through commuter rail and BRT developments (Scenario C). Scenario C was selected as the Master Plan Network (see backcover).

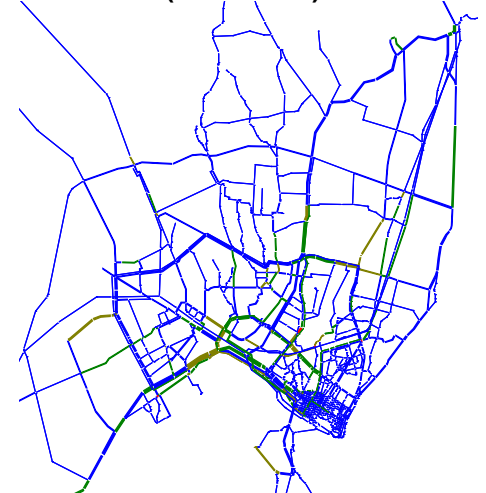
**Scenario A Network (Do Minimum)**



**Scenario B Network (BRT Network)**



**Scenario C Network (Rail & BRT)**



**Traffic Volume-to-Capacity Ratio (VCR), indicating the extent of congestion**

Blue VCR < 1.00 (not congested) Green VCR < 1.20 Yellow VCR < 1.50 Red VCR > 1.50 (extremely congested)

**Master Plan Network (see backcover)**

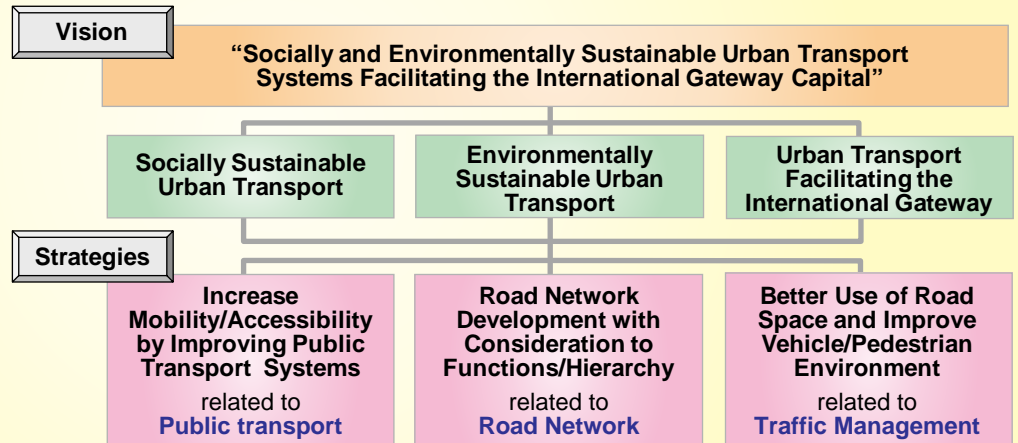
# Urban Transport Vision and Strategies

❖ The following transport development vision and strategies were set out and agreed by the Steering Committee for the Master Plan study.

❖ Since the majority of people living and working in Greater Maputo depend on public transport for their mobility, public transport has been identified as a key element of the Greater Maputo Urban Transport Master Plan.

Public transport improvement policies should aim at the following goals.

- Modal shift from private car to public transport
- Fewer private cars on the road leading to reduced traffic congestion
- Resulting socio-environmental benefits including reduced pollution, transport costs, and travel time, as well as increased accessibility
- A sustainable and integrated public transport system

