Taparura: Non-motorized Urban Transportation Master Plan

A Pilot Project in Tunisia

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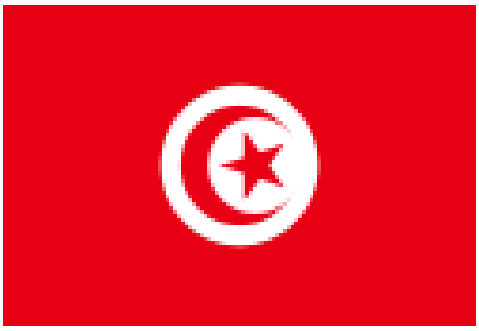
Tunisia

1 Shelter Situation Analysis

1.1 Basic General Data



Form of government	Republic
Capital	Tunis
Official language	Arabic
Population estimate(2009)	10,272,000
Total area (km²)	163,610
Coastline (km)	1,300

Geography and Administration

Tunisia occupies the eastern portion of the great bulge of North Africa. It is bounded on the west by Algeria, on the north and east by the Mediterranean Sea, and on the southeast by Libya. Tunisia is at the crossroads of Europe, the Middle East and Africa .It has lengthy Mediterranean coast and in very open Mediterranean influences.

Climate

Tunisia is situated in the warm temperate zone between latitudes 37° and 30° N. The climate is Mediterranean in the North and on the East coast, semi arid in the inland and Saharan in the South. Average temperatures vary between 11.4°C (December) and 35°C (August). Rainfalls are irregular and concentrated during the cold season: North 800 mm, South 50 to 150 mm. Amounts are also highly irregular from one year to another, and irregularity increases southward toward the desert.

History

Dido, a princess from Libanon, founded the city of Carthage in the 9th century bc., Carthage was one of the great cities and powers of antiquity, and its colonies were in all the western Mediterranean region. In the 7th century Arab conquerors converted the native Berber population of North Africa to Islam. Tunisia's culture is highly diverse, in part because of long periods of Ottoman and then French rule.

Administration

Republic since 1957. The country is divided into 24 governorates. The governorate represents the largest administrative unit. Each governorate is subdivided into delegations. The country is made up of 264 delegations. Besides, there is another subdivision of the territory representing another partition of the country into municipal and non-municipal areas. There are 264 communes.

Demography and Health

Population estimate			
Year	**2009**		
Total population as of July 1st (in thousands)	10 434.4		
Urban population share (in %)	65.8		
Number of households (in thousands)	2 407.2		
Population projections			
Year	**2014**	**2024**	**2034**
Projected total population for 2034 (in thousands)	11 037	12 075	12 742

Health and Welfare

The living standards of the population in general are rising. The country's national health system provides nearly all of its population with access to medical care. A good network of hospitals and clinics has contributed to a relatively low death rate and, in particular, to one of the lowest infant mortality rates on the African continent.

Demographic and Health Indicators

Year		**2008**
Crude birth rate for 1,000 inhabitants	The crude birth rate is calculated as a ratio of the number of births in the year to the estimate of the total population on 1 July of the same year	17.7
Crude death rate for 1,000 inhabitants	The crude death rate is calculated as a ratio of the number of deaths in the year to the estimate of the total population on 1 July of the same year	5.8
Natural growth rate (in %)	The natural growth rate is the difference of crude birth and mortality rates.	1.19
Global fertility rate	The total fertility rate (TFR) is the average number of children that would be born to a woman over her reproductive lifetime if she were to experience the exact current age-specific fertility rates (in the year).	2.06
Infant mortality rate for 1,000 births	The infant mortality rate is calculated as a ratio of the number of deaths of children under 1 year occurring in any year to the total number of births in this same year.	18.4
Life expectancy at birth by gender		
Year		**2008**
Male		72.4
Female		76.3
Total		74.3

Economy

Tunisia has a diverse economy, with important agricultural, mining, tourism, and manufacturing sectors. Governmental control of economic affairs while still heavy has gradually lessened over the past decade with increasing privatization, simplification of the tax structure. Progressive social policies also have helped raise living conditions in Tunisia relative to the region. Real growth averaged almost 5% over the past decade.

