



# *Part II*

*Strategic Urban Development Plan  
of the Greater Yangon*



# Chapter 1: Introduction

## 1.1 Background

The Yangon Region, the largest economic center of Myanmar, has a population of approximately 7.36 million in 2014 (National Census). However, infrastructure has become decrepit due to limited investment and technical support caused by long economic sanction. This becomes a bottleneck for sound urbanization while the current rapid urbanization and increasing population are putting more pressure on the existing old infrastructure.

Under such circumstances, “The Project for the Strategic Urban Development Plan of the Greater Yangon (hereinafter referred to as “SUDP”)” was carried out in 2012 and 2013 by the Yangon City Development Committee (hereinafter referred to as “YCDC”) supported by the Japan International Cooperation Agency (hereinafter referred to as “JICA”) in order to formulate the Urban Development Plan of the Greater Yangon to proceed with an efficient urban development. The Yangon Region Government (hereinafter referred to as “YRG”) adapted the proceeding on urban development in line with the SUDP 2013 at a cabinet meeting. Later, however, economic growth and rapid and massive changes in urban development happened in Yangon, and large-scale development like in Dala and west side of Kye Myin Daing was proposed. Simultaneously, private companies have been planning high-rise or large-scale urban and building development.

The new administration of Myanmar, established in 2016, strongly recognizes that the revised urban development planning and enforced urban development management are necessary. Accordingly, it is required to collect data, find issues, and then update SUDP to consider future vision and necessary actions in consideration of these situations including changes in Yangon and the new administration’s policy. The updated SUDP shall draw an ideal future vision and indicate proper policy and necessary action to achieve the vision and shall share those among the stakeholders who live and work in the Yangon, and also with other people.

## 1.2 Objectives

The primary objectives of the SUDP for the Greater Yangon are as follows:

- a) To present a comprehensive development vision in long term, targeting the year 2040,
- b) To present an urban structure for the realization of the development vision,
- c) To present development policies of urban function and infrastructure development,
- d) To identify necessary priority projects in short-term, targeting the year 2020, and
- e) To present strategies of urban development management for promoting implementation.



Source: JICA Study Team

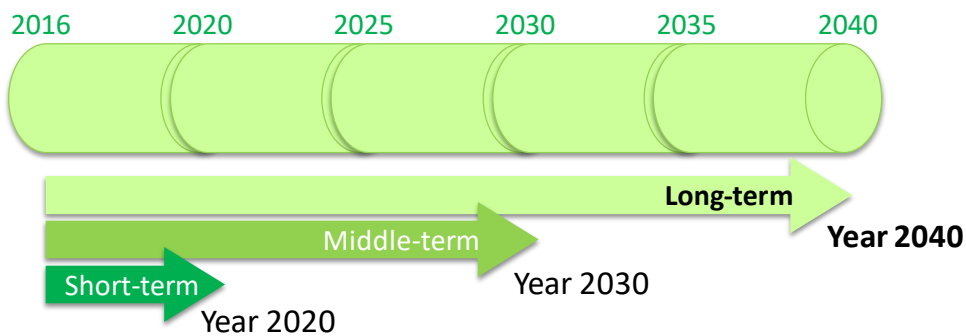
**Figure 1.2.1: Main Items and Flow of the Urban Development Plan (SUDP)**

### 1.3 Target Area

The entire Yangon Region is basically considered in the planning work. The main target area of the plan consists of Yangon City (829 km<sup>2</sup>) and parts of the six neighboring townships of Kyauktan, Thanlyin, Hlegu, Hmawbi, Htantabin, and Twantay (hereinafter referred to as “the Greater Yangon”), which has a total area of approximately 1,500 km<sup>2</sup> as shown in the location map (see beginning page).

### 1.4 Target Year

The target year of the plan is 2040, about 25 years later from 2016, when the development vision of the Greater Yangon is set in long-term. To achieve the set development vision step-wise, benchmarks of the plan are set as follows:

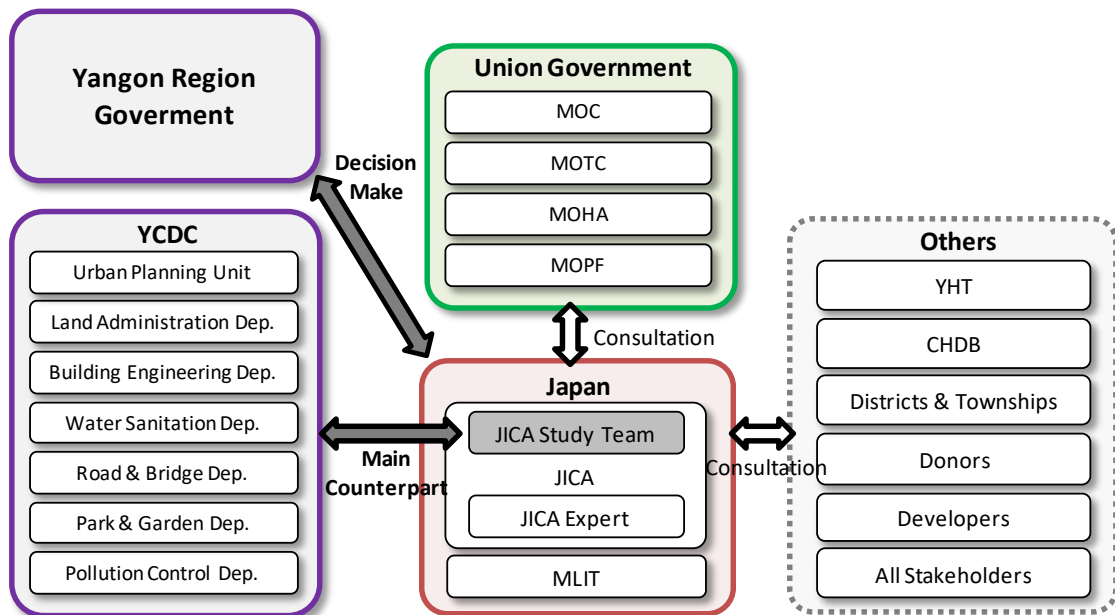


Source: JICA Study Team

**Figure 1.4.1: Target Year of the Urban Development Plan (SUDP)**

### 1.5 Planning and Implementation Organizations

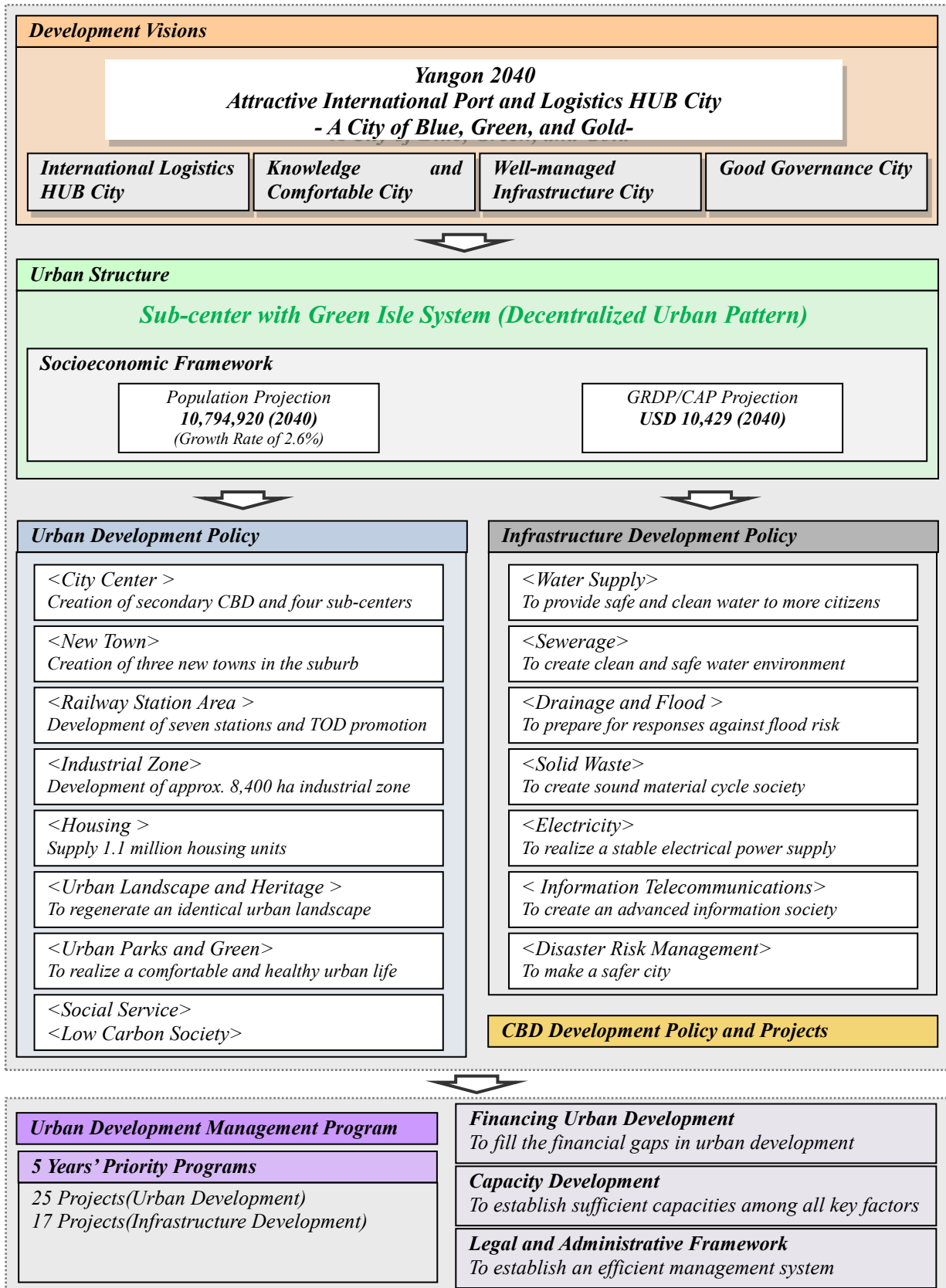
The plan was made under the direction of YRG in close works with YCDC as a counterpart. Consultation with other relevant organizations, such as union ministries, Yangon Heritage Trust (hereinafter referred to as “YHT”), and donors was considerably conducted.



Source: JICA Study Team

**Figure 1.5.1: Main Planning Organizations**

## 1.6 Framework of the Plan



Source: JICA Study Team

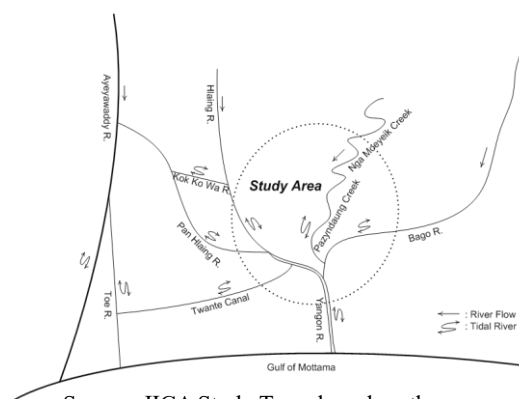
**Figure 1.6.1: Framework of the Plan**

## 1.7 Overview of Yangon

### (1) Environmental Conditions

#### 1) Topographic Conditions

The Greater Yangon lies along the Yangon River between around 17°06' and 16°35'N latitude and between 95°58' and 96°24'E longitude, east of the Ayeyarwaddy River delta. Yangon is located 34 km upstream from the mouth of the Yangon River. Yangon has low hills, which are long and narrow spur of Pegu Yomas hill range in the central area running in the N-S direction with an average height of 30 m and degenerates gradually into delta plains in eastwards and westwards.



Source: JICA Study Team based on the information from several maps

**Figure 1.7.1: River System in and around the Greater Yangon**

#### 2) River System and Water Body

Yangon is bounded in the south, southeast, and southwest by the Yangon, Hlaing, and Bago rivers. The Nga Moe Yeik Creek flows into the center of Yangon and changes its name to Pazundaung Creek and penetrates the center of the city to the Bago River. The river system of the western side of the Greater Yangon is more complicated. A few tidal rivers, namely, the Kok Ko Wa River, the Pan Hlaing River, and the Twantay Canal flow into the Yangon River. Significant sedimentation can be observed at the junction of the Pan Hlaing River and the Kok Ko Wa River. Recently, the main stream of the Upper Pan Hlaing River has been shifted to flow directly to the Kok Ko Wa River instead to the Lower Pan Hlaing River.

The largest water body is the Yangon River, which accounts for 27.80% of the total area of water body. The second largest water body is the Bago River in Thanlyin Township with 13.82% of the total area. Both water bodies have saline water. Regarding the inland waters, Mingalardon Township, comprising Hlawga Lake (the major source of water supply for the Greater Yangon), accounts for 8.16% of the total area. Botahtaung, Dagon, and Pazundaung townships have 1.0-2.0 ha of water body within each township. Botahtaung and Pazundaung townships are suffering from accumulated rainwater. One of the major causes identified might be the absence of or limited water body area.

#### 3) Climate and Rainfall

Generally, temperature in April is high, and the maximum monthly temperature recorded in April 2001 was at 39.1 °C. Minimum monthly temperature recorded in December 2004 was at 13.8 °C. The difference between the monthly maximum and monthly minimum temperature is more than 20 °C from December to February and around 10 °C from June to August, which is the peak season of the monsoon rainfall.

At Kabaraye Meteorological Station, mean annual rainfall is 2,749 mm and maximum mean monthly rainfall is 591 mm in August and minimum mean monthly rainfall is 3 mm in January and February. Maximum annual rainfall was recorded at 3,592 mm in 2007. Maximum monthly rainfall was 868 mm in August 1968 and minimum monthly rainfall was zero in the past several months. One of the features of rainfall in the Greater Yangon is short in duration and intensity. Remarkably, 50-year probable 60-minute rainfall intensity exceeds 100 mm/hour. Such high intensity rainfall is a major cause of inundation problems in downtown Yangon.

The Hlaing River flow discharge in Khamonseik is 1,851 m<sup>3</sup>/s in August and 17 m<sup>3</sup>/s in March with a difference of about hundred times. The Bago River flow discharge in Zaungtu is 242 m<sup>3</sup>/s in August and 2 m<sup>3</sup>/s in January and February with a large difference. The maximum daily flow discharges in Khamonseik and in Zaungtu were recorded at 2,752 m<sup>3</sup>/s in October 1997 and 1,237 m<sup>3</sup>/s in July 1994, respectively.

The highest water level (hereinafter referred to as “HHWL”) is +6.74 m and mean water level (hereinafter referred to as “MWL”) is +3.121 m and ground elevation is normally indicated from the MWL. Hence, it can be said that HHWL around Yangon Port is approximately +3.619 m on ground elevation basis.

#### **4) Ecosystem**

Myanmar has rich biological resources. Although biodiversity inventory has not yet been completed in Myanmar, it is officially stated that there are 350 mammal species, 300 reptile species, 350 freshwater fish species, 800 butterfly species, 1,035 bird species, and 9,600 plant species in Myanmar. Among them, endangered species are recorded, reported to be at around 153 species. The Greater Yangon is recorded to have three threatened animal species and two threatened plant species. All these threatened species are also protected by the Forest Law in Myanmar. In Myanmar, the Protection of Wildlife, Wild Plants and Conservation of Natural Area Law was enacted in 1994. A target has been set to increase the protected area up to 5% in the short term and 10% in the long term. There are at present, 40 protected areas in Myanmar including wildlife and bird sanctuaries, national parks, and nature reserves. Hlawga Park in the Greater Yangon area has an area of 2,342 ha, which is managed strictly as watershed protection forest.

### **(2) Socioeconomic Conditions**

#### **1) Industrial Structure and Labor Population**

The industrial structure in Myanmar is composed of agriculture, livestock, fishery, and forestry sector (36%); the trade sector (20%); the process and manufacturing sector (20%); and the services sector (18%). Meanwhile, the industrial structure in Yangon Region is composed of the processing and manufacturing sector (37%); the trade sector (25%); and the services sector (24%). It is, thus, reasonable to refer to Yangon as the “Commercial and Industrial City” rather than “Commercial City”, judging from the present industrial structure.

As of 2011, the ratio of the labor population to the total population in Yangon City was 50.8% (2.61 million). In the new suburbs and south of CBD, where the population has been growing rapidly in recent years, have shown a tendency to have a rapid increase in the non-working population. In addition, for the 50.8% of the labor force (2.61 million), nearly 70% of the working population (1.78 million) is engaged in tertiary industries.

#### **2) Trade and FDI**

Major export commodities in 2014 were “miscellaneous manufactured articles” (42% of total export) followed by “mineral products” (mostly natural gas, 31%), “vegetable products” (10%), and “textiles and textile articles” (8%). The most notable changes in export are the facts that a share of “mineral products” fell by 7 points from its share of 38% in 2011, while a share of “miscellaneous manufactured articles” jumped up by 20 points from its share of 22% in 2011. These changes reflect the fact that the economy of Myanmar is becoming more diverse in recent years. Major import commodities in 2014 were “mineral products” (mostly refined mineral oil, 17% of total import), followed by “machinery and mechanical appliances; electrical equipment” (16%), “miscellaneous manufactured articles” (16%), “vehicles, aircraft, vessels, and associated

transport equipment” (12%) and “base metals and products” (10%). Yangon is the center of export and import industries of the country because of the presence of Yangon Port.

Inflows of foreign direct investments (FDIs) dramatically increased after 2009. The total amount of FDIs in the period of the recent five years (2010-2014) was USD 38.2 billion, 4.3 times as much as the total of ten years period in 2000-2009. By sector, the resource sector is composed of the oil and gas, power and mining sectors had been dominant until 2011 that made up a vast majority, 93% of the total permitted investment amounts by the existing enterprises in 2011. Starting from 2012, FDIs started to flow into more diverse sectors other than resource sectors. In total for 2012-2014, the share of FDIs to the “manufacturing” sector jumped up to 27% from barely visible 0.8% in total of the previous period of 2000-2011, while the resources sector’s share became 29% in 2012-2014, still very large but not as prominent as it was. It should be noted that foreign investment in the non-resource sectors would provide large benefits to Myanmar’s economy through creating employment opportunities, transferring industrial technologies, enhancing the convenience of the nation, obtaining foreign currency, and so forth. Therefore, it is crucial to expand foreign investment in the non-resource sectors.

In the Greater Yangon, growth in foreign investment is expected in thermal power station, manufacturing, construction, transport, telecommunications, hotel, tourism, real estate, and industrial park. It is expected that the new SEZ Law, (January 2014), new Investment Law (October, 2016), and implementation of Thilawa Special Economic Zone (hereinafter referred to as “SEZ”) development project will further encourage inflows and diversification of FDIs to Myanmar.



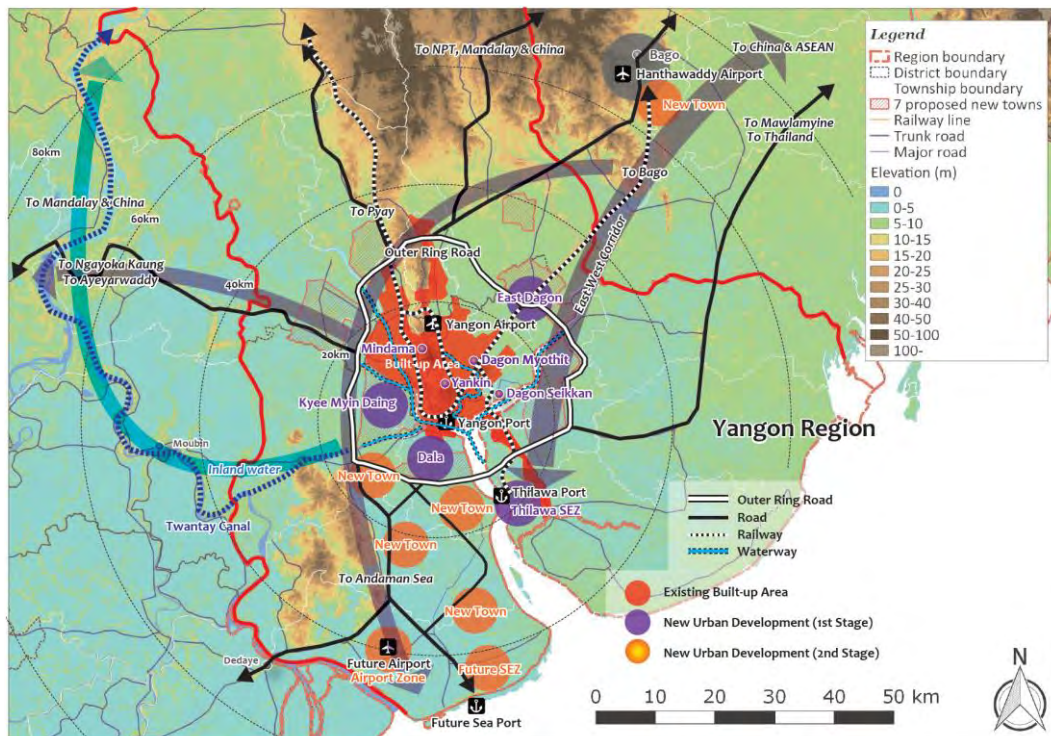
## Chapter 2: Yangon's Future Vision

### 2.1 Schematic Structure

#### 2.1.1 Schematic Structure of Yangon Region

A schematic structure of the whole Yangon Region with its surrounding area shall be discussed in long-term span in order to draw the big picture of the future urban image of Yangon. Drawing and sharing different kinds of viewpoints and approaches are being considered and determining which directions and areas are to be developed as urban areas in the future. Generally, creating and upgrading a city, especially such a large city like Yangon, takes much time in making it an ideal image. To achieve the future urban image requires a long period. In this context, the schematic structure has the image of half a century later, as shown in Figure 2.1.1. Currently, Yangon Region consists of a total of 44 townships, where, 33 townships are covered by YCDC service area, which is Yangon City. Yangon Region has a population of approximately 7.4 million with its area of 10,277 km<sup>2</sup>, and YCDC has a population of approximately 5.2 million with its area of 829 km<sup>2</sup>. Applying an annual growth rate of 2.6%, the future population half a century later (year 2065) will be 27.2 million in the Yangon Region. Meaning, there will be an increase of 20 million in the population.

To manage such large city and to accommodate such large number of population properly and actively, step-wise urban development with appropriate infrastructure provision must be conducted together with governmental initiative in good relation with positive private activities and citizen's understanding and cooperation.



Source: JICA Study Team

**Figure 2.1.1: Schematic Structure of Yangon Region**

## 2.1.2 Necessary Logistics Function

Yangon is surely expected to enhance the function of its international logistics hub by having good linkages of land, sea, air, and water. Key functions must be developed to realize the schematic structure of the following:



Outer Ring Road should be functioned in connection with economic corridors  
Source: JICA Study Team and DCA



Development of Hanthawaddy International Airport is negotiated



Function of Thilawa Area Port is necessary in short and middle term

**Figure2.1.2: Images of Necessary Logistics Functions**

### (1) Economic Corridors and Outer Ring Road

To be more economically active, strengthening economic corridors by having strong connection with neighboring countries (e.g., China, Thailand, India) is essential in terms of logistics and industry by land-based, air-based, and water-based linkages. Yangon is currently expected to be a focal west gateway of the Greater Mekong Sub-region (hereinafter referred to as “GMS”). Additionally, a new emerging economic corridor connecting GMS east-west corridor and Yangon, and then stretching to the west to Ngayoke Kaung SEZ facing the Bay of Bengal, is considered recently. To establish an efficient logistics through the economic corridors and to avoid heavy traffic in existing built-up area of Yangon, an outer ring road should be developed well.

### (2) Airports

The existing Yangon (Mingalardon) International Airport reached a total of 4.9 million passengers in 2015. Considering the past trend of 18% annual growth, air traffic demand is forecasted to reach 42 million passengers in 2040 and 72 million passengers in 2050 respectively by the Myanmar Government. In line with this forecast, the current airport capacity will be inadequate and new international airports are necessary in the near future. Currently, the Hanthawaddy International Airport, located at about 65 km from of Yangon, is expected to start its operation around the year 2022, while the existing airport is processing to expand its capacity having 6 million passengers. Furthermore, development of a new international airport may be also considered in Kungyangon, south of Yangon, according to air traffic demands in a longer term, targeting half a century later.

### (3) Ports

The existing Yangon Port, a river port in the Yangon River, is composed of two port areas, namely: Yangon Main Port and Thilawa Area Port. The Thilawa Area Port has some definite advantages for its entrance because it takes 12 hours to enter Thilawa Area Port from Elephant Point, while it takes 24 hours to reach Yangon Main Port due to the additional time spent while waiting for the tidal cycle. The total container throughput forecast is estimated to be more than 4 million 20 foot equivalent units (hereinafter referred to as “TEUs”) annually in 2030. As the capacity of Yangon Main Port is limited up to less than 1 million TEUs, the main logistics function must shift to Thilawa Area Port gradually. To encourage Yangon to be the logistics node through economic corridors, Thilawa Area Port should be developed and functioned well in short and middle term, and development of a deep sea port at the south of Yangon may be considered in longer term. (\* a comparison study for the future sea port was done and discussed as referring to the end of this report).

#### **(4) Canal and Waterway**

Twantay Canal, which was developed since the old time, should play an important role to connect with China through Mandalay in terms of logistics. It is also necessary to make good use of river ways such as the Yangon River, the Bago River, and the Pazundaung Creek for public transportation inside Yangon.

#### **(5) Railway**

The current number of railway lines, which consist of eight lines with three main lines and five branch lines, is insufficient judging from the present population of Yangon. Not only modernization of existing three main lines but also construction of two new mass rapid transit (hereinafter referred to as “MRT”) lines shall be required in the future.

### **2.1.3 Necessary Urban Function**

Yangon’s urbanized areas shall be surely expanded more in the future. New built-up areas shall be developed to accommodate the increasing population of around 20 million in half a century later.



Riverside space of CBD should be recovered for the citizens.

Source: JICA Study Team



Thilawa SEZ and new towns have been developed.



Industrial Zones (e.g., Hlaing Tharyar) should be improved more.

**Figure2.1.3: Images of Necessary Urban Functions**

#### **(1) Existing Built-up Area**

Generally, urban areas are strongly recommended to be as compact as possible, basically inside of the outer ring road, for efficient traffic and infrastructure development and operation. In this context, existing built-up areas, which have basic infrastructure and social services should be utilized and rehabilitated in the future to have a more comfortable and attractive environment. To avoid further congestion of the current central business district (hereinafter referred to as “CBD”), decentralization of urban function should be promoted by creating new sub-centers. CBD has planning disciplines with grid pattern road network and plenty of greenery. In light that logistics function will shift to Thilawa Area Port, open spaces along the Yangon River has to be recovered for the citizens.

#### **(2) New Cities**

To accommodate a large number of population in the future, development of some new cities is necessary in four main places, namely: Thilawa, Southwest New City (west side of Kyee Myin Daing), Dagon Myothit (East) New City, and Dala New City. Considering new towns, there are some necessary points to be considered thoroughly especially flooding risk at low-lying areas. In the long term, urban development in the south of Yangon is also considered with the proposed deep sea port and new airport.

#### **(3) Industrial Zones**

Thilawa SEZ, as well as industrial zones such as Hlaing Tharyar and Shwe Pyi Thar, should be developed to promote more manufacturing and industrial activities. As the industry activates more in long term, development of more SEZs or industrial zones should be considered outside of Yangon.



## 2.2 Development Vision

A development vision is an ideal future image of a city, which can be attained through addressing problems and issues, catering to the citizens’ needs, and integrating foresight of the stakeholders, and other disciplines. Without setting clear development vision, it would be difficult to implement an integrated urban development plan efficiently. Consequently, the administration would come to a deadlock, as there are a number of concerned sectors playing important roles in developing, improving, and managing a large city.

In this context, it must be noted that the development vision under the new administration commenced from 2016 has been discussed to reach the ultimate visions. Consequently, the development visions of Yangon, which consists of one statement and four key drivers, was crafted as shown in Figure 2.2.1 in consideration of discussions mainly among YRG and YCDC.



Source: JICA Study Team

**Figure 2.2.1: Development Visions of Yangon**

### (1) Statement

**Attractive International Port and Logistics HUB**  
**-A City of Blue, Green, and Gold-**

The statement above expresses Yangon's future goal of urban images, which has strong competitiveness in terms of port and logistics hub against neighboring countries in the world.

Yangon is rich in beautiful lakes, rivers, canals, green natural environment and lighting gold of Shwe Dagon Pagoda. Yangon will enhance its charms and characteristics not only to be stronger but also more attractive with its history, culture, environment, and people.

## **(2) Key Drivers**

Under the statement, key drivers of development visions are summarized into four main points, namely: 1) International Logistics HUB City; 2) Knowledge and Comfortable City; 3) Well-managed Infrastructure City; and 4) Good Governance City. These key drivers correspond to major sector development field of the city and they are expected to become strengths and opportunities which will lead to the realization of the development vision.

### **a) International Logistics HUB City**

Yangon is expected to be an "International Logistics Hub City" with attractive and competitive urban and logistics functions where more people and companies (businesses) gather from surrounding area since Yangon is the city with the largest economy and with an international gateway to Myanmar.

### **b) Knowledge and Comfortable City**

Yangon is expected to be a "Knowledge and Comfortable City", where everyone who lives and works in Yangon should be able to enjoy a more comfortable living in consideration of environmental and social aspects.

### **c) Well-managed Infrastructure City**

To achieve an international logistics HUB city, urban infrastructure development must be the focal factor. To provide a safer, more reliable and convenient urban life, and to realize economic development and industrialization, the vision of becoming a "Well-managed Infrastructure City" must be realized in the future.

### **d) Good-Governance City**

To establish a good city both for living and business, to be a "Good Governance City" is an indispensable key factor.

## 2.3 Development Strategies

### 2.3.1 To be an International Logistics Hub City

Yangon is expected to be an “International Logistics Hub City” with attractive and competitive urban and logistics functions where more people and companies (businesses) gather from surrounding areas. Moreover, Yangon is also expected to be an international business city with integration of Information Technology (hereinafter referred to as “IT”), manufacturing, and service industries at SEZ and new cities.

Yangon is a city with the largest economy and with an international gateway to Myanmar, which is currently a country with increasing attractiveness and growing world attention. Additionally, Yangon is the focal node city of economic corridors of GMS, which are East-West Economic Corridor, Western Economic Corridor, Southern Economic Corridor, and New Emerging Corridor and Asian highways in strong linkage with China, Thailand, India, and other countries not only by land but also by sea, river way, and air. When goods and people movement become freer, particularly in the Association of Southeast Asian (hereinafter referred to as “ASEAN”) region, the international logistics hub and gateway functions for exports/imports and exchange of knowledge shall be improved, thereby leading to accelerated and sustainable economic development.

Yangon has been and will be expected to enhance the central functions of service, trade, and distribution. This means that Yangon will further accommodate the increasing population and employment as the city with the largest economy in Myanmar. Developing the logistics, industrial, and commercial sectors would need a labor force either by in-migration from other areas or a shift from the agricultural sector to the manufacturing and services sectors in the future.

Yangon and Mandalay, which are the main cities of the country in the Two-Polar Development Strategy, will share their respective roles in the future in terms of economics, politics, and culture. These main cities will be connected with railway (Yangon-Mandalay railway) and highway networks and form the main frame of the nation passing Nay Pyi Taw, the capital city. In order to create well-balanced development in the whole country, it is very important to develop road network with broader trunk roads and accesses to logistics nodes all over the country, especially enhancing the function of economic corridors. An outer ring road and elevated inner ring road of Yangon should be constructed in connection with such national road network to mitigate traffic burden by cargo transport passing through the city. Twantay Canal also has a large potential to empower connection with China and Mandalay, in terms of inland water logistics.

Development of SEZ and an international port shall play an important role as an industrial and logistic core area to accelerate economic growth and industrial promotion for Yangon and Myanmar. To accelerate it in the short and middle term, development of Thilawa SEZ and port is necessary and significant. Other industrial zones should be also upgraded with safely and advanced technology. This shall contribute to, not only new job creation but also, economic development by means of attracting advanced manufacturing factories such as motor, electronic, and electrical assembly.

Yangon (Thilawa port and south deep-sea port) and Ngayoka Kaung (SEZ and port in Ayeyarwady) shall be strongly connected with economic corridors by functioned key ports and industrial zones at the Bay of Andaman and Bengal. Additionally, since airports shall push economic and logistics activities up efficiently, airports shall be constructed step by step according to demand forecast.



Source: JICA Study Team

**Figure 2.3.1: Economic Corridor (AHI)**



Source: JICA Study Team

**Figure 2.3.2: Proposed Key Actions for International Logistics HUB City**

### 2.3.2 To be a Knowledge and Comfortable City

Yangon is expected to be a “Knowledge and Comfortable City”, where everyone who lives and works in Yangon should be able to demonstrate their potentials and abilities and to enjoy a more comfortable living in consideration of environmental and social aspects.

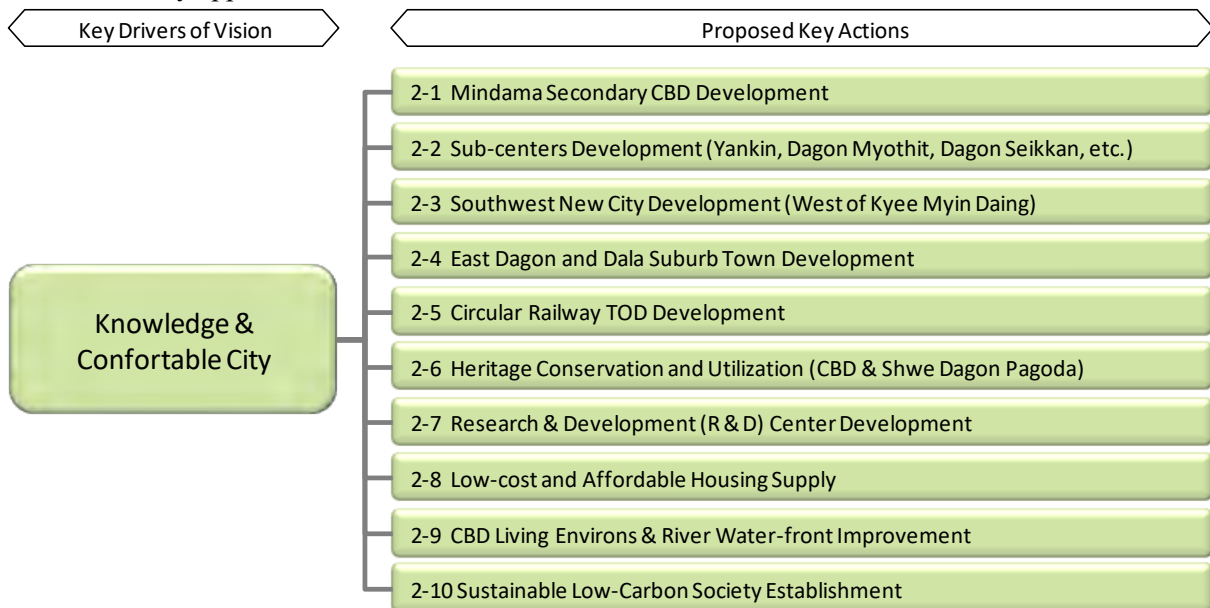
Strengthening knowledge and educational function for improving human resources by research and development (hereinafter referred to as “R&D”) facilities, educational organization, and related facilities shall be necessary. Human resources will be a key factor for foreign and domestic investors in making sound investment decisions to put their businesses in Yangon for international competitiveness.

Yangon is expected to accelerate housing supply of more than one million units to accommodate the families in 2040 for various households. To achieve good living environment, housing supply will be one of the most important measures by means of creating new cities in the suburb area of Yangon including a mass low cost and affordable housings. Creation of sustainable sub-centers and station front urban area with appropriate size should also be considered in order to contribute for Yangon to be efficient and compact city with a concept of decentralization of urban function from CBD. In contrast, high-valued agriculture and related industries in the suburbs should also be enhanced in good balance.

To encourage well-balanced urban development with integrated business and residential areas and with traditional and natural environment with respect to Yangon’s landscape and heritage is also important. Although Yangon has 189 registered historical heritage buildings, some of these heritage buildings are in decrepit condition without much care and utilization. The characteristics of these historical heritages should be maintained and enhanced further. Yangon would play the role of an international gateway for visitors to popular domestic tourism destinations. Succession of such historical heritages and creation of attractive river-front area should be carried forward to the future. Establishment of sustainable low carbon society is also a necessary approach to be achieved.



Source: JICA Study Team  
**Figure 2.3.3: Sub-center Development (Yankin)**



Source: JICA Study Team

**Figure 2.3.4: Proposed Key Actions for Knowledge and Comfortable City**



### 2.3.3 To be a Well-Managed Infrastructure City

To achieve an international logistics HUB city, urban infrastructure development must be the focal factors. To provide a safer, more reliable and convenient urban life and to realize economic development and industrialization, the vision of becoming a “Well-managed Infrastructure City” must be realized for the future, especially in transportation and road, electricity, and water supply. A concept of “public safety” should be thoroughly considered by securing safer sanitation.

For the future of Yangon, the existing transportation system and facilities are inadequate as compared with what they should be. Consequently, it may be necessary to examine how to encourage more commuters to use the existing circular and intercity railway and/or whether to introduce the urban MRT. Integrated public transportation must be considered having suitable roles in good balance with automobiles. To reorganize bus routes with convenience, to upgrade railway network with punctuality, convenience, and comfort, and to utilize water transport as public transport and tourism are expected to enhance more.

Regarding electricity, improvement of power supply is one of the urgent needs. In Yangon, which has a share of almost half of the domestic power demand, it is important to draw the appropriate strategies of power supply and transmission in the future.

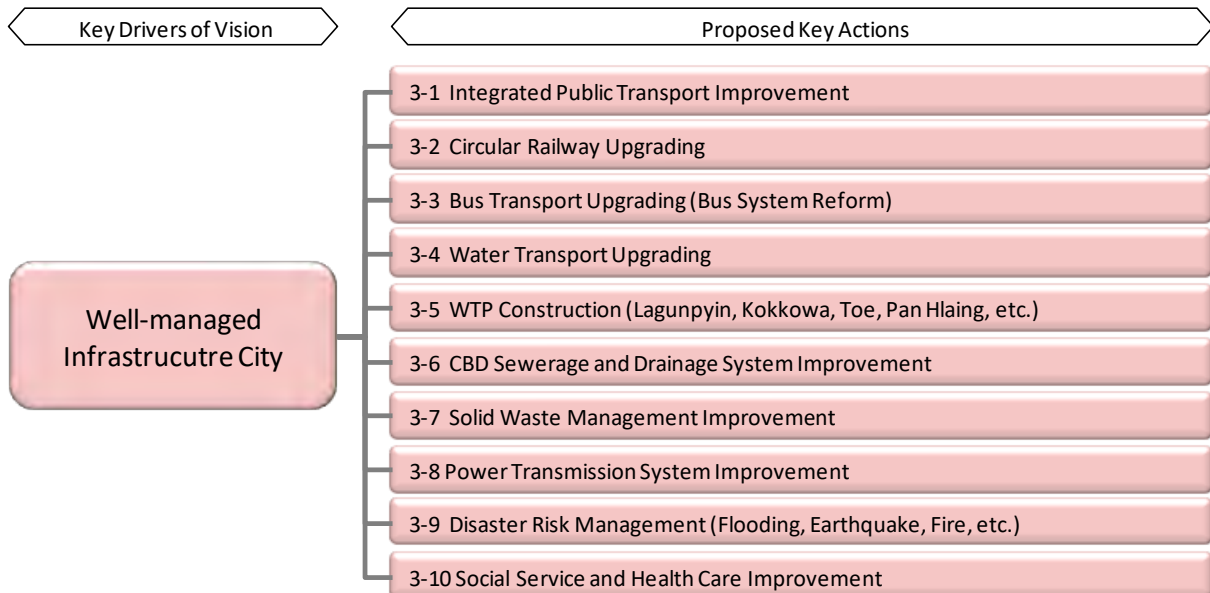
Additionally, urban infrastructure (water supply, sewerage, drainage, solid waste, telecommunication) and social services (education, medical, public facility, and tourism) are in relatively lower level than neighboring countries. Sustainable and reliable infrastructure shall be developed with consideration on effective operation and maintenance (hereinafter referred to as “O&M”).

To be resilient against disaster risk of earthquake and flooding is also important and cope up with step by step to secure public safety.



Source: JICA Study Team

**Figure 2.3.5: Water Reservoir**



Source: JICA Study Team

**Figure 2.3.6: Proposed Key Actions for Well-Managed Infrastructure City**

### 2.3.4 To be a Good Governance City

To establish a good city both for living and business, to be a “Good Governance City” is an indispensable key factor. To realize this urban development plan, it is necessary to establish a system which controls and promotes urban development activities and building constructions based on land use plan and implements infrastructure development and social service projects based on the development strategies and action plans. A concept of “Social Benefit” should be thoroughly considered.

Since preparation and enactment of new laws take time, the tentatively enacted by-laws of Yangon shall be examined for rules and laws enforcement. To implement necessary development projects through transparent legal system under the rule of law is deeply expected, especially a system with regard to zoning regulation and development permission which restrict people’s property rights.