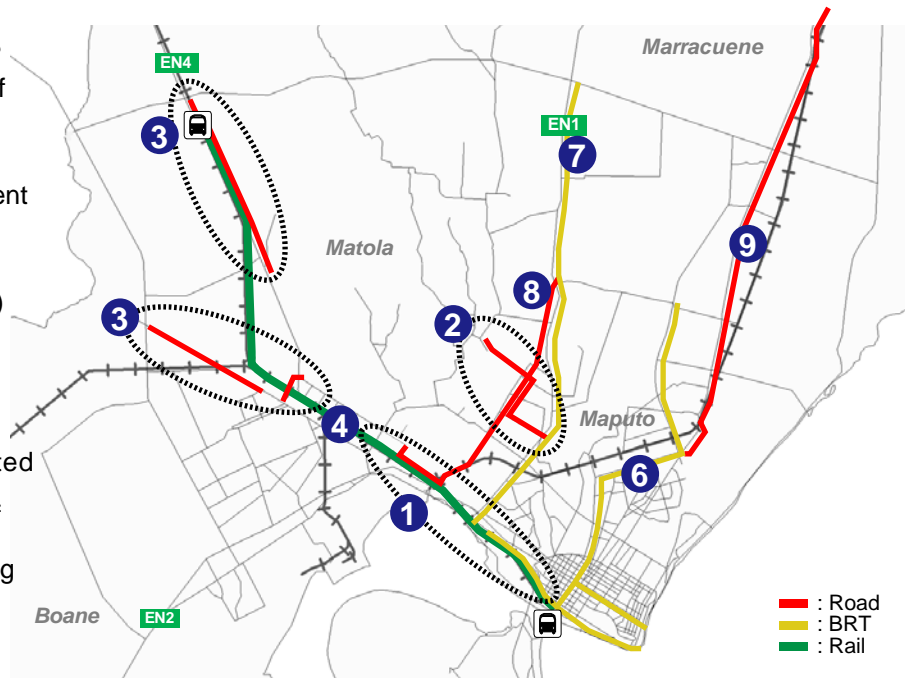


## Master Plan Programs with Proposed Phasing

Program	Urgent (Short Term) (2018)
<b>Maputo-Matola (East-West Axis) Transport Development:</b> <ul style="list-style-type: none"> <li>❖ Introduce mass transit systems (Commuter Rail and BRT) with transit-oriented development (TOD)</li> <li>❖ Improve transport systems for Matola suburban and industrial development and for sustainable metropolitan growth</li> <li>❖ Consider interregional as well as intra-urban transport network</li> </ul>	<ul style="list-style-type: none"> <li>❖ Urgent major capacity expansion along the axis</li> <li>❖ Preparation for commuter rail development</li> <li>❖ Transport improvement for Matola suburban and industrial development</li> </ul> <p><b>Road</b></p> <ul style="list-style-type: none"> <li>❖ Major district roads linking Maputo and Matola (No. 1, 2); Matola industrial area arterial roads (No. 3); N4 widening; reconstruction of Boane Bridge (No. 5)</li> </ul> <p><b>Public Transport</b></p> <ul style="list-style-type: none"> <li>❖ Preparation for development of Maputo-Matola Gare Rail Line (No. 4)</li> <li>❖ Exclusive busway to link Maputo and Matola (No. 1)</li> </ul>
<b>North-South Axis Transport Development:</b> <ul style="list-style-type: none"> <li>❖ Introduce mass transit systems, developing BRT in short to medium term and Commuter Rail in long term</li> <li>❖ Improve transport systems for better accessibility between Maputo and Marracuene and for sustainable metropolitan growth</li> <li>❖ Align transport development with environmental improvement along the coastline</li> </ul>	<ul style="list-style-type: none"> <li>❖ Major capacity expansion along the axis with mass transit systems development (BRT for the North-South axis)</li> <li>❖ Accessibility improvement between Maputo and Marracuene</li> </ul> <p><b>Road</b></p> <ul style="list-style-type: none"> <li>❖ Improvement for BRT (No. 6)      ❖ Maputo-Marracuene (No. 9)</li> </ul> <p><b>Eastern Maputo</b></p> <p><b>Public Transport</b></p> <ul style="list-style-type: none"> <li>❖ BRT (Baixa – Maguanine) (No. 6)</li> </ul> <hr/> <p><b>Western Maputo</b></p> <p><b>Road</b></p> <ul style="list-style-type: none"> <li>❖ Improvement for BRT (No. 7)      ❖ N1 bypass construction (No. 8)</li> </ul> <p><b>Public Transport</b></p> <ul style="list-style-type: none"> <li>❖ BRT along N1 (Zimpeto-Benfika-Brigada) (No. 7)</li> </ul>
<b>Traffic Management and Related Measures in and around CBD:</b> <ul style="list-style-type: none"> <li>❖ Remove major bottlenecks in short term and implement TDM measures in medium to long term</li> <li>❖ Upgrade traffic signal system in stages</li> <li>❖ Implement related urgent measures in short term and move toward greater control or enforcement of related regulations</li> </ul>	<ul style="list-style-type: none"> <li>❖ Short-term traffic management measures for major bottlenecks</li> <li>❖ Initial phase of traffic signal system upgrading</li> </ul> <ul style="list-style-type: none"> <li>❖ Improvement of bottleneck intersections (No. 10)</li> <li>❖ Other measures for major bottlenecks (No. 11)</li> <li>❖ Short-term traffic signal measures (No. 12) incl. operating the Operational Control Centre (CCO)</li> <li>❖ Traffic safety and related measures (No. 13), e.g., digital traffic accident database, safety measures at accident hotspots, better driver training and education, addition of new on-street parking areas</li> </ul>
<b>Capacity/Institutional Development:</b> <ul style="list-style-type: none"> <li>❖ Develop capacity of the public transport sector in short term, restructure the sector in medium term, and achieve its financial sustainability in long term</li> <li>❖ Establish effective Greater Maputo urban transport institution (i.e., GMMTA) in medium term</li> </ul>	<ul style="list-style-type: none"> <li>❖ Capacity building in urban transport sub-sectors</li> <li>❖ Preparation for establishing effective Greater Maputo urban transport institution</li> </ul> <p><b>Public Transport</b></p> <ul style="list-style-type: none"> <li>❖ Capacity building of TPM and improvement of chapa services (No. 14)</li> <li>❖ Bus network design (including feeder services) and fleet renewal (No. 15)</li> <li>❖ Capacity building for mass transit systems (Commuter Rail and BRT)</li> </ul> <p><b>Urban Transport Institution</b></p> <ul style="list-style-type: none"> <li>❖ Initiating activities to establish GMMTA (No. 17)</li> </ul> <p><b>Road</b></p> <ul style="list-style-type: none"> <li>❖ Capacity strengthening for road maintenance (No. 16)</li> </ul>