GDP- per capita (PPP)	$7,500 (2007 est.)
GDP- composition by sector	Agriculture: 11.6% industry: 25.7% services: 62.8% (2007 est.)
Population Below Poverty Line	7.4% (2005 est.)
Industries	petroleum, mining (particularly phosphate and iron ore), tourism, textiles, footwear, agribusiness, beverages
Exports	clothing, semi-finished goods and textiles, agricultural products, mechanical goods, phosphates and chemicals, hydrocarbons, electrical equipment
Agricultural Products	olives, olive oil, grain, tomatoes, citrus fruit, sugar beets, dates, almonds; beef, dairy products
Natural Resources	petroleum, phosphates, iron ore, lead, zinc, salt
Export Partners	France 30.7%, Italy 20.6%, Germany 8.4%, Spain 5.4%, Libya 5.1% (2006)
Imports	textiles, machinery and equipment, hydrocarbons, chemicals, foodstuffs
Import Partners	France 24.1%, Italy 22.2%, Germany 9.8%, Spain 5.1% (2006)

1.2 Shelter Related Fact and Figures

Access to Shelter

Housing Stock Characteristics

Year	**1994**	**2004**	**2009**
Percentage of households owning the dwelling they occupy	78.2%	78.3%	80 %
Percentage of dwelling for rent	13.9%	13.4%	13%

Dwelling structure by type (in %)			
Year	**1994**	**2004**	**2009**
Modern dwelling units (Individual houses, flats)	33.7	45.1	33.8
Traditional dwelling units (arab and traditional houses,)	63.6	54.1	65.9
Rudimentary dwellings	2.7	0.8	0.3

Tenure of households

The problem of illegal occupation of land is restricted to some old districts occupied without legal deeds of ownership.

Ownership and Rental

The percentage of households owning their dwellings is about 80% in 2009. Thus 13% of the whole number of dwellings is rented. House price ranges from 400 to 1100 US$/m² depending on the standing offered in the dwelling and its location. The house price is almost 6 times the household income.

Ownership	
Median house price	USD 45 000
Median annual household income	USD 5 760
House price/household income	6

Rental	
Median rent	USD 1 800
Median annual household income	USD 5 760
House rent/household income	0.31

Land (formal/informal)

The state founded a strong legal framework for the intervention of public and private actors in order to satisfy the national demands in land by:

- Improving of the production level of constructible land by public actors such as the Housing Land Agency (AFH) which produces about 150 ha per year,
- Adjusting the tariffs of constructible plots produced by public actors in order to reduce the prices of social housing (which is about 28000 US$ for an individual dwelling of 50m² and 36.000 US$ for a collective dwelling of 75 m²,
- Selling state land to build social housing projects for a symbolic price,
- Encouraging vertical housing projects in order to reduce the land cost per dwelling.

However, the speculation and the quick growth of the urban population have involved an increase in the land cost.

Developed Land

Median land price	USD 80/m²
Median monthly household income	USD 480
1m² land price/ monthly household income	0.16 %

Access to and Cost of Basic Services/Infrastructure

The state has paid an attention to improving life conditions and especially by providing and generalizing the access to basic facilities for all citizens:

Year	2005	2009
Electricity connection rate (in %)	99.3	99.5
Drinking water connection rate (in %)	84.1	85.3
Drinking water supply rate (in %)	96.1	98.0
Sewage network connection rate (communal areas in %)	80.0	83.6

Access to and cost of Education

Education is free to all school-age children, and schooling is compulsory between the ages of 6 and 16.

Educational Characteristics of the Population

Education level	1966	2004
Primary school (%)	59	99
Secondary school (%)	17	75
University (%)	2.1	26.4
Rate of adult literacy (%)	44.7	95

1.3 Housing Policy

The Tunisian state has made an important effort in providing and reinforcing the right to adequate housing through various mechanisms including:

- The organisation of the Real Estate development sector and allocation of required investments,
- The encouragement of the social housing sector to satisfy the low-income citizens who represent 50 % of the housing demand. In this way, about 2000 social dwellings per year are financed by FOPROLOS for low and medium income citizens,
- The implementation of social programmes for low-income citizens such as the National Rudimentary Housing Eradication, the programme of relocation of Ukala's occupants, projects financed by the National Solidarity Fund 26-26 and other.

1.4 Actors in Shelter Delivery and their Roles

The housing field is characterised by the participation of different public and private actors.