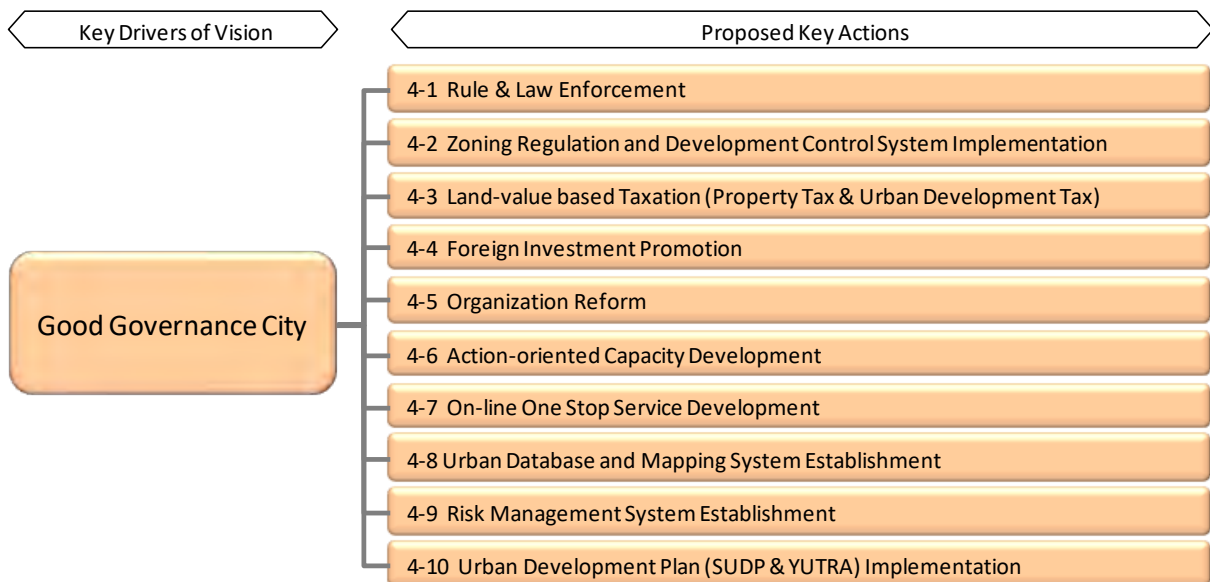
Given the very fast pace of expanding economic activities in the Greater Yangon, needs for urban infrastructure development that needs massive financing sources because the existing financial sources alone are not able to close the financing gaps. To establish urban development financing mechanism in order to fill such gap in urban development by taxation and project financing are necessary in the implementation phase. In the mid to long term, it can be enabled and empowered to explore its untapped potential in order to increase and diversify “own-source revenues”.

Recently, capacity development has been growingly recognized as one of the most essential factors for urban development in particular. Capacity development is defined as the process whereby people, organizations, and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time. Continuous capacity development shall be necessary.



Source: JICA Study Team

**Figure 2.3.7: Planning and Implementation Body (YCDC)**



Source: JICA Study Team

**Figure 2.3.8: Proposed Key Actions for Good Governance City**

## Chapter 3: Urban Framework and Structure

### 3.1 Socioeconomic Framework

Yangon Region is “the Economic Center of Myanmar”, accounting for 14% of the national population and 22% of gross domestic products (hereinafter referred to as “GDP”) in the country. (Based on the 2014 Myanmar Population and Housing Census and Data from Planning Department, Ministry of National Planning and Economic Development (hereinafter referred to as “MNPED”) (2010-2011)).

#### (1) Population

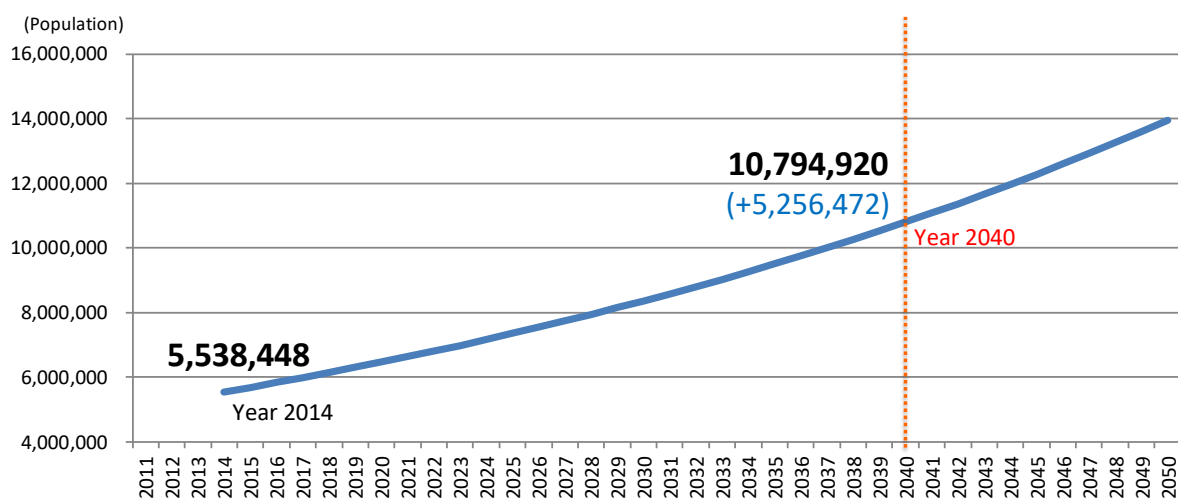
Yangon City has experienced rapid population growth in the past decade. The average growth rate of population in Yangon City between 1998 (3.69 million) and 2014 (5.54 million) is 2.09% annually. With regard to each township group (the CBD, inner urban ring, south of CBD, older suburbs zone, outer ring zone, northern suburbs, and new suburbs zone), while the average population growth rates of CBD and older suburbs zone are -0.10% and -0.03%, respectively, new suburbs and south of CBD have high growth rates, which are 6.93% and 6.01%, respectively.

In the projection of future population for the Greater Yangon, population growth rate of 2.6% (past Bangkok 1975-2000) was adopted. As the population of 2014 is the baseline, future population for the Greater Yangon is projected at 10.8 million (10,794,920) in 2040.

**Table 3.1.1: Population Projection Based on Census 2014**

	2014	2020	2025	2030	2035	2040
Population	5,538,448	6,460,591	7,345,291	8,351,141	9,494,730	10,794,920
Increase		+ 922,143	+ 1,806,843	+ 2,812,693	+ 3,956,282	+ 5,256,472

Source: JICA Study Team



Source: JICA Study Team based on Census 2014

**Figure 3.1.1: Population Projection Based on Census 2014**

## (2) GRDP

It is assumed that the Gross Regional Domestic Product (hereinafter referred to as “GRDP”) per capita in the Greater Yangon would reach the current Thailand level in 2035. As a result, GRDP in the Greater Yangon will be USD 112,580 million in 2040.

**Table 3.1.2: GRDP and GRDP/Capita**

Year	GRDP (USD in Mil.)	GRDP/CAP (USD)	Population Projection	Remarks
2014	11,357	2,050.5	5,538,448	Current
2025	33,625	4,577.7	7,345,291	Projection
2035	90,200	9,500.0	9,494,730	
2040	112,580	10,429.0	10,794,920	

Source: JICA Study Team (2014 data is based on IMF and Myanmar Census. The GRDP per capita reach USD9,500 in 2035)

## (3) Economic Development

Development policy for each economic sector is described reflecting recent development situation as below;

### 1) Manufacturing and Industrial Sector

With the increase in foreign investors’ interests due to the relaxation and gradual lifting of economic sanctions, it is necessary to improve the investment climate for foreign investment in Yangon as well as in the whole country.

- a) To improve the investment climate by utilizing the new Investment Law;
- b) To enhance the functions of the Directorate of Investment and Company Administration (hereinafter referred to as “DICA”) and one-stop service unit in Yangon to shorten the processing period and approval of the applications of foreign investors;
- c) To develop Thilawa SEZ Zone 2 and next international industrial areas so that foreign companies would invest. Foreign investors are anxious to see the completion of the Thilawa SEZ project because they are experiencing difficulty in obtaining appropriate industrial lands with good access to infrastructure and services in the Greater Yangon; and
- d) To implement development project coming next of the Thilawa SEZ, encourage to set up an organization or encourage private developers to O&M.

### 2) Commercial Sector

In Yangon City, there are about 170 traditional markets of varying sizes that are supervised by YCDC. In addition, there are a lot of traditional markets in the neighboring townships of the Greater Yangon supervised by the Ministry of Border Affairs (hereinafter referred to as “MOBA”). A lot of retail shops gather within these traditional markets to sell meat, fish, vegetables, dried foods, flowers, pet food, household goods, clothing, etc. They contribute to the lives of residents visiting these traditional markets.

The number of business establishments in the modern commerce sector has greatly increased in recent years. According to Business Establishment Survey (hereinafter referred to as “BES”) which was done in 2013, about 70% of business establishments in the modern commercial sector were founded after 2000 and about 40% were founded after 2010. In addition, most of these companies have business expansion plans. Traffic congestion may obstruct customer’s access to the modern establishments. Frequent power blackouts increase fuel consumption costs for standby generators.

Under an upward trend, the business establishments are facing problems on skilled labor shortages and strong competition. For labor recruitment, they rely more on printed media such as

newspapers and magazines, and recruitment agencies than other sectors. They tend to put emphasis on employee's training. BES revealed that about 85% of establishments are training employees with their own programs and more than 30% of establishments are outsourcing employee's training programs to schools.

- a) The location of a traditional market is mostly determined by a government directive. YCDC and/or MOBA need to formulate a location planning of new traditional markets based on changes in population distribution in the long term.
- b) Regular inspection of cleanliness is necessary for traditional markets and its adjoining areas.
- c) Modern commercial companies need to work out their business expansion plans based on the analysis of geographical distribution of potential customers and competitors' trend.
- d) YCDC needs to take measures to reduce traffic congestion. Modern commercial establishments need to provide enough parking spaces for customers. Otherwise, modern commercial establishments in the congested area may lose their customers.
- e) The government needs to take measures to improve power supply.
- f) Under an upward trend, the modern commerce sector would continue to have problems on skilled labor shortages and employee's training. They need to continue to take measures to solve these problems.

### **3) Service Sector**

The number of business establishments in the service sector has increased in recent years. According to BES, more than 60% of business establishments in the service sector were founded after 2000 and more than half of those establishments had business expansion plans.

Business establishments in the service sector commonly face problems of strong business competition and skilled labor shortages just like in the modern commerce sector. In addition, a lot of hotels responded in the BES that frequent power supply shortage is a problem. While the amusement industry responded that high fuel costs for standby generators is also a problem.

- a) To continue to address the issue on skilled labor employment and employee's training. Banks require skilled labor and employee's training, since they have to run new types of financing services.
- b) To strengthen strong business competition for having a positive impact on customers by improving the quality of service and/or by bringing the rates down to a reasonable level.
- c) To lift stock market increases the capacity of the registered companies to raise funds. The government should continue to deregulate financial market. At the same time, the government should also support domestic banks to be able to compete with the entry of strong foreign banks.

## 3.2 Urban Structure

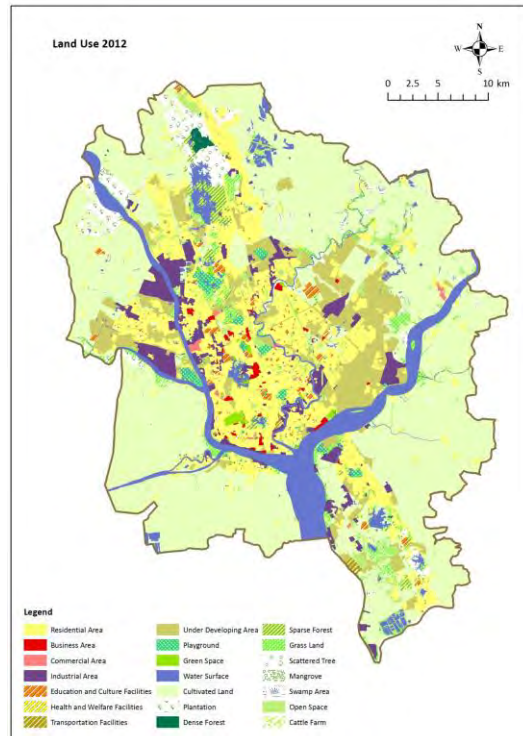
### 3.2.1 Current Land Use

Currently, urban central functions including administration, banking, business and commerce are located in CBD with high density of houses and shops. The population density of CBD is strikingly high at 325.6 persons/ha.

Looking at the inner urban, some lands seem not to be used efficiently from the viewpoint of urban functional use and land use patterns. For example, an international airport also exists inside, although other large-scale cities, which have a population of around or over 10 million do not have their own international airports around 15-20 km radius area from the city center.

Currently, industrial zones seem to disperse throughout the Greater Yangon even in the inner urban, while some of the large-scale zones are located along trunk roads in the suburb area.

Regarding the land use in 2012, agricultural area occupied 51% of the total area, followed by 22% of urbanized areas. With the population growth projection, it is somewhat unavoidable that the ratio of urbanized area tends to increase in the future, while agricultural and open space tend to decrease gradually.



Source: GIS database (1:50,000) developed by the JICA Study Team with 2012 Satellite Image Analysis

**Figure 3.2.1: Land Use Map of 2012**

### 3.2.2 Urban Structure

#### (1) Concept and Principles

<b>Concept</b>
<b>Sub-center with Green Isle System</b>

The proposed urban structure aims at decentralizing the urban center. Five sub-centers will be developed around 10-20 km radius area from the CBD. Additionally, this urban structure aims at controlling urban expansion by means of creating outer green belt in order to avoid continuous and extensive urban expansion with low density called as “urban sprawl” and to supply urban infrastructures efficiently and effectively. An outer ring road will be provided and future urbanization along the outer ring road in the next step of development of the sub-centers growth belt will be promoted, namely, an “Outer Ring Growth Belt”. Green areas including high productive agricultural areas will be conserved as much as possible.



## Principles

### a) Accommodation of 5.2 million population increase

As the base year of population estimation is set on 2014 which the latest census was published, annual population growth rate of “2.6%” is adopted. The population is estimated at 10.8 million in 2040. As a result, population increase from 2014 (0 year) to 2040 (targeted year) is 5.2 million.

### b) Compact urbanized area

Urban expansion shall be basically limited inside the outer ring road, since majority of the area has been already developed. Although population density of new built-up area was equally set as 120 people/ha in previous SUDP, population density of sub centers and areas along circular railway are set as 150 people/ha to make the urbanized area more compact.

### c) Decentralization

Since excess traffic and over accumulation of urban functions in the existing CBD are identified as critical urban issues, decentralization of urban functions from the existing CBD is required.

### d) Four growth axes

As directions of future development, three axes along trunk roads (Lower Mingalardon Road, Yangon - Mandalay Highway) and railways shall be strengthened. Additionally, one axis toward south is also proposed.

### e) Four new cities

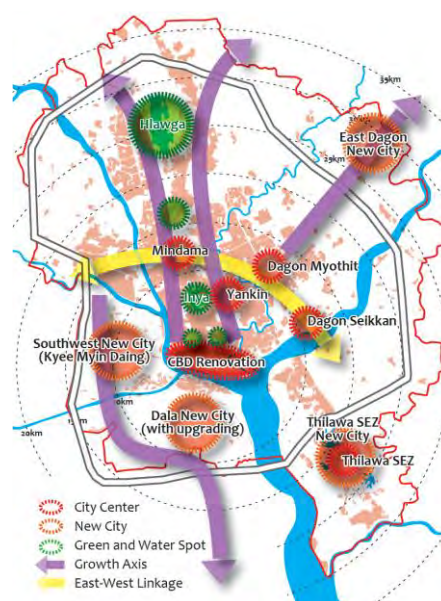
Two stand-alone new towns (Southwest new city, and Dagon Myothit (East) new city) and commuter new town (Dala new city) shall be developed to achieve an effective development in the suburb area. Additionally, Thilawa SEZ new city has been developing.

### f) CBD renovation

Not only the development of sub centers and new cities, but also the renovation of the CBD is required to maximize the development potential of the Greater Yangon. To actualize this, improvement of infrastructure and provision of better urban amenities including walkable spaces are needed.

### g) Transport linkage

Smooth linkage among CBD and other sub-centers and between new city cores and the surrounding areas are required. For the implementation, public transport such as bus, railway, waterway, and so on shall be improved.

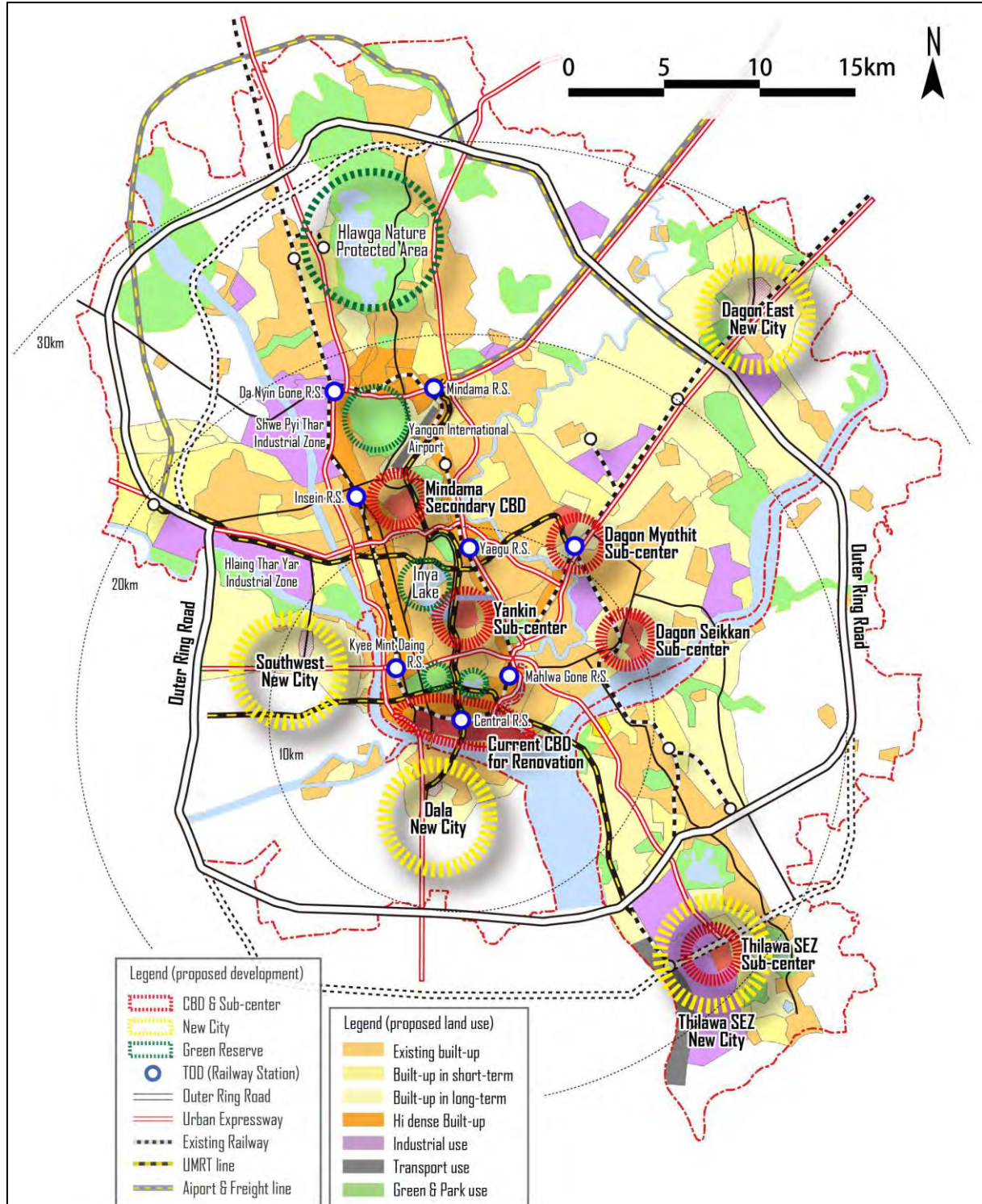


Source: JICA Study Team

**Figure 3.2.2: Development Directions**

## (2) Urban Structure

In line with development principles described above, future urban structure plan for the Greater Yangon is formed through discussion with YRG, YCDC, and other related organizations. The plan is shown as below.



Source: JICA Study Team

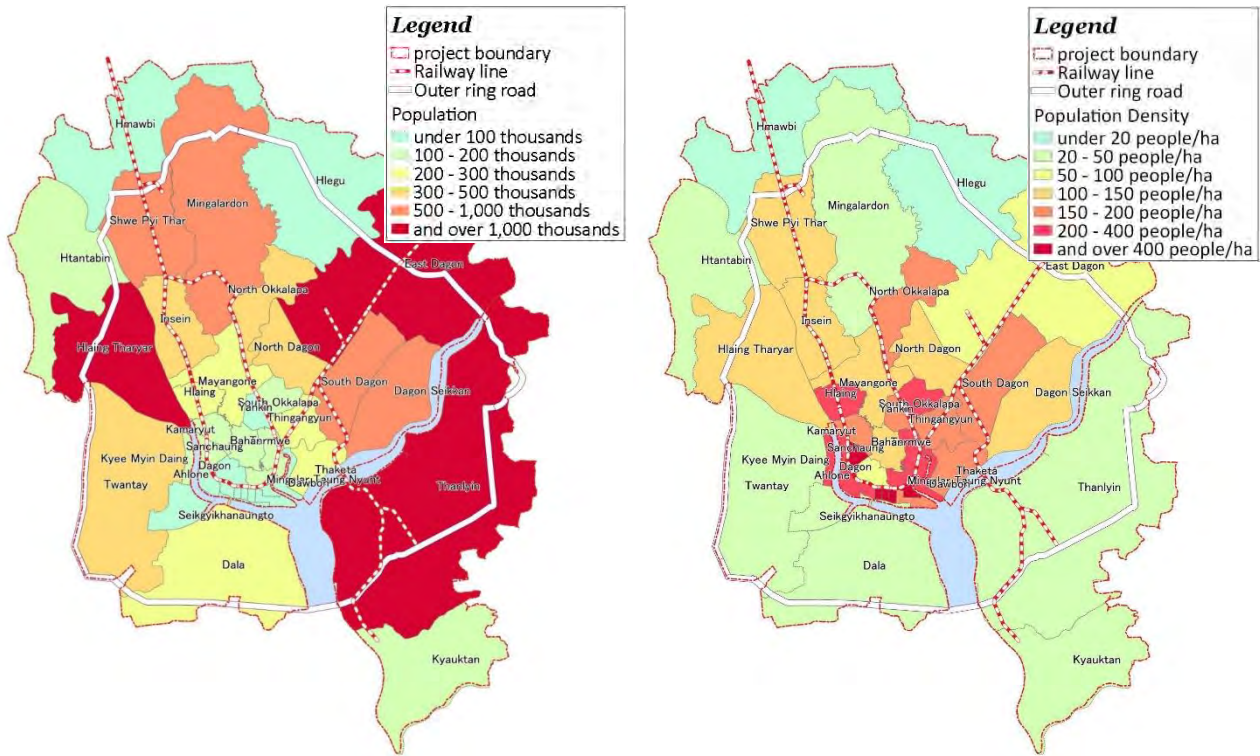
**Figure 3.2.3: Urban Structure Plan of the Greater Yangon in 2040**



### (3) Population Distribution

#### 1) Population and Housing Supply

Figure 3.2.4 shows township wise population and the population density in 2040, and the population density map illustrates that population density along the southern part of the circular railway will be more than 200 people/ha.



Source: JICA Study Team

**Figure 3.2.4: Population Distribution in 2040 (Left: Population, Right: Population Density)**

#### 2) Labor Population and Work Place Supply

Existing industrial zones in the Greater Yangon have a total area of approximately 5,100 ha with 40% of estimated occupancy rate currently. These existing industrial zones are able to accommodate the additional 238,000 laborers. Development of new industrial zone is necessary including 2,400 ha of Thilawa SEZ, which is estimated to accommodate 218,000 laborers in the future. To accommodate another 76,000 laborers of the secondary sector, creating three new industrial zones with a total area of about 900 ha is proposed.

“CBD”, “secondary CBD”, “sub-centers”, and “new city cores” will be the main work places for a lot of laborers in the tertiary sector. In the case of estimation of labor population, 236,000 laborers shall be accommodated by new city cores.



## Chapter 4: Development Policy and Action

### 4.1 Urban Function Development

#### *- To realize a compact and economically effective city –*

The Greater Yangon has continued to expand with population growth. While the decentralization of urban functions is being aimed, the current CBD area, where residences, commercial, and business establishments are concentrated, will still be the CBD in the future as a core of the Greater Yangon. In order to renew and revitalize the city’s efficiency, disaster-resistant, functional, and attractive urban space have to be realized.

Sector Vision	Realization of compact and economically effective urban development through decentralization of urban functions from the existing CBD and encouragement of efficient new urban developments
Basic Policy	<ol style="list-style-type: none"> <li>1) Develop five sub-centers to accelerate decentralization of urban functions accumulated in the existing CBD;</li> <li>2) As new cities, three stand-alone satellite cities at Thilawa SEZ, Southwest (west side of Kyee Myin Daing), and Dagon Myothit (East), and one more commuter city at Dala are planned to make the flow of people more effective and enhance economic activities at suburb areas;</li> <li>3) Railway area developments by utilization of lands owned by Myanmar Railway along Yangon Circular Railway;</li> <li>4) Development of the total area of industrial areas including the existing 5,200 ha of industrial areas which have site area of 8,400 ha.</li> <li>5) Supply of about 1.3 million housing units.</li> </ol>

#### 4.1.1 Commercial and Business Function

##### (1) Sub-center Development

One secondary CBD and four sub-centers are proposed in the updated structure plan, and the total area is 360 ha. These areas shall function for the decentralization of the current urban core (CBD).

##### 1) Development Policy

- a) To promote decentralization, five sub-centers are designed within 10 - 20 km distance from the exiting CBD.
- b) To accelerate economic activities, commercial, and business function shall be accumulated in public-owned lands.
- c) To stimulate people’s attention for the future, advanced, and well-designed urban facilities shall be introduced.



Source: Toyosu Project Committee, Japan  
**Figure 4.1.1: Image of the Subcenter**

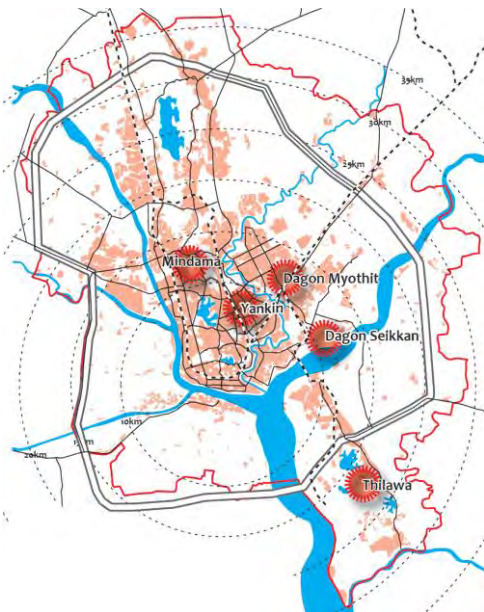
## 2) Development Target and the Schedule

Since sub-centers are planned to function as business cores for the surrounding area, provision of additional employment opportunities is expected. In the tertiary sector, the number of laborers is estimated at 270,000. Although the main land use of urban core is related to business functions such as commercial and office, residential zone shall be developed surrounding the business core. The night population density of the sub-center is planned at 200 people/ha, and total amount is 72,000 people. The development schedule and the development image are shown in Table 4.1.1 and Figure 4.1.2, respectively.

**Table 4.1.1: List of Sub-centers**

Name	Township	Net Area		Schedule		
				Short	Mid	Long
Mindama Secondary CBD	Mayangon	20 ha	(50 acre)	➡		
	Insein	60 ha	(150 acre)		➡	
Yankin Sub-center	Yankin	80 ha	(200 acre)	➡		
Thilawa SEZ Sub-center	Thanlyin	40 ha	(100 acre)	➡		
	Kyauktan	80 ha	(200 acre)		➡	
Dagon Myothit Sub-center	Dagon Myothit (North)	40 ha	(100 acre)		➡	
Dagon Myothit (Seikkan) Sub-center	Dagon Myothit (South)	40 ha	(100 acre)		➡	

Source: JICA Study Team



Source: JICA Study Team



**Figure 4.1.2: Sub-center Development (Left: Location Map, Right: 3D Image)**

Through identification of characteristics and advantage, development vision for each sub-center is summarized as below;



**Table 4.1.2: Development Vision for Each Sub-center**

Name	Advantage	Development Vision
Mindama Secondary CBD	<ul style="list-style-type: none"> <li>• Good accessibility to Yangon International Airport: 3 km</li> <li>• Social facilities are already located (hospital and convention center)</li> <li>• Vacant lands are spread in surrounding area</li> </ul>	<ul style="list-style-type: none"> <li>• Trade center (banks)</li> <li>• Convention center</li> <li>• Social service center for suburb area (general hospital, welfare facility, satellite office of administrative office)</li> </ul>
Yankin Sub-center	<ul style="list-style-type: none"> <li>• High potential for large-scale mixed use development (e.g. “Golden City” and “Myanmar Plaza”)</li> <li>• Green rich environment is spread nearby (Inya Lake)</li> <li>• Good accessibility to trunk road (Kabar Aye Pagoda Road)</li> </ul>	<ul style="list-style-type: none"> <li>• Business center (offices with conventional function)</li> <li>• Commercial complexes (shopping mall)</li> <li>• Tourism center (hotel complexes)</li> </ul>
Thilawa SEZ Sub-center	<ul style="list-style-type: none"> <li>• Industrial facilities are accumulated in Thilawa SEZ</li> <li>• Logistics facilities are already existing (Thilawa Port, railway)</li> </ul>	<ul style="list-style-type: none"> <li>• R &amp; D center</li> <li>• Logistics hub</li> <li>• IT &amp; software hub</li> </ul>
Dagon Myothit Sub-center	<ul style="list-style-type: none"> <li>• Good accessibility to existing railway</li> <li>• Low land development cost since elevation isn’t higher than other southern areas</li> </ul>	<ul style="list-style-type: none"> <li>• R &amp; D center</li> <li>• Sports complex</li> </ul>
Dagon Myothit (Seikkan) Sub-center	<ul style="list-style-type: none"> <li>• Large scale housing development project including commercial facilities is ongoing</li> <li>• The is located at gate from Thilawa to the city of Yangon</li> </ul>	<ul style="list-style-type: none"> <li>• Inland logistics hub</li> <li>• Business center (offices)</li> <li>• Amusement center</li> </ul>

Source: JICA Study Team

## (2) New City Development

Four new cities including Thilawa SEZ are selected as priority areas for suburb development, and the core area, “new city core”, is mainly made up of mixed use land use such as commercial, office, and public functions.

### 1) Development Policy

- a) To accommodate a larger population, remote areas having plenty of unused lands are designed as new cities. Especially farmlands are widely spread in candidate areas, conversion of these farmlands is adequate to implement.
- b) To be independent from the exiting built-up, stand-alone urban function shall be provided in close connection with work place and residence.
- c) Rich green and water in the urban area shall be designed and provided.



Source: Osaka Prefecture.

**Figure 4.1.3: Image of New Town Core**

## 2) Development Target and Outline

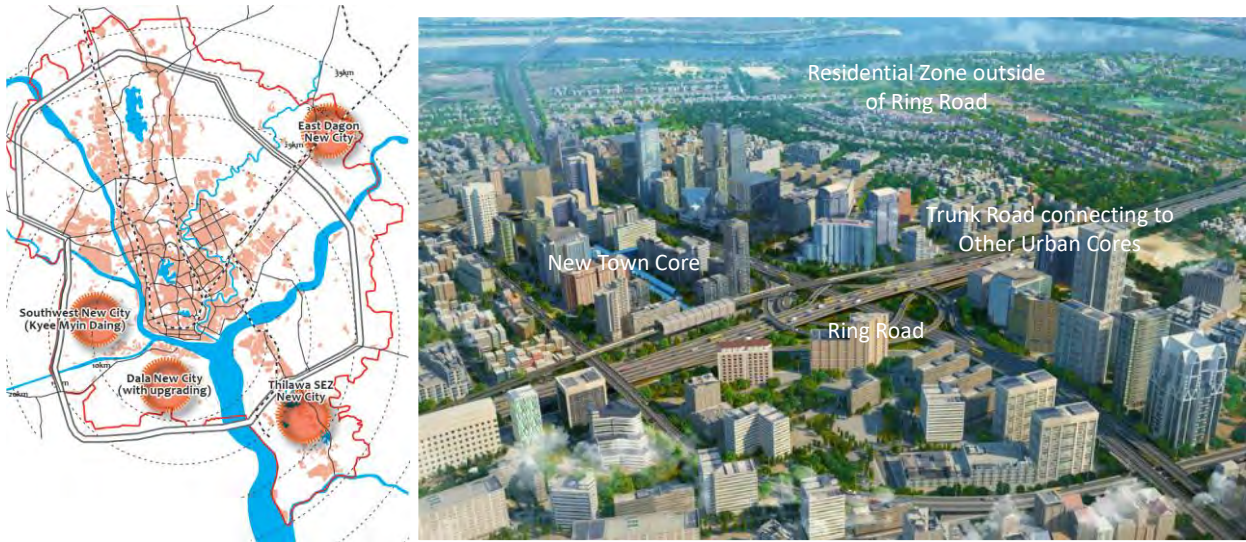
### (I) New City Development

Regarding suburb area development, two types of new city, “stand-alone satellite city” and “commuter city” are planned. Since Thilawa New City, Southwest New City (west side of Kye Myin Daing), Dagon East New City are located 10 - 20 km from the CBD, the business core should not be dependent on the CBD. For this reason, stand-alone type is suitable for these new cities. On the other hand, Dala New City is close to the CBD, and the Dala Bridge connecting the CBD and Dala area is now being planned by an agency from the Korean government. The area has potential to develop as a commuter city. As total, 1.2 million can be accommodated by development of these 4 new cities.

**Table 4.1.3: List of New Cities**

Name	Township Location	Net Area	Schedule		
			Short	Mid	Long
Thilawa New City	Thanlyin Kyauktan	2,400 ha (6,000 acre)	➡		
Southwest New City (west side of Kye Myin Daing)	Twantay	3,600 ha (9,000 acre)	➡		
	Kye Myin Daing		➡		
Dagon East New City	Dagon Myothit (East)	3,900 ha (9,500 acre)	➡		
Dala New City	Dala	1,600 ha (4,000 acre)	➡		

Source: JICA Study Team



Source: JICA Study Team

**Figure 4.1.4: New City Development (Left: Location Map, Right: 3D Image)**

Considering new cities, there are some necessary points to be considered thoroughly especially flooding risk at low-lying areas as shown in Table 4.1.4.

**Table 4.1.4: Points to be considered for New Urban Development**

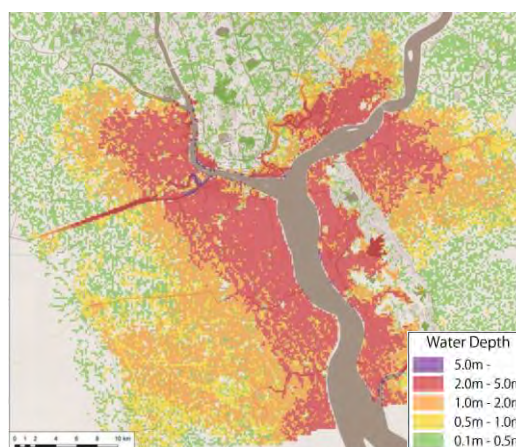
Items	Points
1. Population	A developing area should correspond to population forecast (increase population) no to be over-scale development.
2. Accessibility	A developing area should have strong linkage of public transportation connecting with built-up area of Yangon.
3. Infrastructure	A developing area should develop infrastructures and social services, especially how water and power are supplied.
4. Flood Resistant	Costly embankment and drainage system are necessary for a low-lying area to minimize flooding risk
5. Earthquake Resistant	Buildings in a developing area, especially low-lying, should consider deep-piling works, which takes much more cost
6. Development Cost Financing	Estimated cost becomes more expensive when the development area is selected in low-lying. Financing should be considered.

Source: JICA Study Team

According to the flooding risk analysis done by Asian Development Bank (hereinafter referred to as “ADB”), river side of Dala, Kyee Myint Dain and Twantay areas have 2 to 5 meters flooding by cyclone same size as Nargis. Therefore, it is necessary to consider about land development (soil filling up and the compaction) cost for these new city developments.

Source: “Transformation of Urban Management -Part II- Flood Management”, ADB, 2016

**Figure 4.1.5: Flood Risk Map**



## (II) New City Core Development

As described above, Southwest New City and Dagon East New City are stand-alone new city, an accumulation of commercial facilities and offices is needed as urban core. Even Dala New City, the area should be developed as a gateway to southern area of the Yangon region, development of urban core is required. Although accumulation of business functions is not high like the CBD or sub-centers, a total of 136,000 laborers for tertiary sector are estimated for these areas (total area of new city cores is 250 ha). The development schedule and the development image are shown in Table 4.1.5 and Figure 4.1.6, respectively.

**Table 4.1.5: List of New City Cores**

Name	Township Location	Net Area	Schedule		
			Short	Mid	Long
Southwest New City Core (west side of Kyee Myin Daing)	Twantay	50 ha (125 acre)	→		
	Kyee Myin Daing	50 ha (125 acre)		→	
Dagon East New City Core	Dagon Myothit (East)	100 ha (250 acre)		→	
Dala New City Core	Dala	50 ha (125 acre)			→

Source: JICA Study Team

Characteristics and vision of each new city are summarized as below;



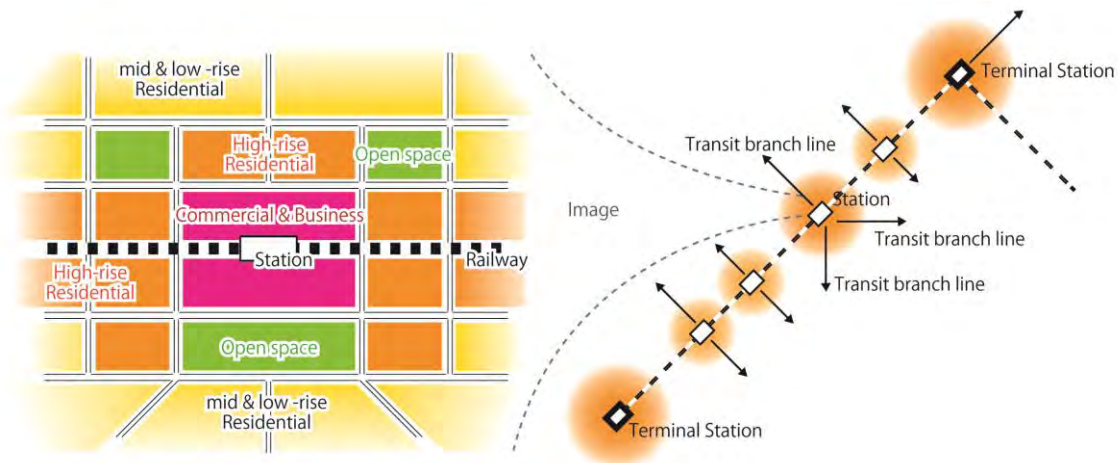
**Table 4.1.6: Development Vision for Each New City Core**

Name	Advantage / Challenge	Development Vision
Southwest New City Core	<ul style="list-style-type: none"> <li>• Accessibility to the CBD: 7km from the CBD</li> <li>• Land availability (currently farm land)</li> <li>• Low lying land, necessity of high land development cost</li> </ul>	<ul style="list-style-type: none"> <li>• Stand-alone satellite city</li> <li>• Education city (university)</li> </ul>
Dagon East New City Core	<ul style="list-style-type: none"> <li>• Accessibility to transportation: existing railway and Road No.2 are passing through</li> <li>• Land availability (currently farm land)</li> <li>• Low flooding risk because of high elevation</li> </ul>	<ul style="list-style-type: none"> <li>• Stand-alone satellite city</li> <li>• Research city (R&amp;D)</li> </ul>
Dala New City Core	<ul style="list-style-type: none"> <li>• Accessibility to the CBD: 2km from the CBD</li> <li>• Land availability (currently farm land)</li> <li>• Low lying land, necessity of high land development cost</li> </ul>	<ul style="list-style-type: none"> <li>• Commuter city connected to CBD</li> </ul>

Source: JICA Study Team

### (3) Railway Station Area (TOD) Development

Transit Oriented Development (hereinafter referred to as “TOD”) is an idea to solve several urban problems resulting from a private vehicle-dependent lifestyle, such as urban sprawl, traffic congestion and traffic pollution at urban core. Conventionally, transportation has been assigned a complementary role just to connect the living, working, and resting areas. But in the TOD concept, urban core should be set upon a public transportation terminal and the terminal area would be preferentially and collectively developed.



Source: JICA Study Team

**Figure 4.1.6: TOD Image of Station Area Development**

In Yangon, traffic congestion is identified as one of the critical urban issues, and prompt development of public transportation is important. To achieve this development goal, efficient and effective railway station area development is also needed.

#### 1) Development Policy

- a) To make railway function well and increase ridership, seven railway station areas of Yangon Circular Railway are designed for commercial/business and transit mode.



Source: Flickr

**Figure 4.1.7: Image of Railway Station Area Development**



- b) To promote TOD coming from surrounding areas by feeder, multi-modal function shall be provided in the areas.

## 2) Development Target and Outline

As shown in Table 4.1.7, seven areas in front of the proposed transit and main railway stations are listed as key urban development areas. Since provision of smooth transit between railway from/to other modes such as bus or taxi at this area is required, station plaza including bus terminal and taxi berth is essential. The total development area for railway station area is calculated as 150 ha and the estimated labor population in tertiary sector is 100,000. The list of proposed railway station area developments and the development schedule are shown in Table 4.1.7, and Figure 4.1.8, respectively.

**Table 4.1.7: List of Railway Station Area**

Name	Township	Key Function	Net Area	Schedule		
				Short	Mid	Long
Yangon Central Railway Station	Mingalar Taung Nyunt	Emblem station of the nation Gateway of the CBD	15 ha (38 acre)	➔		
Kyee Myin Daing Railway Station	Kyee Myin Daing	Commercial and business function accumulated station	5 ha (13 acre)		➔	
Malwagone Railway Station	Mingalar Taung Nyunt	Intercity terminal station	40 ha (100 acre)		➔	
Insein Railway Station	Insein	Transit node station from surrounding areas	20 ha (50 acre)	➔		
Yegu Railway Station	Mayangon	Transit node station from surrounding areas	10 ha (25 acre)	➔		
Mingalardon Railway Station	Mingalardon	Intercity terminal station	50 ha (125 acre)		➔	
Danyingone Railway Station	Insein	Intercity terminal station	10ha (25 acre)		➔	

Source: JICA Study Team



Source: JICA Study Team

**Figure 4.1.8: Railway Station Front Development (Left: Location Map, Right: 3D Image)**

#### **(4) Urban Rehabilitation on Existing Built-up Area**

##### **1) Urban Regeneration**

Since the existing CBD and the surrounding area were started to build up from early 20<sup>th</sup> Century, especially majority of buildings including infrastructure in the CBD are getting old. In addition, population increase and activation of economic activities were occurred, capacity upgrading and stable provision of the infrastructure are required.