# Proposed Priority Projects

- ❖ **No. 1:** New Construction of Exclusive Bus Road of Maputo–Matola
- ❖ **No. 2:** New Construction and Improvement of Infulene–Maputo Connection Road
- ❖ **No. 3:** Western Matola Industrial Road Improvement
- ❖ **No. 4:** Preparation for Maputo– Matola Gare Rail Line Project
- ❖ **No. 5:** Reconstruction of Boane Bridge
- ❖ **No. 6:** BRT City Center–North (Baixa–Maguanine)
- ❖ **No. 7:** BRT along N1 (Zimpeto–Benfica–Brigada)
- ❖ **No. 8:** N1 Bypass Construction
- ❖ **No. 9:** Maputo–Marracuene Connection Road Improvement
- ❖ **No. 10:** Intersection Improvements
- ❖ **No. 11, 12, 13:** Traffic Management and Related Measures in and around CBD
- ❖ **No. 14, 15:** Capacity Building and Improvement of the Bus Sector
- ❖ **No. 16:** Road Maintenance Capacity Strengthening Project
- ❖ **No. 17:** Establishment of Greater Maputo Metropolitan Transport Agency (GMMTA)



Abbreviations: BRT = Bus Rapid Transit, GMMTA = Greater Maputo Metropolitan Transport Agency, TDM = Traffic Demand Management  
 Note: The numbers indicated in the short-term initiatives column correspond to the numbers of the priority projects listed above.

## Medium Term (2025)

- ❖ Continued capacity expansion along the axis
- ❖ Mass transit systems development including: (i) commuter rail with transit-oriented development (TOD), and (ii) BRT
- ❖ Local mobility upgrading measures

### Road

- ❖ Improvement for BRT (3 major routes/sections)
- ❖ Inner ring road; other major district roads; major distributors

### Public Transport

- ❖ Maputo-Matola Gare Rail Line
- ❖ BRT (3 major routes/ sections)

- ❖ Continued capacity expansion along the axis with BRT
- ❖ Local mobility upgrading measures
- ❖ Environmental improvement along the coastline

### Road

- ❖ Improvement for BRT (Julius Nyerere Line)
- ❖ Costa do Sol area roads
- ❖ Other arterial roads; major district roads; major distributors

### Public Transport

- ❖ BRT (Julius Nyerere Line)

### Road

- ❖ Other arterial roads; major district roads; major distributors

- ❖ Medium-term traffic management measures
- ❖ Expansion of traffic signal system
- ❖ Greater control/enforcement of related regulations

- ❖ High occupancy vehicle (HOV) lanes
- ❖ Full operation of CCO; Adaptive Signal Control (ASC) system; medium-term traffic signal expansion
- ❖ Other related measures, e.g., greater control of fleet, electronic safety enforcement, further increase in on-street parking areas, control of sidewalk parking

- ❖ Restructuring of Public Transport Industry
- ❖ Establishment of effective Greater Maputo urban transport institution

### Public Transport

- ❖ Restructuring of public transport industry; continued improvement of bus network (including feeder services) and bus fleet
- ❖ Upgrading of mass transit systems operation (Commuter Rail and BRT)