Public actors:

- ***The Real-Estate National Company (SNIT)*** established in 1957. The objective is to offer the social and economic housing for low and medium income social categories. Until 2009, the SNIT built about 270000 housing units (60% social, 35% economic, 5% standing)
- ***The Housing Land Agency (AFH)*** was created in 1973 and was responsible for the acquisition and servicing of land for building before transferring them to the citizens or developers. The AFH covers about 25% of the national needs of developed land for housing,
- ***The Social Housing Promotion Company (***SPROLS***)*** was created in 1977 in order to build housing for rent. Than the SPROLS turned to the production of social housing. Until 2009, the SPROLS built about 23000 units for low-income social categories,
- ***The Urban Rehabilitation and Renovation agency (ARRU)*** which was created in 1981 and was in charge of renovating and rehabilitating old dwellings and unregulated self-built housing in urban areas,

Private actors:

Since 1995, the state has encouraged and organised the private sector (families and developers). It is noticed an increased in the number of developers from 150 developers in 1988 to 2000 developers now. Consequently, the number of private operation of housing projects increased.

1.5 Shelter Design

Physical Planning and Land Use:

Since the independence, the State has focused on the land use planning field in order to organise the urban space. All urban agglomerations are covered by master plans.

Population and Urbanization

It was estimated that 65% of the population lived in urban areas in 2004. The population isn't equally distributed on the Tunisian territory. The capital city, Tunis, had a population of 1,860,000 in that year.

	1966	1994	2004
Total population	4 583 200	8 785 700	9 910 872
Urban population	40.1%	60%	65%

Social Inclusion

In the recent years the new housing operations tried to design housing projects including both high standing and social dwellings in order to assure the cohabitation of different social categories. However, some difficulties are noticed for low-income people to access these projects because of their high cost.

Gender Issues

The progressive Code of Personal Status, which was introduced in 1956, succeeded to offer equality between men and women in all the fields.

Sustainable Development

The sustainable development is one of the new objectives of the urban planning and housing field. It consists on many actions such as:

- Preserving farming lands through the densification policy
- Graduate increase in the use of sustainable energy and the application of the policy of energy economy in the building field by the design of ecological dwellings.
- The protection of the environment (the average of green areas increased from 4.4m²/inhabitant in 1994 to 14m²/ inhabitant in 2006)

2 Organisation

The Ministry of Transport and Equipment that is in charge of the design of the state policy in the housing and the territorial planning was formed on 28 January 2011, with the merger of two Ministries: namely the Ministry of Equipment, Housing and Territorial planning and the Ministry of Transport. Thus the majority of the infrastructure developments within the country are being facilitated through

this ministry. MTE has the overall mandate for the facilitation of the development and delivery of sustainable solutions for transport, infrastructure, housing and territorial planning.

The housing and urban development sector has two main overall responsibilities .These include to overseeing and regulating the physical development of the country and to facilitate the development and delivery of sustainable solutions for housing through development projects.

In the Equipment and Housing sector, several autonomous key government organizations are also under the umbrella of MTE. They are:

- The SNIT, SPROLS,AFH agencies in the housing field
- The ARRU agency in the rehabilitation and renovation field.
- The SPLT and TAPARRURA companies in the development of the seaboards
- The SOMATRA Company in the field of roads, motorways, tunnels and bridges.

3 Shelter Problem

It is now obvious that the positive results in the housing sector in Tunisia during the last ten years were achieved by designing adequate policies and institutions providing the adequate housing for low incomes groups :(such as the National Rudimentary Housing Eradication, the programme of relocation of Ukala's occupants, projects financed by the National Solidarity Fund 26-26 and other) **Now**; in order to improve these achievements the state identified the following objectives:

- The provision of adequate dwelling to every citizen.
- building sustainable human settlements which are implemented by differents priorities like:
    - The sustained management effort in property reserves and land servicing;
    - The protection of the existing housing stock and the rehabilitation of those settlements which are unfit for housing;
    - Human settlements planning and management within a sustainable development process;

- Control of the resources utilization and specially the energy consumption.

Looking to my specialty as an architect and my work position in the housing direction under a governmental organization (The Ministry of Transport and Equipment) and since I am inspired from the Swedish experience in promoting cycling and walking in cities, I want to orientate my research to know more about the plannings models facilitating the **non -motorized urban transportation systems** which should be consolidated in my country.