###### **(I) Development Policy**

- a) Urban redevelopment to improve living environment for locals and to upgrade infrastructure for efficient economic activities are required. In addition, creation of space for urban facilities such as roads and parks by land readjustment is also required.
- b) Development of development standards to control urban sprawl and un-unification by private developments.

###### **(II) Actions**

- a) Effective space utilization of potential areas by urban redevelopment  
As short term projects, updating of urban functions through urban redevelopment scheme is proposed. Currently, some urban development projects are ongoing at CBD and the surrounding area, areas along Yangon circular railway and arterial roads also have highly development potential. Therefore highly utilization of the lands and urbanization of the land use are required.
- b) Provision of urban facilities by land readjustment  
Regarding the existing residential area with unsatisfactory infrastructure, implementation of infrastructure updating including provision of urban facilities shall be carried out by utilizing land readjustment scheme. The residential areas surrounding the CBD are candidates of this project.
- c) Capacity development of YCDC for the efficient development control  
Capacity development on development control of coming urban development is critical to implement this plan. Formation of operational structure, development of system to assess proposed projects in line with this plan and the financial planning are main components for this project.

##### **2) Proper Utilization of Government Owned Lands**

After transition to civilian rule, rapid urbanization occurs in Yangon. Although majority of newly urban development projects or urban redevelopment projects are handled by private sectors, the Ministry of Construction (hereinafter referred to as “MOC”) has implemented 2 urban development projects at 50<sup>th</sup> street and Link Road by 2016 and planning to conduct the other project at Lanthit Township. These projects are redevelopment projects of decrepit existing apartments, and main purpose is provision of more housing units with stable infrastructure. MOC still owns several potential sites in Yangon, and implementation of redevelopment projects for the sites are expected.

###### **(I) Development Policy**

- a) Provision of more housing units for low and middle income families
- b) Improvement of living environment includes infrastructure
- c) Provision of social facilities to achieve “Social Benefit” to locals who are living in surrounding areas (not only for residents)

## (II) Actions

In JICA Study “Data Collection Survey on Urban Housing Development in Yangon”, urban redevelopment project of Government owned lands by phased development starting from Pyitawthit was proposed. As implementation scheme, land clearance by Government and building construction by private are proposed to maximize land value for Government and smooth implementation for both. The project outline and development images are shown as below;

**Table 4.1.8: Outline of Proposed Urban Redevelopment Projects**

Project site	Pyitawthit	Uwisara	Wailuwon
Proposed phase	First phase	Second phase	Third phase
Building use	Mainly residential, Partially social & commercial	Residential, commercial, office and social	Residential, commercial, office and social
Site area	2.1 ha	7.8 ha	3.2 ha
Current FAR* / Num. of current units	70% / 114 units	80% / 684 units	110% / 400 units
Proposed FAR / Num. of proposed units	420% / 852 units	370% / 1,026 units	360% / 600 units

Note: \*FAR stands for Floor Area Ratio

Source: Data Collection Survey on Urban Housing Development in Yangon by JICA



Source: Data Collection Survey on Urban Housing Development in Yangon by JICA

**Figure 4.1.9: An Example of Urban Redevelopment Project Image of Pyitawthit Redevelopment**

### 3) Rehabilitation of Informal Settlements

Due to inflow of people from rural to urban and shortage of housings, informal settlements are spreading mainly the area along Yangon river. Therefore, provision of housings for low-income people and also provision of working opportunities near the residences are required.

#### (I) Development Policy

- a) Provision of low-cost housings to relocate people from informal settlements
- b) Provision of working opportunities for sustainable lives for residents
- c) Utilization of river side occupied by informal settlements

## (II) Actions

Because housing units for relocation from informal settlements has to be provided at first, development of large number of housing units for low and middle income people is required. In addition to housing development, working opportunities for residents has to be provided through development of commercial facilities at center of the developed area or industrial area development nearby to make the project sustainable. As middle term project, development of long-term and low-rate mortgage system for residents is also needed.

### 4) Urban Redevelopment Scheme

Currently, urban redevelopment related law or regulation is not available in Myanmar. Because of this, challenges to implement the urban redevelopment projects such as regulation of compensation cost, assessment of land price and division of roles on land clearance are existing. It is required to clarify these points to accelerate the project implementation.

#### (I) Development Policy

- a) Development of regular publication of public land price list
- b) Development of laws or regulations of compensation for right owners
- c) Clarification of role-sharing regarding land clearance

#### (II) Actions

Land price list in Yangon was published from Internal Revenue Department in 2013, it had a big gap between the market price. To make it more accurate, regular publication of the list is required.

The urban redevelopment related law or regulation which covers identification of compensation items (e.g. leasing right of the land, ownership of the building, business of right owner, cost of relocation or resettlement etc.), the cost and role sharing of land clearance between public and privates, have to be developed for smooth project implementation.

In addition, establishment of the Urban Redevelopment Authority (hereinafter referred to as "URA") to implement urban redevelopment projects includes land readjustment subjectively is also proposed. Expected roles of URA are 1) land acquisition or clarification of land ownership, 2) Relocation of residents (permanently or tentatively) including payment of compensation fee, and 3) land clearance including demolition of existing buildings, outside infrastructure development, and land development.

### 4.1.2 Industrial Function

In Yangon City, 29 industrial zones are currently under operation with a total area of 5,105 ha, which include some unused lands.

Labor population of secondary sector is estimated to increase by 554,000 from present to 2040. According to examples of current Yangon City and neighboring countries, the labor population density per unit area is in the range of 150-200 labors/ha. The total industrial zone necessary for the Greater Yangon in addition to the unused area in the existing industrial zones and Thilawa SEZ is estimated to be approximately 900 ha. Labor for these areas are planned to come from new cities nearby; therefore, access roads from new city to the industrial areas are required to develop in time with both developments. It is recommended that new industrial zones are to be located along the outer ring road, and existing industrial lands for factories located within 15 km distance from CBD are transferred outwards in the future.



**(1) Development Policy**

- a) Existing industrial zones shall be improved with advanced technologies, especially Hlaing Tharyar and Shwe Pyi Thar.
- b) To accommodate more factories and labors of secondary sectors, development of three new industrial zones is proposed along the outer ring road (e.g. East Dagon, Hlegu, Payagi).
- c) By transferring logistics function of Yangon Port to others, the center area shall be free from logistics vehicles and industrial function.
- d) Upgrading of existing industrial areas and relocation of decrepit industrial area from inside of residential area to periphery of urbanized area

**(2) Development Target and Outline**

Not only Thilawa SEZ, but also industrial areas at East Dagon, Hlegu and Payagi are also proposed. The total area of industrial areas including the existing 5,200 ha is 8,400 ha. From all of these industrial areas, 609,000 of employment opportunity will be generated and 80% of them is estimated as secondary sector. The breakdown of the area and labor population, and location map are shown in Table 4.1.9 and Figure 4.1.10, respectively.

**Table 4.1.9: List of Industrial Area**

Name	Net Area	Labor Population	Schedule		
			Short	Mid	Long
Existing industrial zones	5,100 ha (12,600 acre)	315,000	→		
Thilawa SEZ	2,400 ha (5,900 acre)	218,000	→		
Three New industrial zones (e.g. East Dagon, Hlegu, Payagi)	900 ha (2,200 acre)	76,000			→

Source: JICA Study Team



Source: JICA Study Team

**Figure 4.1.10: Location of Industrial Development**

### 4.1.3 Housing Function

#### (1) Current condition

##### 1) Housing Provision by DUHD in Myanmar

Since 1951, MOC and the Department of Urban Housing and Development (hereinafter referred to as “DUHD”) have provided housings as shown in Table 4.1.10. Furthermore, according to the Five-Year Housing Master Plan, one million housing units will be provided by 2030-2031 fiscal year in whole of Myanmar as shown in Table 4.1.11. According to the Five-Year Housing Master Plan from 2016-2017 to 2021-2022, DUHD will provide 8,000 units of low cost housing in the first term.

**Table 4.1.10: Total Number of Housing Units of Provided by DUHD in Myanmar by 2016**

Housing for Rent		Housing for Sell			Total
Public Housing (excluding for government staff)	Housing for Government Staff	Low Cost	Middle Cost	High Cost	
14,190	12,136	35,866	59,620	12,884	134,696

Source: DUHD

**Table 4.1.11: Number of Housing Units to be Developed During each Five-Year Term in Myanmar**

Five-Year Term Plan	Fiscal Year	Planned Units
1st	2011-2012 to 2015-2016	100,000
2nd	2016-2017 to 2020-2021	180,000
3rd	2021-2022 to 2025-2026	300,000
4th	2026-2027 to 2030-2031	420,000
Total		1,000,000

Source: DUHD

##### 2) Current issues in the Greater Yangon

The Greater Yangon’s population will increase from 5.54 million in 2014 to 10.79 million in 2040. On the other hand, household size decreased from 5.4 to 4.4 persons per household by 2014. Besides, current shortage of affordable housing formulates informal settlement which is estimated 150,000 units in the Greater Yangon. Then housing provision will be more important for improving urban environment. On the point of housing quality, the main structure of houses stayed the same. Timber and bamboo are the main materials for about 90% of all units in Myanmar.

#### (2) Development Policy

Sector Vision	To upgrade living standards and provide adequate housing for all citizens
Basic Policy	<ol style="list-style-type: none"> <li>1) Provision of adequate and affordable housing For consideration of population projection and current shortage of housing units, about 1.3 million housing units will be required in the Greater Yangon by 2040.</li> <li>2) Distribution of housing</li> <li>3) Formulation of housing management sector</li> <li>4) Enactment of law, rules, and regulations</li> </ol>

### **(3) Preliminary Development Plan**

#### **1) Categorized Housing Supply**

Suitable policies and procedures to be defined for setting the price of the land, houses, and apartments are as follows:

- a) Market price for the high-income people to achieve the highest national income,
- b) Suitable price for the middle-income people,
- c) The lowest price which is calculated by the amount of the investment divided by the number of the units provided by the project, and
- d) The price for low-income people is decided by the government to be affordable for low-income people including the people who live in the informal settlements.

#### **2) Provision of Adequate and Affordable Housing**

The population projection in the Greater Yangon by 2040 will be 10.79 million, which is about 5.25 million more than in 2014. According to the average household size, almost 1.2 million housing units will be required for new residents by 2040.

Upgrading of informal settlements which is estimated as 150,000 units by YRG is also important project to improve living environment of low-income people. To solve the situation, relocation of informal settlements and provision of at least 150,000 units low-cost housing is required.

In addition, it is necessary for better environment for residents to develop enough urban facilities such as road, park, drainage, sewage, water, electricity and so on. Management authorities for the urban facilities such as the YCDC are required to develop these urban facilities along with affordable housing provision by the DUHD.

### **3) Housing Management**

#### **(I) Formulation of Housing Management Sector**

Housing provided by redevelopment project should be managed and maintained by the Housing Management Committee which is formed by the representative of residents and other stakeholders such as contractor and developer. The following are to be carried out for formulation and effective operation:

- a) Publish rules, regulations, and guideline to form the respective Housing Management Committee;
- b) Define the duties and responsibilities of the Housing Management Committee; and
- c) Develop the procedures of formulating agreement of housing management among buyers, contractors, and developers.

#### **(II) Participation of Private Sector**

Housings should be provided not only by public but also private sector to provide higher qualities and profits from housing development. DUHD also proposed that 80% of the housing units to be developed from fiscal year of 2010-2011 to 2030-2031 will be provided by private sector and public sector, except for regional governments which will be through public-private-partnership (hereinafter referred to as “PPP”) scheme.

#### **4) Utilizing Various Financing**

Investments for housing project should be from various ways such as the following:

- a) Housing development fund of DUHD,
- b) Construction loan by Construction and Housing Development Bank (hereinafter referred as to “CHDB”),
- c) Budget of region and state government,
- d) Public housing fund for low-income people,
- e) Grants from foreign organizations,
- f) Contribution of the profit from mixed use development through cross-subsidize,
- g) PPP,
- h) Foreign investment implemented by a joint venture company or as build-operate-transfer (hereinafter referred to as “BOT”),
- i) Housing-ownership system or Myanmar Provident Fund collecting money from active government staff, and
- j) Loan and housing mortgage system connected with CHDB or other banks.

#### **5) Enactment of Laws, Rules, and Regulations**

While providing affordable housings for the low-income people, it is necessary to set or revise laws and guidelines such as National Housing Development Law and Condominium Law.



## 4.2 Environmental and Social Function Development

### 4.2.1 Urban Landscape and Heritages

#### *- To regenerate and maintain identical urban landscape and heritages -*

#### (1) Current Conditions and Issues

According to the history, the surrounding area of the Shwedagon Pagoda was the first area where people inhabited during the first century B.C. and earlier. Afterwards, Yangon expanded gradually to the south, and during the British Colonial Period, a grid patterned urban area was developed also along the river. After the independence of Myanmar, the city grew to the north and created new cities, satellite towns, and industrial zones. Throughout history, we could learn and find various characteristic of urban landscapes that were strongly connected not only with cultural heritage but also natural resources, to create own unique landscapes. However, as time passed, there are a number of dilapidated structures that require repairs and improvement, and also facilities that have been decided to change its uses for new functions.

For the conservation of historical buildings, the Yangon City Heritage Building List for Conservation was issued in 1996 by YCDC. Altogether, 189 buildings which were constructed before 1930 are in the list. While the YHT provided the Yangon Heritage Strategy which proposes the 12 key principles for future vision, three-phased strategy, and 24 sections of action plan to combine conservation heritages and development for Yangon's livability in 2016.

#### (2) Policy

Sector Vision	Regeneration and maintenance of identical urban landscape so that future urban development will coexist with historical and cultural heritage
Basic Policy	<ol style="list-style-type: none"> <li>1) Recording of historical and cultural heritage</li> <li>2) Establishment of guidelines including zoning plan for urban regeneration plan utilizing heritage buildings</li> <li>3) Establishment of management plan for the implementation of conservation</li> <li>4) Cultivation of human resources of experts for heritage-related construction</li> <li>5) Implementation of heritage buildings renovation and urban landscape</li> </ol>

#### (3) Preliminary Development Plan

##### 1) Construction of the Database of the Historic and Cultural Heritage

Database of historic important buildings listed by YCDC and unlisted significant buildings such as heritages proposed by the YHT, factories, and warehouse must include actual architectural drawings (plan, elevation, and section), collections of actual and old photos, and descriptions of historic values.

##### 2) Formulation of the Guidelines for the Urban Landscape

Heritage buildings: The guidelines are needed to give requirements focused on building conservation. Prescribed database and the following items are examples to be considered:

- a) Prohibition items: Reconstruction, modification of façade, and installation of signboards
- b) Regulation: Dimension, design, and material

Urban Landscape: To sustain the uniqueness of Yangon, an orderly urban landscape has to be formed through regulations according to scale from close view to distant view, together with the following conservation areas:

- a) Cityscape and urban landscape / middle distance view,
- b) Views of the urban landscape / middle distance to infinity view, and
- c) City's skyline / infinity view.

### **3) Establishment of Management Plans for the Implementation of Conservation**

There is a need to clarify the function and role of each governmental institution, to construct the flow of permission and licensing, and to establish a system of organization for the operation of the conservation plan. By implementing an urban heritage assessment for the renovation of existing buildings or new development plan, the urban landscape is expected to be maintained.

### **4) Cultivation of Human Resources of the Expert for Heritage Related Construction**

The cooperation of various professionals including YHT and human resource development for experts in various fields are required for the conservation work. Urban planners, architects, and historians in the planning stage; practitioners in assessment and licensing stage; and construction engineers who specialize in historic building restoration in construction stage urgently need to be trained by implementing development programs such as technology transfer workshops with experienced experts.

### **5) Water-front Development**

The waterfront and the river it fronts are the reasons for the existence of the historic city of Yangon, which forms today's CBD. It is anticipated that over the period of this plan, the current commercial cargo port facilities will be relocated elsewhere, releasing much of the waterfront for other uses. There will be pressure for commercial development including living, workplace, and leisure development, for which the waterfront would provide an attractive and sought after environment.

### **6) Implementation to Renovate Heritage Buildings and Urban Landscape**

It is effective to implement the key project for the conservation plans by public funds or by international donors prior to the redevelopment by the private sector. Currently, most of the former government buildings in the city have not been used for public use; therefore, it is desirable to conserve and regenerate them as new urban facilities. The key project for the comprehensive urban landscape together with the development of surrounding environment such as the implementation of public spaces by street trees, sidewalks and streetlights in the key streets, is expected to be implemented.

## **4.2.2 Public Parks and Green**

*- To realize comfortable and healthy urban life -*

### **(1) Current Conditions and Issues**

In the whole Yangon City, there are 62 public parks, pagodas, and other public open spaces and the total area is 1,272 ha (515 acre) which corresponds to 2.3 m<sup>2</sup> of park space per person. However, the population in the Greater Yangon is estimated to 10.79 million by 2040, so providing new public parks will be required for achieving sustainable urban development.

**Table 4.2.1: Total Area of Parks and Open Spaces**

Type	Quantity	Total Area (ha)	Remarks	
Public Park	62	200	All managed by YCDC, *1	
Hlawga Forest (Protected Area)	1	623	*2 excluding forest area	
Public spaces which have equivalent functions as public Parks	Pagodas	143	*2	
	Zoological and botanical garden	2	122	*2
	Playground	99	58	*1
	Roundabout	7	1	*1
Road side and center island	159	18	*1	
Private space	Golf courses	14	593	*2

Source: \*1: YCDC, \*2: JICA Study Team

## (2) Policy

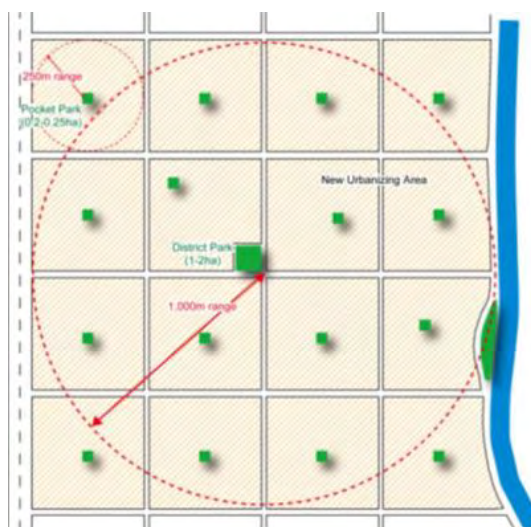
Sector Vision	Creation of green amenity spaces by construction of public parks and improvement of greenery to realize comfortable and healthy urban life
Basic Policy	<ol style="list-style-type: none"> <li>1) Improvement of green and water network in the Greater Yangon</li> <li>2) Construction of new public parks and open spaces To keep current area per capita, 1,555 ha of new parks is required.</li> <li>3) Renovation of existing public parks to meet the citizen's needs and satisfactions</li> <li>4) Promotion of comfortable greenery in urban areas</li> </ol>

## (3) Preliminary Development Plan

### 1) Construction of New Public Parks in New Development Areas

Public parks to be constructed mainly in new development areas will be categorized basically into two types, “district park” and “pocket park”, depending on their sizes and functions. This kind of criteria may contribute to more efficient supply of public parks to the citizens. For making these two types of public parks, service distance for use as well as accessibility for users shall be considered. Figure 4.2.1 shows the basic idea of the attracting distance.

While the population is increasing, new parks will be required. Currently, 1,555 ha is under development on new urban areas which may total up to 513 km<sup>2</sup> by 2040. In this case, the total area of public parks will be 1,755 ha together with the existing one, which is approximately nine times as large as the existing.



Source: JICA Study Team

**Figure 4.2.1: Service Distance for Use of District Park and Pocket Park**

### 2) Renovation of Existing Public Parks and Urbanized Areas with Green

Public parks are expected to satisfy four basic functions, namely: 1) providing spaces for recreation, 2) improving landscape, 3) mitigating disasters (flood control), and 4) conserving nature and improving environmental conditions. From the viewpoint of Myanmar's situation, it is recommendable to emphasize on the following additional functions when public parks are renovated or constructed:

- a) Creation of waterfront spaces for relaxing,
- b) Creation of shady spaces provided by large trees,
- c) Creation of walking and jogging path and deck, and
- d) Creation of playground spaces with a variety of equipment for children.

### 3) Promotion of Greenery in Urban Areas

Required Green Space Coverage: Suitable green spaces coverage ratio (green spaces/total development area) should be adopted when large-scale buildings are constructed or reconstructed. Administrative instruments for development activities shall be undertaken under the building application/permission procedure by the Engineering Department (Building) of YCDC into two categories according to the sizes of development activities.

Recommendation of Greenery in Private Lands: To improve private spaces with rich greenery, two main categorized strategies should be adopted, promoting and disseminating information related to greenery, and constructing a system for recommendation, guidance, and supporting greenery.

#### 4.2.3 Social Services

*- To provide equal and inclusive social services for all citizens -*

##### (1) Current Conditions and Issues

###### 1) Education

Large numbers of students are unable to continue education beyond primary school.

###### 2) Health

There are 11 townships where there are no hospitals with more than 25 beds.

###### 3) Poverty Group

Housing conditions of them are small and unstable. It is also difficult to get opportunities for education and health services, and with lack of information and knowledge about the laws, customs, or working conditions in their destinations, females are vulnerable to trafficking and exploitation when they leave home.

###### 4) Disability

There is no effective law to encourage employment of persons with disabilities (hereinafter referred to as “PwDs”).

##### (2) Policy

Sector Vision	Provision of equal and inclusive social services for all citizens
Basic Policy	<ul style="list-style-type: none"> <li>1) Provision of equal opportunity of education for all</li> <li>2) Provision of healthy and secure living environment for all</li> <li>3) Provision of equal opportunity of employment for all</li> <li>4) Provision of mobility and accessibility for all</li> </ul>

**Table 4.2.2: Basic Measures for Implementation**

Field	Basic Measures
Education	<ul style="list-style-type: none"> <li>- Establishment of a business model towards "low-carbon Yangon City"</li> <li>- Preparation of school allocation plan according to the estimated future number of students and appropriate assignment of qualified teachers.</li> <li>- Provision of post-primary schools including middle schools and branch schools, and operation of school bus to commute from remote area.</li> <li>- Close communication with the monastic schools and the government to have consistency with the government policy on education.</li> </ul>
Health	<ul style="list-style-type: none"> <li>- Establishment of hospitals in proper size and manner, and training and appropriate assignment of qualified health workers.</li> </ul>
Poverty groups and employment	<ul style="list-style-type: none"> <li>- Survey on the existing condition of poverty group and orphans regarding living condition, education, employment, and health.</li> <li>- Provision of affordable housing for low-income group and support system for the poverty groups to connect to the urban services.</li> <li>- Upgrading of income sources by vocational training, and establishment of financial support system for new business entities with low interest rate.</li> <li>- Assistant program for the students who need financial support including a lending system of stationeries which are required in schools.</li> <li>- Enhancement of vocational training which targets special job seekers.</li> <li>- Provision of various employment opportunities by job matching system.</li> <li>- Establishment of flexible employment system.</li> </ul>
PwDs	<ul style="list-style-type: none"> <li>- Survey on current condition of mobility and accessibility of PwDs, establishment of laws and regulations, and subsidy system on the barrier-free.</li> <li>- Special assistance for children with disabilities to study in general schools together with normal students.</li> <li>- Fostering of social acceptability to PwDs and minorities by public campaign to help people understand the current situation of PwDs and necessary supports.</li> </ul>

Source: JICA Study Team

#### **4.2.4 Low Carbon Society**

##### ***- To establish a sustainable low-carbon society -***

##### **(1) Needs of Low Carbon Development**

Due to the rapid economic growth, Yangon City has been facing electricity shortage and needs stable electricity and energy supply to meet increasing demand for the recent commercial and industrial development. Also, the agenda prepared by the new government encourages application of renewable energy such as solar generation as alternative energy. Considering the necessity for energy saving and renewable energy development, it is expected to materialize low carbon society. As one of the ongoing projects for low carbon development, waste to energy plant has been constructed and will start its operation in April 2017. Moreover, in the private sector, introduction of high efficiency equipment, such as boilers and chillers, are under implementation in existing or new factories, which saves electricity consumption in Yangon.

In order to precede sustainable and low carbon development and to introduce such ideas into future development of Yangon City, it is necessary to prepare low carbon action plan through all relevant sectors of YCDC including pilot projects which can promote its implementation as scheduled.

It plans to prepare the draft of Low Carbon Action Plan by March 2017 and formulate and prepare a list of pilot project in April 2017.



## (2) Policy

Sector Vision	<p>Establish a sustainable low-carbon society through the following:</p> <ul style="list-style-type: none"> <li>- Harmonization of green environment and economy, and</li> <li>- Creation of their good cycle, so that the good natural environment can be maintained for the next generation.</li> </ul>
Basic Policy	<ol style="list-style-type: none"> <li>1) Industry: Reduction of greenhouse gas emission from industrial activities</li> <li>2) Energy: Utilization of renewable energy resources and energy efficient systems</li> <li>3) Urban City: Creation of low-carbon city by introduction of low carbon technique</li> <li>4) Transportation: Creation of smart system by introduction of low carbon technique</li> <li>5) Waste Management: Creation of recycling-oriented society</li> <li>6) Education: Environmental education and study on global environment issues</li> <li>7) International Cooperation: Introduction of high-end technology through international cooperation and city to city collaboration</li> <li>8) Monitoring, reporting and verification (hereinafter referred to as “MRV”): R&amp;D of environmental technologies</li> </ol>

Based on the basic policy, basic measure for implementation of low carbon society is formulated as follows. Also, as for short term project, pilot projects are selected from priority sector for low carbon development.

**Table 4.2.3: Basic Measures for Implementation**

Field	Basic Measure for Implementation
Industry	<ul style="list-style-type: none"> <li>- Establishment of a business model towards "low-carbon Yangon City"</li> <li>- Fostering eco-friendly industries</li> <li>- Creation of an eco-friendly model for industrial complexes</li> </ul>
Energy	<ul style="list-style-type: none"> <li>- Promotion of solar-city project</li> <li>- Creation of a system for making an effective use of energy</li> <li>- Making a wider use of renewable energy resources considering regional characteristics</li> </ul>
Urban city	<ul style="list-style-type: none"> <li>- Encouraging construction of high energy efficient buildings</li> <li>- Introduction of energy efficient technology into public sector</li> <li>- Promotion of energy efficient technology to private sector</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>- Establishment of eco-friendly transportation network</li> <li>- Enhancement of convenience of public transportation</li> <li>- Promotion of measures for greenhouse gas emitted from automobiles</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>- Promotion of 3R activities of non-industrial wastes and industrial wastes</li> <li>- Introduction of low-carbon waste incineration facility</li> <li>- Reduction of greenhouse gas emission from collection and transportation of wastes</li> </ul>
Education	<ul style="list-style-type: none"> <li>- Promotion of environmental education and study</li> <li>- Promotion of human resource development</li> </ul>
International Corporation	<ul style="list-style-type: none"> <li>- Contribution to reduction of global greenhouse gas emission by introducing high-end technology through international and city to city corporation</li> <li>- Supporting and cooperating international environment conservation activities</li> </ul>
MRV	<ul style="list-style-type: none"> <li>- R&amp;D of environmental technologies, and promotion of scientific measures</li> <li>- Conducting MRV in order to promote introduction of renewable energy and energy saving technology</li> </ul>

Note: Pilot projects have been planned/considered to materialize by YCDC and/or prospective players with details, such as implementation schedule and budget.

## 4.3 Infrastructure Development

### 4.3.1 Water Supply

*- To provide safe and clean water to more citizens -*

#### (1) Current Conditions and Issues

##### 1) Not-standardized Management System

The water supply system is managed by the Engineering Department (Water and Sanitation) with 2,185 staffs in total as of October 2016. Currently, YCDC charges MMK 88/m<sup>3</sup> for households and MMK 110/m<sup>3</sup> for commercial. However, the expenditure from water supply service exceeds the revenue. For example, the revenue was MMK 9,288 million and the expenditure was MMK 62,990 million in fiscal year (hereinafter referred to as “FY”) 2015. Low water tariff and lack of financial guidelines for accounting, budget regulation, etc are considered as major issues causing such situation.

Water supply system facilities have been developed by grant project and official development assistance (hereinafter referred to as “ODA”) loan project; however, the modernization of organization is still delayed and one of the main issues is improper financial status. The deficit has increased year by year and the revenue does not cover even operational expenditure at present. It had already been pointed out that improvement of water tariff system is desired. However, it has not been achieved so far due to insufficient understanding of financial management and improper organization system. Under the circumstances, JICA technical assistance project to improve management system is ongoing.

##### 2) Shortage of Water Resources and Low Coverage Ratio

The Engineering Department (Water and Sanitation) has five water resources, namely Gyobu (27 million gallons per day (hereinafter referred to as “MGD”)), Phugy (54 MGD), Hlawga (14 MGD), Ngamoeyeik (90 MGD), and tube wells (8 MGD) as of 2016. Additionally, Lagunbyin (40 MGD) funded by YCDC and related transmission/distribution facilities under ODA loan project are being developed as shown in Figure 4.3.1 (10 out of 40 MGD will be utilized for Thilawa SEZ). The feasibility study (hereinafter referred to as “F/S”) for Kokkwa Phase 1 (60 MGD) has been completed and it has already been pledged. The YCDC water supply service ratio in 2014 is 33% of total population in the Greater Yangon and there are public water supply systems in Kyauktan and Thanlyin townships. However, the others, about 60% of total population, take water from private tube wells, pond, and rainwater.



Source: JICA Study Team

**Figure 4.3.1: Lagunbyin WTP as of 2015**

The water demand as of 2016 is 156 MGD. however, it is estimated that the water demand will increase year by year and reach 610 MGD in 2040 (refer to Figure 4.3.2). Therefore, sequential developments of water resources and transmission/distribution pipe are necessary to supply water with larger area.

##### 3) High Ratio of NRW

Non-Revenue Water (hereinafter referred to as “NRW”) of the YCDC water supply system in 2013 is quite high, estimated at 66%. To solve this situation, an NRW reduction projects for Mayangone Township until 2022 (by Tokyo Metropolis, TSS and Toyo Engineering), Insein

Township, and South Okkalapa Township (by Mitsubishi Corporation and Manila Water) are ongoing, and for Tarmwe Township funded by Agence Française de Développement (hereinafter referred to as “AFD”) is under the planning stage. Additionally, distribution network improvement in Yankin Township until 2016 by grant and technical assistance on distribution water management by JICA advisor until 2015 had been executed, and JICA technical assistant project on NRW reduction will be completed in 2020. However, it is necessary to rehabilitate aged transmission/distribution pipes and install water meter continuously.

#### 4) Low Water Quality

There are one water treatment plants (hereinafter referred to as “WTPs”), of Nyaunhnapin (rapid sand filter), one primary WTP of Gyobu (sedimentation) and four WTPs for tube wells of Yangonpauk, Dagon Myothit (South) No.1, Dagon Myothit (South) No.2 and Thaephyu (sand filter). However, water from Hlawga and Phugyi reservoirs is distributed without treatment. Such situation will be solved by installation of chlorination facilities under ongoing ODA loan project. However, it is considered that capacity development of water quality test operator and formulation of manual/standard for water quality management are also necessary for improvement of water quality. Ongoing JICA technical assistant project covers this issue as well.

#### (2) Policy

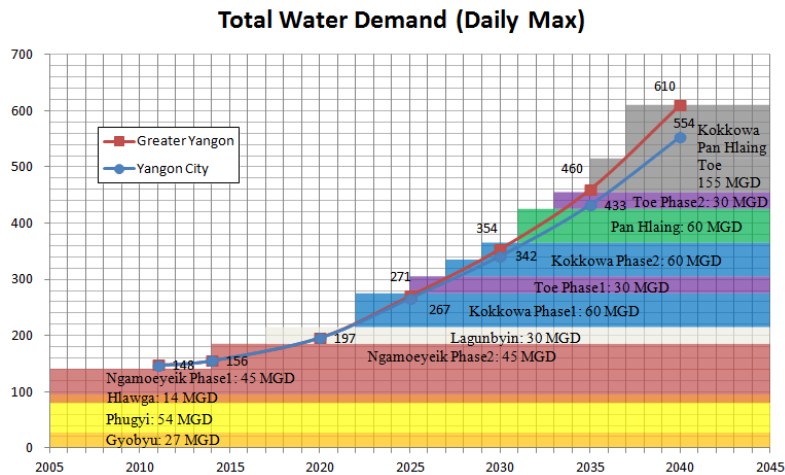
Sector Vision	Provision of safe and clean water to more citizens with appropriate volume, pressure, and price; and realization of sustainable management
Basic Policy	<ol style="list-style-type: none"> <li>1) Development of water resources of Lagunbyin Reservoir (40 MGD), the Kokkowa River (120 MGD), the Toe River (60 MGD), and the Pan Hlaing River (60 MGD).</li> <li>2) Development of transmission/distribution system to cover 73% of the total population in the Greater Yangon.</li> <li>3) Enhancement of management capacity and reduction of NRW ratio to 15% in 2040 for proper management.</li> <li>4) Improvement of water quality control for serving safety water with 100% compliance with World Health Organization (hereinafter referred to as “WHO”) guidelines.</li> </ol>

#### (3) Preliminary Development Plan

##### 1) Development of Water Resources

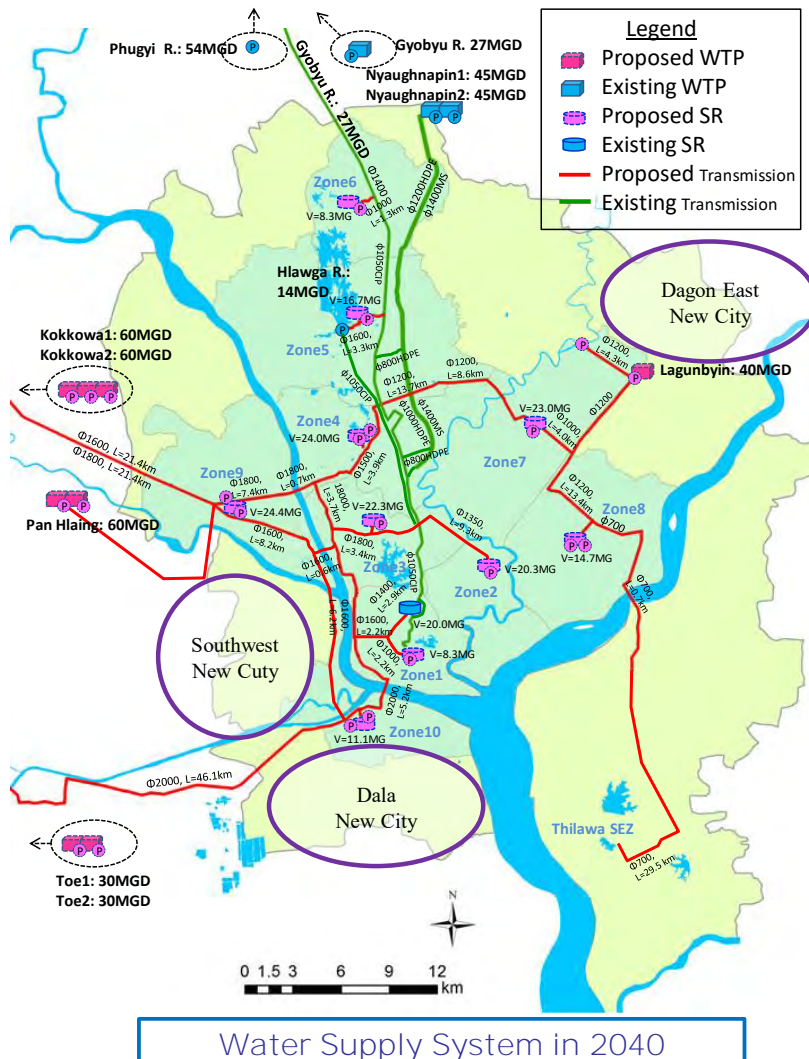
The population projection is executed based on 2014 census and water demand is updated. As a result, water demand in the Greater Yangon will decrease from 634 MGD to 610 MGD in 2040 because 1) the total population is decreased and 2) the population in the suburb area where water supply service ratio is relatively low increased. Based on the updated water demand, the development plan of water resources is modified as shown in Figure 4.3.2. For short term project, development of Kokkowa Phase1 water resources is recommended.

After the development of Kokkowa Phase 1, additional development of water resources such as Kokkowa after phase 2, Toe after phase 1, and Pan Hlaing after phase 1, will be necessary to meet the water demand of 610 MGD in 2040. Location and planned capacity for each water resource are shown in Figure 4.3.3.



Source: JICA Study Team

**Figure 4.3.2: Development Plan of Water Resources**



Source: JICA Study Team

**Figure 4.3.3: Location of Each Water Resource**

## **2) Development of Transmission/Distribution System**

Lagunbyin and Kokkowa Phase1 transmission/distribution system are short term project together with the development of water resources. Additionally, rehabilitation of existing distribution reservoirs, namely, Kokkine and Central reservoirs, is proposed as short term project.

Continuous development of transmission/distribution system and introduction of supervisory control and data acquisition (hereinafter referred to as “SCADA”) and district metered areas (hereinafter referred to as “DMA”) system are recommended by 2040. Moreover, there are new city plans by 2040 at Southwest (west side of Kyee Myin Daing), Dagon Myothit (East), and Dala. Therefore, it is necessary to consider transmission/distribution system development for these new towns.

## **3) Enhancement of Management Capacity and Reduction of NRW**

Short term projects are 1) improvement of institutional management system and 2) replacement of aged pipes and installation of water meter. Regarding 1), JICA technical assistance project is being executed to solve this problem and will be completed in 2020. Main components of this project are 1) establishment of the planning section, 2) development of the institutional management plan and 3) enhancement of human resources development.

There are some projects for reduction of NRW, namely, rehabilitation of aged pipe and installation of water meter at several townships (refer to 4.3.1 (1) 3)). Additionally, improvement of NRW management will be achieved by JICA technical assistant project.

Urgent replacement of aged pipes is required to reduce NRW. However, this project will cost huge amount and take long term to complete in terms of annual budget. In addition, because the useful life of distribution pipes is around 25 to 40 years and the rehabilitation work is necessary at that time, this will be urgent and continuous work.

## **4) Improvement of Water Quality**

Installation of chlorination facility is being executed under ODA loan project as tangible solution. Additionally, improvement of intangible conditions, development of manual/standard, and water quality management plan are recommended for short term project.

After formulation, they should be updated accordingly to meet the conditions at those times.

## **5) Implementation Schedule**

The development plan for short-, middle-, and long- term is formulated based on the basic policy as shown in Table 4.3.1.



**Table 4.3.1: Implementation Schedule (Water Supply)**

No.	Project/Study Name	Status	Implementation Schedule (FY)					
			2016	2020	2025	2030	2035	2040
1	Development of Lagunbyin WTP	Short						
2	Development of Kokkow WTP Phase1, and rehabilitation of existing distribution reservoirs (Kokkine and Central)	Short						
3	Construction of transmission/distribution pipe	Short/ Middle/ Long						
4	Improvement of institutional management system, and replacement of aged pipes and installation of water meter	Short/ Middle/ Long						
5	Development of manual, standard and water quality management plan	Short						
6	Development of Toe WTP Phase1, and Kokkowa WTP Phase2	Middle						
7	Enhancement of existing transmission/distribution pipes, and introduction of SCADA system	Middle						
8	Build up of water quality analysis, and improvement of existing WTP process and extension	Middle						
9	Development of Pan Hlaing WTP, Toe WTP Phase2 and additional water resources	Long						
10	Progress of reduction of NRW and revenue system	Long						
11	Formulation of water quality analysis act, education and training and spread to nation wide	Long						

Source: JICA Study Team

## 4.3.2 Sewerage

*- To create clean and safe water environment -*

### (1) Current Conditions and Issues

#### 1) Non-standardized Management System

The sewerage system is managed by the Sanitation Division with only 150 staffs in Engineering Department (Water and Sanitation) as of October 2015. The account for sewerage is together with that of water supply. Currently, the sewerage service is provided to residents for free. On the other hand, it is estimated to cost about MMK 502 million in FY 2016, which accounts for about 0.6% of total expenditure of the Engineering Department (Water and Sanitation).

Because expenditure from the sewerage section is low compared with total expenditure of Engineering Department (Water and Sanitation), that situation is not a concern. However, as the sewerage service covers larger area, the expenditure will increase and it will be a burden to them. Additionally, it is considered that the experience of staffs for O&M of sewerage system is not enough.

#### 2) Insufficient Existing Sewerage System

The sewage collecting system was developed in 1890 during the British Colonial Period and has been used for over 120 years with repairing and expansion. The existing wastewater treatment plant (hereinafter referred to as “WWTP”) was built in 2005. The sewerage system consists of following components:

- a) Sewer Main (L=10.8 km, Diameter=300-900 mm)
- b) 40 ejector stations (5 out of 40 do not work)
- c) Two air compressor stations
- d) WWTP (Capacity=14,775 m<sup>3</sup>/day)

In this plan, the improvement of the existing sewerage system is set as a priority program. However, there are no projects so far. The sewerage system only collects black water, and gray water is discharged without treatment. Additionally, the amount of sewage flowing into the WWTP is about one-tenth of the design capacity of the WWTP. It is considered that one of the main reasons causing such situation is aging of the existing sewerage system. Regarding the existing WWTP, it is estimated that the capacity of 14,775 m<sup>3</sup>/day is not enough in case the existing collecting system is improved and all sewage generated from the CBD flows into the WWTP.