### Urban Transport Institution

- ❖ Establishment/strengthening of GMMTA and capacity building for its effective operation
- ❖ Establishment of an institute for transport and traffic studies (within an existing educational institution)

## Long Term (2035)

- ❖ Transport infrastructure development for sustainable metropolitan growth with decentralized population
- ❖ Continued development of mass transit systems (toward suburban areas)

### Road

- ❖ Outer ring road extension; N2 widening (southwest); arterial roads for suburban development
- ❖ Improvement for BRT extension

### Public Transport

- ❖ BRT extension
- ❖ Machava-Boane Rail Line

- ❖ Transport infrastructure development for sustainable metropolitan growth with decentralized population
- ❖ Continued development of mass transit systems (toward suburban areas)

### Road

- ❖ Arterial roads for suburban development
- ❖ Improvement for BRT extension

### Public Transport

- ❖ BRT extension
- ❖ Maputo-Marracuene Rail Line

### Road

- ❖ Arterial roads for suburban development
- ❖ Improvement for BRT extension

### Public Transport

- ❖ BRT extension

- ❖ Traffic Demand Management (TDM) measures
- ❖ Continued expansion of traffic signal system

- ❖ TDM measures (traffic-related), e.g., private vehicle restrictions (using license plates to control circulation), parking control regulations, car-pooling, HOV lanes
- ❖ TDM pricing measures, e.g., higher parking charges, tolls, vehicle ownership taxes/fees, fuel tax
- ❖ Continued expansion of traffic signals

- ❖ Achievement of financial sustainability in public transport sector
- ❖ Application of Maputo experience to other cities

### Public Transport

- ❖ Measures to achieve financial sustainability of public transport systems including public bus, Commuter Rail, and BRT

### Traffic Management

- ❖ Implementation of TDM measures, thereby controlling urban transport demand cost-effectively and increasing revenues usable for urban transport management

# Pre-Feasibility Study on N1 BRT Project

The traffic congestion along the North-South Axis, a major transport issue in Greater Maputo, can be greatly improved by introducing the Bus Rapid Transit (BRT) system, which is a relatively low cost mass transit system that can be developed within a relatively short period of time. As part of this Master Plan study, a Prefeasibility Study (Pre-F/S) was conducted on the BRT project along the N1 corridor that was selected among the high-priority projects identified in the Master Plan. The project consists of the improvement and widening of the existing N1, development of BRT facilities on N1 (up to Maputo Station), and the improvement and development of transport nodes, as identified in the map below (red line). Note that another BRT project (orange line in the map) has been planned with assistance from Brazil.