4 Proposal for Change and Improvement

A pilot project in Tunisia: how to design a non -motorized urban transportation master plan and to implement it? The purpose of the Non Motorized transportation Plan is to promote active transportation by guiding development of a community wide bicycle and walking network that can be used by all residents for all types of trips.

Plan goals are to:

1. Use new approaches to street design that focus on working together early in project design to plan and build transportation projects that address the needs of all users: pedestrians, cyclists, public transit riders and motorists.
2. Encourage an increase in bicycling, walking and other active forms of transportation by providing safe, efficient and easy to use facilities that connect activity centers.
3. Improve Taparura transportation plan which didn’t give much importance to non motorized transportation system.

4.1 The benefit of non motorized transport systems:

A complete and accessible non-motorized system provides numerous benefits to users and nonusers alike. Again a properly planned and maintained network can improve general health, increase accessibility and promote a cleaner environment.

Transportation benefits

Non – motorized travel can play an important role in the overall transportation system. Both bicycling and walking are the easy ways to complete short errands or commute to work .While helping to reduce traffic congestion. In addition, people without drivers' license or access to motor vehicles can relay on such mode of transportation.

Health benefits

Bicycling and walking are generally recognized as excellent forms of physical activity, and can help prevent and control the conditions that lead to dangerous diseases. Health is further benefited by the resulting decrease in fuel emissions that would result from a decrease in vehicle trips.

Economics benefits

Non -motorized facilities can also benefit the City economically. Cycling and walking: reduce the energy consumption, may therefore attract tourists and related business to the city.

4.2 Analysis of the Destination of the Project

Location and historical background of the site of Taparura

Sfax is a city in Tunisia, located 270 km southeast of Tunis .The city is often described as Tunisia's second city, because it has a population of 350,000 inhabitants and It's an industrial centre for processing phosphates .For many years the coastal area adjacent to the harbour of Sfax has been affected with pollution from various types of solid and liquid wastes. Phosphogypsum, the residue from phosphate treatment, has been stored in an uncontrolled manner along the coastline, with a surface of approximately 50 hectare and a height of 6 meters above the sea level.Pollution from this site was threatening the beaches and coastal waters of Sfax, hampering further development and economical growth, such as tourism.

The main problem was what to do with the complex industrial site, the phosphogypsum dump of approximately 3,000,000 m³.The solution that was ultimately selected is to create a central piece in the whole area; a pyramidal looking park covering a total area of approximate 55 ha.The beach and landfill restoration will create a complex multidisciplinary mega site Taparura .

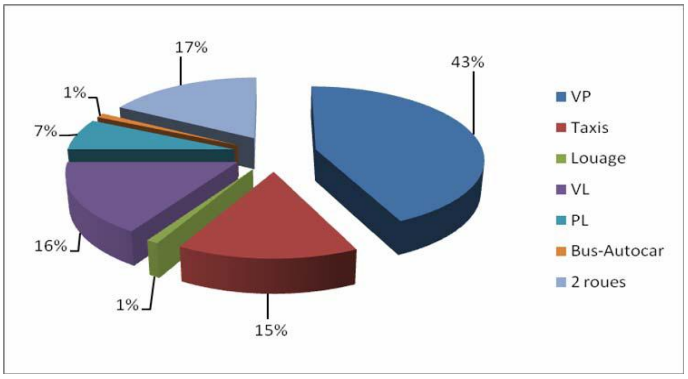
Taparura is a mixed space for new public and private activities, such as beaches, parks, sports grounds, educational, health… and museum infrastructures. The Taparura Project is a typical example of the ecological aspects in planning and the sustainable development that means an effort respectful to the environment, a littoral revalorization, the creation of new equipment and of innovative activities.

4.3 Modal Share of Motorized Traffic in the City

Analysis of movements in the Grand Sfax

The assessment of travel in Greater Sfax has estimated the total daily vehicle trips residents of Grand Sfax to about 1.14 million in 2009.

This figure shows the portion of urban travel by different modes in Sfax



VP: Cars (cars, taxis, rental)
V.L: Light vehicles (commercial vehicles)
PL: Trucks (trucks and articulated vehicles)
TC: Public transport it (buses, minibuses, buses)
2R: two wheels (motorcycles and bicycles)

VP traffic is dominant on the road structuring Grand Sfax (about 43% of total traffic). It is followed by that of two wheels (17%) commercial vehicles (16%) and taxis (15%). Two wheel traffic is declining continuously, dropping from 25% in 2002 to about 17% in 2009. In contrast, the TC traffic (buses & coaches) is very low on the roads of Greater Sfax structuring, as its share from 1 to 2% of total traffic.