Source: JICA Study Team

**Figure 4.3.4: Existing WWTP**

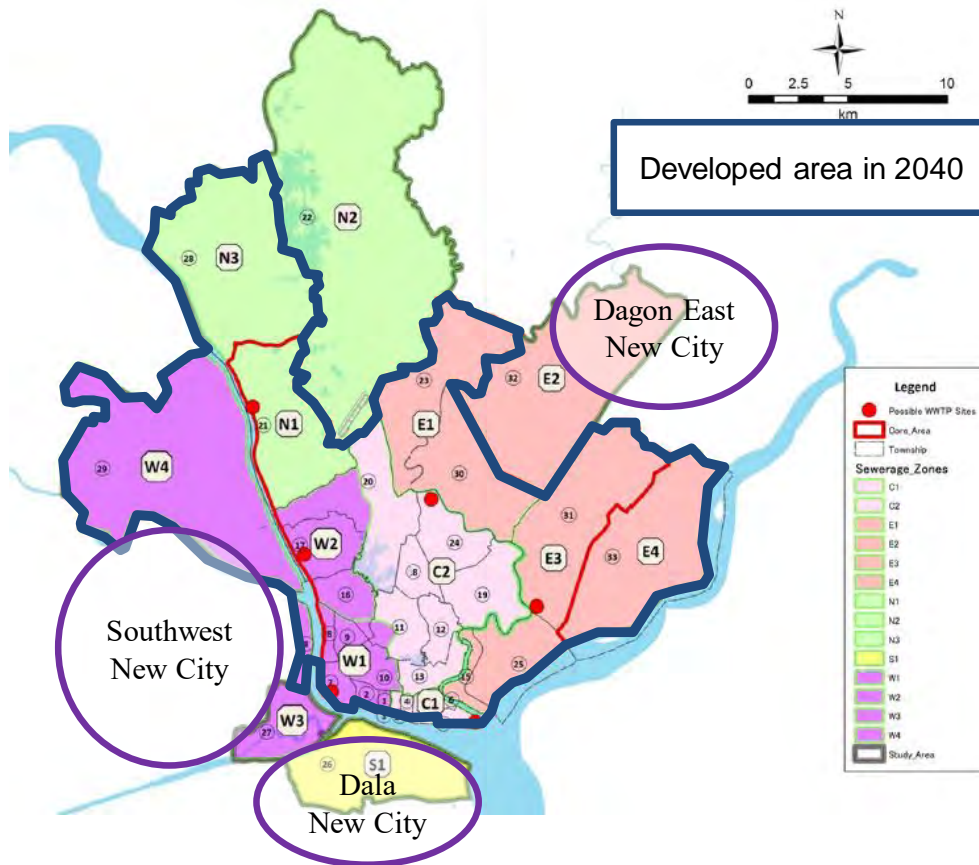
### 3) Low Service Coverage Ratio

It is estimated that the existing sewerage system only covers the CBD, which accounts for only 4.1% of the total population in the Greater Yangon as of 2014. Septic tank system and pour flush system, etc. are applied outside the service area.

The service coverage ratio is still at a low level. Additionally, the necessity of expansion of sewerage system increases year by year because the population increases and urbanization of the suburb area where wastewater is discharged without treatment is proceeding.

## (2) Policy

Sector Vision	To create clean and safe water environment
Basic Policy	<ol style="list-style-type: none"> <li>1) Development of sewage collecting system at C1, C2, W1, W2, W4, E1, E3, E4, N1, and N3 area whose total coverage ratio is 59% of the total population in Greater Yangon (approximately 4% as of 2016)</li> <li>2) Development of sewage collecting system at New City, namely Southwest, Dagon East, and Dala New City, will be studied in consideration of developing conditions at these new cities accordingly</li> <li>3) Development of WWTP whose target treated water quality has biochemical oxygen demand (hereinafter referred to as “BOD”)=20 mg/L and suspended solids (hereinafter referred to as “SS”)=30 mg/L together with development of collecting system</li> <li>4) Improvement of institution, organization, and human resources</li> </ol>



Source: JICA Study Team

**Figure 4.3.5: Sewerage System Planning Area**

### (3) Preliminary Development Plan

#### 1) Development of Sewage Collecting System

Based on the result of the population projection implemented, confirmation of population density in 2040 to check which township should have centralized treatment by 2040 is implemented. As a result, it is revealed that basically same sewerage system planning area can be applied in the plan. However, W4, N3, and E4 areas should be included in the target developed area in 2040 in consideration of the population projection in the plan shown in Figure 4.3.5. Development at C1 and W1 planning areas is recommended as short term project. However, the following should be noted:

- a) C1 and W1 area  
The CBD consisting of six townships has the existing sewerage system; however, it is divided into two planning areas, namely C1 area (Pabedan Township, Kyauktada Township, Botahtaung Township, and Pazundaung Township) and W1 area (Latha Township and Lanmadaw Township). It is desirable to incorporate the two townships in W1 area into C1 area in terms of existing facilities and requirement from the Engineering Department (Water and Sanitation).
- b) New City Plan  
There are new city plans by 2040 for Southwest New City, Dagon East New City, and Dala New City. It is recommended to review the developing conditions at these Townships and study the development of sewage collecting system accordingly.

## 2) Development of WWTP

The WWTP should be constructed together with the development of sewerage collection system to treat collected wastewater. Therefore, improvement of WWTP at C1 and development of that of W1 areas shall be a short-term project. Sequential development of WWTP is necessary as sewerage collecting system is developed at C2, W2, E1, E3, and N1 areas.

## 3) Improvement of Institution, Organization, and Human Resources

The short-term projects are 1) improvement of legal system, 2) introduction of sewerage charging system, and 3) capacity development for operation. Legal system and O&M organization should be improved accordingly for proper management.

## 4) Implementation Schedule

The development plan for short-, middle-, and long- term is formulated based on the basic policy as shown in Table 4.3.2.

**Table 4.3.2: Implementation Schedule (Sewerage)**

No.	Project/Study Name	Status	Implementation Schedule (FY)						
			2016	2020	2025	2030	2035	2040	
1	Development of collecting system (C1, W1)	Short							
2	Improvement of existing WWTP (C1), and development of WWTP (W1)	Short							
3	Improvement of legal system, capacity development for management	Short							
4	Installation of collecting system (C2, W2) and connecting pipes	Middle							
5	Development of WWTP (C2, W2) and individual treatment facilities on site	Middle							
6	Enhancement of legal system and O&M organization	Middle/Long							
7	Development of collecting system (W4, E1, E3, E4, N1, N3), and installation of pipeline network for reusing treated sewage on CBD	Long							
8	Development of WWTP (W4, E1, E3, E4, N1, N3), installation of advanced WWTPs, and establishment of reusing system of sludge	Long							

Source: JICA Study Team

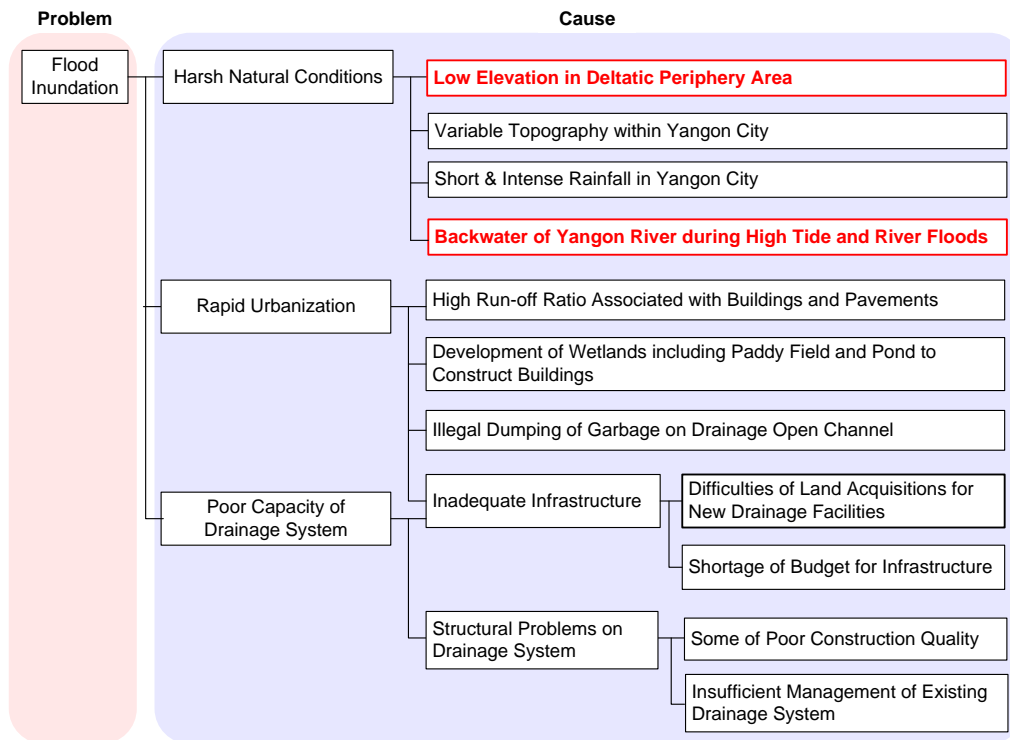
### 4.3.3 Drainage and Flood

#### - To prepare for responses against flood risk and damage -

##### (1) Current Conditions and Issues

The flood inundation problem in the Greater Yangon is caused by several conditions, such as 1) harsh natural conditions, 2) rapid urbanization, and 3) poor capacity of drainage system, as shown in Figure 4.3.6. “Low elevation in the deltaic periphery area”<sup>1</sup> and “backwater from the Yangon River during high tide and river floods”<sup>2</sup>, written in red color in Figure 4.3.6, make rainwater drainage in the Greater Yangon difficult. On the other side of frequent flood inundation issues, cyclones can cause severe flood disaster in the Greater Yangon<sup>3</sup>. The Cyclone Nargis in 2008 took away 1,640 people and the 2015 flood due to monsoon rainfall forced approximately 16,000 people in the Yangon Region to evacuate. In the Greater Yangon, most of the casualties due to the cyclone were from the periphery areas.

Thus, there are two flood risks, namely flood inundation as “frequent flood with small damage” and “infrequent flood with large damage” such as cyclone in the Greater Yangon.<sup>4</sup>



Source: JICA Study Team

**Figure 4.3.6: Fault Tree of Current Conditions of Flood Inundation in the Greater Yangon**

<sup>1</sup>There are several lowland areas below El. 3.0 m in the Greater Yangon with rainwater drainage issue. Most of the lowlands are located in the south part of the area including the townships of Dala, Twantay, Kyauktan, and Thanlyin.

<sup>2</sup>The Yangon River has large water level differences between low and high tides. Water levels of the Yangon River increases to El. 2.5 to 3.0 m during high tide with full moon. Dala Township has periodical high tide on every high tide during full moon all around the year although it is short duration: half to one hour. Rainwater cannot be drained out to the Yangon River from some drainages in the Greater Yangon.

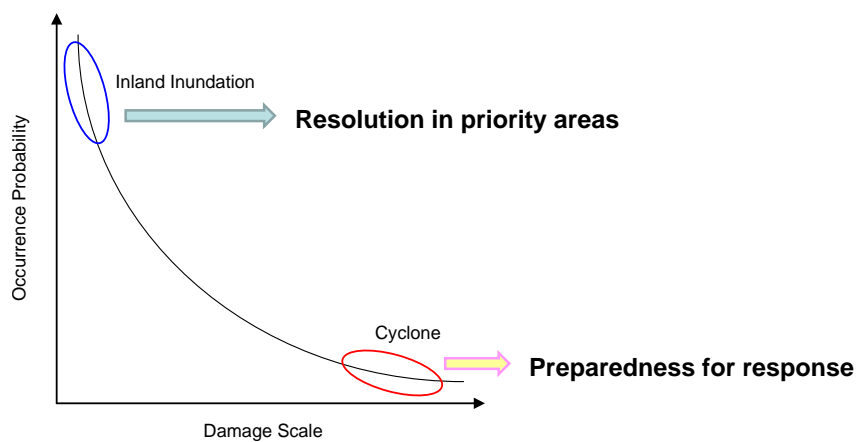
<sup>3</sup> Severe cyclones tend to occur either during the pre-monsoon season of April to May or post-monsoon season of October to November. Cyclones have three destructive forces, namely: i) storm surge, ii) heavy rainfall, and iii) strong wind.

<sup>4</sup>In general, measures for “infrequent disaster with large damage” are considered to be more important than that for “frequent disaster with small damage” because of its impacts on human life and properties.



## (2) Policy

Sector Vision	Resolution of “frequent flood with small damage” in priority areas and Preparedness for responses against “infrequent flood with large damage”
Basic Policy	<ol style="list-style-type: none"> <li>1) Flood risk assessment to establish fundamental information for urban development plan (land use and infrastructure) and disaster preparedness measures</li> <li>2) Structural measures for flood inundations in the priority area (first: CBD) and lowlands in the periphery areas to be newly developed as subcenters of the Greater Yangon</li> <li>3) Arrangement of safety nets for human life against flood disasters in flood prone areas</li> <li>4) Capacity development of human resources of related authorities to manage floods</li> </ol>



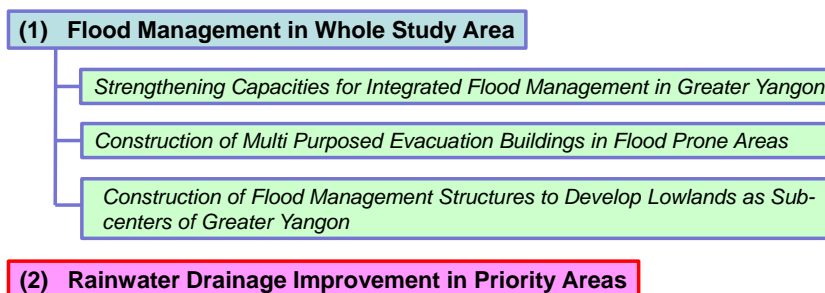
Source: JICA Study Team

**Figure 4.3.7: Theory of Disaster Risk and Its Countermeasures**

## (3) Preliminary Development Plan

### 1) Strategies

The preliminary development plan of flood management in Greater Yangon composes of two strategies and (1) flood management in the Greater Yangon has three programs as shown in Figure 4.3.8. The scope of works on each program is described below.



Source: JICA Study Team

**Figure 4.3.8: Components of Preliminary Development Plan of Flood Management**

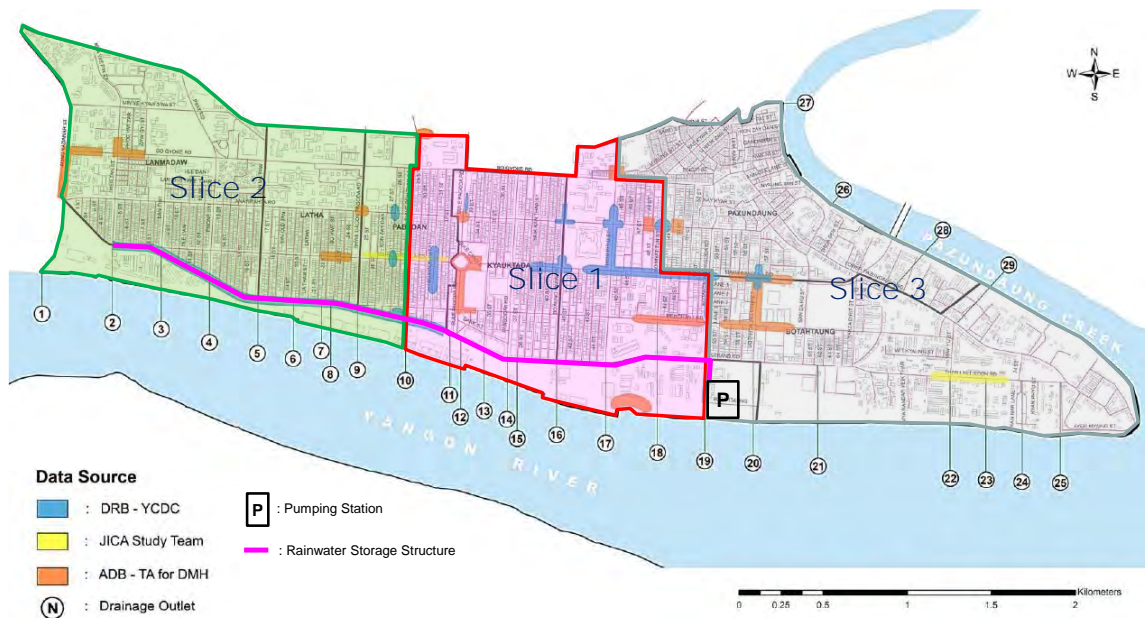
## 2) Flood Management in the Whole Area

Figure 4.3.9 shows tentative phase planning of flood management programs. Project No. 1, for the whole area, and No. 4, for urban areas of Yangon as listed in Table 4.3.3, will be described in detail latter as prioritized projects in Section 5.1.3. Project No. 2, for the whole area, is safety nets for human life against flood disasters in flood prone areas.

Project No. 3 is structural measures for flood inundations in lowlands in the periphery areas to be newly developed as subcenters of the Greater Yangon like Dala and Twantay townships. The possible structural measures are 1) ring dike, 2) inland water retarding basin, 3) pumping station, and 4) filling up of development areas located on lowlands. Single or combined measures shall be selected by an alternative study with considerations on implementation and O&M costs, environmental impacts, technical aspects, easiness of operation, and maintenance. The implementation period of the project is depending on scale of development areas and conditions of locations.

## 3) Rainwater Drainage Improvement

In the rainwater drainage master plan (hereinafter “M/P”) prepared in 2014, construction of rainwater storage pipe and pumping station was planned on mid- and long-term plan, respectively. Estimated implementation cost of the rainwater drainage improvement in CBD was approximately USD 450 million. It is proposed that improvement of rainwater drainage system in CBD shall be completed first as “the project phase-I” because of investment effectiveness and discussion results with the Department of Roads and Bridges (hereinafter “DRB”)-YCDC. Improvement works in the CBD can tentatively be sliced and be step-wised as shown in Figure 4.3.9 and Table 4.3.3 based on areal priority<sup>5</sup> and flood inundation magnitudes<sup>6</sup> in CBD. The slice boundaries and prioritization will be quantitatively decided in F/S stage of the Project. other three drainage channels namely Tha maing, Thebyu, Kyaikasan, which were listed as short term improvement project in the M/P, are the prioritized as CBD.



Source: JICA Study Team

**Figure 4.3.9: Tentative Step-wise Plan of Rainwater Drainage Improvement in CBD**

<sup>5</sup> Several governmental, business and commercial functions are concentrated in the Slice 1 area.

<sup>6</sup> Main roads in the Slice 1 has the most serious flood inundation and the west part of the Kanner Road in the Slice 3 has secondly serious flood inundation according to DRB survey.

#### 4) Implementation Schedule

The development plan for short-, middle-, and long-term is formulated based on the basic policy as shown in Table 4.3.3.

**Table 4.3.3: Implementation Schedule (Drainage and Flood)**

No.	Project/Study Name	Status	Expected Implementing Agencies	Implementation Schedule (FY)					
				2016	2020	2025	2030	2035	2040
1	Strengthening Capacities for Integrated Flood Management in Greater Yangon*	Short/Middle	DMH, RRD, YCDC						
2	Construction of Multi Purposed Evacuation Buildings in Flood Prone Areas	Middle	Yangon Region						
3	Construction of Flood Management Structures to Develop Lowlands as Sub-centers of the Greater Yangon	Middle/Long	Yangon Region						
4	Rainwater Drainage Improvement in Priority Areas**								
	Phase-I-1: CBD								
	Slice 1: Centre of CBD (Kyauktada TS, east part of Pabedan TS and west part of Botahtaung TS)	Short/Middle	DRB-YCDC						
	Slice 2: West Part of CBD (Pabedan TS, Latha TS, Lanmadaw TS)	Middle/Long	DRB-YCDC						
	Slice 3: East Part of CBD (Pazundaung TS and East part of Botahtaung TS)	Middle/Long	DRB-YCDC						
	Phase-I-2: Mitigation of Inundation in Urgent Areas	Short/Middle	DRB-YCDC						
	Phase-II: Inner Urban Ring	Middle/Long	DRB-YCDC						
	Phase-III: Other Urban Areas Planned in Drainage MP	Middle/Long	DRB-YCDC						

Note: \*: Update of flood hazard information and flood disaster education programs every five years is planned.

\*\*\*: From the viewpoint of efficiency, priority areas of rainwater drainage infrastructures are on 1) CBD and other urgent area, and 2) Inner Urban Ring. The prioritization is based on i) population density of township and ii) discussions with DRB-YCDC.

Source: JICA Study Team

#### 4.3.4 Solid Waste

*- To create sound material cycle society -*

##### (1) Current Conditions and Issues

###### 1) Institutional Status and Ongoing Projects

Solid waste in Yangon City is generated by waste generators such as residents, business owners, and retailers; and is collected by the Pollution Control and Cleansing Department (hereinafter referred to as “PCCD”) of YCDC. PCCD has 39 officers, 1,040 staff, and 3,800 laborers divided into two areas: 1) east and south and 2) west and north; and covers waste collection and transportation generated in 33 townships of the city. It is then transported to the six final disposal sites (hereinafter referred to as “FDSs”) operated as open dump sites. According to PCCD, the total volume of disposed waste to the FDSs in 2016 is estimated at approximately 2,000-2,500 tons/day. Even though the PCCD has made significant efforts to lessen the volume of solid wastes, waste littering and illegal waste disposal are observed in the city.

There are two key projects launched since 2013. One is a pilot scale WtE project in Shwe Pyi Htar township by YCDC utilizing the Japanese joint crediting mechanism. The other one is a private-based project for development of comprehensive waste management facility in Thilawa SEZ to treat industry and business related waste from the SEZ and the other areas including

Yangon City. On the other hand, the project for privatization waste collection services utilizing PPP scheme was canceled due to opposition of increasing waste collection fee by residents. The two large-scaled WtE projects<sup>7</sup> utilizing BOT scheme have not lunched yet due to not settling power purchase agreement (hereinafter referred to as “PPA”) with Ministry of Electricity and Energy (hereinafter referred to as “MOEE”)<sup>8</sup>.

## 2) Securing Capacity of Final Disposal Sites and Other Facilities

There are two large scaled open dumping sites (Htain Bin in Hlaing Tharyar Township and Htwei Chaung in Dagon Myothit (East) Township) and four small scaled open dumping sites managed by YCDC. The number of years remaining to receive solid waste of the two large scaled dumping sites is about ten years. A sanitary landfill site are planned to be established in Kyun Chaung. However, land for new FDSs needs to be secured in case the existing dumping sites become full are nowhere in sight in any authorized documents at this moment. The previous SUDP 2013 predicted that the amount of solid waste to go to FDSs will be around four times from 2016 to 2025 due to population increase and economic growth. Thus, securing lands for candidates of new FDSs and/or installation of municipal waste incinerators will be required to meet the demand of waste to be disposed.



Source: YCDC

**Figure 4.3.10: Current FDS**

As for the sites for FDSs, PCCD used to have the ideas based on the recommendations by JICA experts dispatched in early 2000’s at Hlawgar, Mingalardon, Maso, Kyi Su, Kyauk Yae Dowin, Dagon Seikkam, Alark Chaung and Dala, in addition to Htain Bin and Htwei Chaung. Following this idea, in the previous SUDP 2013, the infrastructure layout plans in short-, mid-, and long-term were proposed at Htein Bin, Kyi Su, Thanlyn, Dala and Hlegu. However, it has been recognized that some of those candidate sites like Mingalardon, Maso, Kyi Su can not be candidate sites anymore due to the landownership or other land use plan.

Therefore, it is very crucial for PCCD to re-consider other candidate areas within the boundary of YCDC to be utilized as the solid waste management facilities such as FDSs as the sanitary landfill, intermediate treatment facilities including WtE plants or recycling centers, and waste transfer stations, in the solid waste management master plan.

Another important issue related to the existing FDSs is the possibility of environmental and health impacts to the surrounding areas and underground due to seeping leachate from the sites without any treatment and prevention system. In addition, emission of greenhouse gases and bad odor, generation of pests and littering the waste are also concerned as the environmental and social problems.

## 3) Lack of Facility to Treat High Risk Hazardous Waste

YCDC has a simple hazardous waste disposal site to dispose expired medicines, paints, and mercury; and a crematory furnace to incinerate hospital waste. However, high risk hazardous waste such as liquid infectious waste, explosive waste, and corrosive waste shall be treated by a hazardous waste incinerator or detoxifying treatment such as solidification and chelation.

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<sup>7</sup> One of two projects is including utilizing landfill gas and construction of a new sanitary landfill site in Hlaing Tharyar Township.

<sup>8</sup> As of November 2016, the contractors of two WtE projects submitted proposal to PCCD to extent the negotiation period of PPA by another one year and are waiting for the decision of the extension by YCDC as well as YRG.

#### 4) Pollution from Industrial Zones

According to PCCD of YCDC, illegal dumping sites are existing in and around industrial zones. In industrial zones in Yangon City, labor-intensive industries, such as food processing, beverage, and clothing, are dominant and organic waste may be generated from such sectors. Hazardous and chemical waste may be generated through manufacturing process in some factories such as battery, dyeing, and metal smelting. There is a possibility that these illegal dumping sites may cause health impacts to the surrounding residence due to seeping leachate from the sites including hazardous and chemical wastes.

In addition to critical issues pointed by PCCD, the following issues are also identified as the results of the survey to achieve vision and basic policy:

- a) Lack of detailed plan for solid waste management (hereinafter referred to as “SWM”),
- b) Weakness of legislation/unclear enforcement of hazardous/infectious waste management,
- c) Incomplete cost recovery from beneficiary,
- d) Inefficient waste collection system and old equipment, and
- e) Securing lands for transfer stations in the city to respond to increased municipal solid waste for reducing cost and environment burden to be transferred to new dumping sites.

#### (2) Policy

In 2040, the amount of all of the waste generated including municipal waste, industrial waste, and infectious waste in the city is estimated at 14,000 - 15,000 tons/day. A proper SWM, which ensures safe and clean environment to people and encourages them to join a life style with less negative environmental impact, is one of the key components to build the city envisaged in this strategic urban development planning. Thus, the vision of SWM is “creating a clean and comfortable city with a sound material cycle through participation of citizens, enterprises, and governments”. To accomplish the vision, the following five basic policies are formulated.

Sector Vision	Creating a clean and comfortable city on sound material cycle society through participation of citizens, enterprises, and governments
Basic Policy	<ol style="list-style-type: none"> <li>1) Installation of necessary infrastructures - Installing SWM facilities based on the M/P to be developed with application of feasible methods of waste management in terms of environment, society, economy, and technical aspects possible to manage all of estimated generated wastes in 2040. As for this, careful considerations on securing the areas required for these infrastructures within the boundary of YCDC should be given to the urban development plan.</li> <li>2) Appropriate industrial and hazardous waste management - Controlling of all of hazardous waste generated in 2040 (installation of pollutant release and transfer register (hereinafter referred to as “PRTR”) system and no illegal dumping sites in the City)</li> <li>3) Restraint of waste generation - Controlling of increasing municipal waste generation per capita less than 540 kg/capita/year in 2040 (average value in the Organization for Economic Co-operation and Development (hereinafter referred to as “OECD”) member countries in 2010)</li> <li>4) Promotion of 3R (waste reduction, waste reuse, and waste recycling) -Increasing recycling ratio up to 35% in 2040 (Average recycle ratio in OECD member countries in 2015)</li> <li>5) Participation of citizens, enterprises, governments - Promoting the above activities by all participants</li> </ol>



### (3) Preliminary Development Plan

On the basis of the above analysis, preliminary SWM development plan is formulated to achieve the vision and basic policy as shown in Figure 4.3.11. There are three terms, namely, short-term (by 2020), mid-term (by 2030), and long-term (by 2040), in accordance with each stage with level of economic development. Eight goals are proposed in each stage to create sound material cycle society. Under the eight goals, 13 projects are proposed by 2040 with the implementation schedule shown in Table 4.3.4.

It should be noted that this development plan shall be based on the preparation of the reliable integrated SWM Master Plan.



Source: JICA Study Team

**Figure 4.3.11: Preliminary SWM Development Plan**

#### 1) Infrastructure Development Plan

- a) **Waste collection and transportation:** In 2015, outsourcing waste management for the 33 townships in Yangon under PPP was terminated. Issues on illegal dumping, waste dumping to public drainages etc. are still laying due to inefficient waste collection system and old equipment for waste collection and transportation. Thus, project for supply of collection equipment for SWM is proposed in the short-term. In the middle- and long-terms, YCDC is expected to procure collection equipment.
- b) **Intermediate treatment (incineration):** Although two Waste to Energy (hereinafter referred to as “WtE”) projects under BOT scheme were planned, these projects were once to be terminating in December 2016 due to disagreement on PPA with the MOEE but may be extended for a while for more negotiations. On the other hand, a pilot scale WtE project in Shwe Pyi Htar (60 tons/day with 0.7 MW) utilizing the Japanese joint crediting mechanism has been started its operation since April 2017. The other WtE project (approximately 400 tons/day) will be also planned to install in the south of Yangon City. Currently, YCDC keeps promoting WtE projects (three new projects to treat approx. 2,000 tons/day in total). However, it is necessary to assess the feasibility on the projects in terms of environment, society, financial, and technical aspects during the short-term because it is difficult to get a feasible result on WtE projects in other ASEAN countries without consideration of tipping fee, power selling price, and financial support from the

- government. In addition, it is also necessary to secure the areas for these intermediate treatment facilities even it requires less area than FDSs.
- c) **Intermediate treatment (transfer station):** It is obvious that there are no spaces to install FDSs to secure capacity of waste to be disposed in the city area after ten years. There are only available spaces for new FDSs in suburban areas. In order to reduce cost of transportation, traffic congestion, air emission, and greenhouse gases, securing lands for transfer stations is proposed in short-term, construction of the new stations is proposed in the middle-term, and expansion of the stations is proposed in the long-term.
  - d) **Final disposal site:** There are two critical issues on FDSs, namely: 1) securing new FDSs possible to receive enough volume of waste to be disposed even if large-scaled incinerators are installed and 2) improvement of existing open dumping not to cause further pollution and to remedy past environmental pollution caused. Thus, securing land in the short-term and stepwise construction of new FDSs are proposed taking into consideration the remaining number of years to receive solid waste by FDSs in the middle- and long-terms. As for improvement of existing dumping sites, a project for the improvement of existing dumping sites to sanitary landfill sites is propose in the short term because stopping environmental pollution is a primary issue on SWM. It should be understood that, without the sanitary landfill, any improvement of waste collection and transportation system and intermediate treatment facilities are just an ineffective one-sided solution.
  - e) **Industrial waste and hazardous waste management (including hospital waste management):** A private project for development of a comprehensive waste management facility in Thilawa SEZ has been in operation since November 2015. Since the facility includes the controlled landfill site to treat hazardous waste to meet the United States Environmental Protection Agency (hereinafter referred to as “US-EPA”) standard, at least one hazardous waste treatment facility that meets international standard is available in Myanmar now. In addition, the Ministry of Natural Resources and Environmental Conservation is preparing a categorization and classification of hazardous waste in accordance with the requirement stipulated in the Environmental Conservation Rules with the support of the Norwegian Government. Furthermore, YCDC has plans to install recycle centers in each industrial zone and to install an incinerator for infectious waste. On the basis of the above actions, construction of hazardous waste landfill site is suspended and construction of recycling centers of each industrial zone and incinerator for infectious waste are proposed in the short-term. In the middle- and long- terms, YCDC is expected to proceed with the improvement of industrial waste and hazardous waste management by their own budget in collaboration with the private sector.

## **2) Strengthening Enforcement of SWM Laws, Regulations, and Policies by Government Officials, Organizations, Institutions, and Societies**

- a) Apart from the infrastructure development mentioned above, strengthening the enforcement of SWM laws, regulations, and policy by government officials, organizations, institutions, and societies are an important factor to achieve basic policy and vision. It is also important to develop a feasible M/P on SWM toward 2040 immediately, taking into consideration of existing SWM and updated strategic urban development plan. Thus, a technical cooperation project for development planning on SWM with capacity development project including M/P development, short term action plan development, public enhancement program, and technical training is proposed in the short-term. Then, a subsequent project is also proposed in the middle-term for further strengthening capacities on SWM.

### 3) Implementation Schedule

The development plan for short-, middle-, and long-term is formulated based on the basic policy as shown in Table 4.3.4.

**Table 4.3.4: Implementation Schedule (Solid Waste)**

No.	Project/Study Name	Status	Implementation Schedule (FY)					
			2016	2020	2025	2030	2035	2040
1	Project for Supply of Collection Equipment for SWM	Short						
2	Project for Improvement Existing Final Disposal Sites	Short						
3	Projects for Improvement Hazardous Waste Management	Short						
4	Project on Technical Cooperation for Development Planning on Improving SWM	Short						
5	Waste to Energy Projects	Short/Middle						
6	Project for New Sanitary Landfill Sites Development (for Mid-term 1)	Middle						
7	Project for Transfer Stations (for Mid-term)	Middle						
8	Projects for Improvement Hazardous Waste Management (2)	Middle						
9	Project for Capacity Development of SWM including updating Master Plan for SWM	Middle						
10	Project for New Sanitary Landfill Sites Development (for Mid-term 2)	Middle/Long						
11	Project for New Sanitary Landfill Sites Development (for Long-term)	Long						
12	Project for Expansion of Transfer Stations (for Long-term)	Long						
13	Projects for Improvement Hazardous Waste Management (3)	Long						

Source: JICA Study Team

### **4.3.5 Electricity** **- To realize stable electrical power supply -**

#### **(1) Current Conditions and Issues**

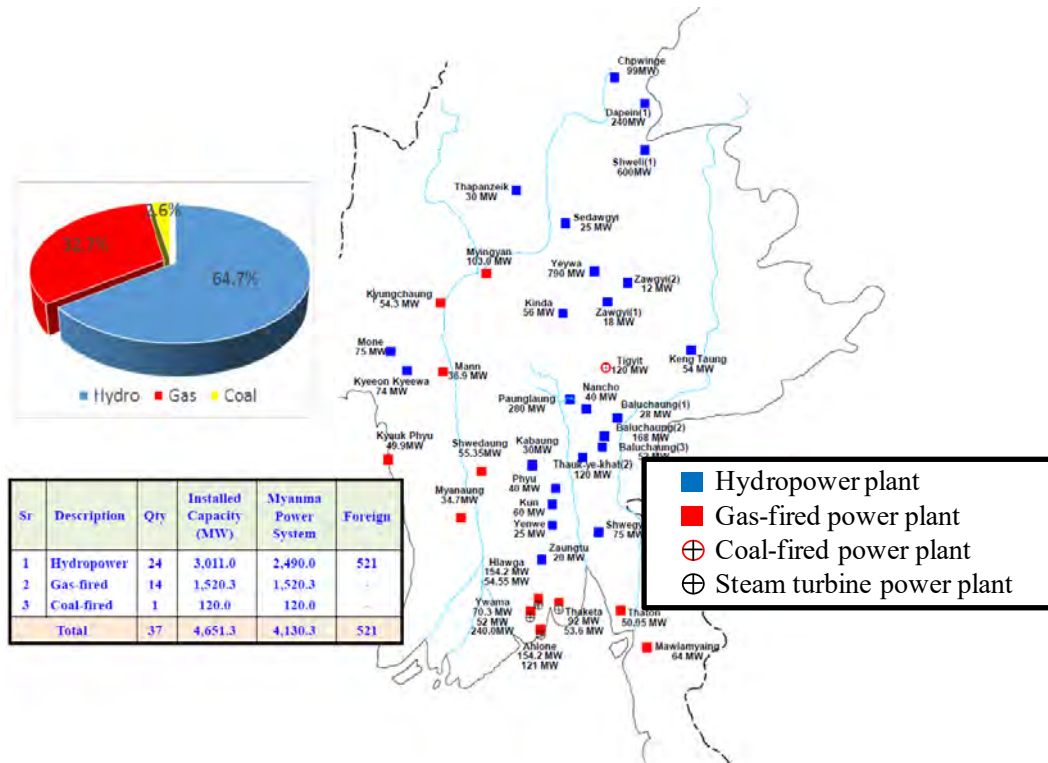
##### **1) Necessity of Improvement of Management Capacity**

The electricity system is managed by MOEE, and MOEE is consisted of 11 departments. Each department has responsibility, such as planning, power generation, and transmission/distribution. One of the departments, Yangon Electricity Supply Corporation (hereinafter referred to as “YESC”) is in charge of electricity distribution in Yangon area. Tiered charge system, divided into for residential and for commercial, is applied for electricity tariff in Myanmar. Currently, there is no official Electricity M/P and one of the reasons is considered as non-standardized organization system. Under the circumstances, JICA is executing the assistance project which will continue up until early 2019 for formulating Electricity M/P. MOEE is expected to familiarize itself with technical knowledge and skills required for the formulation/update of the M/P through this project. Additionally, it is considered that technical level, such as O&M of power station and transmission/distribution should also be improved.

##### **2) Shortage of Electrical Supply Capacity**

Myanmar has four types of power station, namely hydropower (2,801 MW), gas turbine power (1,714 MW), combined cycle and thermal power (498 MW), and coal-fired power (120 MW). The total installed capacity reaches 5,133 MW. According to the study of Data Collection Survey on Capacity Development of Power Sector Development Planning (2015), the electricity demand will reach at least 9,100 MW in 2030. Therefore, additional power stations development and rehabilitation/upgrade of existing power stations are being executed and planned. Additionally, MOEE has procured 600MW rental based power generation for next 5 years, and incineration plant from waste has started operation in Shwe Pyi Thar Township with capacity of 700 kW as alternative energy source. The locations of power stations as of August 2015 are shown in Figure 4.3.12.

Actual power generation in 25 August 2016 is only 2,554 MW, though total installed capacity is 5,133 MW. The main reason of deviation of total capacity and actual generation considered is because of aged facilities. Moreover, the electricity demand in 2016 is estimated at least 2,800 MW according to the Data Collection Survey (2015). Currently, the generation does not meet the demand by about 300 MW.



Source: Data Collection Survey on Capacity Development of Power Sector Development Planning (2015)

**Figure 4.3.12: Location of Power Stations as of August 2015**

### 3) Power Losses on Transmission/Distribution Lines

The electric power transmission system in Myanmar consists of 230 kV, 132 kV, and 66 kV; while distribution system consists of 33 kV, 11 kV, 6.6 kV, and 0.4 kV or less.

The losses on transmission/distribution lines show quite high value, about 25% consisting of 7% from transmission and 18% from distribution, as of 2012. Aged transmission/distribution lines and substations are considered as the reasons causing such current situation. The improvement of distribution lines and substations are being executed and under planning by YESC. However, development plan of ten substations in Dagon South and South Okkalapa is facing with the difficulties in terms of time and land acquisition.

#### (2) Policy

YESC contributes to electricity distribution in Yangon area and the others works such as construction of power plants are to be executed by the others department in MOEE.

Sector Vision	Realization of stable electrical power supply of high quality and sufficient quantity for securing advanced urban functions
Basic Policy	<ol style="list-style-type: none"> <li>1) Capacity development for planning and O&amp;M for the electrical power system</li> <li>2) Development/improvement of the power stations</li> <li>3) Development/improvement of transmission/distribution lines and substations</li> </ol>

Note: YESC contributes to the Basic Policy with “\*” to achieve the Sector Vision



### (3) Preliminary Development Plan

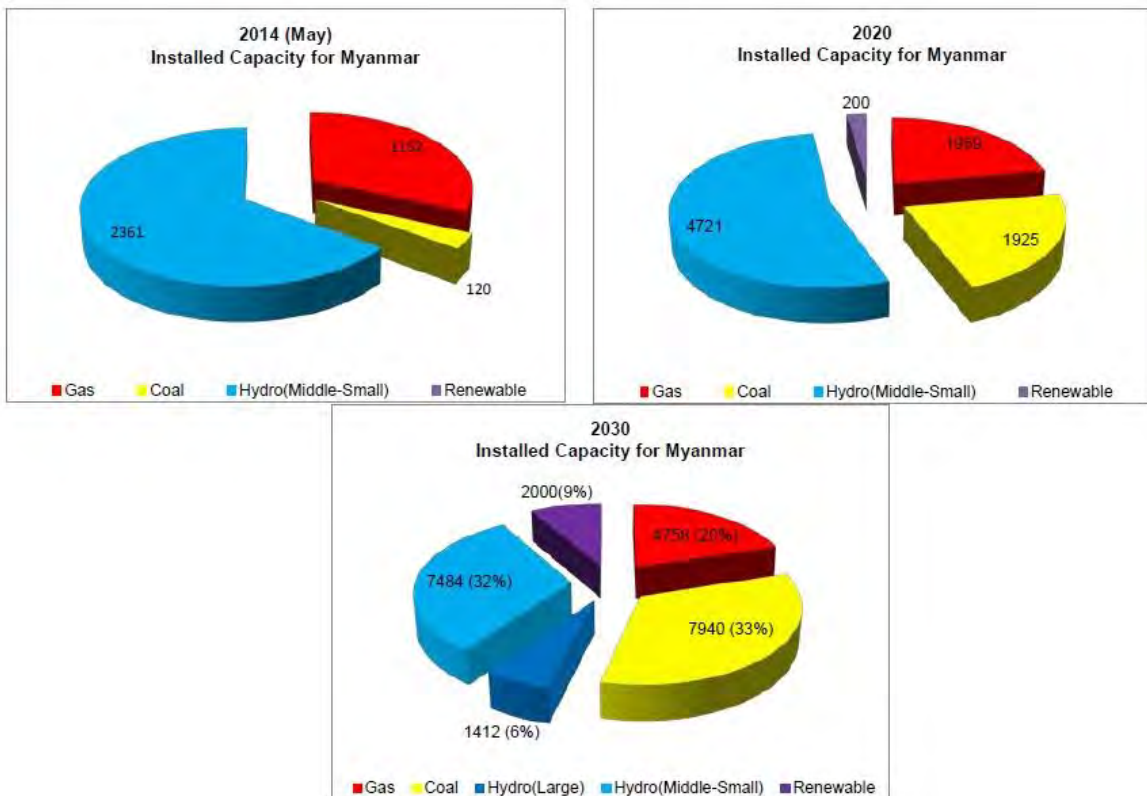
#### 1) Capacity Development for Planning and O&M for the Electrical Power System

It is considered that capacity development of MOEE staffs for planning is a priority project. Currently, JICA is carrying out the project for assistance on formulating the Electricity M/P. It covers the capacity development of MOEE staffs and will be completed in early 2019.