## 3 Terminals



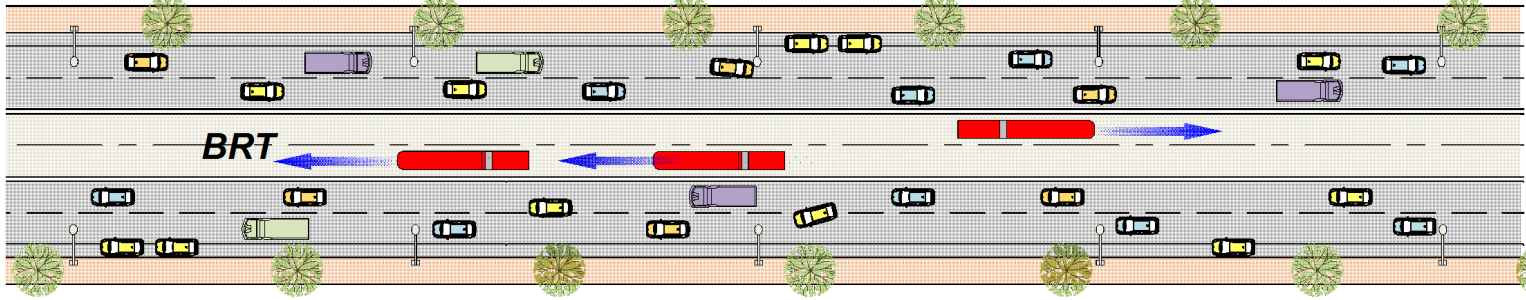
## Missão Roque Terminal



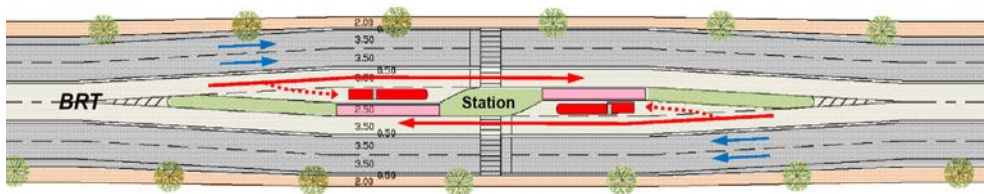
## Maputo Station Terminal & Depot



## Plan



### ❖ 16 Intermediate Stations



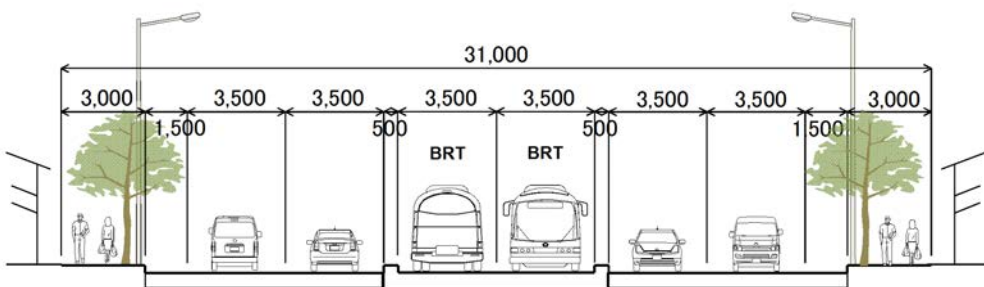
### ❖ Estimated Ridership of N1 BRT

Year	Route Length (km)	No. of Passengers/day	Average Trip Length (km)	Estimated Revenue (USD/day)
2020	19.1	106,300	12.4	48,200
2035	19.1	134,800	13.2	63,700

### ❖ Proposed Development of N1 BRT

Section	Overview of Development
North Section	<ul style="list-style-type: none"> <li>Develop the north part of BRT N1 (between Benfica–Zimpeto, approx. 6.6 km).</li> <li>Develop the terminal on north side.</li> <li>Procurement of appropriate size and number of BRT buses based on demand forecast and operation plans (assuming a center BRT lane, with doors opening onto a platform on the right side)</li> <li>Develop a depot.</li> <li>Consider private car use on N1.</li> </ul>
South Section and Maputo Station Access	<ul style="list-style-type: none"> <li>Develop the south side of N1 (between Malanga–Benfica, approx. 8.7 km) as a BRT line (bus lane, bus stop, terminal development—including preparations such as widening of bridges and roads, improvement of intersections, etc.).</li> <li>Facilities for connecting to trunk bus routes.</li> <li>Develop an exclusive busway (as part of the N1 BRT project) using the railway right-of-way (ROW) between Malanga and Maputo Central Station (approx. 3.8 km)</li> <li>Develop a depot.</li> <li>Consider private car use on N1.</li> </ul>

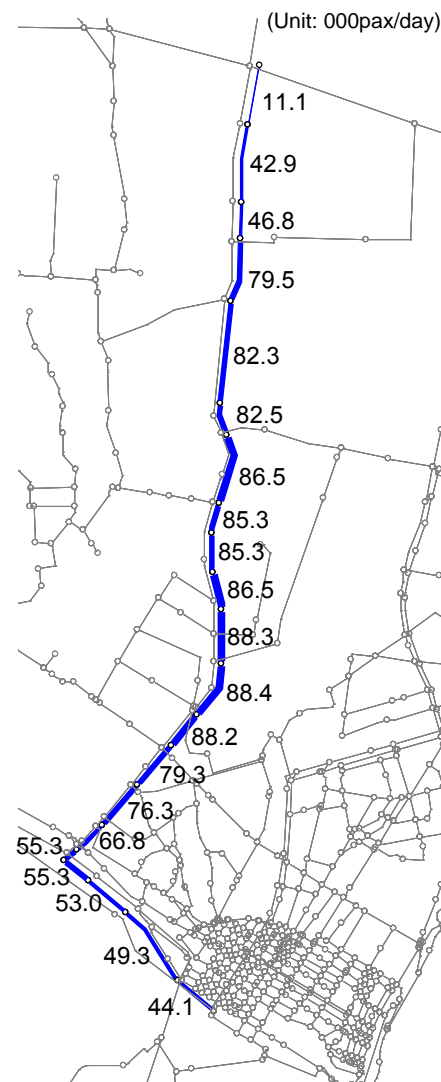
### ❖ Proposed Cross Section



### ❖ BRT vs. Conventional Bus Fleet

BRT Fleet	Conventional Bus Fleet
App. 20 m long	10 – 12 m long
3 doors (front, middle, back)	2 doors (front, back)
Articulated units	Single unit
160 – 190 pax.	70 – 90 pax.
Off-board fare collection	On-board fare collection