Modal share of motorized traffic in the city 2026

Year 2009 *Year 2026*

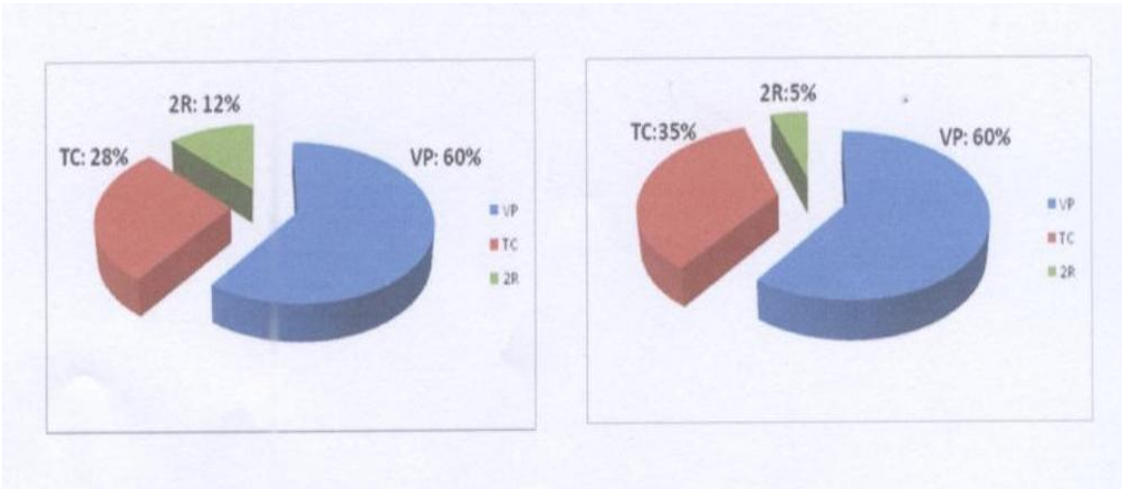


Diagram 5: Evolution of modal split (in trips per day)

Effect estimates, the modal split payments (trips per day) is as follows: 35% for the horizon chosen for the completion and filling of the project area, is the year 2026. The lack of adequate infrastructure is a non-motorized intercept of its regression use of public transport (CT) and 65% for individual transport assuming that:

- travel by individual vehicles (VP, individual taxis, car and truck) would stabilize at the 60% increase in the current situation;
- The use of two-wheelers continue to regress current 12% to 5% 2026;
- The proportion of TC that would be provided by buses, the future railway network (metro and suburban railway line north) would increase from 28% currently to 35% by 2026.

Potential development of soft mobility

Non Motorized Traffic is an attractive solution for travel in urban areas, where they are less than one kilometer for travel on foot, or 5 km for travel by bicycle. Census data done in sfax , don' t give precisely the proportion of trips depending on the length of journeys, but the poll conducted at this point, estimates that more than 50% of journeys home and work are less than 5 km in the central cities and municipalities, a significant proportion of these trips could be made by bicycle.

This study showed that there is untapped potential in terms of soft mobility. This is particularly marked in Sfax, given the current low modal share: 12% of trips by bike are still in steep decline up to 5% in 2026.

The fact that 50% of journeys made by motorized transport in Sfax do not exceed 5 km opens encouraging prospects for changing patterns of non-motorized transportation facilities.

4.4 Design guide-lines

The types of non –motorized improvements that may be implemented are ultimately contingent on the existing configuration of the particular roadway corridor. Since almost all corridors possess pedestrian sidewalks on both sides of the street, the main objective is to provide a safe, separate area for bicycles.

Bikeway design

Improvements can be classified into three categories: Marginal roadway improvements, roadway designation and separated facilities. The choice of which improvement to utilize depends on the likely user group and the existing physical conditions:

- Marginal roadway improvements generally take the form of minor upgrades to the surface quality of the roadway pavement and the removal of minor barriers to bicycle travel.
- Roadway designation involves the use of pavement markings to install an easily recognazble space for non-motorized users.
- Separated facilities refer to pathways not adjacent to vehicular traffic, and usually include the consruction of Separate infrastructure for non-motorized traffic.