#### 2) Development of the Power Stations

In response to rapid electricity demand growth, power generation development is clear priority. Currently, the installed capacity of hydropower stations account for more than 50% of total installed capacity. However, it is said that the power stations should be developed not to rely on the kind of generation in the Data Collection Survey (2015) as shown in Figure 4.3.13. The demand in 2030 is estimated at 14,542 MW, and the total installed capacity is planned to reach 18,964 MW having reserved margin of 30%. It should be noted that JICA is assisting for formulation of the Electricity M/P and will be completed in 2018. The development plan should follow the M/P.

Because given the concession for rental based power is expected to expire after 5 years, planning and construction of new power plants with sizable scale which would supply power in place of rental based plants and to meet future demand increase is urgent issue. As MOEE is now considering option to import Liquefied Natural Gas (hereinafter referred to as “LNG”) as fuel for power generation, parallel planning and implementation of new gas fired power plants utilizing imported LNG is the key for power supply to Yangon region in the meddle term.



Source: Data Collection Survey on Capacity Development of Power Sector Development Planning (2015)  
**Figure 4.3.13: Power Stations Balance to be Developed (2014, 2020, and 2030)**

### 3) Improvement of Transmission/Distribution Lines and Substations\*

Same as the development plan of power stations, the Data Collection Survey (2015) mentions about development of transmission lines and substations. Based on the Survey, improvement works funded by JICA such as construction of 500kV main transmission lines and substations are ongoing. A total of two main transmission lines are to be constructed. Additionally, ADB and JICA is supporting 230kV transmission lines and/or substations in Yangon area.

Regarding distribution lines and substations in the Greater Yangon, YESC has a five-year's investment plan (FY 2016-FY 2020), and it mentions that upgrading of distribution lines and substations from 33 kV to 66 kV is necessary. The improvement of distribution line and substations funded by ADB is being executed at Mayangone Township, Kamaryut Township, Hlaing Tharyar Township, Mingalardon Township, and Hlaing Township. Additionally, JICA is planning to carry out improvement of distribution lines for 11 townships, and improvement of substations for four townships in Yangon City.

### 4) Implementation Schedule

The development plan for short-, middle-, and long-term is formulated based on the basic policy as shown in Table 4.3.5.

**Table 4.3.5: Implementation Schedule (Electricity)**

No.	Project/Study Name	Status	Implementation Schedule (FY)					
			2016	2020	2025	2030	2035	2040
1	Capacity development for formulation of development plan	Short						
2	Improvement of existing power stations	Short						
3	Development of new power stations	Short/ Middle/ Long						
4	Development of 1st main transmission line and substations	Short						
5	Development of the others transmission lines and substations	Short/ Middle/ Long						
6	Development of transmission/distribution line and substations in Yangon area	Short/ Middle/ Long						
7	Enhancement of management capacity	Middle/ Long						
8	Development of 2nd main transmission line	Middle/ Long						

Source: JICA Study Team

### **4.3.6 Information Telecommunications** **- To create advanced information and communication society -**

#### **(1) Current Conditions and Issues**

##### **1) Inadequate Telecommunication Policy and Undeveloped Institutional Framework**

The Ministry of Transport and Communication (hereinafter referred to as “MOTC”) is in charge of telecommunication work. There are two organizations in MOTC related to telecommunication, namely Myanmar Posts and Telecommunications (hereinafter referred to as “MPT”) and Posts and Telecommunication Department (hereinafter referred to as “PTD”). The MPT provides telephone, telegram, mobile phone and postal services; and PTD regulates telecommunications and broadcasting.

Progress of telecommunication sector can be found. However, improvement of regulations and institutional framework of both regulatory bodies and carriers are needed.

##### **2) Necessity of Securing High Speed and Highly Reliable Telecom Network**

Telenor from Norway and Ooredoo from Qatar have entered the mobile phone business in Myanmar since September 2014. Additionally, Viettel from Vietnam has been selected as the fourth mobile phone business company in March 2016. There are four carriers including the MPT at present.

Telenor has started the GSM and W-CDMA service in Yangon, Naypyidaw and Mandalay from September 2014 and possessed more base station than Ooredoo had as of October 2015. They have launched 4G LTE service in Naypyidaw from July 2016.

Ooredoo also has started the W-CDMA type’s 3G service in major cities including Yangon, Naypyidaw and Mandalay in 2014 and got loan from ADB and IFC to expand the service area of 3G. Additionally, they have introduced 4G LTE service in a part of Yangon, Naypyidaw and Mandalay from March 2016.

MPT has provided various types of mobile phone service, such as CDMA, GSM and W-CDMA, and lowered the price of SIM card to compete with other companies. From October 2016, they have also launched 4G LTE service in Yangon and Naypyidaw.

It has caused drastic increase of subscriber of mobile phones. Approximately 80% of the total population in Myanmar owns their mobile phones as of May 2016.

Because adoption rate of mobile phone has increased drastically, enough telecom network has not been developed. Additionally, fixed telephone users are still at 1% of the total population.

##### **3) Lack of Internet Infrastructure and Facilities**

The number of service providers has become 27 as of August 2015, even though the number was only three in 2012. Satellite terminal, digital subscriber line (hereinafter referred to as “DSL”), and fiber to the x (hereinafter referred to as “FTTx”) services are provided.

Users of broadband are only 190,000 people accounting for 0.3% of the total population as of 2015 due to the delay of implementation of fixed telecom network.



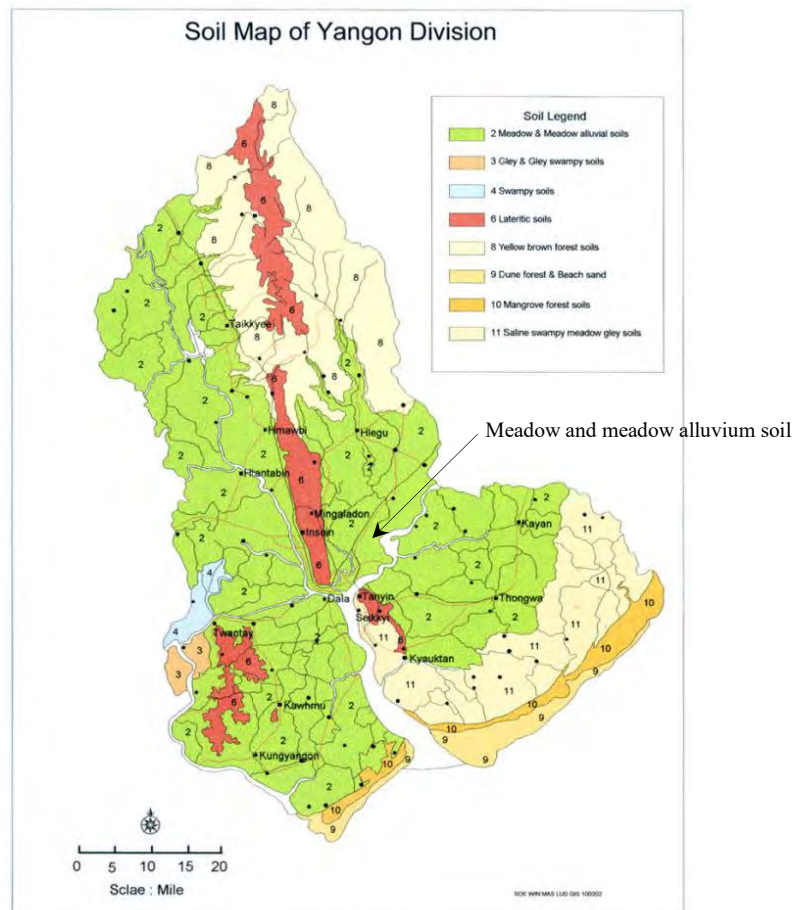
### 4.3.7 Disaster Risk Management (Earthquake) - To improve building seismic properties -

#### (1) Current Conditions and Issues

##### 1) Risk of Earthquake

The 1,200-km long Sagaing Fault is running from north to south in the central area of Myanmar. M7 class earthquakes have been recurring around this fault since 1900s. Major cities such as Yangon, Nay Pyi Taw, and Mandalay are adjacent to Sagaing Fault.

Yangon is located adjacent to a high-probability area<sup>9</sup> of Sagaing Fault that has potential risk of earthquake in the future. According to a research paper by Aung Lwin and others (Mandalay Technological University), soft layer or alluvium soil spreads out along rivers in Yangon (Figure 4.3.14). Due to this, once earthquake occurs, this soft subsurface layer is highly likely to amplify the tremor and cause massive seismic damage. Seismic property of city infrastructure and buildings need to be improved for Yangon to achieve sustainable development.



Source: Yangon River Geomorphology Identification and Its Environmental Impact Analysis by Optical and Radar Sensing Techniques, HP  
**Figure 4.3.14: Soil Map of Yangon Division**

<sup>9</sup>High-probability area: area that had seismic activity in the past but has not been the seismic center for a long period of time.



## 2) Construction Practice

Research on three general apartment buildings in Yangon revealed that none of the buildings, being lower than eight-stories, was obliged to adopt seismic design under current building inspection institutions (2016). After conducting seismic diagnosis, it was discovered that the horizontal bearing capacity of these buildings did not meet the seismic load mandated by the Myanmar National Building Code (hereinafter referred to as “MNBC”). This is assumed to be due to the lack of seismic design in the targeted buildings. In addition, inappropriate construction situations were observed during construction site visit.

The following are major issues concerning earthquake-resistant design and construction practices observed in Yangon:

- a) There is no building standards in place as of now. The MNBC was revised creation based on enforced American standards called ASCE7.
- b) Seismic design is not mandated for the building lower than eight stories.
- c) Without building inspection after completion of construction, some buildings are not constructed according to the submitted drawings. We observed a case where a submitted drawing and a drawing used on-site are not the same, leading to inconsistency of column section.
- d) Construction technologies and supervising capabilities are lacking. Insufficient covering depth and hoop fixation length were confirmed in the construction site. Some column concrete had honeycomb, which indicates lack of sufficient construction technologies.
- e) Construction materials are not appropriately managed with rebar stocked outside exposed to the rain.

### (2) Policy

It should be necessary to establish policies regarding structural design, construction material, and construction management for improving building's seismic capacity. For existing buildings, it should be necessary to conduct seismic diagnosis and, as appropriate, seismic strengthening.

Sector Vision	Improvement of building seismic properties and construction technologies
Basic Policy	<p>Legal system reform</p> <ol style="list-style-type: none"> <li>1) Establish building standards (MNBC was revised)</li> <li>2) Establishment of construction status monitoring system</li> <li>3) Institution to improve construction quality</li> <li>4) Building quake-proof city</li> <li>5) Establishment of disaster response policy and enforcement of reinforced aseismic capacity for existing buildings</li> </ol>

### (3) Preliminary Development Plan

For building a strong quake-proof city, it is necessary to review current legal regulations and institutions for new buildings to be constructed in the future to improve seismic capacities of each building. For existing buildings, especially the ones without seismic design (mainly buildings lower than eight-stories) and after prioritization, should go through seismic diagnosis and get reinforced as necessary.

## **1) Newly Constructed Buildings (Legal System Reform)**

As previously mentioned, without building standards related law in place, the building lower than eight stories are not obliged to adopt earthquake-resistant design. In addition, since buildings do not need to go through inspection after construction, there are cases where buildings are constructed differently from the submitted drawing. Construction quality is also low. In order to improve such issues, the following regulations or necessary monitoring system should be established in a project feasible in a short period of time:

- a) Establish building standards (MNBC was revised in 2016)  
Assumed counterpart: MOC and YCDC  
The following items should be incorporated in the building code enforcement:
  - Obligatory earthquake-resistant design,
  - Create standards documents in Burmese language so that seismic design standards become widely established,
  - Designating construction material to be used (designation of quality),
  - Implementing mandatory inspection by third party during and after construction.
- b) Establishment of construction status monitoring system  
Assumed counterpart: YCDC  
Specifically, execution of unannounced test against construction site by adding personnel in the supervising institution (YCDC) could be one example. In the future, it is desirable to establish regulations that enforce post-construction inspection for all buildings.
- c) Institution to improve construction quality  
Assumed counterpart: Myanmar Engineering Society (hereinafter referred to as “MES”)  
It is necessary to provide professional ethics education to construction supervisors and set up license system to be granted for construction supervising engineers. It is desirable to establish regulations mandating that personnel who obtained the abovementioned license resides on-site and instructs construction workers.

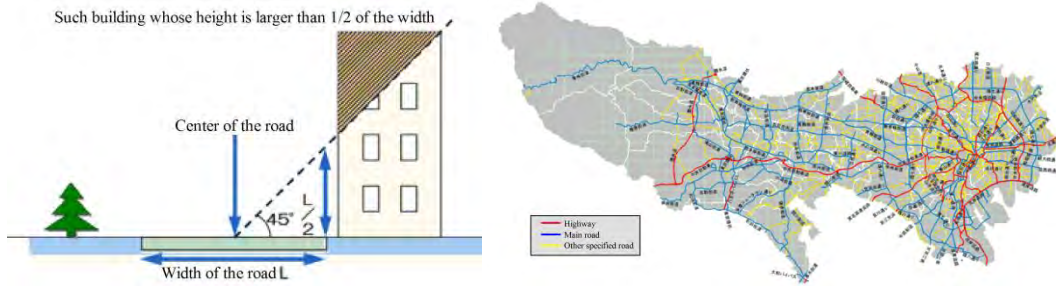
## **2) Existing Buildings (Building Quake-Proof City)**

Seismic diagnosis and seismic reinforcement are required for improving the seismic properties of existing buildings. The team hereby proposes a project feasible in a short period of time to execute the following steps to ensure execution of improvement in a step-by-step and stable manner:

- a) Define specific emergency transportation routes<sup>10</sup> for transporting emergency goods in times of disaster.
- b) Start with buildings along emergency routes for applying seismic reinforcement. Specifically, identify buildings along the emergency roads and mandate application of seismic reinforcement on such buildings whose maximum height is larger than 1/2 of the width.

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<sup>10</sup> Specific emergency transportation routes: Prevent roads from being obstructed by collapsed buildings in time of earthquake that mainly secures evacuation and transportation routes in a wide area. For example, over four-lane road that can facilitate truck transportation.



Setting up specific emergency transportation routes. Tokyo prefecture: Sample of specific emergency transportation routes  
Source: Tokyo Metropolitan Government Earthquake-Resistant portal site (<http://www.taishin.metro.tokyo.jp/>)

**Figure 4.3.15: Example of Specific Emergency Transportation Routes**

At a later stage, aim for mid- to long-term implementation of quake-resistant in a phased manner through seismic diagnosis and seismic strengthening for buildings outside the specific emergency transportation routes, such as existing public facilities constantly used by the general public.

### 3) Implementation Schedule

The development plan for short-, middle-, and long-term is formulated based on the basic policy as shown in Table 4.3.7.

**Table 4.3.7: Implementation Schedule (Earthquake)**

No.	Project/Study Name	Status	Implementation Schedule (FY)					
			2016	2020	2025	2030	2035	2040
1	Create and enforce Building Standards Law	Short	<div style="display: flex; align-items: center;"> <div style="width: 100px; height: 10px; background-color: #ff00ff; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; background-color: #808080; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; border-bottom: 1px dashed black; margin-right: 5px;"></div> <div style="font-size: 12px;">                     &lt; Legend &gt;                      : MP, FS, DD, Tendering                      : Construction                      : Commencement of Operation                 </div> </div>					
2	Establish and operate construction status inspection system	Short/Middle	<div style="display: flex; align-items: center;"> <div style="width: 100px; height: 10px; background-color: #ff00ff; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; background-color: #808080; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; border-bottom: 1px dashed black; margin-right: 5px;"></div> </div>					
3	Institution and its operation for improved construction quality	Short/Middle	<div style="display: flex; align-items: center;"> <div style="width: 100px; height: 10px; background-color: #ff00ff; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; background-color: #808080; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; border-bottom: 1px dashed black; margin-right: 5px;"></div> </div>					
4	Set up emergency transportation routes and select prioritized buildings to conduct seismic diagnosis/seismic strengthening	Short	<div style="display: flex; align-items: center;"> <div style="width: 100px; height: 10px; background-color: #ff00ff; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; background-color: #808080; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; border-bottom: 1px dashed black; margin-right: 5px;"></div> </div>					
5	Establish and operate institution for seismic diagnosis/seismic strengthening	Short/Middle	<div style="display: flex; align-items: center;"> <div style="width: 100px; height: 10px; background-color: #ff00ff; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; background-color: #808080; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; border-bottom: 1px dashed black; margin-right: 5px;"></div> </div>					

Source: JICA Study Team

### **4.3.8 Disaster Risk Management (Fire)** *- To provide fire prevention -*

#### **(1) Current Conditions and Issues**

##### **1) From Fire Statics**

In Yangon, about 200 fire accidents occur and about 20 people die every year. Though there are few number of deaths, markets, and factories burned down every year. There is few fire spread because almost all of the buildings are made of concrete and have brick walls. Concrete is a non-combustible material and is heat-resistant. Brick wall prevents fire spread because it functions as firewall. The fire safety of Yangon is in good condition.

##### **2) Fire Station**

In average, callings from fire accidents received in Yangon are at two to three times per day during dry season and one to two times during rainy season per day. There are 55 fire stations and 109 fire engines. Compared to fire stations, the number of fire engines appears smaller. The district boundary of one fire station is a large area making rushing time long. Water resources for firefighting are ponds, river, and outdoor standpipes. Some outdoor standpipes have pressures under 3.5 bars.



Source: JICA Study Team

**Figure 4.3.16: Fire Station and Outdoor Standpipe**

##### **3) Highly Crowded Area**

The CBD, as a main urban area, is blocked by many wide roads, which is expected to prevent fire spread. Narrow roads have been congested with parking cars on both sides. Consequently, the fire engine cannot enter into narrow roads. Presently, parked cars are moved by crane. It needs a lot of time to do so. There are many electric wires outstretched above narrow roads. The height of them is sometimes less than 10 ft. Fire engine's height is about 10 ft. Then fire engine cannot access narrow roads.

##### **4) Low Crowded Area**

Although almost all areas outside of the CBD area are blocked by some wide roads, the north-east area is not blocked by wide roads. Therefore, the risk of fire spread would increase with the increase of buildings.

## 5) Fire Safety Code

Buildings in Yangon have few fire prevention measures because Yangon does not have a Fire Safety Code. The Fire Safety Code is made by the MES and the Fire Service Department. The code will be published soon. The Fire Service Department demands architects to install some fire prevention equipment when proposing new buildings. Although, it is a matter of consultation, the Fire Service Department has no binding force. After introducing the Fire Safety Code, the Fire Service Department will have a binding force. Sometimes, fire engine meets traffic jam and causes delay in getting fire site because they do not have the right-of-way.

### (2) Policy

Presently, there are few fire accidents and deaths in Yangon. It has good condition for fire safety. Recently, the number of high-rise buildings is increasing, especially in the CBD. Generally, the escape time from high-rise building takes much time. Therefore, it needs fire provision including roads for fire safety.

Sector Vision	Provision of fire prevention for a safer city
Basic Policy	<ol style="list-style-type: none"> <li>1) Enforcement of the urban fire prevention provision based on the policy of each area.               <ul style="list-style-type: none"> <li>&lt;High Dense Area&gt;                   <ul style="list-style-type: none"> <li>- Improvement of road environment for firefighting.</li> <li>- To suppress a huge fire.</li> </ul> </li> <li>&lt;Low Dense Area and New Cities &gt;                   <ul style="list-style-type: none"> <li>- To promote setting up of fire stations and towns having fire spread prevention function.</li> </ul> </li> </ul> </li> <li>2) Introduce and implement the Fire Safety Code.</li> </ol>

### (3) Preliminary Development Plan

#### 1) Enforcement of Fire Prevention in the CBD Area

Narrow roads are congested with parked cars on both sides. Consequently, the fire engine cannot enter into narrow roads. There are many electric wires outstretched above the narrow roads. The height of them is sometimes less than 10 ft. while fire engine's height is about 10 ft. Then, fire engine cannot access narrow roads.

- To limit parking in narrow roads to ensure a driving zone (12 ft. width).
- To install electric wires at over 20 ft. height while electric wire maintenance is carried out.

#### 2) Construction and Function of Fire Stations

The district boundary of one fire station is a large area making rushing time long.

- To set up one fire station per 30,000 people, and 2 km from fire site should be set up.





Source: JICA Study Team

**Figure 4.3.17: Location of Existing Fire Stations and those Circles of Radius 2km**

### 3) Introduction of Fire Safety Code

Buildings in Yangon have few fire prevention measures because it does not have Fire Safety Code. Sometimes fire engines meet traffic jam and cause delay in getting to the fire site.

- To introduce and implement of the Fire Safety Code, the Fire Safety Code should include the following:
  - ◇ To install automatic extinguish equipment to markets and warehouses,
  - ◇ To install water tank for fire fighter in the basement of high-rise building.
  - ◇ To install fire compartment for shaft and staircase.
  - ◇ To install automatic fire alarm system.
  - ◇ To install two-way escape route.
- Yield Right-of-Way to Emergency Car.  
Emergency cars should have right-of-way, normal car stop for emergency car.

### 4) Infrastructure Development in Consideration of Fire Prevention

Wide roads are expected to prevent fire spread. Water resources for firefighting are ponds, rivers, and outdoor standpipes. The Fire Service Department demands 3.5 to 5.5 bars of water pressure for outdoor standpipes. Although some outdoor standpipes have pressures under 3.5 bars.

- Blocking by wide roads.
- To set up ponds in parks.  
Firefighting from multiple water resources is better than from a single water resource.
- To increase pressure of outdoor stand pipe and to put outdoor standpipes every 100m.  
Pressure of outdoor standpipes will be improved through water supply works.

### 5) Implementation Schedule

The development plan for short-, middle-, and long-term is formulated based on the basic policy as shown in Table 4.3.8.



### **4.3.9 Urban Transport and Logistics**

#### ***- To establish a robust network for sustainable urban growth -***

#### **(1) Current Conditions and Issues**

##### **1) Overview**

Condition of urban transport in Yangon region has been rapidly deteriorated due to the rapid increase of population and vehicles (e.g. number of registered private car was more than doubled from 2012 to 2016). Although both better utilization of the existing transport infrastructure through the improvement on transport management and construction of new infrastructure are needed to meet the increasing traffic demand, neither of them has not been implemented in an efficient and effective manner.

Lack of transport management and transport infrastructure provides significant negative impact in terms of social, environmental and economic aspects such as air pollution, traffic accidents and economic loss due to the increased travel time etc. Since urban transport includes various factors, holistic approach in the long run based on well balanced improvements on both transport management and infrastructure development should be adopted.

##### **2) Infrastructure Development of Urban Transport & Logistics**

Since there are certain locations causing traffic congestion such as bridges, roundabouts, areas adjacent to flyovers, level crossing points with railway etc., such bottlenecks should be eliminated at the earliest opportunity.

Although modal share of bus in the Greater Yangon is relatively high (43% in 2013), level of service is quite low due to the old vehicle as well as inappropriate manner of driving and risks safety of passengers. Modal share of railway is very small (2% in 2013) in spite of its basic network connecting central and suburban areas as shown in Figure 4.3.18. Therefore, both upgrade of the existing railway system and construction of new lines are necessary to improve the railway system as the major mode of public transport.

Due to the rapid increase of the population, amount of cargo traffic in the Yangon Region has been dramatically increasing (e.g. number of registered trucks in 2016 was more than 5 times comparing to 2012). Since unnecessary intrusion of cargo traffic in urban area becomes a major factor to deteriorate traffic congestion and risk safety of pedestrians, it should be strategically separated through the construction/rehabilitation of outer ring road, relocation of truck terminals etc.

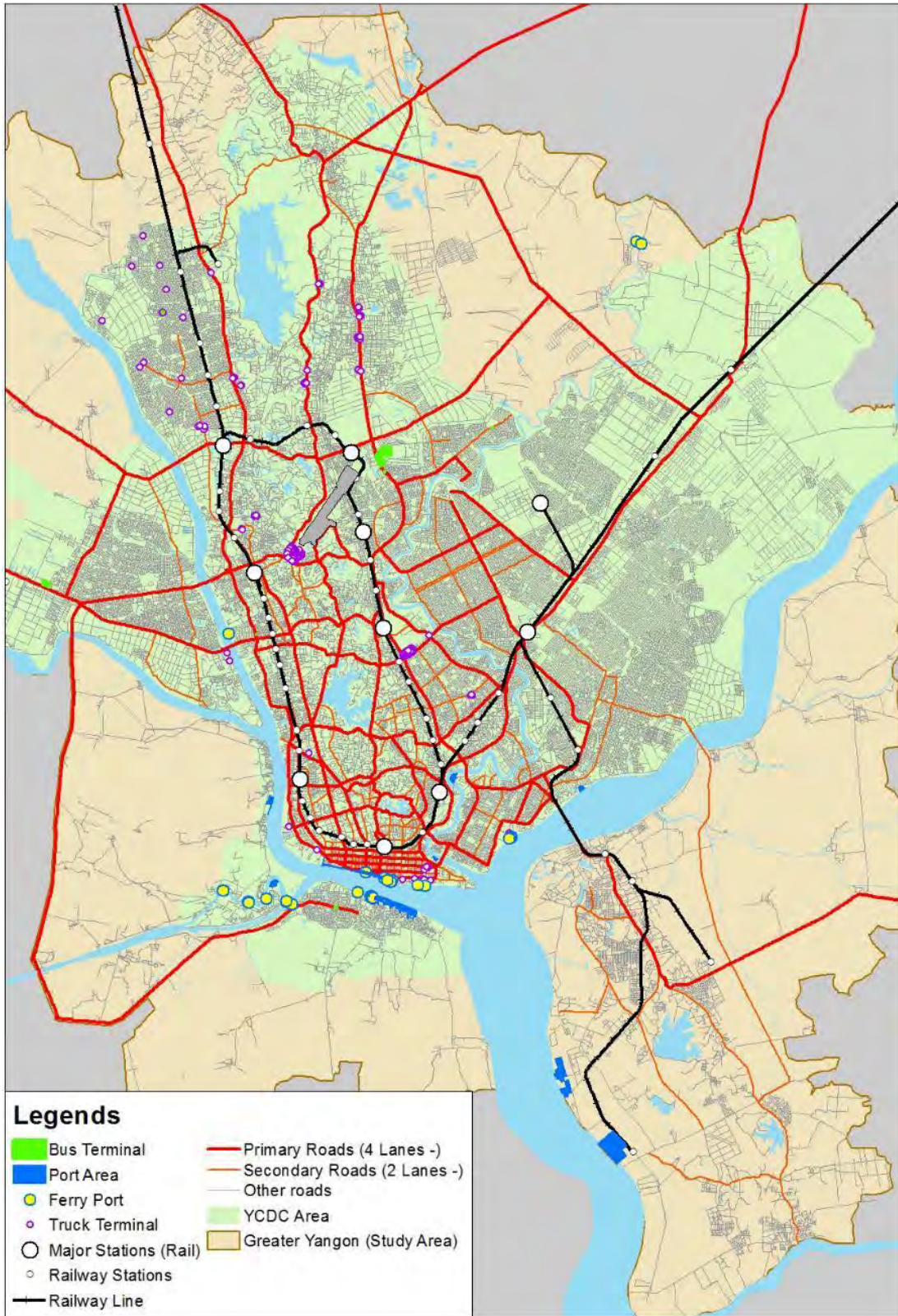
##### **3) Urban Transport Management**

While urban growth cannot be sustained without sufficient transport capacities, efficient and effective utilization of the existing infrastructure is necessary considering the limited financial and land availability. Therefore, making the most use of the existing urban transport infrastructure is essential through the integration with the improvements on urban transport management such as increase the available travel space in the roadway by the enforcement of control for illegal on-street parking.

Improvements on urban transport management is necessary not only for better utilization of the existing transport infrastructure but also for safety enforcement and utilization of limited financial and human resources. Although the Yangon Region Transport Authority (hereinafter referred to as “YRTA”) has been established for the improvements on transport management, its capacity is still limited and certain technical transfer is needed to implement the better urban transport management. Although new traffic control center was completed in 2016, it has not



been operated as of January 2017 and should be fully utilized under the necessary capacity enhancement.



Source: YUTRA

**Figure 4.3.18 Overall Transport Network in the Greater Yangon, 2016**

## (2) Policy

Sector Vision	Sustainable transport development for the Yangon Region to function as a competitive international and national growth hub and provide needed mobility and accessibility for the people.
Basic Policy	<ol style="list-style-type: none"> <li>1) <b>Connected:</b> Transport must be connected at international, national, regional, and city levels.</li> <li>2) <b>Competitive:</b> Transport must be competitive, meaning with high quality, performance, comfortability, and efficiency as well as amenity.</li> <li>3) <b>Inclusive:</b> Transport must be inclusive, meaning people-oriented and accessible to vulnerable groups such as the aged, people with disabilities, etc.</li> <li>4) <b>Ecological:</b> Transport must be ecological, meaning energy-efficient, less polluting, and disaster-resilient.</li> <li>5) <b>Coordinated:</b> Transport must be coordinated among vertical and horizontal government institutions and between public and private sectors.</li> </ol>

## (3) Preliminary Development Plan

### 1) Enhancement on Urban Transport Network

In order to eliminate the bottlenecks, road network should be enhanced with sufficient traffic capacity as shown in Figure 4.3.19. Development programs aiming for enhancement urban transport network includes bottleneck removal of major corridors and CBD, bus modernization, missing links development and land readjustment, urban rail network development, urban expressway development and Inland waterway transport development.

Promotion of public transport increases the effectiveness and efficiency of urban transport infrastructure in terms of social, environmental and economic aspects due to the decrease in use of private owned vehicle, provision of safe, convenient and comfort mobility/accessibility in inexpensive price, decrease and punctuality in travel time etc. Since currently numbers of railway services are limited, additional railway system should be introduced as shown in Figure 4.3.19 to encourage further use of public transport. Multi modal transfer facilities are also required at the stations to secure safe, convenient and comfort transfer among different means of public transport.

### 2) Enhancement on Urban Transport Management

As previously described, enhancement on urban transport management is essential to operate the improved urban transport network in a safe, efficient and effective manner. Since YRTA is a key agency to manage urban transport, development programs aiming for enhancement on urban transport management includes traffic management and safety improvement and strengthening of YRTA.

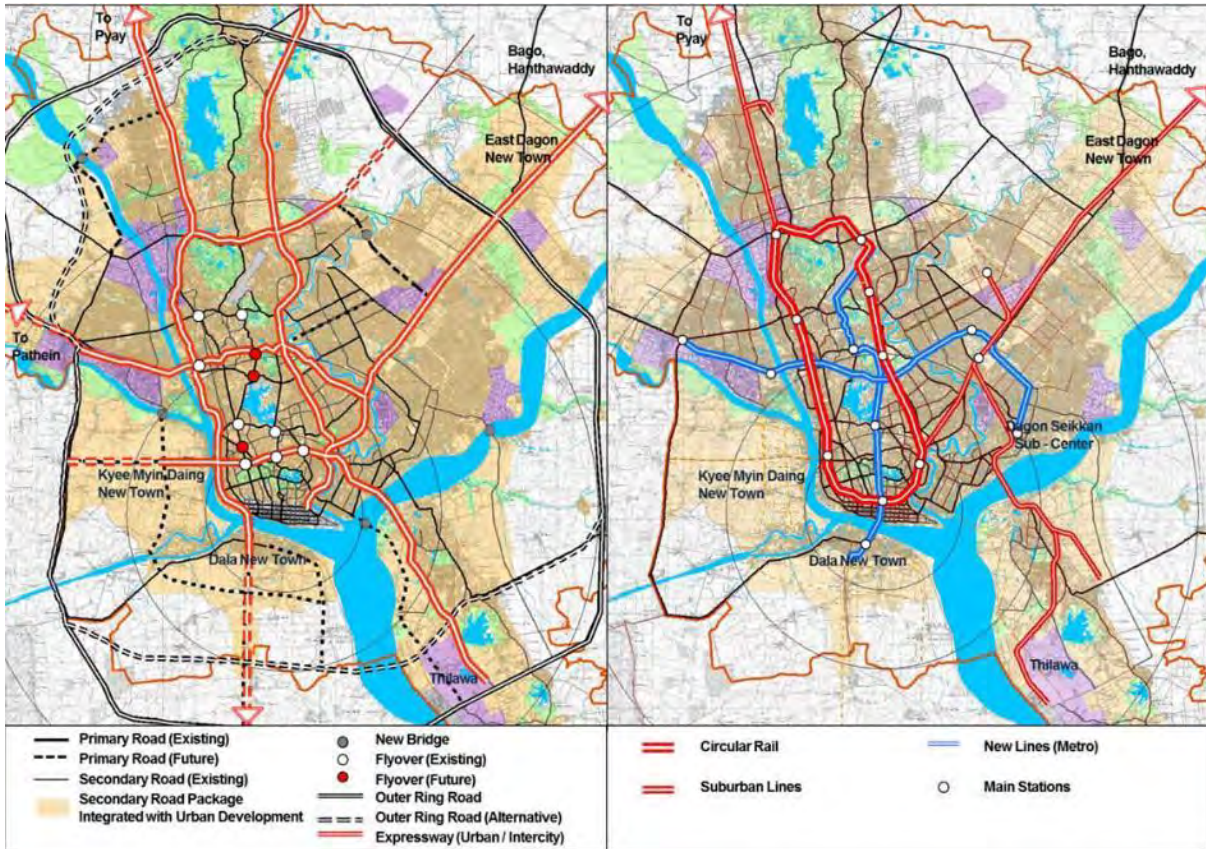
### 3) Maximization of Benefits by Development of Urban Transport

Since urban transport is supposed to ensure sustainable urban growth, it should be integrated with urban development. For example, many missing links are identified in the existing road network as shown in Figure 4.3.18 due to the inefficient land use and parcel size. Therefore, efficient road network should be introduced as a part of land readjustment project.

Transit oriented development (TOD) is also a major strategic development approach to integrate urban and transport development to maximize the benefits of the development. Mixed use development in the station area improves convenience and results in the increase of the ridership of the public transport. Accessibility and mobility should be considered not only in the



station area but also within the walking distance (500m-1km) from the station in addition to the multi-modal transfer facility previously mentioned.



Source: YUTRA

**Figure 4.3.19 Future Road/Expressway Network (left) and Railway Network (right)**

#### 4) Implementation Schedule

Each development program is planned to implement by phases (short-, middle-, and long- term) as shown in Table 4.3.9 based on the basic policy.

**Table 4.3.9: Implementation Schedule (Urban Transport & Logistics)**

No.	Program Name	Status	Implementation Schedule (FY)						
			2016	2020	2025	2030	2035	2040	
1	Bottleneck Removal of 8 Major Corridors and CBD	Short	█						
2	Bus Modernization	Short/Middle	█	█					
3	Traffic Management and Safety Improvement	Short/Middle	█	█					
4	Missing Links Development and Land Readjustment	Short/Middle/Long	█	█	█				
5	Urban Rail Network Improvement	Short/Middle/Long	█	█	█	█			
6	Urban Expressway Development	Short/Middle/Long	█	█	█				
7	Inland Waterway Transport Development	Short/Middle/Long	█	█	█				
8	Transit Oriented Development	Short/Middle/Long	█	█	█	█			
9	Strengthening of YRTA	Short/Middle/Long	█	█	█				

<Legend>

█ : MP, FS, BD, DD, Tendering

█ : Construction, Institutional Arrangement, Capacity Development

█ : Commencement of Operation

Source: JICA Study Team

## **4.4 CBD Renovation**

### **4.4.1 Vision for the CBD**

The overall vision for the CBD is to create a livable city that respects the community and cultural heritage of the CBD including its built heritage, which will continue to present a distinctive face of Yangon to the world; and that will contribute, in a complementary way, to the economic development and success of the wider metropolitan region and country.

CBD Vision
<p>By 2040, Yangon will have a ring of sub-centers and new towns established in the suburbs of the city, surrounding the current CBD. Each will be a commercial center. However, the current CBD, with its wealth of cultural, built, and religious heritage, will remain the center of the Greater Yangon and the symbol of the city.</p> <p>The area around Sule Pagoda, the iconic centerpiece of the old city, will be improved. Traffic planning will result in a reduction in vehicle movements and high quality public realm.</p> <p>The heights and designs of new buildings will be appropriate to the historic character of the area. The current mix of uses will be preserved to provide a mix of tourism, residential, and office uses. To the east and west of the CBD area where many vacant plots are located currently, new development will allow some functions to be relocated from the CBD.</p> <p>The CBD will become a showcase of the most advanced infrastructure. Public transport, pedestrian, and public facilities will be integrated to create an environment suitable for all, including persons of advanced age and with disabilities. In particular, public services including drainage systems for rain and sewerage will be designed to be the best in the world.</p> <p>The CBD is a high density residential area which is vulnerable to earthquakes. In the future, all new buildings in the CBD will be designed to be earthquake-resistant and there will be strict inspection of applications for building permits and construction and reinforcement work to ensure earthquake-resistance.</p>

The development policies for the CBD covering the four key themes are as follows:

- a) Heritage and Design,
- b) Transportation and Road,
- c) Urban and Infrastructure Development, and
- d) Urban Amenity and Tourism.

### **4.4.2 Policies for the CBD**

#### **(1) Heritage and Design Policies**

Yangon is the only city in Asia with its historic core largely intact. The CBD area has an estimated 2,000 properties that date back from before 1950. Over a hundred buildings are recognized as heritage buildings. Many more are considered to make a positive contribution to the character and appearance of the area and are worthy of similar protection. Many of these buildings are being demolished to make way for modern buildings or are vulnerable to such development in the future.

The CBD is therefore rich in heritage and remarkably complete. Aside from a great number of individual buildings of historic interest, the heritage value of the area arises from the complete cityscape of street, building, public realm, and mix of activities. The unique combination of planned grid, incorporation of pre-existing pagoda structures, the internal network of narrow north south streets,

and the scale and rhythm of the buildings and street frontages that vary according to street width gives this area an exceptionally strong identity and character. This character has been lost in many other Asian cities due to insensitive redevelopment. By retaining this character, Yangon will be able to promote an attractive and distinctive city center in an increasingly globalized economy, where values of authenticity and localism are increasingly sought after.

### 1) The Establishment of a Conservation Area

The key heritage and cityscape policy is the establishment of the CBD conservation area (see proposed boundary in Figure 4.4.1). The conservation area policy sets a clear spatial boundary and the appraisal of the conservation area will identify the characteristics of the area that give it such a unique feel. These same characteristics will inform design guidance and other policies for the area.

Policy
<p><b>The Establishment of a Conservation Area</b></p> <p>A CBD conservation area should be established, clearly setting out the rationale for designation and the geographic area that the policy covers. A full conservation area appraisal should be prepared (drawing on work such as the Yangon Heritage Strategy) and additional planning, construction, and design controls should be identified to protect the key characteristics of the CBD.</p>



Source: YHT

**Figure 4.4.1: Proposed CBD Conservation Area Boundary by Yangon Heritage Trust**

### 2) Public Realm Design Guidance

The public realm is the space between buildings that is publicly accessible. The public realm has to accommodate almost every aspect of the life of the city from the accommodation of traffic and transportation, to retail and recreation. There will also be many temporary uses of the public realm, for example to accommodate markets, festivals, or other community events.

The quality of the public realm will influence the ‘livability’ of the CBD area; and significantly, the ownership, design, and management of the public realm is substantially within the control of public sector agencies. Therefore, a key policy for the CBD development relates to the public realm.

**Policy**

**Public Realm Design Guidance**

A public real design guide should be prepared for the CBD area. This should ensure that the public realm supports the economic, community, and cultural life of the city, that there is an appropriate balance of the needs of pedestrian and vehicular traffic, and that a consistent approach to design and materials that respects the heritage values of the area is adopted. The public realm design guide should do the following:

1. Establish standard design approaches to the public realm for the different scales of streets in the CBD grid hierarchy that provide pedestrian movement, accommodate necessary vehicular movement and parking, support economic activity in the buildings fronting the street including related on-street activity (e.g. seating, display, and trading areas), and that is flexible enough to accommodate temporary activities;
2. Include guidance on building frontage treatment, including signage and advertising for existing and new buildings;
3. Set a palette of materials (including painting) that is appropriate to the area;
4. Include a lighting strategy for adoption throughout the CBD;
5. Accommodate utility and drainage infrastructure and consider access to and maintenance; and
6. Consider maintenance costs and regimes in proposing designs and materials.

### 3) Planning Briefs for Key Opportunity Sites

There are some key opportunities for development around the edges of the CBD area in particular, and the development of these areas can absorb demand for additional floor space in the wider CBD area. These sites are therefore strategically important, so a policy for key opportunity sites to ensure that these sites are used in an effective way is proposed.

The potential sites are as follows:

- a) The CBD Northern Gateway - Central Railway Station and environs.
- b) The Waterfront – The area currently dominated by port activities but that is likely to become redundant in a time scale of 5-15 years as modern, deep water berths are developed in alternative locations.

**Policy**

**Planning Briefs for Key Opportunity Sites**

Sites of major change or development potential in the CBD area are to be identified and planning briefs should be prepared to establish the vision and objectives for development of these sites, and to set out planning and design guidelines (including scale, massing, mix of uses, and infrastructure requirements) and related requirements. Development proposals will be assessed for compliance with the planning brief.

## (2) Transportation and Road Policies

### 1) Car Traffic Inflow Control

According to output of the plan, about 600,000 persons went to the CBD every day in 2013. Among these persons, about 330,000 persons used buses. In 2040, the volume of persons who come to CBD is predicted to slightly decrease, but traffic congestion will be a big issue for CBD as ever. There is a proposed method for suppressing the traffic that flows into the CBD. As a

first step, an electronic road pricing (hereinafter referred to as “ERP”) system or odd-even license plate system should be introduced for controlling private car traffic. As a second step, at the edge of the CBD, travelers to the CBD will be induced to transfer from car to bus in a multi-modal transportation facility and car park.