### ❖ Number of Passengers on N1 BRT by Section in 2020



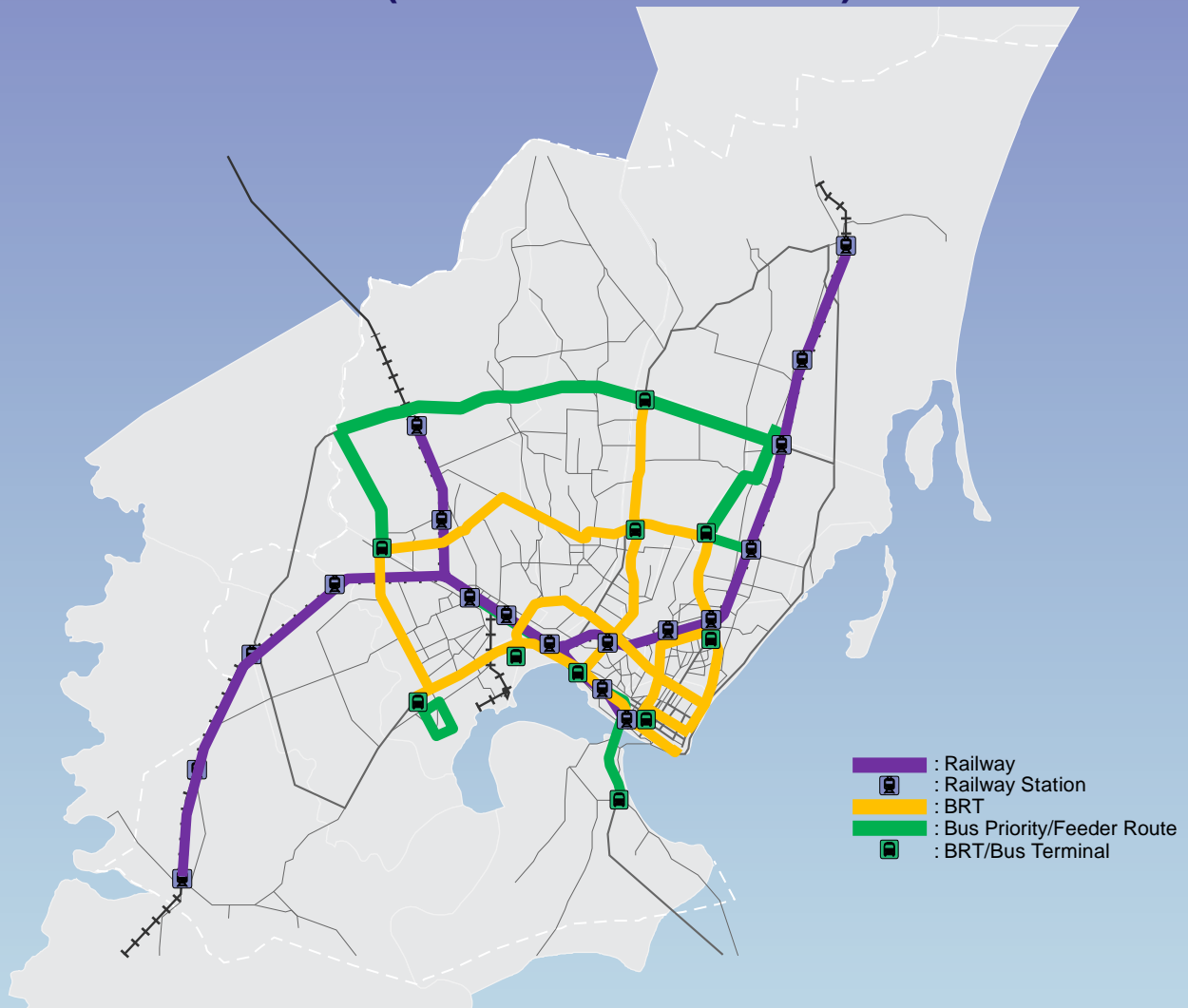
### Conventional Bus Fleet



### BRT Fleet



# Master Plan Network (Mass Transit Network)



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