Bikeway Paths

A “bike path “provides bicycle travel on a paved right-of-way completely separated from nearby streets or highways.

Bike Lanes

A” bike line” designates (through striping and stenciling) a lane for one-way bicycle travel on a sreet or highway.Bike lines delineate separated areas for bicycles and vehicles to provide more predictable movement for both.

Bike Parking

Most users of the bicycle system will ultimately stop at some point, and therefore will need facilities to lock and store their bicycle. Public bike parking should be installed liberally throughout the city to encourage use of the system.the ultimate goal should be to one day provide bicycle parking at every public facility within the city .and when choosing bike parking and locations, there are a number of things to keep in mind: they must be good located to not disturb the traffic on roads and clearly visible aerea to deter vandalism and other crime.

Pedestrian facilities

We are all pedestrian, whether strolling through a park, using a wheelchair, skateboarding or walking. All pedestrian facilities must be constructed to accommodate people with varying abilities and it benefits all users.

Side walks

The sidewalk is the most obvious element of the pedestrian network. Their widths should vary according to the number of pedestrians anticipated to use the sidewalks.

Curb ramps

Curb ramps provide access between the street and the side walk for people who use wheelchairs and with vision problems .Priorities for curb ramp installation on existing facilities should include access to government facilities , transportation, public accommodations , and schools and for employees to reach their place of employment.

Pedestrian crossings

A pedestrian crossing is defined as any location where the pedestrian leaves the sidewalk and enters the roadway. Cross walk markings may be used to define the preferred pedestrian path of travel across the roadway and to alert drivers to the crosswalk locations, so the Cross walk markings must be visible, especially at night.

Shorten crossing distance

One method to improve pedestrian crossing safety is to shorten the crossing distance, pedestrian refuge islands, curb extensions, reducing curb return radii and elimiting a travel lane are popular measures used to reduce the width of the intersection. Refuge islands are placed in the middle of the street to give pedestrians a safe space to wait before crossing the remaining half of the roadway.

Raised treatments

Pedestrian visibility can be enhanced with two devices that elevate pedestrian path. A raised intersection involves building up the entire intersection, including crosswalks, to the level of the sidewalk. Raised crosswalks are similar to speed bumps but provide a flat surface too wide for pedestrian crossings, so this

decrease automobile speeds and enables pedestrians to cross the road at the same level as the side walk.

Signs and signals

Another way to increase pedestrian safety may involve devices to warn motorists of the presence of pedestrians, such as signs, signals and lights.