<b>Policy</b>
<p><b>Introduction of restriction entry (road pricing system) as Transportation Demand Management (hereinafter referred to as “TDM”) tool</b></p> <p>Road pricing system is one effective way to control the traffic volume of the CBD. This is a first step to solve the traffic congestion. Two road pricing systems, ERP and odd-even license plate system, are proposed.</p> <p><i>* To be adjusted according to the study of YUTRA</i></p> <p><b>Construction of multi-modal transportation facilities for integrated public transport</b></p> <p>It is proposed that six multi-modal transportation facilities with carpark. The location of these facilities on main access routes into the city will make them convenient to use. Car drivers and fellow passengers will change their means of transportation (car to bus). The locations of multi-modal transportation facilities and carpark are ThaKhin Mya Garden Park, above the Circular Railway, Pansodan Bridge, Kandawgalay, Road Transport Department, and Pazundaung Market.</p>

## 2) Public Transportation Promotion

The existing main mode of access to the CBD is by bus service. During the peak time of traffic, bus services schedule cannot keep fixed because of traffic congestion. Reliability and quality of bus services in Yangon CBD is not as good as many other capital cities. In the future, bus services must become better than the existing to encourage car users to switch to bus use.

Shwe Dagon Pagoda is the most important place for Myanmar's people. In the future, the CBD and Shwe Dagon Pagoda should be connected by public transport with large capacity. It is recommendable to provide an effective public transport route from the waterfront to Shwe Dagon Pagoda. The synergy will be provided by coordination with passenger ferry services (inland water transportation) which will be much improved within the same timescale (up to 2040).

<b>Policy</b>
<p><i>* All to be adjusted according to the study of YUTRA</i></p> <p><b>Provide new bus stations to serve the central CBD and two looped new bus routes</b></p> <p>The existing bus routes are concentrated, with seven routes in the CBD area. Currently, over sixty buses come to the CBD per hour during peak times. YUTRA proposes a new bus network. According to their plan, four routes will access the CBD. It recommends three bus routes - two loops and one straight line. The two loops would serve the west and east side of the CBD, with new bus stations on streets east and west of Sule Pagoda Road, removing bus traffic from this important route.</p> <p><b>Introduction of bus only lane</b></p> <p>The YUTRA Team proposes eight main corridors for primary trunk bus route. Four of these routes connect to the entrance of CBD with Maha Bandoola Road, Pyay Road, Sule Pagoda Road, and Thein Phyu Road. According to this plan, 72 buses will go through per hour, and each bus stop will need four to five bus berths (based on the assumption of four minutes to get on and off the bus).</p>



Bus lanes are an effective way to facilitate the traffic of buses, so installation of bus lanes in CBD arterial roads is proposed.

**Utilization of existing tram with new railway network**

Shwe Dagon Pagoda Road is an old road from Shwe Dagon Pagoda to the CBD. In the report of YHT, this road is an important road in Yangon.

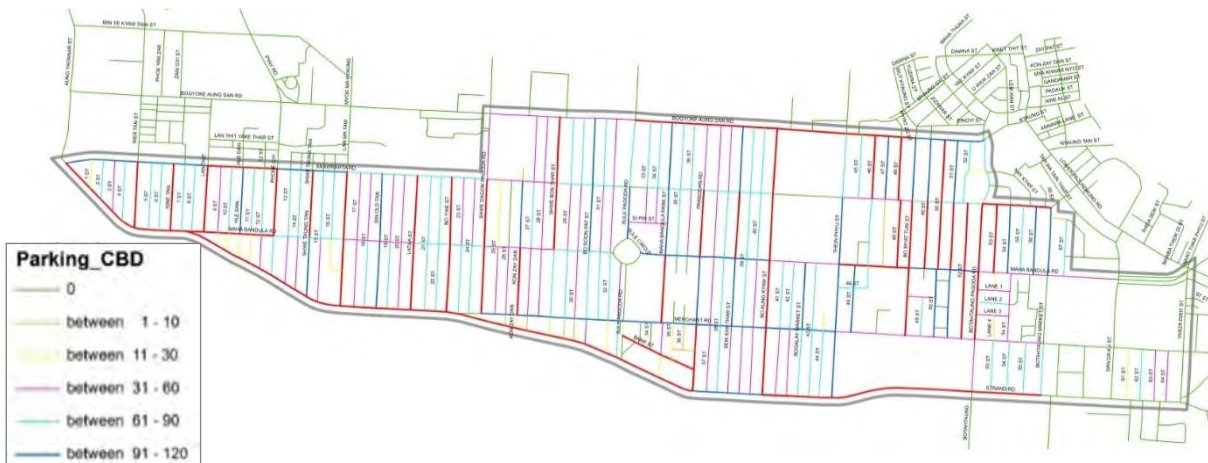
In YCDC’s plan for Shwe Dagon Pagoda Road, the first floor of Theingyi Market, located in front of Shwe Dagon Pagoda Road, the Junction City and Bogyoke Aung San Market are connected with a sky deck. A complimentary scheme for a new tram line from Shwe Dagon Pagoda to Shwe Dagon Pagoda Landing Park is proposed. This tram will transport passengers for worship, sightseeing, shopping, and work.

**To install new Jetty on Pazundaung redevelopment project for commuting**

In order to eliminate chronic traffic congestion, improved passenger ferry services or water taxis using Pazundaung Creek will be implemented. This will provide one additional public transport mode for commuters travelling to work on weekdays, and tourism transport functions at weekends and holidays.

**3) Car park Provision**

The capacity of on-road car park in the CBD is about 20,000, and off-street car park buildings are very few. Many visitors of the CBD cannot park their cars. In future, access to CBD by car will be suppressed as much as possible, but senior citizen and PwDs will still be able to access the CBD by car. It is recommended to construct off-street car parks (multi-storey car parks) in necessary locations in CBD. This will cater to the demand of the elderly and people with disabilities as well as serve the minimum requirements for living and businesses, and thus change the system of on-road parking. This will release pay-parking spaces in the central CBD for visitor use.



Source: JICA Study Team

**Figure 4.4.2: Current Capacity Volume of On-road Car Parking**

**Policy**

**Promotion for construction of parking buildings (commercial, office, etc.)**

In the CBD, the capacity of parking spaces is about 20,000. The number of families living in the CBD is about 40,000 - existing capacity of parking spaces is therefore about 50% of households. Drivers coming into the CBD for work, tourism, dining, and shopping need additional parking by hour. Nine parking buildings are targeted, namely: Tha Khin Mya

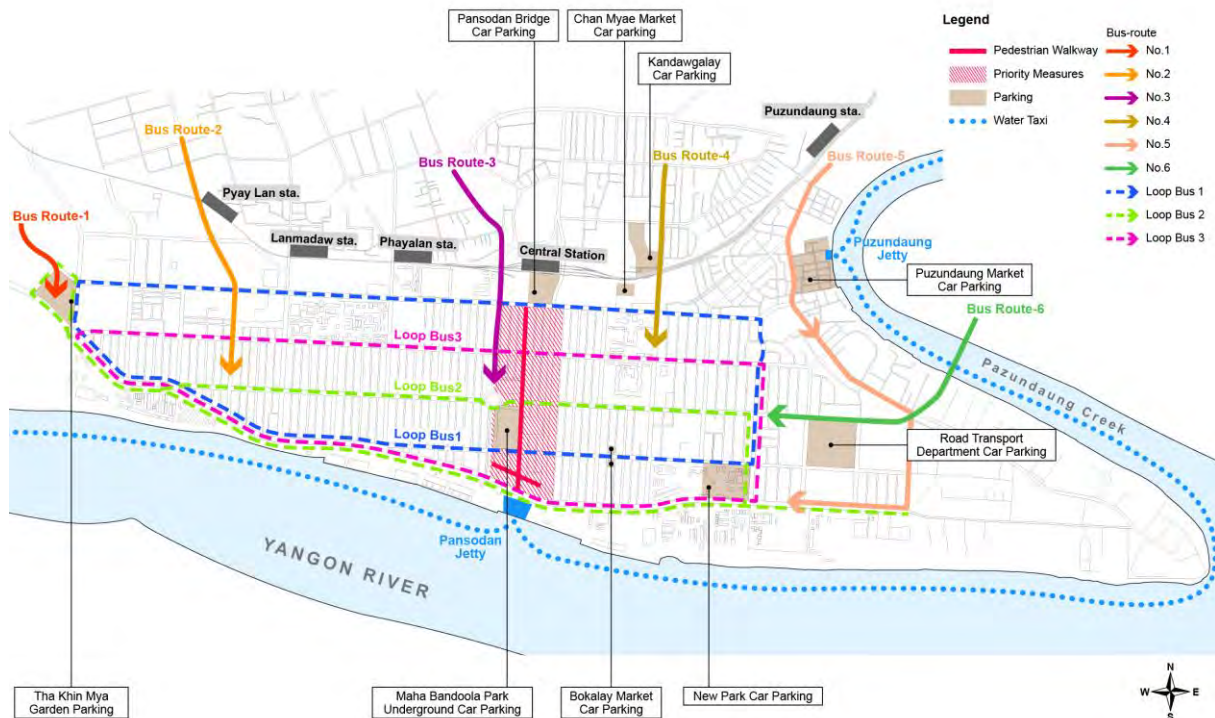


Garden underground car park, Circular Bridge car park, Pansodan Bridge car park, Kandawgalay car park, Road Transport Department car park, Pazundang Market car park, Bokalay Market car park, Chan Myae Market car park, and Maha Bandoola Park underground car park.

**Promotion for introduction of new system of parking on the streets**

There is currently no need to pay for on-street parking in the CBD. Almost all parking lots within the CBD are used by houses, shops, or restaurant owners for their exclusive use. It is proposed to change this system so that YCDC must charge users for parking. The central area of the CBD (around Sule Pagoda) is an area with high parking demand. In this area, during daytime (8:00-17:00), all lots should be allocated to visitors. During nighttime (17:00-8:00), all parking places will be allocated to residents, shops, and restaurant owners for their exclusive use.

*\* To be adjusted according to the study of YUTRA*



Source: JICA Study Team

**Figure 4.4.3: An Integrated Image for Transportation and Road Policies**

**(3) Urban and Infrastructure Development Policies**

**1) Development Regulation and Control**

All areas within the CBD have been subject to new development to some extent. Often, this development has been larger in scale than the historic pattern of the area.

For example, the area around Sule Pagoda is a popular location for commercial and office uses. New high-rise buildings with large footprints have been constructed fronting the Sule Pagoda Street. As a result, the view of the Sule Pagoda from the street has changed; and with current regulations, it is impossible to preserve a good landscape around Sule Pagoda.

A provisional zoning code has been in use by YCDC to guide decisions on the appropriate scale of development by regulating development density and building heights in the CBD. This zoning code will continue to be appropriate in areas to the west and east of the CBD, where redevelopment areas have been identified which will remove some of the development pressure from the central CBD. Within the area of the proposed conservation area, the approach set out in Heritage and Design Policy 2 ‘Managing Height and Scale of Development’, is proposed. Within this area, it is necessary to regulate building heights based on the character and scale of the streets on which they are built. This heritage-led approach will ensure that the character and appearance of the conservation area is preserved.

<b>Policy</b>
<p><b>Establishment of the development control and regulation in Yangon City</b></p> <p>To effectively implement the control of development, it is proposed that YCDC should prepare a guidebook setting out the zoning codes and clear processes for obtaining planning permission. A space for public viewing of zoning code should be provided for developers and land owners.</p> <p>The contents of the guidebook should include definitions of land use types, how to calculate the coverage and floor volume, and special cases (e.g. planning of buildings located on two kinds of zoning codes).</p> <p>A planning register detailing planning applications and permissions must be opened and should be available for everybody to access easily. It is also proposed to make a space or room available for reading the zoning code. For comparison, in Singapore, the URA made the zoning code information available to the public, and those who wish can also request information on city planning from URA. It is proposed that the space for information will be located in YCDC Urban Planning Section.</p>

## 2) Urban Development and Restoration

More than 50 years have passed since the construction of almost all buildings in the CBD. The buildings in the CBD are aging. It is anticipated that both new public buildings and private developments will be required.

<b>Policy</b>
<p><b>Restoration of heritage buildings in the CBD</b></p> <p>Significant time and costs are needed to repair the heritage buildings in the CBD. The aim of conservation is not only to repair heritage buildings but also to adapt them to receive new uses such as offices and other commercial uses and residences. Two methods for conserving heritage buildings were proposed.</p> <ul style="list-style-type: none"> <li>- <b>To establish an intermediate organization between heritage building owners and tenants</b></li> </ul> <p>Currently, YHT mediates between heritage building owners and tenants. It is proposed that in the future, YHT and the government will establish a new organization to carry out this role, to provide more resources for heritage conservation in the CBD. Currently, 189 buildings are listed in Yangon Heritage List, and over 100 are located in the CBD. YHT and the new supporting organization will promote projects to conserve the heritage buildings.</p> <ul style="list-style-type: none"> <li>- <b>To repair the heritage buildings by building owners and tenants</b></li> </ul> <p>In the CBD, many old apartment buildings listed in Yangon Heritage List are used for a</p>

mix of residences, shops, and offices. In such cases, existing occupiers will be encouraged to repair the buildings and stay or return to them upon completion of the works.

Turquoise Mountain in partnership with YHT and the community of 491-501 Merchant Street have completed the restoration of such mixed-use buildings. This is an exemplar project, showing how typical historical Yangon buildings can be conserved. In the future, such methods should be encouraged for conservation and restoration projects in the CBD.

**Conservation repair and adaptive reuse of government buildings**

Former government buildings located in the CBD - many of which now contain a mixture of residences and offices - must be conserved and properly adapted for their new functions.

Some existing functions such as industrial and storage uses should be relocated from the center of the CBD to the development areas to the east or west of CBD to allow appropriate redevelopment of their sites.

Government and public sector workers' housing is aging and in need of repair. It should be repaired without relocation of existing residents. New residential buildings could accommodate a mix of existing CBD residents and new residents.

Some of the market buildings in the CBD date from the late 20<sup>th</sup> century and have little or no heritage merit. It is proposed that Pazundaung Market, Bokalay Market, and Chan Myae Market will be reconstructed with additional functions to benefit the CBD. For example, Pazundaung Market could be reconstructed with added functions of transfer from car to bus and ferry to bus along with carpark, commercial space, and the market.

**Promotion of renewal of private old buildings**

YCDC and YHT have developed and improved a system for dealing with "dangerous buildings". YCDC have joined the project of repair or redevelopment of aging decayed buildings and consulting with the community using dangerous building, and promoting their repair or reconstruction. If a decayed old building is to be demolished, it should be replaced with a building in accordance with the policies above relating to height and scale of buildings.

**3) Infrastructure Development and Natural Disaster Prevention**

A sanitary, safe and barrier-free CBD suitable for an international city will be achieved. The drainage systems will be improved so that flooding in the CBD will be reduced. The backyards of every block will be provided with new underground drainage so that CBD residents can take back their community space in their backyards. New facilities for disaster prevention will be provided by open spaces (parks and green spaces).

**Policy**

**Study for risk assessment by documents**

Some measures for the prevention and reduction of damage from flooding, cyclones, and earthquakes are proposed. The Greater Yangon is the biggest city in Myanmar and the CBD has highest density within it. To mitigate the risks from flooding and cyclone, the drainage system of the CBD should be renewed to provide greater capacity. Regarding earthquake resilience, an assessment of the likely performance of one or more sample buildings in an earthquake situation, as a first step towards achieving an earthquake-resilient city will be carried out.

**Construction of disaster prevention support facilities to open spaces**

Approximately 225,000 persons live in the CBD. In the event of a substantial earthquake,

many victims will need shelters. Open spaces within the CBD are very important for such circumstances, and such open spaces should have a function for shelter. It is proposed that some disaster relief provisions are put in place. For example, the use of a warehouse for stocking food, tents, fuel, water, and blankets; as a buffer for spreading fire; and as a meeting place for victims. Maha Bandoola Park is important for disaster relief and public facilities. The three-dimensional use of park is proposed. For example, the surface of the park for open space, and the underground space could provide the location for water tank, a reservoir for emergency water provision.

**Repair and reconstruction of surface water drainage and sewage disposal system**

The capacity of the sewage disposal system is not enough for the existing population of the CBD. It should be reconstructed for the planned increase in population expected by 2040. Surface water, wastewater, and foul water sewage systems need to be renewed, to provide the required capacity. By updating these systems, increased capacity can be created to deal with future demand. In addition, the backs of buildings within the CBD which are currently blighted by exposed drainage will be reclaimed as backyard spaces for CBD communities.

**(4) Urban Amenity and Tourism Policies**

**1) Water-front Development**

The waterfront and the river it fronts are the reasons for the existence of the historic city of Yangon, which forms today's CBD. The development of the waterfront in the 20th century – a mixture of cargo docks, related warehouses and the toll road which serves them, ferry landings, and related commercial facilities - have given rise to its form today. These developments have cut off the city from its waterfront and present a poor image of the city from the river.

It is anticipated that over the period of this plan, the current commercial cargo port facilities will be relocated elsewhere, releasing much of the waterfront for other uses. Ferry facilities will continue to develop to provide for the commuters from Dala - which will itself develop and grow – and elsewhere. Other facilities will develop to provide facilities for leisure traffic on the river which is also anticipated to increase. Meanwhile, there will be pressure for commercial development including living, workplace, and leisure development, for which the waterfront would provide an attractive environment.

The waterfront is an integral part of the historic city. Although it differs in character from the grid street layout of the city behind it, the same four key policies for the CBD, set out in this report, are also appropriate to guide its future development.

The land of Yangon Port is owned and managed by MPA. The plan of water front development shall need to be consulted closely with MPA so that the urban development sides (YRG and YCDC) and the port side (MPA) will come to an agreement in the admissible plan for waterfront development.

<b>Policy</b>
<p><b>Waterfront Regeneration</b></p> <p>YCDC will work with other stakeholders to relocate the existing port's commercial logistics activities to free up the waterfront area for amenities and development which accord with other policy objectives for the CBD, and with the vision for the city. The objective is to achieve this transformation by 2040.</p> <p>A development brief shall be prepared for the waterfront site. The waterfront is one of the major development opportunity sites. As such, it requires a specific planning brief to guide its</p>

future development in line with the CBD policies.

The development brief will be prepared with input from all stakeholders. It will provide clear guidance to YCDC and potential owners, developers, and other stakeholders on how to apply the CBD policies to the range of development possibilities for the waterfront sites. The development brief will address a range of issues including the following:

1. Appropriate uses;
2. Development capacity;
3. Scale, massing, and layout of buildings;
4. Access + movement;
5. Open spaces; and
6. Materials.

## 2) Pedestrian ways and community space improvements

It is important that wide pedestrian walkways are provided on roads in the CBD. From the middle of November 2016, a street vendor relocation project was started. At the end of November, night markets have started to take place. In the CBD, a pedestrian pavement width of at least 4 m is proposed on main east-west and north-south arterial roads (100-ft wide) such as Sule Pagoda Street, Maha Bandoola Park Street, and Bank Street. Firm policies are as follows:



Source: JICA Study Team based on YCDC data

**Figure 4.4.4: Current Volume of Street Vendors**

### **Policy**

#### **Relocation of street vendors and changing car parking system**

Street vendors would be relocated to Kanner Road step by step. It is proposed that some car parking spaces will be removed and some carpark lots should change their system. For example, Maha Bandoola Road carpark spaces are at right angles to the road - car parking spaces should be laid out parallel to the road. With this change, the width of the pedestrian pavements will increase from 3 m to approximately 5 m.

#### **Development of pedestrian streets (e.g. Maha Bandoola Park Street, Bank Street)**

Maha Bandoola Park Street is close to Maha Bandoola Park. This street is located in the center of proposed conservation area. It currently accommodates a through route, car park, and street vendors. It is currently not a safe street for pedestrians. It is proposed that the function of Maha Bandoola Park Street is changed to a pedestrian street. In the future, the functions of Maha Bandoola Park Street will be harmonized with Maha Bandoola Park. A trial event was done in December 2016 as one of SUDP's activities.

### 3) Tourism Promotion

In 2003, 210,000 tourists visited Myanmar. In 2013, about 2,040,000 tourists visited. The number of tourist has increased about tenfold during the last ten years. The Ministry of Hotels and Tourism has estimated a future projection of approximately 7,500,000 tourists per year visiting Myanmar. The great majority of these will visit Yangon, and the CBD will be the center for tourism in the city. The facilities in the CBD will be updated to provide functions and facilities suitable for an international city.

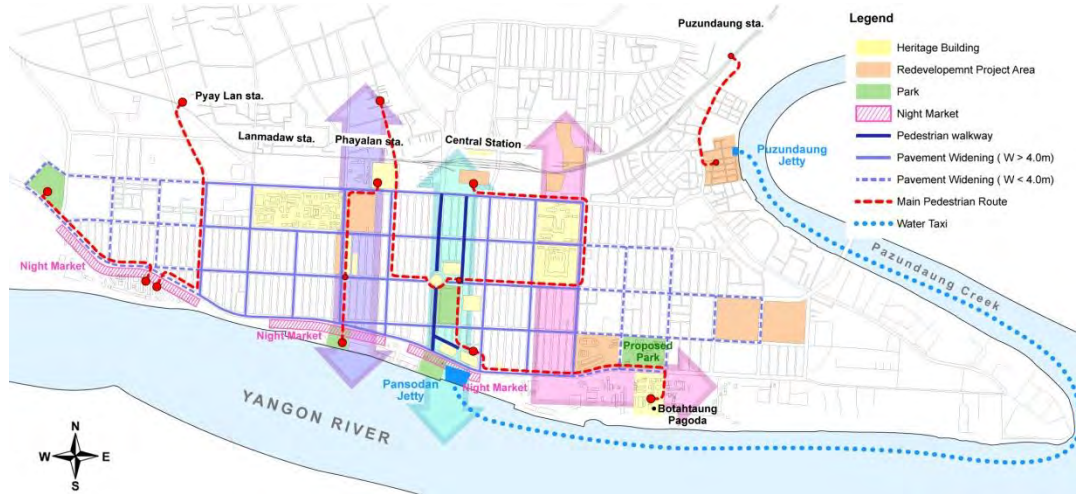
<b>Policy</b>
<p><b>Construction of pedestrian walkways with harmonized planting and street vendors</b></p> <p>Maha Bandoola Park Street and Bank Street are important for future CBD vision. Many Yangon people and tourists concentrate on this area for working, relaxing, and walking. It is proposed to make a pedestrian route from Maha Bandoola Park to the waterfront area to utilize these two streets.</p> <p>At first, an event will be held on Maha Bandoola Park Street and Bank Street. During this event, the streets will be closed to traffic and there will be no parking. This will allow events to be held on the streets. If the temporary closure to traffic is considered a success, these streets will be changed to pedestrian streets.</p> <p><b>Installation of a tourist information center near Sule Pagoda</b></p> <p>Sule Pagoda is a famous destination for tourist. Many heritage buildings and Maha Bandoola Park are located nearby. This is a good location to install a tourist information center. The former Ministry of Hotels and Tourism building near Sule Pagoda is considered to be a good location for a tourist information center.</p>

### 4) Environmental Conservation

Two large parks (Maha Bandoola Park and Thakin Mya Park) are located in the CBD. Some roads within the CBD are tree-lined roads. In the future, the width of pedestrian pavements will be widened and some space will be secured for planting. Trees provide the twin benefits of shade from the sun during dry season and shelter from wind and rain during wet season. Firm policies for environmental conservation are as follows:

<b>Policy</b>
<p><b>To plant on pedestrian pavements and backyards of each block of the CBD</b></p> <p>In the future, pedestrian pavements will be widened and street vendors will be relocated, allowing space for additional planting along streets. In addition, the upgrading of sewage and wastewater systems currently located in the back streets and yards of properties in the CBD will result in associated improvements to the backyards in the area creating better quality space. This will allow as the next step, for plants to be planted to create green areas in the backyards.</p> <p><b>To construct new park in east area of CBD</b></p> <p>Two large parks are located in the CBD, one at its center (Maha Bandoola Park) and one to the west area (Thakin Mya Park). By 2040, it is proposed that a new large park will be constructed to the east area of the CBD. This new park will be an open space and disaster relief base for the residents of the eastern area.</p>





Source: JICA Study Team

**Figure 4.4.5: An Integrated Image for Urban Amenity and Tourism Policies**

### **A Trial Event “Yangon Living Street Experience”**

Implementation of regulation for car free area to make pedestrian street is generally not easy, because it affects people’s right who use and park cars in the area. In such case, it is effective and commonly used in other countries to implement some pilot projects before actual implementation to make a trial and enhance community’s understanding for social benefit including the people with established interest.

On 10 and 11 December 2016, a trial event “Yangon Living Street Experience” was implemented at a part of Maha Bandoola Park Street and Bank Street in Kyauktada Township. The objectives of this event are to provide an opportunity for Yangon people to rediscover amenity of pedestrian street and value of heritage buildings. During the event, cars are prohibited to enter and street performances including traditional dance, exhibition about Yangon’s history and night market attracted a lot of people.

To get feedback from the event, some kinds of survey were conducted. According to a traffic count survey, about 90,000 people visited the event during the event time, 17:00-21:00 of both days. A questionnaire survey was conducted to get people’s opinion about not only the event itself but also city improvement activities including making pedestrian street, creating park and restoration of heritage buildings. These feedbacks will be utilized for future plan and projects.



(a) Exhibition



(b) Questionnaire Interview



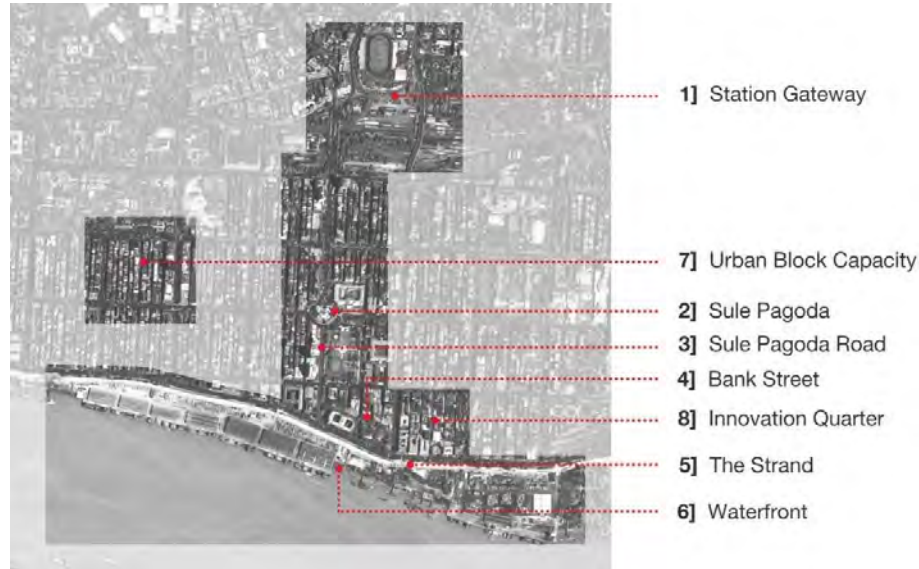
(c) Night Illumination on Maha Bandoola Park Street

Source: JICA Study Team

**Figure 4.4.6: Photos of Yangon Living Street Experience**

### 4.4.3 Key Projects for the CBD

The effects of implementing the proposed CBD policies are best illustrated through a series of exemplar projects. The selected area for the exemplar projects is the zone connecting the Central Station to the waterfront and ferry terminal, including the Sule Pagoda. This zone includes known projects and priorities and is also a high-profile area, familiar to the citizens of Yangon and known to many international visitors. The exemplar project area is illustrated in Figure 4.4.7.



Study Team

Source: JICA

**Figure 4.4.7: Example Projects**

#### (1) Central Station

##### **Objectives**

The Central Station area is a key arrival point to the CBD that offers considerable potential for development. The objectives of this project are as follows:

- To create a strong link to the south to link the Central Station with the CBD area,
- To deliver an exemplar mixed use TOD, and
- To protect the heritage value of the railway station and other nearby landmarks.

##### **Description**

The Central Station area has already been earmarked as a potential site for a comprehensive development, including commercial office and retail uses as well as enhanced transportation infrastructure. Future improvements to public transport including the enhanced Circular Railway, bus rapid transit (hereinafter referred to as “BRT”) and metro/tram routes, will make Central Station one of the best connected location in the city.

A clear planning brief should be prepared that will guide investors/developers and provide YCDC with a reference framework for appraising development proposals and giving regulatory approvals for development.

##### **Expected Outcomes**

The Central Station Gateway will deliver a world-class gateway to Yangon CBD. With potential future fast links to the airport, as well as serving commuter lines from across the expanded metropolitan area, the Central Station will be a primary arrival point in the city for residents, businesses, and visitors. The integrated, mixed-use development will provide easy access in all directions and particularly to the core CBD area to the south. The mix of uses including some residential and hotel uses, will create a vibrant and active place, thronging with activity during the daytime and evening. The design will have made best use of the existing heritage, to ensure a unique and distinctive place.



## (2) Sule Pagoda and City Hall Environs

### Objectives

The Sule Pagoda is a key cultural and physical landmark in the CBD area that is isolated in the middle of a traffic gyratory. It is cut-off from other significant cultural assets such as the City Hall and Maha Bandoola Park. The objectives of this project are as follows:

- To restore an appropriate setting for the Sule Pagoda;
- To radically improve pedestrian access to the Pagoda;
- To create a larger pedestrian dominated civic space that connects the Sule Pagoda, Yangon City Hall, and Maha Bandoola Park;
- To place the Sule Pagoda at the center of a larger project to illustrate how key north-south streets can be transformed into attractive, pedestrian friendly spaces.

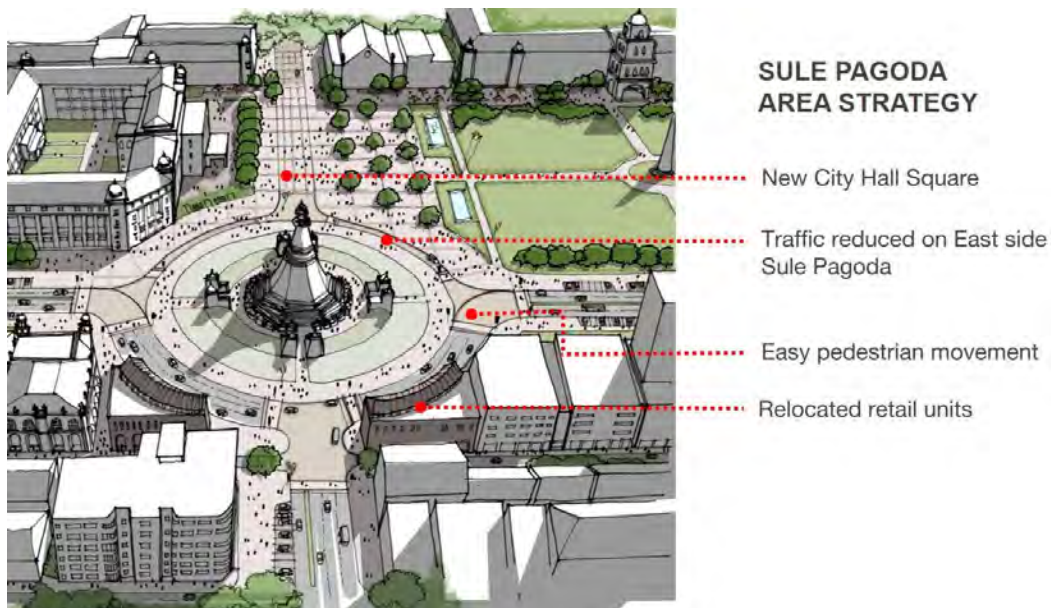
### Description

The proposal is for an integrated urban design, public realm, and transportation study, which takes a comprehensive look at the environs of the Sule Pagoda, City Hall, and Maha Bandoola Park; and proposes a radical reprioritization of this space, reclaiming it for the city and its citizens. In essence, the proposal is for a new city space, connecting the Sule Pagoda, City Hall, and Maha Bandoola Park with a single, continuous public realm, where the pedestrian will be priority.

Traffic circulation will be restricted with only essential traffic such as the proposed new city shuttle bus service passing the eastern side of the Pagoda and between the City Hall and Maha Bandoola Park. The traffic movement around the western side of the pagoda and north south along Sule Pagoda Street will be reduced and ‘calmed’. The various retail and business units will be re-provided with locations close to the Pagoda linked to the proposed refurbishment of the former Ministry of Tourism building.

### Expected Outcomes

The Sule Pagoda will once again occupy a key central civic space at the heart of the CBD. This will be an exemplar of an integrated approach to heritage, transportation, and economic development, according to the proposed vision and policies for the CBD. The new civic space will integrate the Pagoda, City Hall, and Maha Bandoola Park, making this an even stronger destination in the City, attracting residents of the CBD, the wider communities of the Yangon Metropolitan area, and visitors from near and far. The Sule Pagoda Street and Maha Bandoola Park Streets will become attractive boulevards, leading people to and from the waterfront.



Source: JICA Study Team

**Figure 4.4.8: Sule Pagoda and Environs and Sule Pagoda Road Visualization**

### (3) Bank Street

#### Objectives

The Bank Street is an underutilized street, containing a concentration of buildings of heritage value, offering an opportunity to show how the complete street – buildings, public realm, and the people using the street – can be transformed to revitalize those parts of the CBD where historic uses have faded away. The objectives of the project therefore are as follows:

- Regenerate Bank Street, bringing new life, and activity to an underutilized space;
- Introduce a new mix of activities and building uses, to show the potential for daytime and nighttime activity and use;
- Show how buildings with heritage value can be adapted and reused to meet contemporary economic needs; and
- Integrate the building uses and the public realm, and to show how the use of the public realm can vary during the day and the week.

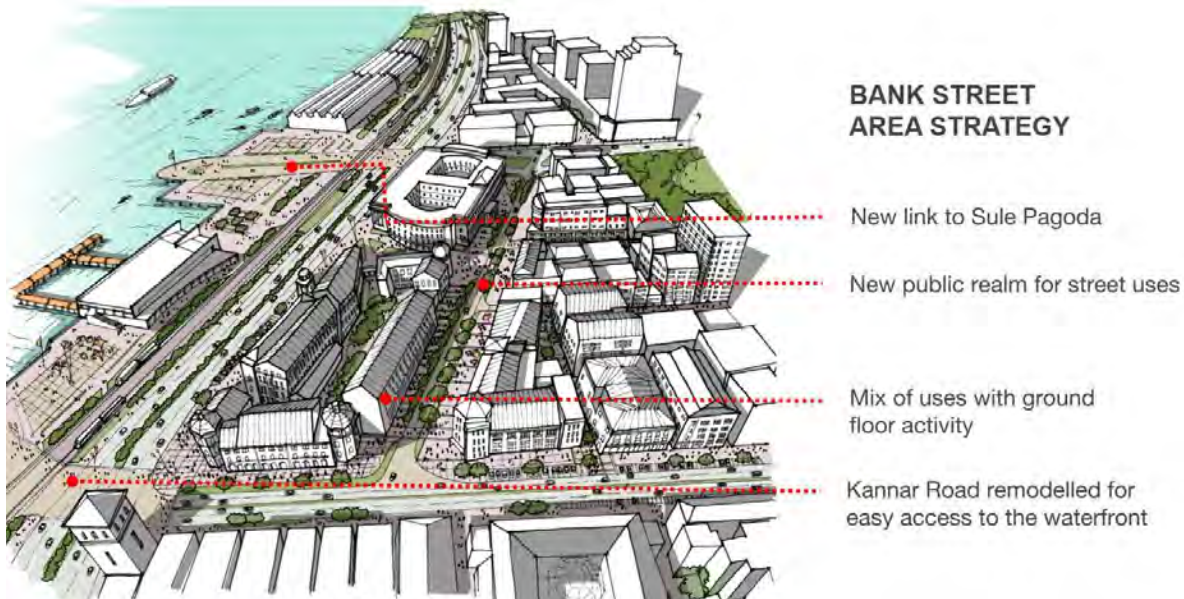
#### Description

The proposed project seeks to build momentum for a comprehensive transformation of Bank Street, which is currently - and unusually for the CBD area – an underutilized and quiet street, whose buildings have variously fallen into disrepair or are used in ways which do not bring life and activity to the street. However, the Yangon Divisional Office Complex (also known as the New Law Courts and Police Commissioners Offices) building is currently being converted into a 5\* hotel and this could well provide the catalyst for change. In addition, the Yangon Divisional Court and Department of Pensions building has been earmarked as a pilot project, to demonstrate the ways in which older heritage buildings might be reused.

The next steps are to commission detailed master planning and public realm studies, to support the existing building projects and to develop proposals for other buildings along Bank Street.

#### Expected Outcomes

The Bank Street is expected to become a popular destination in the CBD for residents, daytime business population, and for visitors. The refurbished and revitalized buildings will accommodate a mix of business, residential, and cultural uses; and ground level cafes and restaurants will spill into the public realm, which is unusually generous in this street. People will pass through Bank Street on their way to and from the ferries and the waterfront, but the new uses and activities will encourage them to linger in the Bank Street. The public realm will support a regularly changing spectacle of markets, community events, and festivals.



Source: JICA Study Team

**Figure 4.4.9: Bank Street and Waterfront Visualization**



Source: JICA Study Team

**Figure 4.4.10: Bank Street and Kanner Road Master Plan**

#### **(4) The Innovation Quarter**

##### **Objectives**

To stimulate local economic regeneration and development, and to demonstrate how the particular urban form of the existing CBD area can be used to create a distinctive and vibrant creative industries innovation quarter.

##### **Description**

The area selected for the proposed innovation quarter is the urban block contained by the Merchant Road, Kanner Road (Strand Road), Bo Aung Kyaw Street, and Pansodan Street.

The project has the following parts:

1. The development of managed workspace and small workspaces for new and developing businesses. These developments will take advantage of government-owned small warehouse buildings that are developed in former gap sites, possibly resulting from bomb damage.
2. A public realm strategy that takes advantage of gap sites and small scale redevelopment, to put in place a series of east-west connections greatly increasing the pedestrian permeability of the typical blocks, which are dominated by north-south streets. In addition, in key locations ‘utility bollards’ will be provided in streets and open spaces, providing water and power for street vendors and to support cultural and other events.

##### **Expected Outcomes**

The new innovation quarter will develop to become an established location for small and new business enterprise, supporting the long term sustainable economy of the city. The new businesses will attract trade and activity, and the public realm strategy will deliver an attractive working environment and support street activity, appealing to all residents and visitors. The innovation quarter will be seen as the best practice in successful regeneration of the downtown area, delivering real economic and quality of life benefits.



## (5) Kanner Street

### Objectives

Kanner Road is the interface between the waterfront and the CBD. Many significant buildings are front onto Kanner Road and together they present an impressive image and visual ‘signature’ for the city. At the same time, Kanner Road is completely dominated by traffic and crossing to the waterfront or the ferries is virtually impossible except via an over bridge. Accordingly, the objectives of this projects are as follows:

- Provide an appropriate setting for many important buildings fronting Kanner Road and to enable their collective identity to be seen and appreciated.
- Ensure better connectivity to the waterfront by improving pedestrian crossing facilities and reducing the impact of traffic.

### Description

Kanner Road would have been the first impression for visitors to Yangon when arrival by ship or boat was the main mode of transport. As such, the buildings on Kanner Road were designed to impress and many reflected the trading economy of the city. Over time, other modes of transport such as air have become the predominant modes of international travel; and the focus of business and related facilities, such as hotels, has shifted to other parts of the city.

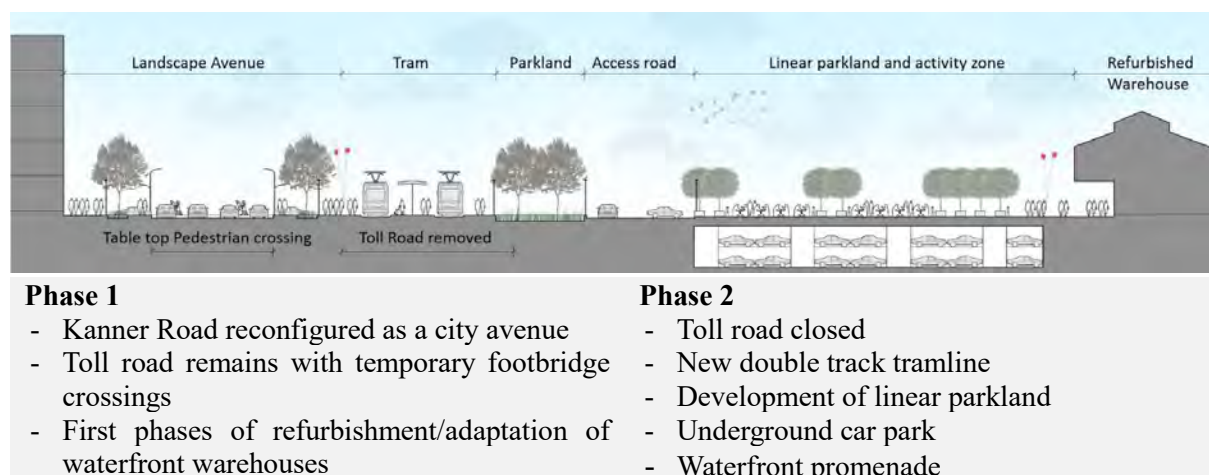
Whilst the port has remained important for freight transshipment, even this role is expected to reduce as increasing ship size and containerization of cargo has driven a move to deeper water berths and larger port handling areas to deal with containers. In the future, therefore, it is expected that the port areas will become available for new uses and that port related traffic on Kanner Road will reduce.

The Kanner Road project is therefore a public realm and infrastructure project that takes the opportunity of the changing role of the waterfront to reduce the level of traffic, reclaim the public realm for people, and to restore some of the former grandeur and setting to the buildings facing towards the river.

### Expected Outcomes

In the future, Kanner Road will be one of the world’s best known streets, as familiar as the Bund in Shanghai or the Embankment in London. It will be a strong visual image of Yangon. Kanner Road will still accommodate traffic but the road space will be reduced and more emphasis will be given to pedestrians. There will be multiple, broad crossing points at grade allowing pedestrians to cross to and from the waterfront easily along the length of Kanner Road; to the ferries; the future waterfront attractions; and also, to simply enjoy being by the water’s edge, appreciating the views across the water and also back to the CBD.