Side walk buffers

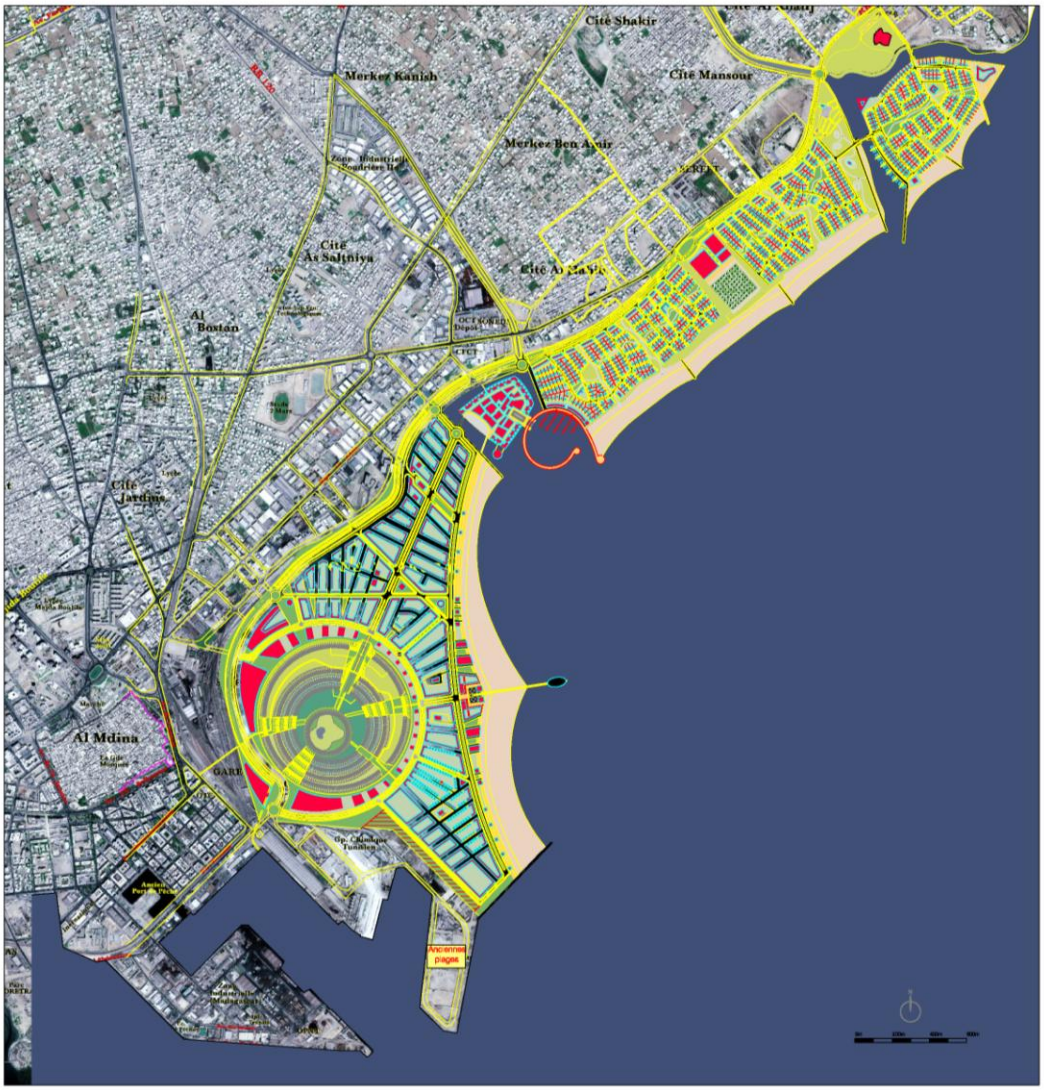
The level of comfort a pedestrian experiences while walking on a side walk can be enhanced with a planting strip or a buffer zone and that will improve the sens of safety while walking beside heavy or fast traffic.

Traffic calming

Over the past several years, traffic calming has been widely used to improve both bicycle and pedestrian safety, especially in residential areas. Traffic calming devices are installed to slow motorists, increase awareness of bicyclists and pedestrians around them, reduce cut – through traffic and reduce the impacts of higher speed collisions.common traffic calming devices are :

- Traffic circles/ roundabouts
- Curb build-outs,chokers and neck-downs
- Diagonal diverters
- Speed Bumps
- Narrowed street widths.

4.5 Design of an Urban Non-motorized Transportation Master Plan of the Area



4.6 Implementing strategy

The overall success of integrating non motorized traffic into the local transportation network not only depends proper planning and construction, but relies heavily on supporting education, encouragement and enforcement programs.

Enforcement

Enforcement of state and local bicycle regulations is an important element in providing a safe non-motorized environment.Like any other transportation

system; uniform rules and regulations define user expectations and reduce the risk of accident.

Education

To ensure a safer bicycling experience, public education programs frequently address effective riding principles and the use of safety equipment such as helmets and reflectors. The City should consider sponsoring bicycle driver education classes at local schools as well as community and vocational training centers.

Encouragement

Programs and initiatives that encourage bicycling are also an important element of creating a bicycle friendly community. One way to promote and encourage bicycling is to provide assistance in the form of maps, brochures, and travel guides to make bicycling more approachable and enjoyable for novice and advanced bicyclists alike.

Conclusion

This plan is a pilot document, identifying the means to establish a built and cultural environment that supports and encourages safe, accessible, comfortable, and convenient non-motorized and multimodal transportation options throughout the City and into the surrounding communities. A multimodal transportation system will result in a greater number of individuals choosing alternative transportation modes, including not only walking and bicycling, but also taking public transportation. This increase will lead to a safer transportation system, a more environmentally sustainable City, an increased quality of life of residents and visitors, and neighborhoods and business districts that are more attractive.

This plan outlines detailed recommendations related to the placement of non-motorized facilities within the city of Taparura. Through a comprehensive analysis of existing destinations and available route corridors, it provides the framework and hierarchy for the citywide system. Please refer to the master plan on the next page for a complete picture of this system.