## A Phased Approach to Transforming the Kanner Road



Source: JICA Study Team

**Figure 4.4.11: Finished Section from Kanner Street to the Waterfront Warehouses**

## (6) Waterfront

### Objectives

The waterfront is an integral part of the history of Yangon and a primary driver of economic activity, which is reflected in the development of Kanner Road and the CBD beyond. In the medium-term, the port will move to a deep-water location with better infrastructure and the waterfront can be redeveloped to provide leisure, recreational, and cultural facilities. The objectives for the Yangon Waterfront are as follows:

- To create a new destination for leisure, recreation, and events for residents and visitors;
- To reveal the waterfront and allow people to enjoy the views of the water and the city; and
- To find new uses for port structures including warehouses and to create new parks.

### Description

A master plan approach is required to determine the key connections, views to be protected (of Kanner Road) and new views to be created (e.g. of Sule Pagoda). An appraisal of future uses is needed though focus on leisure, recreation, attractions, and business tourism (e.g. conferencing and exhibitions) is likely to predominate. A phased strategy is needed to mirror the progressive reduction of port operations; and temporary or ‘interim’ uses of sites and structures will allow testing and proof of concept before committing to adaptation and conversion of buildings which recognizes the need for continuing port operations which will reduce over a ten-year period, and the concession granted on the land and warehousing at the western end of the port. Broadly speaking, it is envisaged that the redevelopment works will commence at the eastern end of the site and spread westwards in stages.

### Expected Outcomes

The waterfront will become a key destination in the city, a place to gravitate to for leisure and recreation; and for visitors drawn by the mix of activities, the public realm, and the views of the water and the City.

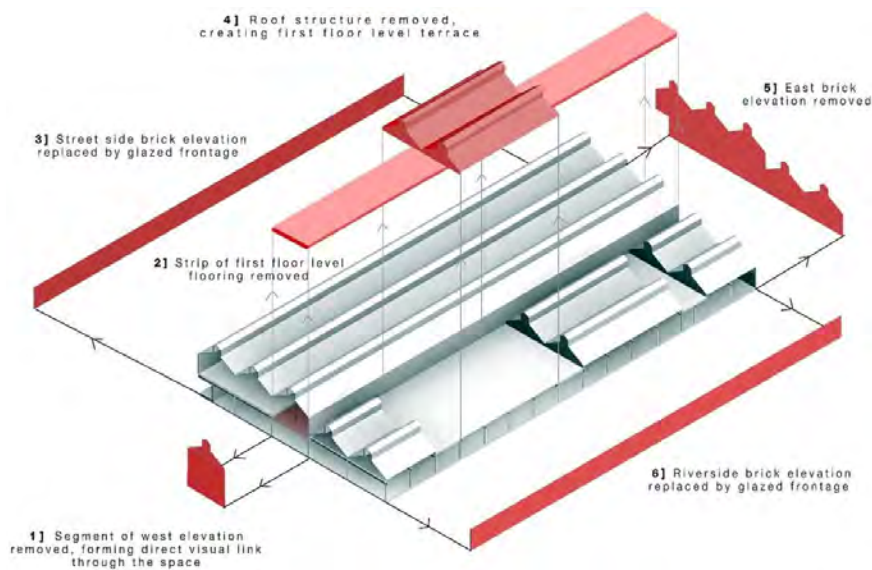


Source: JICA Study Team

**Figure 4.4.12: The Waterfront and Kanner Road – Long-Term Vision**

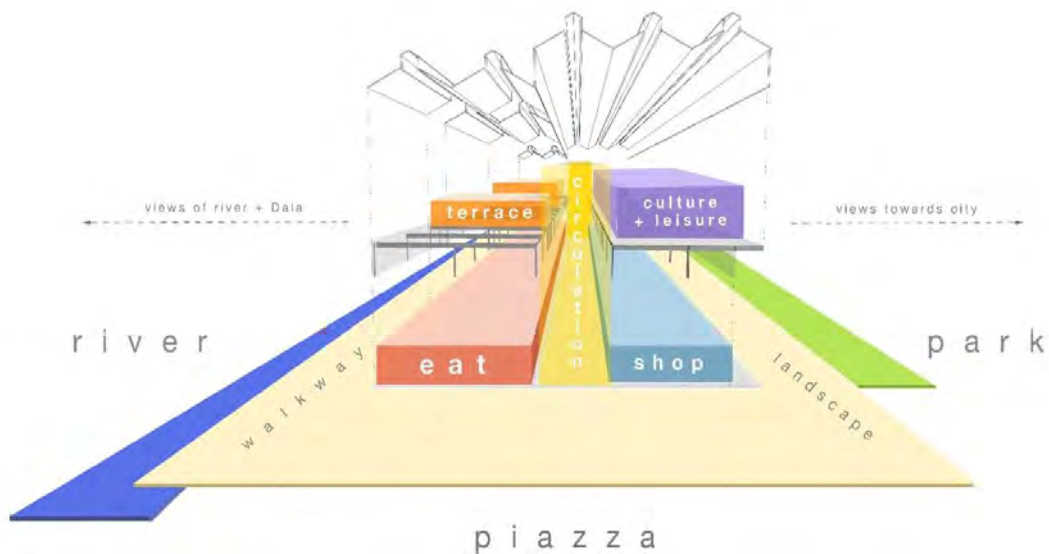
Some of the existing waterfront buildings will be demolished to allow the creation of major new city squares and waterfront spaces, to provide much needed open space in the city, and to open up views from the city to the waterfront on key axes of the Shwe Dagon and Sule pagodas. Some warehouses will be demolished to make way for new buildings to meet specific uses that cannot be accommodated in the warehouse type buildings. Any new buildings will be limited in height to the existing buildings to protect views.

The remaining warehouse buildings can be readily converted to accommodate new uses such as leisure and recreational facilities, cultural spaces such as museums and performance venues, conference and exhibition spaces, restaurants, and cafes to exploit the riverfront and city views. Figure 4.4.13 illustrates the range of building interventions that could be made to facilitate new uses, such as replacing solid walls with glazing, removing internal floors to create atria and circulation spaces, and removing elements of the roof to create terraces and let light into these deep plan buildings.



Source: JICA Study Team

**Figure 4.4.13: Exploded View of Waterfront Warehouse Indicating Adaptations to Enable New Uses**



Source: JICA Study Team

**Figure 4.4.14: Waterfront Warehouse – Indicative Uses**



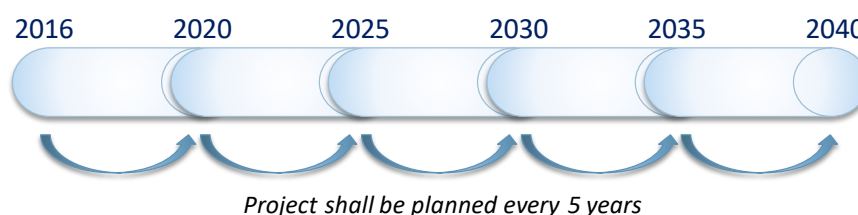
## Chapter 5: Urban Development Management Programs

### 5.1 Priority Projects

#### 5.1.1 Definition and Overview

To achieve the development vision and realize the urban structure mentioned in the section above, 40 priority projects, which are focal actions to be commenced by 2020, are selected and described in detail in this section.

It is recommendable that the priority projects are to be planned, reviewed, and updated every five years through monitoring regarding the progress of conducting projects and change of circumstances. According to the drafted “Urban and Regional Development Plan”, a M/P shall be formulated every five to ten years under the conceptual plan. In this context, re-planning of priority projects shall be one of the works in the master planning.



Source: JICA Study Team

**Figure 5.1.1: Image of Planning Cycle for Priority Projects**

As total 42 projects, which are divided mainly into 25 priority projects related to urban development management sector and 17 priority projects related to infrastructure development sector, are selected among the proposals. In projects of urban development management sector, 1) urban development projects such as sub centers and new cities, 2) CBD renovation project such as heritage, water-front and transportation, and 3) social service and management project, are proposed. In infrastructure development sector, not only improvement of the existing infrastructure, but also strengthening of disaster resilience are proposed.

#### 5.1.2 Priority Projects for Urban Development Management Sector

Priority projects of urban development management consist of 25 projects as shown in Table 5.1.1.

**Table 5.1.1: Priority Projects of Urban Development Management Sector**

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
PP-01 Mindama Secondary CBD Development Project	[Objectives] <ul style="list-style-type: none"> <li>• To develop a secondary CBD which includes trade center, banking, and administration functions among others.</li> <li>• To upgrade urban service level and boost new economic growth.</li> <li>• To accumulate FDIs.</li> </ul> [Project Scope]	Approximately USD 90 mil.  <i>* only the cost for land reclamation and key infrastructure development</i>	YRG, YCDC, Land Owners, and Private Partners



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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<ul style="list-style-type: none"> <li>• To make an area development plan including development concept, spatial plan, and implementation plan.</li> <li>• To make development organization and coordinate with development partners.</li> <li>• Construction and operation.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Promotion of local economic growth and prosperity.</li> <li>• Promotion of urban service level of Mindama surrounding areas.</li> <li>• Mitigation of too much development pressure in the current CBD.</li> </ul>		
PP-02 Yankin Sub-center Development Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To develop a sub-center which includes commercial, tourism, and business functions, among others,</li> <li>• To upgrade urban service level and boost new economic growth.</li> <li>• To accumulate FDIs.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• To make an area development plan including development concept, spatial plan, and implementation plan.</li> <li>• To make development organization and coordinate with development partners.</li> <li>• Construction and operation.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Promotion of local economic growth and prosperity.</li> <li>• Promotion of urban service level of Yankin surrounding areas.</li> <li>• Mitigation of too much development pressure in the current CBD.</li> </ul>	Approximately USD 80 mil.  <i>* only the cost for land reclamation and key infrastructure development</i>	YRG, YCDC, MOC, and Private Partners
PP-03 Thilawa SEZ Sub-center Development Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To develop a sub-center which includes commercial and business functions at the Thilawa SEZ zone-A area.</li> <li>• To upgrade urban service level and boost new economic growth.</li> <li>• To accumulate FDIs.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• To make an area development plan including development concept, spatial plan, and implementation plan.</li> <li>• To make development organization and coordinate with development partners.</li> <li>• Construction and operation.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Promotion of local economic growth and prosperity.</li> <li>• Promotion of urban service level of the Thilawa SEZ surrounding areas.</li> <li>• Mitigation of too much development pressure in the current CBD.</li> </ul>	Approximately USD 50 mil.  <i>* only the cost for land reclamation and key infrastructure development</i>	Myanmar Japan Thilawa Development Ltd., YRG, MOC, and Private Partners
PP-04 Southwest New City Development Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To create a new city to accommodate the increasing number of population utilizing unused lands and farm lands in the west side of Kyee Myin Daing area.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• To make an area development plan including</li> </ul>	Approximately USD 80 mil.  <i>* only the cost for land reclamation and key infrastructure development</i>	YRG, YCDC, MOC, MOTC, and Private Partners

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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<p>development concept, spatial plan, infrastructure plan, and implementation plan.</p> <ul style="list-style-type: none"> <li>• To make development organization and coordinate with development partners.</li> <li>• Construction and operation.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Promotion of local economic growth and prosperity.</li> <li>• Promotion of urban service level of the Kyee Myin Daing surrounding areas.</li> <li>• Mitigation of too much development pressure in the current urban area.</li> </ul>	<p><i>USD 50 mil of land development cost is estimated additionally</i></p>	
<p><b>PP-05</b> Yangon Central Railway Station Area Development Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To deliver an exemplar mixed use TOD.</li> <li>• To create a strong link to the south, to link the Central Station with the CBD area.</li> <li>• To protect the heritage value of the railway station and other nearby landmarks.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• A multi-modal transport node for Circular Railway, BRT and metro/tram routes.</li> <li>• Comprehensive mixed use development including residential, commercial office, and retail uses.</li> </ul> <p>[Expected Outcomes]</p> <p>The Central Station will be:</p> <ul style="list-style-type: none"> <li>• The primary arrival point in the city for residents, business users, and visitors;</li> <li>• One of the best connected locations in the city;</li> <li>• A world-class gateway to Yangon CBD with potential future fast links to the airport; and</li> <li>• Based around retained elements of the historic station.</li> </ul> <p>It will provide:</p> <ul style="list-style-type: none"> <li>• Improved transport for Yangon commuters and residents;</li> <li>• An integrated, mixed-use development with easy access in all directions; and</li> <li>• A vibrant and active place, thronging with activity during daytime and evening.</li> </ul>	<p>(N/A)</p> <p><i>* the project is now proceeding to tender phase.</i></p>	<p>Myanma Railways, YCDC, and Private Partners</p>
<p><b>PP-06</b> Feeder Stations Area Development Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To increase more ridership for public transportation and decrease private transportation by utilizing TOD.</li> <li>• To promote commercial and business functions around thr railway station area.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Target area: Insein Railway Station and Yegu Railway Station.</li> <li>• To make an area development plan including development concept, spatial plan, and implementation plan.</li> <li>• To make development organization and coordinate with development partners.</li> <li>• Comprehensive mixed use development including residential, commercial office, and retail uses.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Promotion of public transportation use and upgrade transport service level.</li> <li>• Promotion of local economic growth and prosperity.</li> <li>• Promotion of urban service level of the surrounding</li> </ul>	<p>Approximately USD 0.3 mil.</p> <p><i>* only the cost for land reclamation and key infrastructure development</i></p>	<p>Myanma Railways, YCDC, and Private Partners</p>

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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	area.		
<b>PP-07</b> Thilawa SEZ Zone-B Development Project	[Objectives] <ul style="list-style-type: none"> <li>• To develop and manage Zone-B area (101 ha).</li> </ul> [Project Scope] <ul style="list-style-type: none"> <li>• To acquire land and remove people with compensation.</li> <li>• To accumulate FDIs</li> <li>• To establish forward and backward linkages between FDIs providers and local business societies.</li> <li>• To engage local business societies in non-traditional industries.</li> <li>• To establish an integrated and efficient logistics services in order to contribute to the regional and global supply chain.</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Induce FDIs and utilize the resources of Greater Yangon.</li> <li>• Create non-traditional industries in the nation by absorbing new technologies from FDI and transferring them to local business societies.</li> <li>• Diversify the industries of Myanmar by accommodating various types of industries in SEZ.</li> <li>• Establish an international gateway in regional and global supply chain by building up manufacturing base firms and creating efficient logistics system.</li> <li>• Create job opportunities for local workers.</li> </ul>	(N/A)  <i>* The project is already ongoing: The project is conducted by MJTL</i>	Myanmar Japan Thilawa Development Ltd. ,YRG, MOC, and Private Partners
<b>PP-08</b> Existing Industrial Zones Upgrade Project	[Objectives] <ul style="list-style-type: none"> <li>• To upgrade existing industrial zones (Hlaing Tharyar, Shwe Pyi Thar, and east side of Yangon) with enough infrastructures to operate.</li> </ul> [Project Scope] <ul style="list-style-type: none"> <li>• To develop appropriate effluent treatment facility and effluent management system.</li> <li>• To ensure continuous electricity supply.</li> <li>• To develop road network and logistic network.</li> <li>• To attract factories.</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Increase in local job opportunity and improvement in employment environment.</li> <li>• Promotion of local economic growth and prosperity.</li> </ul>	(N/A)  <i>* The project cost for infrastructure updating is covered by developers</i>	Ministry of Industry, YCDC and YRG
<b>PP-09</b> Governmental Lands Redevelopment Project	[Objectives] <ul style="list-style-type: none"> <li>• To decentralize urban function from the CBD.</li> <li>• To promote commercial and business function and to enhance public open-space function and green.</li> <li>• To suppress inflow of car traffic to CBD and to promote public transportation.</li> </ul> [Project Scope] <ul style="list-style-type: none"> <li>• Redevelopment of the YCDC owned lands (e.g. Pazundaung, Chan Myae and Bokalay Market)</li> <li>• Redevelopment of the Ministry of Transport owned land (e.g. Botahtaung)</li> <li>• Redevelopment of the Road Transport Department owned land (e.g. Botahtaung)</li> <li>• Redevelopment of Ministry of Health and Sports owned land with open-space(e.g. Kyaikkasan)</li> <li>• Redevelopment of other Union Ministries owned lands(e.g. Dagon)</li> </ul>	Approximately USD 180 mil.	Union Ministries, YRG, YCDC, and Private Partners

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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Activation of commercial and business activities and creation of job opportunity</li> <li>• Creation of green and open-space</li> <li>• Traffic congestion relief of CBD and inner urban area</li> <li>• Utilization of vacant lands</li> </ul>		
<p>PP-10 Sule Pagoda and Environs Project (CBD)</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To restore an appropriate setting for the Sule Pagoda.</li> <li>• To radically improve pedestrian access to the Pagoda.</li> <li>• To create a larger pedestrian-dominated civic space that connects the Sule Pagoda, Yangon City Hall, and Maha Bandoola Park.</li> <li>• To create an exemplar project for other north-south streets.</li> </ul> <p>[Project Scope]- Phase 1</p> <ul style="list-style-type: none"> <li>• Pedestrian priority/essential vehicles only to current roadway in front of City Hall.</li> <li>• Removal of bus depot from the front of the city hall to a more suited location and redesign of the city hall plaza into a pedestrian zone.</li> <li>• Mahabandoola Park street would be developed into a well-designed pedestrian street lined with informal hawkers.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• A high quality setting for Sule Pagoda – the foremost historic building in the city center and an iconic symbol of the city.</li> <li>• Improved environments for pedestrians – residents, workers, and tourists - at the heart of the city.</li> </ul>	Approximately USD 2.3 mil.	YRG, YCDC, and YHT
<p>PP-11 Bank Street Project (CBD)</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To regenerate the Bank Street, bringing new life and activity to an under-utilized space.</li> <li>• To introduce a new mix of activities and building uses.</li> <li>• To show the potential for daytime and nighttime activity and use.</li> <li>• To bring a group of high quality but decayed buildings back into economic use.</li> <li>• To integrate building uses and public realm, and to show how the use of public realm can vary during the day and week.</li> </ul> <p>[Project Scope] Phase 1</p> <ul style="list-style-type: none"> <li>• Pedestrianize Bank street and Lower Pansodan street.</li> <li>• High quality public realm scheme.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Create a high quality street which will become a popular destination.</li> <li>• Bring a group of heritage buildings back into good condition and economic use.</li> <li>• Provide accommodation for local businesses and high quality apartments.</li> <li>• Create a pleasant and safe route for commuters from the river ferries.</li> </ul>	Approximately USD 3.2 mil.	YRG, YCDC, and YHT
<p>PP-12 Kanner Road (Strand) Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To improve the quality of Kanner Road, the most prominent historic road in Yangon.</li> </ul>	Approximately USD 0.7 mil.	MOC, YRTA, YCDC, and YHT

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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
(CBD)	<ul style="list-style-type: none"> <li>• To provide an appropriate setting for the many important historic buildings fronting Kanner Road.</li> <li>• To ensure better connectivity between the waterfront and city.</li> </ul> <p>[Project Scope]- Phase 1</p> <ul style="list-style-type: none"> <li>• Improvements for pedestrians crossing from the ferry terminals to the city.</li> <li>• Continuing improvements to pedestrian facilities and removal of poor quality aspects in the current street scene (e.g., pedestrian bridges, advertising hoardings).</li> <li>• Integration with nearby waterfront site.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Renewal and improvement of one of Asia's most iconic roads.</li> <li>• Creation of a high quality waterfront roadway, and another iconic symbol of the regeneration of the city.</li> <li>• Integration with public transport systems – river ferries and trams.</li> </ul>		
PP-13 Waterfront Project (CBD)	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To reclaim the waterfront for the people of Yangon and its visitors.</li> <li>• To create a new destination for leisure, recreation, and events for residents and visitors.</li> <li>• To reveal the waterfront and allow people to enjoy the views of the water and the city.</li> <li>• To find new uses for port structures including warehouses and to create new parks.</li> </ul> <p>[Project Scope]- Phase 1</p> <ul style="list-style-type: none"> <li>• Redevelopment of cargo (logistics) port area for mixed use development – culture/leisure with some residential and commercial uses.</li> <li>• Improvements to historic ferry landings and park.</li> <li>• Retention and re-use of some historic structures for culture/leisure uses for residents and visitors.</li> <li>• Creation of high quality landscaped waterfront walkways, Parks and Sule landing plaza.</li> <li>• Demolition of Warehouse 1.</li> <li>• Conversion of warehouse 2 into cultural facility.</li> </ul> <p>–[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• The waterfront will become a key destination in the city, a place to gravitate to for leisure and recreation, and for visitors, drawn by the mix of activities, the public realm and the views of the water and the city.</li> </ul>	Approximately USD 16 mil.	MPA, YRG, YCDC and Private Partners
PP-14 Circular Railway Multi-modal Facility Development Project (CBD)	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To suppress inflow of car traffic to CBD.</li> <li>• To promote public transportation.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Construction of parking lots on Circular Railway</li> <li>• Establishment of bus stop with parking lots</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Congestion relief of CBD.</li> <li>• Promotion of bus use.</li> </ul>	Approximately USD 50 mil.	Myanmar Railways, YRG, YCDC, and Private Partners
PP-15 Thein Phyu Multi-modal Facility	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• Suppression of inflow of car traffic to CBD</li> <li>• Promotion of public transportation</li> </ul> <p>[Project Scope]</p>	Approximately USD 59 mil.	YRG, YCDC, and Private Partners



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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
Development Project (CBD)	<ul style="list-style-type: none"> <li>• Construction of parking lots and multi-modal function in Thein Phyu site</li> <li>• Development of commercial and business function</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Congestion relief of CBD</li> <li>• Promotion of bus use</li> </ul>	<i>* only the cost for Parking building (three floors) infrastructure development</i>	
PP-16 Road Pricing and Parking System Establishment Project (CBD)	[Objectives] <ul style="list-style-type: none"> <li>• To suppress inflow of car traffic to CBD.</li> </ul> [Project Scope] <ul style="list-style-type: none"> <li>• Establishment of twelve check points.</li> <li>• Construction of accounts receivable system of penalties.</li> <li>• Construction of accounts receivable system of parking lot user.</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Congestion relief of CBD.</li> <li>• Promotion of bus use.</li> </ul>	Approximately USD 2.3 mil.	YRTA, YCDC
PP-17 Bus System Improvement Project (CBD)	[Objectives] <ul style="list-style-type: none"> <li>• To suppress inflow of car traffic to CBD.</li> <li>• To promote public transportation.</li> <li>• To improve bus service.</li> </ul> [Project Scope] <ul style="list-style-type: none"> <li>• Construction of bus exclusive lane.</li> <li>• Reorganization of bus routes.</li> <li>• Establishment of large bus berth to USD west area of CBD.</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Promotion of bus use.</li> <li>• Scheduled bus service.</li> <li>• Increase in bus users.</li> <li>• Congestion relief of CBD.</li> </ul>	Approximately USD 5.8 mil.	YRTA
PP-18 Car Parking under Parks Project (CBD)	[Objectives] <ul style="list-style-type: none"> <li>• To suppress inflow of car traffic to CBD.</li> <li>• To promote public transportation.</li> <li>• To utilize public space (underground of park).</li> </ul> [Project Scope]           Construction of underground parking lots of the park. <ul style="list-style-type: none"> <li>• Establishment of bus stop for transferring from car to bus.</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Congestion relief of CBD.</li> <li>• Parking places for night market users.</li> <li>• Promotion of bus use.</li> </ul>	Approximately USD 110 mil.	YRTA, YCDC
PP-19 Yangon Heritage Strategy Implementation Project (CBD)	[Objectives] <ul style="list-style-type: none"> <li>• To make Yangon more attractive and livable city utilizing the value of heritage buildings and their conservation.</li> </ul> [Project Scope] <ul style="list-style-type: none"> <li>• Implementation of Yangon Heritage Strategy Action Plans</li> </ul> [Expected Outcomes] <ul style="list-style-type: none"> <li>• Heritage conservation in sustainable manner.</li> <li>• Promotion of Yangon's attractiveness and comfort.</li> </ul>	(N/A)  <i>* The project shall be conducted respectively based on the proposed actions in the Yangon Heritage Strategy</i>	YCDC and YHT
PP-20 Financing	[Objective] <ul style="list-style-type: none"> <li>• To expand financing mechanism for low-cost urban</li> </ul>	Approximately USD 100 mil.	CHDB and MOC

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
Low-cost Urban Housing Program	<p>housing.</p> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Establishment of a revolving fund for long-term housing loans at low interest rates under CHDB.</li> <li>• Capital injection to CHDB in a form of “Two-Step Loan” financed by concessional loans in order to provide housing loans of long-term and low interest rates.</li> <li>• Capacity development for CHDB in lending management of loans and financial management of a revolving fund.</li> <li>• Technical cooperation for DUHD to improve the rules and regulations including “Condominium Law” allowing “collective property right” in order to expand the scope of target population for housing loans.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• A revolving fund for low-cost housing is established.</li> </ul> <p>Long-term housing loans at low interest rates are provided under CHDB.</p>	* as a seed fund.	
<p><b>PP-21</b></p> <p>New Parks Construction Project</p>	<p>[Objective]</p> <ul style="list-style-type: none"> <li>• To provide public parks as recreation areas in sub-centers, and new development areas.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Conduct of a survey and F/S of a suitable site for new public parks in new development areas to be developed.</li> <li>• Conduct of land reclamation by making a pond to supply soil.</li> <li>• Harmonization of the development with the natural environment.</li> <li>• Development of basic infrastructures, and construction of pedestrians’ path and wood deck.</li> <li>• Provision of park equipment (playground equipment, benches, small arbors, toilets, lightings, signboards, etc.).</li> <li>• Planting of large trees to provide shady spaces at the parks.</li> <li>• Conduct of a capacity development for management of public parks.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Provide a comfortable living condition with rich green environment and open-space in urbanized and urbanizing areas.</li> </ul> <p>Contribute in the mitigation of climate change, environmental pollution, flood, and other negative impacts.</p>	Approximately USD30 mil.	YCDC and Private Partners
<p><b>PP-22</b></p> <p>Barrier-free for PwDs Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To get a detailed condition and problems of PwDs they are facing with.</li> <li>• To promote barrier-free society especially for PwDs.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Survey on current mobility and accessibility of the PwDs in public facilities and transport modes.</li> <li>• Establishment of laws and regulations to create a barrier-free environment.</li> <li>• Subsidy for construction/renovation of public facility buildings and replacement of transport mode, which applies to the regulations.</li> <li>• Special assistance for children with disabilities to</li> </ul>	Approximately USD 6 mil.	Ministry of Health , and YCDC,

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Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<p>physically and educationally study in general schools.</p> <ul style="list-style-type: none"> <li>• Fostering of social acceptability to PwDs and minorities through public campaign.</li> <li>• Provision of medical care services and financial aids for assistive devices.</li> <li>• Implementation of livelihood program.</li> <li>• Establish a sign language-supported media.</li> <li>• Support to involve in social activities (e.g., water festival) and disability-related sport activities.</li> </ul> <p>[Expected Project Outcomes]</p> <ul style="list-style-type: none"> <li>• Clarify the current condition of PwDs.</li> <li>• Establish a barrier-free law.</li> <li>• Promote acceptability of people to PwDs.</li> <li>• Assist children with disability to study together with normal students.</li> </ul>		
<p>PP-23 Education System Strengthening Project</p>	<p>[Objective]</p> <ul style="list-style-type: none"> <li>• To promote participation and level of education.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Preparation of school allocation plan according to estimated future population and number of students.</li> <li>• Upgrading teaching quality with pre-service and in-service teacher's training programs.</li> <li>• Improvement of educational infrastructures such as open more schools with modern teaching aids.</li> <li>• Expansion for provision of post-primary schools including middle schools and branch schools.</li> <li>• Operation of school bus service from remote areas.</li> <li>• Launching the mobile school program in remote area and special program for over-age children.</li> <li>• Upgrading the education standard to international level and alignment it with the needs of technology driven labor market.</li> <li>• Close coordination with monastic schools and government to have consistency with national education policy.</li> <li>• Develop regulations that lead to greater complementarities between private and public schools.</li> </ul> <p>[Expected Project Outcomes]</p> <ul style="list-style-type: none"> <li>• Increase in student's enrollment ratio of five years old.</li> <li>• Increase in ratio of students eligible for university.</li> <li>• Increase in number of teachers</li> </ul>	<p>Approximately USD 8 mil.</p>	<p>Ministry of Education, and YCDC</p>
<p>PP-24 Urban Poor Assistance Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To get the detailed living condition of poverty group.</li> <li>• To upgrade the living condition and provide opportunity to poverty group.</li> <li>• To promote participation of poverty group to social activity.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Survey on the existing living condition, education, and health status of poverty group.</li> <li>• Promotion of human development programs.</li> <li>• Supporting home-based income-generating activities.</li> <li>• Implementation of micro-finance scheme.</li> <li>• Launching the education-related assistance program such as scholarship program, school book loan</li> </ul>	<p>Approximately USD 6 mil.</p>	<p>Ministry of Education, and YCDC</p>

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<p>program.</p> <ul style="list-style-type: none"> <li>Support system to connect the urban services.</li> </ul> <p>[Expected Project Outcomes]</p> <ul style="list-style-type: none"> <li>Upgrading of living condition of poverty group.</li> <li>Increase in number of students who can continue studying in school.</li> <li>Increase in number of employment of poverty group.</li> </ul>		
<p>PP-25</p> <p>Urban Development Management Capacity Development Project</p>	<p>[Objective]</p> <ul style="list-style-type: none"> <li>To facilitate capacity development in YCDC for urban planning and management in the Greater Yangon.</li> </ul> <p>[Project Scope]</p> <p>The proposed four-year technical cooperation project will undertake a scope with the following activities:</p> <ul style="list-style-type: none"> <li>Support the establishment of the planning hierarchy, coordination capacity, and monitoring &amp; evaluation framework for the SUDP's implementation in YCDC;</li> <li>Assist in the enforcement capacity of the legal and regulatory frameworks and the introduction of the one-stop services for planning and building permits and certificates in urban development;</li> <li>Help in the urban planning capacity in research and survey, zoning and land use planning, urban design and district planning, infrastructure and transport, GIS and CAD and database management, etc.; and</li> <li>Support the planning and management capacity in proposed CBD development projects in waterfront, parking, streets, bus terminals, and heritage conservation, as well as awareness raising for protecting landscapes.</li> </ul> <p>[Expected Outcome]</p> <ul style="list-style-type: none"> <li>YCDC builds the institutional fundamentals to undertake proper urban planning and management for the attainment of the Yangon Future Vision 2040.</li> </ul>	Approximately USD 5 mil.	YCDC, and YRG

Source: JICA Study Team

### 5.1.3 Priority Projects for Infrastructure Development Sector

The priority projects of infrastructure development sector consist of 17 projects as shown in Table 5.1.2 .

**Table 5.1.2: Priority Projects for Infrastructure Development Sector**

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
<p>PP-26</p> <p>Kokkowa WTP and Transmission /Distribution Pipeline Construction Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>To meet the increasing water demand.</li> <li>The first WTP, which has river water resource in the Greater Yangon.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>Construction of intake pump facilities from the Kokkowa River and conduct pipeline.</li> <li>Construction of new WTP (60 MGD).</li> <li>Construction of transmission/distribution pipeline.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>To add developed water resources of 60 MGD</li> </ul>	Approximately USD 400 mil.	YCDC

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<ul style="list-style-type: none"> <li>· To develop water supply system to Zone 1 and Zone 9</li> </ul> <p>* It has been pledged to be implemented by JICA, as of December 2016.</p>		
PP-27 Zone 1 Distribution Pipe Network Renewal Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>· To provide stable water supply.</li> <li>· To reduce NRW and to increase supply water</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>· Renewal of distribution pipe network.</li> <li>· Rehabilitation of the existing two reservoir.</li> <li>· Installation of 30 DMA.</li> <li>· Installation of distribution pumps for higher area.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>· Reduce NRW and increase the supply water volume.</li> <li>· Introduce proper management system for water distribution.</li> </ul> <p>* It has been pledged to be implemented by JICA, as of December 2016.</p>	Approximately USD 230 mil.	YCDC
PP-28 Zone 9 Distribution Pipe Network Renewal Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>· To provide stable water supply for Hlaing Tharyar.</li> <li>· To reduce NRW and to increase supply water</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>· Renewal of distribution pipe network.</li> <li>· Rehabilitation of the existing two reservoir.</li> <li>· Installation of distribution pumps for higher area.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>· Reduce NRW and increase the supply water volume.</li> <li>· Introduce proper management system for water distribution.</li> </ul>	N/A	YCDC
PP-29 Pumping Station Renewal Project	<p>[Objective]</p> <ul style="list-style-type: none"> <li>· To renew exiting aged pumps</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>· Saving energy by installing high efficiency pumps</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>· Improve the water quality</li> <li>· Provide water with energy saving system</li> </ul>	N/A	YCDC
PP-30 CBD Sewerage System Improvement Project	<p>[Objective]</p> <ul style="list-style-type: none"> <li>· To create a clean environment at CBD.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>· Improvement of the existing sewerage collecting system at CBD.</li> <li>· Expansion of the existing WWTP at CBD.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>· Collect and treat sewage generated in CBD properly.</li> <li>· Improve the water quality of discharged water body.</li> </ul>	Approximately USD 120 mil.	YCDC
PP-31 W1 Sewerage System Improvement Project	<p>[Objective]</p> <ul style="list-style-type: none"> <li>· To create a clean environment at W1 area.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>· Development of sewerage collecting system at W1 area.</li> <li>· Development of WWTP at W1 area.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>· Collect and treat sewage generated in W1 properly.</li> </ul>	Approximately USD 250 mil.	YCDC



Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<ul style="list-style-type: none"> <li>Improve the water quality of discharged water body.</li> </ul>		
<b>PP-32</b> Drainage Improvement Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>Reduction of flood inundation risks in priority areas in the Greater Yangon.</li> <li>The five-year probable flood is to be design as to the scale of the project based on the rainwater drainage M/P.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>Improvement of creeks in the prioritized area of CBD zone* (Slice 1), and other 3 creeks such as Tha maing, Thebyu, Kyaikasan etc.</li> </ul> <p>CBD Zone</p> <ul style="list-style-type: none"> <li>Rainwater storage structures below Kanner Road (<math>\phi=5,000</math> mm, <math>l=2,000</math> m for the Slice 1).</li> <li>Pumping station with gate (<math>Q_{out}=14.0</math> m<sup>3</sup>/s for the Slice 1, Area of pumps building=<math>1,000</math> m<sup>2</sup>).</li> </ul> <p>Other 3 Creeks</p> <ul style="list-style-type: none"> <li>Improvement of existing creeks</li> <li>Construction of rainwater storage facilities and pumping stations.</li> </ul> <p>Others</p> <ul style="list-style-type: none"> <li>Procurement of maintenance machineries for rainwater storage structures.</li> <li>Capacity development of DRB staffs for O&amp;M of drainage facilities.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>Improved drainage networks.</li> <li>Rainwater storage structures below Kanner Road (<math>\phi=5,000</math> mm, <math>l=2,000</math> m for the Slice 1).</li> <li>Pumping station with gate (<math>Q_{out}=14.0</math> m<sup>3</sup>/s for the Slice 1, Area of pumps building=<math>1,000</math> m<sup>2</sup>).</li> <li>Maintenance machineries for rainwater storage structures and drainage networks (five vacuum cars).</li> <li>O&amp;M manual for drainage facilities.</li> </ul> <p>* 14 creeks in CBD zone are planned to be improved by World Bank in 2018.</p>	CBD Zone: Approximately USD 160 mil.  Other 3 Creeks: Approximately USD 110 mil.	DRB, and YCDC
<b>PP-33</b> Sewerage Management Capacity Development Project	<p>[Objective]</p> <ul style="list-style-type: none"> <li>To provide proper sewerage service to residents.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>Improvement of legal system such as regulation and criteria.</li> <li>Improvement of sewerage charging system.</li> <li>Capacity development for operation.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>Formulate necessary regulations</li> <li>Enhance sewerage management capacity of YCDC</li> </ul>	Approximately USD 1.3 mil.	YCDC
<b>PP-34</b> Integrated Flood Management Capacity Development Project	<p>[Objective]</p> <ul style="list-style-type: none"> <li>Establishment of fundamental information for urban development and mitigation of health effects on local people by flood disasters</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>Integration of flood information for an accurate flood hazard map.</li> <li>Flood disaster education program focusing on residents in flood prone areas.</li> </ul>	Approximately USD 6 million	DMH, RRD, and YCDC

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Flood hazard map of the Greater Yangon.</li> <li>• Preparedness against flood disasters by residents in flood prone areas.</li> </ul> <p>*YRG requested the World Bank to support flood measures in Yangon City. The project including preparation of flood management plan and flood disaster educations on local communities are under consideration by World Bank.</p>		
<p>PP-35</p> <p>Collection Equipment Supply for SWM Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To replace the aged vehicle with new waste vehicle.</li> <li>• To improve the capacity of maintenance equipment.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Procurement of number of waste vehicles and equipment.</li> <li>• Procurement of and equipment of maintenance tools and equipment</li> <li>• Implementation of Zero Waste Zone Project in CBO area and promotion of cleanup public drainages in the City.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Improve solid waste removal from the living environment of YCDC.</li> </ul>	Approximately USD 18 mil.	YCDC
<p>PP-36</p> <p>Existing FDSs Improvement Project</p>	<p>[Objective]</p> <ul style="list-style-type: none"> <li>• To rehabilitate the existing open dumping sites to sanitary landfill sites (Htein Bin: 50 ha, Htwei Chaung: 50 ha)</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Construction of a sanitary landfill.</li> <li>• Procurement and installation of necessary equipment and facility for landfill management such as weighing scale, heavy equipment, environmental monitoring equipment, etc.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Operate a final disposal site in sanitary manner.</li> <li>• Prevent negative impact to the environment.</li> </ul>	Approximately USD 80 mil.	tYCDC with BOT scheme
<p>PP-37</p> <p>Waste to Energy Promotion Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To incinerate musical waste (2,000 tons/day) with generation of electric power and reduce amount of waste to dispose FDSs.</li> <li>• To reduce environmental pollution in the city</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Agreement of the BOT or other PPP schemes including PPA with MOEE</li> <li>• Construction of incineration plants with electricity generation functions.</li> <li>• Establishment of O&amp;M system</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Reduce volume of waste to dispose FDSs and environmental pollution in the city</li> <li>• Contribute to electric power supply</li> </ul>	Approximately USD 400 mil.	YCDC with BOT Scheme
<p>PP-38</p> <p>Hazardous Waste Management Improvement Project</p>	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To segregate hazardous waste from industrial, business related waste, and municipal waste.</li> <li>• To treat infection waste from hospitals and clinics.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Construction of recycle centers in ten major industrial</li> </ul>	Approximately USD 8 mil.	YCDC

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
	<p>zones. [Component 1]</p> <ul style="list-style-type: none"> <li>• Construction of an incinerator plant for infectious waste. (ten tons/day) [Component 2]</li> <li>• Start up collection services of hazardous waste from domestic and commercial areas. [Component 3]</li> </ul> <p><b>[Expected Outcomes]</b></p> <ul style="list-style-type: none"> <li>• Control and handle hazardous waste in proper manner.</li> <li>• Prevention of negative impact to the environment and health.</li> </ul>		
<p><b>PP-39</b> Solid Waste Management Capacity Development Project</p>	<p><b>[Objectives]</b></p> <ul style="list-style-type: none"> <li>• To develop a M/P for municipal SWM including strategic environmental impact assessment.</li> <li>• To carry out capacity development in the organizational and individual level to solve/improve the current problems listed above.</li> </ul> <p><b>[Project Scope]</b></p> <ul style="list-style-type: none"> <li>• Development of a M/P for municipal solid waste in 2040.</li> <li>• Preparation of an action plan for short-term development based on the development concept prepared, which is to cover the facility development plan.</li> <li>• Review, update and modify the waste collection system.</li> <li>• Develop an operation manual of hazardous waste management including separation at source, reinforcement of the polluter pays principle and operation of its treatment facility.</li> <li>• Prepare and execute public enhancement program. To coordinate with the concerned stakeholders including departments of YCDC, ministry, NGO, and private sector.</li> <li>• Develop and execute a regular training program for SWM.</li> <li>• Find candidate lands for new FDSs and transfer stations.</li> </ul> <p><b>[Expected Outcomes]</b></p> <ul style="list-style-type: none"> <li>• Develop a feasible M/P of SWM in 2040.</li> <li>• Formulate and authorize a short-term policy of SWM.</li> <li>• Improve the efficiency of solid waste collection.</li> <li>• Realize and execute the method and procedure of public enhancement.</li> <li>• Share the experiences and knowledge of SWM in YCDC.</li> </ul>	<p>Approximately USD 6 million</p>	<p>YCDC</p>
<p><b>PP-40</b> Existing Substations Upgrading Project</p>	<p><b>[Objective]</b></p> <ul style="list-style-type: none"> <li>• To provide stable electricity.</li> </ul> <p><b>[Project Scope]</b></p> <ul style="list-style-type: none"> <li>• Upgrade of existing substations from 33 kV to 66 kV.</li> <li>• Introduction of 66 kV incoming distribution line.</li> </ul> <p><b>[Expected Outcomes]</b></p> <ul style="list-style-type: none"> <li>• Increase power supply capacity.</li> <li>• Replace aged facilities.</li> </ul>	<p>N/A</p>	<p>YESC</p>
<p><b>PP-41</b> Seismic Capacity Development</p>	<p><b>[Objective]</b></p> <ul style="list-style-type: none"> <li>• Improve seismic capacity of the city as well as buildings as city components.</li> </ul>	<p>Approximately USD 5 mil.</p>	<p>YCDC, MOC, and MES</p>

Project Name	Project Outline	Preliminary Estimated Cost	Players for Implementation
Project	<p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Establish bases that collect and distribute supplies transported from outside, and evacuation centers for residents.</li> <li>• Establish emergency transportation routes for transporting emergency relief supplies from outside.</li> <li>• Prioritize seismic diagnosis and seismic reinforcement targeting schools that provide education to young people who support the future of the country and also serve as evacuation center in case of emergency, as well as hospitals that treat injured people in case of emergency.</li> <li>• Prioritize execution of seismic diagnosis/seismic strengthening against bases, evacuation centers, fire stations, hospitals and police departments that collect supplies and city offices that serve as stronghold in case of disaster.</li> <li>• Identify buildings that may block emergency transportation routes and promote seismic diagnosis and seismic strengthening.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Improved building seismic capacity</li> <li>• Established emergency transportation route (smooth operation of emergency centers in time of disaster)</li> </ul>		
<b>PP-42</b> Fire Safety Improvement Project	<p>[Objectives]</p> <ul style="list-style-type: none"> <li>• To improve road environment for firefighting.</li> <li>• To install fire prevention equipment in buildings.</li> </ul> <p>[Project Scope]</p> <ul style="list-style-type: none"> <li>• Make the rule of narrow road side car parking and ensure driving zone (12 ft. width) in CBD narrow roads.</li> <li>• Install electric wires at over 20 ft. height while electric wire maintenance is carried out. Ensure driving zone (20 ft. height) in CBD narrow roads.</li> <li>• Yield right-of-way to emergency cars.</li> <li>• Introduce and implement Fire Safety Code.</li> </ul> <p>[Expected Outcomes]</p> <ul style="list-style-type: none"> <li>• Emergency cars can arrive at the destination smoothly.</li> <li>• Buildings can have fire safety performance.</li> </ul>	Approximately USD 5 mil.	YCDC

Source: JICA Study Team

### 5.1.4 Project Costs and Financing

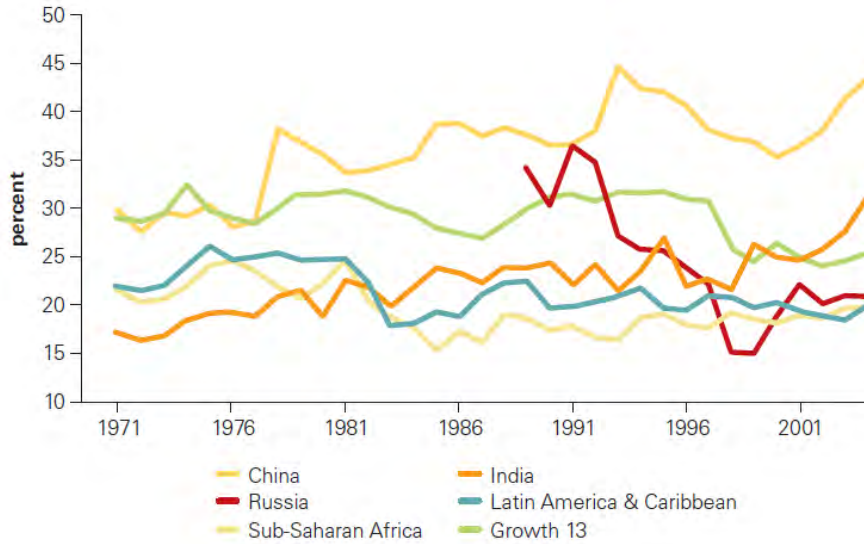
Preliminary estimated cost to conduct proposed 42 priority projects is USD 2,684 million in total for both urban development management sector and infrastructure development sector as a part of public investment, not including private one.

**Table 5.1.3: Estimated Cost for Priority Projects**

Sector	Estimated Cost	No. of Projects
<b>Urban Development Management Sector</b>	<b>USD 885 mil.</b>	<b>25</b>
Urban Development Projects	(USD 480 mil.)	(9)
CBD Renovation Projects	(USD 249 mil.)	(10)
Social Service and Management Projects	(USD 155 mil.)	(6)
<b>Infrastructure Development Sector</b>	<b>USD 1,799 mil.</b>	<b>17</b>
<b>TOTAL</b>	<b>USD 2,684 mil.</b>	<b>42</b>

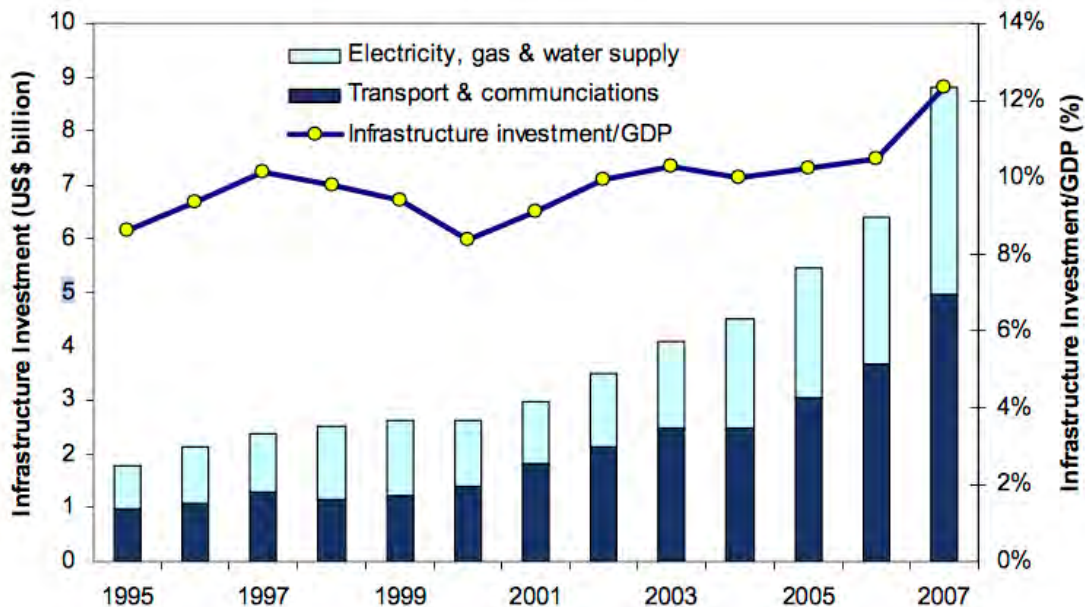
Source: JICA Study Team

Since the total cost is quite high, which seems to exceed the capacity of current financing of Yangon, it is also necessary to do investment in advance in order that the economic growth would follow. As a reference in fast-growing Asia, public investment in infrastructure accounts for 5–7 percent of GDP or more. In China, Thailand, and Vietnam, total infrastructure investment exceeds 7 percent of GDP. History suggests this is the right order of magnitude for high and sustained growth, although it is difficult to be precise as shown in Figure 5.1.2 below.



Source: World Bank The Growth Report: Strategies for Sustained Growth and Inclusive Development  
**Figure 5.1.2: Percentage of GDP, Investment Rate by Growth**

According to Harvard Policy Dialogue Papers, infrastructure has also been an important component of Vietnam’s development strategy. Over the last twelve years, the government of Vietnam was able to sustain infrastructure investment at 10% of GDP (12% in max) as shown in Figure 5.1.3 below. This remarkably high level of investment has resulted in a rapid expansion of infrastructure stocks and improved access.



Source: Vietnam’s Infrastructure Constraints Prepared under UNDP – Harvard Policy Dialogue Papers  
**Figure 5.1.3: Infrastructure Investment in Vietnam**

In line of the scenario above, successful countries provide economy and society with infrastructure needed to maintain growth. In the scenario, 8%-9% of GRDP would be applied to achieve rapid economic growth.

Table 5.1.4 below shows a scenario of investment for infrastructure in the Grater Yangon for the future based on GRDP growth forecast. According to the scenario, investment for infrastructure could be provided USD 2,720 million as of 2025, USD 8,100 million as of 2035, and USD 9,040 million as of 2040 as a range of 8.0% and 9.0% of total GRDP of the Grater Yangon. Since this estimated investment is a figure of just single year, it can be accumulated.

**Table 5.1.4: Scenario of Investment for Infrastructure in the Greater Yangon**

Year	GRDP (million USD)	GRDP Annual Growth Rate	GRDP per Cap (USD)	Total Investment for Infrastructure in Greater Yangon				
				Total as % of GRDP	Public Investment as % of GRDP	Public Invesment (Mill USD)	Private Investment as % of GRDP	Private Invesment (Mill USD)
2016	14,000	-	2,373	-	-	-	-	-
2025	34,000	10.4%	4,578	12.1%	8.0%	2,720	4.1%	1,391
2035	90,000	10.2%	9,500	13.3%	9.0%	8,100	4.3%	3,879
2040	113,000	4.7%	10,429	11.9%	8.0%	9,040	3.9%	4,384

Source: JICA Study Team



## 5.2 Financing Urban Development - To fill financial gaps in urban development –

Given the very fast pace of expanding economic activities in the Greater Yangon, needs for urban infrastructure development as well as financing sources are massive, and the existing financial sources alone could not close the financial gaps.

Since the current financing for infrastructure is insufficient, the path to long-term finance is to diversify sources. In doing so, it is most viable to begin with making better use of the existing financial sources by revising some vital elements of the current schemes.

For the most immediate effects on urban center development, it is important to further promote participation of private sector (FDIs for a large scale investment) in development projects on municipal lands by establishing clear and stable rules and regulations on urban development. For urban housing, development banks that are allowed to extend long-term loans are the key financial sources.

In the mid to long term, the Greater Yangon can be enabled and empowered to explore its untapped potential of “Land-Value-Based Financing” in order to increase and diversify “own-source revenues” in innovative ways. It is quite a notable and fortunate feature that Yangon is a rare case where “Land-Value-Based” taxes and administrative organizations to manage them have been in place since 1922 up until present. Problems are the facts that current levels of valuation of property are way too low and tax rates are way too high. It is recommended to revise such existing taxes to make them better fit to the current real estate market prices and financial needs. On top of it, it is also recommended to introduce new urban development tax (city planning tax) for urban centers where more concentrated investments and economic activities are expected to take places.

### 5.2.1 Current Situation and Issues

#### (1) Financial Base of YCDC

YCDC is considered as an independent body raising its own revenues through collecting fees, taxes, issuing licenses, and etc. In recent years, YCDC’s budget both on the revenue and expenditure sides have been increasing quite rapidly. Total income of YCDC has dramatically increased by 380% from MMK 58 billion in 2011/2012 to MMK 279 billion in 2015/16. The most increased source is “Capital Income” that has come to be MMK 122 billion (44% of total income) in 2015/2016 that is 20 times as large as the one back in 2011/2012. A budget deficit, once it was as large as -23.4% as percentage to the total expenditure in 2011/2012, has been controlled to be smaller at the level of -1.9% in 2015/2016.

**Table 5.2.1: YCDC Income and Expenditure Account from FY2011/2012 to 2015/2016 (Billion MMK)**

Account Title	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2015/2016 % Share by account	increas e over 5yrs
<b>Total Income</b>	<b>58</b>	<b>103</b>	<b>146</b>	<b>252</b>	<b>279</b>	<b>100%</b>	<b>380%</b>
Tax and Normal Income	52	95	92	134	142	51%	173%
Capital Income	6	8	53	116	122	44%	1850%
Income from foreign help	0	0	1	2	13	4%	-
Income from debt	0	0	0	0	3	1%	-
<b>Total Expenditure</b>	<b>76</b>	<b>100</b>	<b>146</b>	<b>252</b>	<b>285</b>	<b>100%</b>	<b>275%</b>
Normal Expenditure	36	48	50	68	80	28%	122%
Capital Expenditure	16	52	95	182	190	67%	1070%

Account Title	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2015/2016 % Share by account	increas e over 5yrs
Expenditure from Special Fund	24	0	0	0	0	0%	-
Expenditure from foreign help income	0	0	1	2	13	4%	-
Expenditure from debt income	0	0	0	0	3	1%	-
<b>Fiscal Balance (Income-Expenditure)</b>	<b>-18</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>-5</b>	-	-
<b>Fiscal Balance (as % of expenditure)</b>	<b>-23.4%</b>	<b>3.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>-1.9%</b>	-	-

Source: YCDC data.

The structure of YCDC's income in 2015/2016 is as summarized as the table 5.2.2. There were three major types of income sources. The largest source was "Capital Income" = "YCDC Property Based" (44% of total income) and most of which (33% of total income) was basically onetime-income as shares from sales of real estate development projects where YCDC provided land (virtually as a from of in kind investment) to the private developers. The second largest is "Service Charge Based" that were for cost recovery of public services. The smallest was "Tax Based" (13%) that could be most stable and sustainable sources in the long term perspective.

**Table 5.2.2: YCDC Income Account from in FY2015/16 (Billion MMK)**

Account Title	Descriptions	Income	Share
<b>Tax and Normal Income</b>		<b>141.8</b>	<b>50.8%</b>
<b>Income from Tax</b>	<b>"Tax Based"</b>	<b>36.4</b>	<b>13.0%</b>
Property Tax	Tax levied on properties.	12.8	4.6%
Wheel Tax	Tax levied on automobiles.	13.9	5.0%
Revenue Share	Shared tax from Union tax.	9.6	3.4%
<b>Income from goods selling and services</b>	<b>"Service Charge Based"</b>	<b>99.3</b>	<b>35.5%</b>
City Planning and Land Admin. Department	Land inspection and other fees.	24.5	8.8%
Engineering Department (Buildings)	Real estates rental, inspection, and licence fees.	19.9	7.1%
Engineering Department (Water & Sanitation)	Water supply service charges and other fees.	11.0	3.9%
Administration Department	Various fees	9.3	3.3%
Markets Department	Rental fees and other fees.	7.3	2.6%
Engineering Department (Road & Bridges)	Billboard fees	5.4	1.9%
	Others	1.9	0.7%
Pollution Control and Cleansing Department	Waste Management Sevices	5.0	1.8%
Others		14.9	5.3%
<b>Forfeit and other Incomes</b>		<b>6.1</b>	<b>2.2%</b>
<b>Capital Income</b>	<b>"YCDC Property Based"</b>	<b>122.2</b>	<b>43.7%</b>
Engineering Department (Building)	Construction of Urban Development Buildings	91.3	32.7%
Markets Department	Income from the Construction of New Markets	15.8	5.7%
Urban Planning and Land Admin. Department	Income from the selling of new plots of land	10.9	3.9%
Others		4.2	1.5%
<b>Income from Foreign Help</b>		<b>12.5</b>	<b>4.5%</b>
<b>Income from Loan</b>		<b>2.8</b>	<b>1.0%</b>
<b>Grand Total</b>		<b>279.4</b>	<b>100.0%</b>

Source: YCDC data.

## **(2) Issues in Income Structure**

### **1) YCDC Property Based Incomes - “Important but must use them carefully”**

The most notable characteristic of the income structure of YCDC is the fact that it depends upon “YCDC Property Based” incomes. Given the fact that “Tax Based” income is small and unlikely to be expanded as fast as increase demand for public investment, “Real Estate Based” income shall be the most important source especially in the immediate to short term perspectives. There are 3 points to note regarding “Real Estate Based” incomes.

Firstly, it should be noted that the private sector investments are often essential to develop urban buildings and structures on YCDC’s lands to yield economic returns, especially those in high potential urban centers. “No private investment” means “no capital income for YCDC”. Thus, private sector participation must be encouraged.

Secondly, it is essential not to provoke real estate speculation. There is nothing wrong with decent rises in real estate prices as results of urban development in conjunction with improvements of public infrastructure. However, once the real estate speculation goes way too far up to the level of “bubble market”, negative impacts will be devastating not only on urban development but also on the whole Myanmar economy. There could be many empty buildings and condominiums, many of them often not to be completed. Such non-performing assets are vast waste of resources. Under “bubble” many of average Yangon citizens could never afford to buy their houses. Low cost urban housing is by itself an important area that needs special attention by the public sector.

Thirdly, in order to control speculation, there must be well-designed urban zoning and regulations to impose it. A refined property based taxation system is also essential in order to increase costs for those who benefit from provoking speculative moves.

### **2) Tax Based Income - “Property tax could also work as a link to bring rises in real estate values back to public incomes.”**

As already mentioned, shares of “Tax Based” incomes are very small. “YCDC Property Based” incomes may neither always be stable nor able to grow at a current pace for a long period of time. Thus, it is recommended to increase shares of “Tax Based” incomes. In the context of expanding the financing sources for urban development, “Property Tax” is the most directly relevant tax item. It is recommended to refine the system of property related taxes and to be prepared to make a solid link between increase in real estate values and tax incomes with long term perspectives.

## **5.2.2 Prospective Sources of Financing**

Among the other options, there are four prospective sources of financing in order to meet high priority needs for urban development of Yangon.

### **(1) Private Sector Participation**

Given the fact that “YCDC property based income” will remain to be the largest financial sources at least in immediate to short term, it is most realistic and viable to encourage more private sectors, especially FDIs participation in urban development. The most important thing is to eliminate institutional uncertainties. According to the extensive interviews, YCDC senior officials, banks, and real estate developers all agreed that the largest problem is not “financing schemes” that considerably differ case by case but lack of clear rules and regulations.

There are three things to do in order to eliminate things that FDIs see as the sources of uncertainty.

- Common and clear understandings based upon urban development plans: urban plans are generically long-term in its vision and goals to achieve how a city is structured. Plans should be revised flexibly to accommodate socioeconomic changes and new needs. But it should not be too often at the level of structural plans that define principles and directions of urbanization.
- Clear and solid rules and regulations (building codes, fire safety codes, land use, incentives, and etc.): rules and regulations must be clearly written with concrete operational guidelines that do not leave rooms for arbitrary decisions.
- Transparent and consistent application of rules and regulations: rules and regulations must be applied in a transparent and consistent manner. Transparency and consistency make it predictable for investors in estimating time and costs they need to go through process of investments.

## **(2) Expand Development Bank Financing for Housing**

Urban housing is one of the most important aspects of urban development. In case of Yangon, at the moment, low-cost and affordable housing is a critical piece of urban development and urban renewal at large. Without accelerated supply of low-cost and affordable housing in Yangon area, those rapidly growing manufacturing and processing industries will soon face shortage of labor. At the same time, potential buyers do not have sufficient savings to buy houses. Thus, it is recommended to expand financing for low-cost housing by increasing financial capacity of banks that are capable of extending long term housing loans. One option to support this is to do capital injection in a form of “Two-Step Loan” financed by concessional loans by development partners and to establish revolving funds for long-term housing loans at low interest rates. As of December 2016, the CHDB is the only bank that has a development bank license allowing the bank to extend loans longer than one-year repayment period. (see detailed description in *Part 1, 2.6 Financing Urban Development, (4) Supplemental Explanations of the SUDP, 7) CHDB “Housing Saving Account” Program*)

Recommended actions include the following items,

- Financing for low-cost and affordable housing development projects (supply side).
- Providing housing mortgage loans to the individual buyers (demand side),
- Promote “Housing Savings Account” (generate private savings),

Establishing revolving funds for long-term and low interest rates – one option to support this is to do capital injection in a form of “Two-Step Loan” financed by concessional loans by development partners. It is also expected that recently approved “Condominium Law” to be a good starting point to provide a legal basis for condominium owners to have “building unit ownerships” that enables them to take out mortgages on their condominium units. Once a law for “building unit ownerships” is in place, registration (update of ownership documents) and thus, appropriate registration for annual property tax must be part of the conditions to be eligible for housing loans by CHDB.

## **(3) Adjust Rates of Existing Taxes and Charges to Their Requirements**

There are other means where some existing taxes can be used as leading tools to change people’s behavior towards policy objectives, such as imposing higher tax rates on “sources” of traffic problems. Raising “Wheel Tax” within Yangon is being considered. Reintroduction of “Parking Tax (Fees)” can have the same effects. On the other hand, “Water Charges” and “Cleaning Charges” are more of charges for provision of specific public services. Given the present level of charges, they do not fully recover their operational costs and unrealistic to expect them to do so in a short period of time. In case of waste collection, for example, service charges cover around 50% of service costs. Sudden and steep increase of service charges likely to provoke users’ resistance. Rather, it is recommended to first

improve service levels good enough to raise levels of beneficiaries' "willingness to pay" and then raise charges accordingly.

#### **(4) Land-value-based Financing**

Land-based financing is an underutilized source of funding. Land values typically increase with urbanization that is largely incurred with public investment for urban development. Thus, this "unearned increment" is socially generated. Ways to share this value include value-based annual land taxes, capital gains taxes, developer exactions, and land readjustment. For initial investment for new urban development, developer exactions, such as putting conditions to let developers provide certain amount of lands or investments for public use, are appropriate. However, for financing operation, maintenance in the longer term, stable land value based taxation is indispensable. Given the present conditions in Yangon, there are four options to enhance land-value-based financing. (for international comparison of different approaches see *Part 1, 2.6 Financing Urban Development, (4) Supplemental Explanations of the SUDP, 4) Comparison of Different Approaches of Property Tax*)

##### **1) Property Tax**

Firstly, the existing annual property tax should be adjusted to be more effective and fair in terms of beneficiaries pay principle. In doing so, "taxable land values" must be linked to current property values. At present, taxable values for "property tax" are set way lower than "roadside values" that are used for "stamp duties" levied at the time of property sales. A level of taxable value for "Property Tax" is set at 1/5 to 1/10 of "roadside values". (For details of the current property taxes, see *Part 1, 2.6 Financing Urban Development, (4) Supplemental Explanations of the SUDP, 4), 5), and 6).*)

It is recommended that taxable values for annual property tax should be same as the ones for "stamp duties". Instead, the rates of property tax should be lowered to 1/5 to 1/10 in order to offset large increase in the levels of taxable values in order to avoid drastic increase in the amount to pay. What is important now is to establish links between property tax and current property values rather than raising tax revenues immediately.

##### **2) Urban Development Tax**

Secondly, it is recommended to introduce new and additional "Urban Development Tax" for designated high-value zones within CBD and other new urban development areas. Taxable values for this new tax should be "roadside prices" that is applied for "stamp duties". It is expected to see more concentrated public investments within CBD and the other new urban centers in order to transform them to a cluster of high-value zones with high density development for urban public transport, commercial activities linked with residential zones. These areas need extra amount of public investment in order to accommodate high-value activities, likewise, additional land-based tax to share extra increment socially. This "Urban Development Tax" should be a "local and objective tax" to be allocated for a special purpose fund such as "Urban Development Fund for Yangon CBD and Urban Centers" that is earmarked specifically for investments within the designated areas where it is levied.

##### **3) Property Trade Tax and Stamp Duty**

Thirdly, the rates of Property Trade Tax (Union Tax) and Stamp Duty are too high and should be lowered. For example, low-cost housing unit is worth between MMK 10 million and MMK 12 million in Yangon. In this case, Property Trade Tax and Stamp Duty are levied at 15% and 7% of the property values, respectively. At such high rates, people are likely to be discouraged to either buy houses or pay taxes, likewise, revenues could fall further. In addition, when people do not pay taxes, they are unlikely to update ownership documents, which causing additional problems. It is more important to encourage them to buy, register houses, and pay annual

property taxes for longer period of time than to impose one-time heavy taxes at the time of property trade.

#### **4) Fiscal Cadaster (Urban Mapping)**

Lastly, a transparent and up-to-date fiscal cadaster (urban mapping) is essential in the utilization of land-value-based financing. A fiscal cadaster is a cadaster designed for property tax purposes. That is, it includes those factors required for implementation of a property tax system such as legal description, dimensions, location of boundaries, ownership, description of improvements, and land use. A fiscal cadaster could be integrated with other urban development GIS database that could be a powerful planning tool as well.

### **5.3 Capacity Development**

#### ***- To enhance inclusive ownership and capacities among all key actors -***

In recent years, capacity development has been growingly recognized as one of the most essential factors for development in general, and urban development in particular. ‘Capacity development’ is defined as ‘the process whereby people, organizations, and society as a whole, unleash, strengthen, create, adapt, and maintain capacity over time’<sup>11</sup>. The ‘Quito Declaration on Sustainable Cities and Human Settlements for All’ has also emphasized that capacity development should be promoted as ‘a multifaceted approach that addresses the ability of multiple stakeholders and institutions at all levels of governance, and combines the individual, societal, and institutional capacity to formulate, implement, enhance, manage, monitor, and evaluate public policies for sustainable urban development’<sup>12</sup>. However, it is not easy to strengthen capacity development in the short term because there is such a complex process required. It is important, therefore, to have its long-term strategy for capacity development to ensure proper urban planning, design, financing, development, governance, and management for sustainable urban development.

#### **5.3.1 Current Conditions and Issues**

##### **(1) Main Actors**

DUHD under MOC is responsible for undertaking the legal, policy, and planning framework in urban planning, development, and management at the national level. The DUHD has 14 region and state branches and 19 district level planners in the country to support local governments in these fields. YRG takes charge of service deliveries in urban planning, development, and management at the local level through its regional ministries and lower layer of administrative offices, including YCDC, 4 districts, 44 townships, and 742 wards/636 village tracts. In addition, there are some public entities and authorities for service deliveries, like the YESC, the MPT, the Yangon Region Transport Authority (hereinafter referred to as “YRTA”), the Myanmar Port Authority (hereinafter referred to as “MPA”), the Myanmar Railways (hereinafter referred to as “MR”), the Inland Water Transport (hereinafter referred to as “IWT”) etc.

##### **1) YCDC**

YCDC is an administrative service provider in Yangon City, which covers 33 out of 44 townships of the Yangon Region. YCDC is also the first responsible administrative body for the implementation of this plan through internal and external coordination. There are 20 departments in YCDC. While sector departments, like the Engineering Departments and the Pollution Control and Cleaning Department, are responsible for the constructions, maintenance

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<sup>11</sup> OECD. (2006). ‘The Challenge of Capacity Development: Working Towards Good Practice’. Paris: OECD Publishing.

<sup>12</sup> UN Habitat. (2016). ‘Habitat III: New Urban Agenda’. Quito: UN Habitat.



of infrastructure, and service deliveries in urban development and management, but there had been no planning department until recently. In 2012, the Urban Planning Unit was established in YCDC and later upgraded to the Urban Planning Division (hereinafter referred to as “UPD”) under the City Planning and Land Administration Department. The UPD consists of six branches, namely: Zoning and Land Use Planning Branch; Urban Design and District Planning Branch; Urban Socioeconomic Studies Branch; Infrastructure and Urban Amenities Planning Branch; Urban Transportation and Road Network Planning Branch; and Administration Branch. There are nearly 60 officials at the UPD, including approximately 30 contractual staff.

## **2) Non-State Actors**

While the private sector has played a central role as the main engine to promote urban development through direct investments, the other non-state actors has crucially acted as a catalyst to support the government and the private sector in urban planning, development, and management from their respective professional backgrounds. They include the MES, the Association of Myanmar Architects (hereinafter referred to as “AMA”), the Committee for Quality Control and High-rise Building Construction Projects (hereinafter referred to as “CQHP”), the YHT, the Yangon Technological University (hereinafter referred to as “YTU”), the Yangon University (hereinafter referred to as “YU”), the United Nations Human Settlements Program (hereinafter referred to as “UN-Habitat”), JICA and the other actors.

### **(2) Human Resources**

Human resource development for urban planning, development, and management is still in transition. In 2011, there was to some extent a pool of human resources in the field of civil engineering and architect, such as the MES, the AMA, and others, but not for urban planning, which is a new concept in Myanmar. Despite some academic institutes, like the YTU, have recently begun to provide a course on urban planning, although it is still not popular among students due to weak demands in labor market. YCDC is also no exception. They have a limited number of professional officials in urban planning, development, and management. YCDC training institute provides a training course for their engineers while MOC offers one in urban planning through the Urban Research Development Institute (hereinafter referred to as “URDI”) with support from the UN-Habitat. The MES and the AMA provide continuous capacity development in civil engineering and architecture, and the YHT supports heritage conservation in urban planning and management. Donors, like the European Union (hereinafter referred to as “EU”), JICA, and the others, also offer a variety of training opportunities for urban planning and management in the country or overseas.

## 5.3.2 Capacity Development Strategy

### (1) Strategic Goals and Guiding Principles

To facilitate the attainment of the ‘Yangon Future Vision 2040’, it is critical to strengthen good city governance through enhancing capacity development at individuals, organizations, and society level ranging from short to long term. It is important to recognize two types of capacity, including hard and soft capacities. The former includes technical skills and knowledge, organizational capacity, and legal frameworks while the latter includes organizational culture, leadership, relational skills, change management, etc.

Strategic Goals	To establish legal, policy, financial, and institutional frameworks as well as sufficient capacities among all key actors, including governments and non-state actors, to ensure proper urban planning, design, financing, development, governance, and management for the attainment of equal use and enjoyment of city and human settlements in a sustainable way.
Guiding Principles	<ol style="list-style-type: none"> <li>1) Action Learning: Capacity development must be fostered through learning by doing approach rather than traditional lecture-based training. In this process, it is crucial that all stakeholders share their experiences and lessons learnt from each other to create learning platforms.</li> <li>2) Holistic Approach: Capacity development must be strengthened not only through hard capacity but also soft capacity to tackle capacity challenges in complex settings.</li> <li>3) Demand-Driven Capacity Development: It is important to be noted that capacity development should be demand-oriented through recognizing needs and taking actions under ownership.</li> </ol>

### (2) Strategic Framework

#### 1) Updating the Governance Structure

It is essential to review if governance structure functions appropriately for urban development to ensure better resource allocation and service delivery. The vision of this plan can be achieved only if government is well-structured and functions for effective intergovernmental relations and coordination with non-state actors.

#### 2) Enhancing Prioritization for Action

It is important to prioritize target activities to take actions for capacity development in the short, medium, and long term. The activities might scope urban planning, urban management, regulatory services, revenue collections, etc.

#### 3) Strengthening Monitoring and Evaluation

Regular reviews contribute to good city governance by fostering learning from past experiences and establishing a framework for accountability.

#### 4) Alignment with the Union Capacity Development Plan

This strategy must align with the Five-Year Capacity Development Plan 2016-21 of the DUHD and MOC to ensure its strategic consistency to capacity development for urban development at all levels.

### **5.3.3 Capacity Development Action Plan**

#### **(1) Undertaking Planning and Institutional Arrangements (Short and Medium-Term)**

The Government of Myanmar may undertake planning and institutional reforms in the short term to create an enabling environment for this plan to be efficiently and effectively implemented as follows:

##### **1) SUDP on Top of the Planning Hierarchy in Yangon**

This plan may be necessarily endorsed by the Union Cabinet to enable it to coordinate the Union's line ministries for its implementation. It is also important that YRG approves this plan to be on top of the planning hierarchy in Yangon among sector development plans.

##### **2) YCDC Planning Reform and Restructuring**

YCDC might need to reform their planning structure by having a planning department under the committee office to ensure the function of the planning hierarchy with the sector development plans. In this context, UPD might be one of the good candidates to act as top of the planning hierarchy by being constituted by YRG and the Ministry of Planning and Finance (hereinafter referred to as "MOPF") as an independent department. YCDC may also need to undertake department reorganizations to enhance reallocation of limited human and financial resources for maximizing service deliveries in line with the public needs.

#### **(2) Action-Oriented Capacity Development (Short and Medium-Term)**

It is important to conduct an action-oriented capacity development for urban development and management in UPD and YCDC in short and medium term to ensure efficient and effective implementation of the SUDP through:

- a) Establishing the coordination mechanism and the monitoring and evaluation framework for the implementation of the SUDP through building an institutional framework that clearly defines the division of labor and responsibility among departments in urban development;
- b) Enhancing the legal and regulatory framework and the one-stop service system for urban development that facilitate the induction and regulation of zoning, planning and building controls;
- c) Making the planning framework for Sub-Center Development, New City Development and TOD through strengthening knowledge and skills as public administrators on urban research and surveys, land use planning, and urban planning; and
- d) Producing the planning framework for the CBD renovation, managing the implementation of the CBD development projects, and conducting awareness raising activities for a landscape and heritage building protection in the CBD through improving knowledge and skills as public administrators on district planning and project management.

Aside from the government training schemes provided by the YCDC Training Institute and the URDI, it is essential to utilize external training opportunities by ensuring demand-driven capacity development.

#### **(3) Urban Redevelopment Authority (Medium and Long-Term)**

The URA may be established in the medium and long term to enhance land readjustment and urban redevelopment once the legal and policy framework is introduced. The URA might offer permanent posts to officials from line ministries and authorities in order to tackle cross-cutting issues over land readjustment and urban redevelopment.

## **5.4 Legal and Administrative Framework**

### ***- To establish a transparent and efficient management system -***

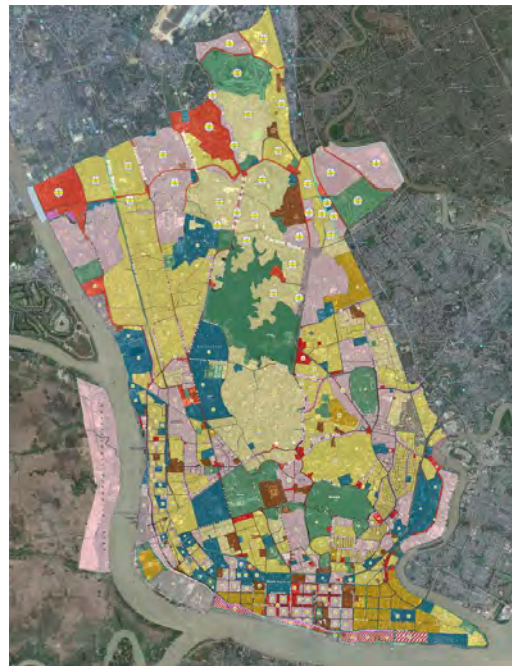
#### **5.4.1 Endorsement of SUDP**

The endorsement of the plan, despite its importance, is important as a first step, but it may only mark the first step to promote and control urbanization that is taking place in the city. Currently, MOC drafted “the Urban and Regional Development Planning Law” and prepared it to be enacted in the next year. According to the drafted law, the urban development plan, defined as a city conceptual plan, shall be submitted to the National Urban and Housing Development Central Committee. In line with this law, this plan shall be approved by YRG and acknowledged at the national level. The real task comes after the endorsement of the plan – that is the enforcement and implementation of the plan.

#### **5.4.2 Procedure for Development Activities**

As the urban development plan could touch upon the individual’s property right, which is a basic right stipulated in the new Constitution, there must be a law on urban planning to regulate the means by which individuals pursue his/her property right considering the overall benefit of the nation. For this purpose, Urban and Regional Development Planning Law should be enacted at the national level.

Yangon is privileged in the sense that the YCDC Law had already been enacted, and a number of by-laws are now in effect. While the laws and by-laws provide the general framework for the urban planning to be implemented locally, the actual regulations are neither well-established nor well-publicized to the general public. The regulations for building control and permissions should be clearly established and widely publicized for the general citizens to follow.



Source: YCDC

**Figure 5.4.1: Draft of Zoning Regulation**

##### **(1) Zoning Regulation**

Spatial control is a common and principal measure to be taken by the local government for the realization of urban development policies and projects. These control measures are expected to be executed based on the law, by-laws, and other legal frameworks.

Under the proposed area of the plan, especially the existing built-up area, a zoning regulation must be discussed and introduced by YCDC to control land and building use, floor area ratio (hereinafter referred to as “FAR”), building coverage ratio (hereinafter referred to as “BCR”), and building height to encourage proper urban development with necessary infrastructure and social service. Since YCDC has already drafted the zoning regulation, the system is expected to be introduced and executed on an earlier stage as possible with appropriate and transparent procedure.

##### **(2) Development and Building Permission**

Currently, YCDC has building permission procedure, which is basically to check individual building regardless of the size of the building and development site. To secure clarity and transparency in procedure where a person who intends to do development activities can rely on it, current system must be improved as soon as possible. On the other hand, development permission system, which target

certain scale of urban development project, shall also be discussed to be introduced to cope with the change of infrastructure demand, and impact on the environment and social aspect.

To conduct both new city development projects in the suburbs and large-scale urban development projects in the existing built-up area, the developers who shall be required to implement the following assessment as mentioned below and to propose mitigation of raised risks in advance.

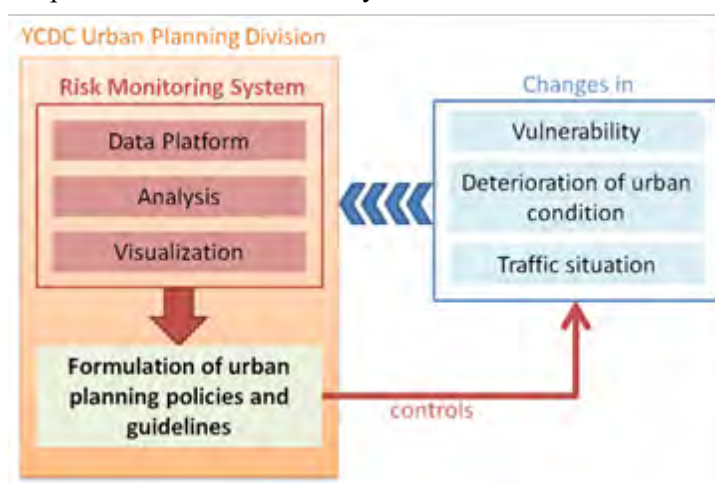
- a) Traffic Impact Assessment
- b) Disaster Risk Assessment
- c) Environmental Impact Assessment
- d) Social Impact Assessment

### 5.4.3 Improvement of Implementation System

#### (1) Data Platform and Risk Monitoring System

With the current high demand for development in the Greater Yangon, it is essential to make sure that further development not only contributes to the economic growth of the city, but at the same time, also reduces the accumulation of risk in the urban fabric. For example, higher density of buildings constructed with flammable material increases the risk of fire, and lack of parks or open-spaces in such neighborhoods mean no place to evacuate from such fire. Given this situation, it is necessary to embed a database urban risk monitoring system as the basis for guiding safer future development in the city.

Such risk monitoring systems will use GIS-based spatial data with information of building properties over the urban area which can allow for spatial and numerical analyses. The function of the risk monitoring system will be twofold: First, it will help to identify areas which have the potential of becoming vulnerable, and assess the impact of new development projects to the surrounding area risk. Next, these outputs from the system can be used by YCDC Urban Planning Division to guide the formulation of policies and development guidelines of new projects in order to 1) prevent potentially vulnerable areas from becoming vulnerable and 2) contribute to the risk reduction of the existing surrounding area.



Source: Institute of Industrial Science, The University of Tokyo

**Figure 5.4.2: An Image of Risk Monitoring System**

Such a risk monitoring system can be created with the combination of the different data that is already electronically maintained by the different departments within YCDC. At the same time, its use is not necessarily limited to evaluating risk and can be extended also to the improvement of regular services such as ambulance accessibility, traffic congestion, as well as monitoring and upgrading slum conditions in the city.

#### (2) One Stop Services for Permits and Certificates

YCDC might introduce the one stop services for planning permit, building permit, building standard certificate, building completion certificate etc. to enhance transparency through providing clear guidelines and procedures. The customer-centered approach may mobilize efficient and effective investments in sustainable urban development through undertaking the new public management.



# *Appendix 1*

*A Comparison Study  
for the Future Sea Port*





**Appendix 1: A Comparison Study for the Future Sea Port**

	Western mouth of Yangon River (Elephant Point) (Survey in FY 2012)	Eastern mouth of Yangon River (Survey in FY 2012)	Kyaikkami (Survey in FY 2015)	Dawei (Survey in FY 2015)
Assumed cargo volume	Container cargo 3 million TEU (2030)		Container cargo 240,000 TEU General cargo 520,000 tons (2030)	Container cargo 1.65 million TEU General cargo 18.13 million tons (2030) ----- [Short-term plan (2020)] Container cargo 700,000 TEU General cargo 1.83 million tons
Location	Approx. 47 km from Yangon No further access road	Approx. 46 km from Yangon No further access road	Gateway to the East-West Economic Corridor Approx. 370 km from Yangon	Gateway to the Southern Economic Corridor Approx. 600 km from Yangon
Facilities specifications and estimated project costs	Berth Length : 1,800 m (Container Berth : 6) Berth Depth(Max) : 14 m Approach Channel : 42km Access Road : 9 km Initial Construction cost : \$2,000 million (Annual Maintenance Dredging : \$30 million or more)	Berth Length : 1,800 m (Container Berth : 6) Berth Depth(Max) : 14 m Approach Channel : 12 km Access Road : 35 km Initial Construction cost : \$2,460 million (Annual Maintenance Dredging : \$6 million or more)	Berth Length : 480 m Container Berth : 1 General Cargo Berth : 1 Berth Depth (Max) : 12 m Access Road : 1 km Initial Construction cost : \$302 million (USD1 = ¥120) ----- <i>*The ports and Harbours Bureau of MLIT estimated a case of 14 m berth depth, instead of 12 m in the above results.</i> Berth Length : 600m Container Berth : 1 General Cargo Berth : 1 Berth Depth (Max) : 14 m Access Road : 1 km Initial Construction cost : \$425 million (USD1 = ¥120)	Berth Length : 3,800 m Container Berth : 6 General Cargo Berth : 11 Berth Depth(Max) : 14 m Approach Channel : 5 km Initial Construction cost : \$1,367 million (USD1 = ¥120) ----- [Short-Term Plan (2020)] Berth Length : 1,400 m Container Berth : 2 General Cargo Berth : 3 Berth Depth (Max) : 14 m Access Road : 5 km Initial Construction cost : \$844 million (USD1 = ¥120)

Source: MLIT





# *Appendix 2*

*Presentation Summary  
of Final Report I*



# The Updated Strategic Urban Development Plan of the Greater Yangon

## Final Report I Presentation Summary

Yangon Region Government,  
Yangon City Development Committee,  
JICA and JICA Study Team



## Planning Framework

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### Objectives **proposing Vision & Strategies**

- 1) To present a development vision and urban structure,
- 2) To present development policies and action plans,
- 3) To present prioritized projects

### Target Area **covering Yangon Region**

Target Area: Greater Yangon (1,500km<sup>2</sup>)  
covering whole Yangon Region (10,170km<sup>2</sup>)

### Target Year **Long-term 2040**

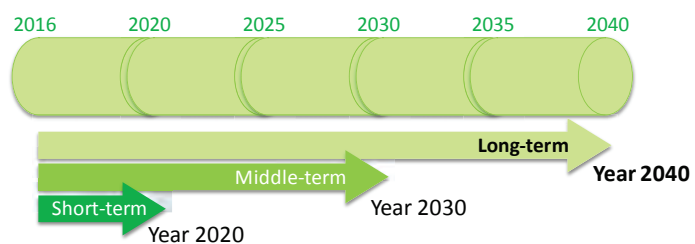


Figure: Target Area

Figure: Target Year



# Schematic Structure

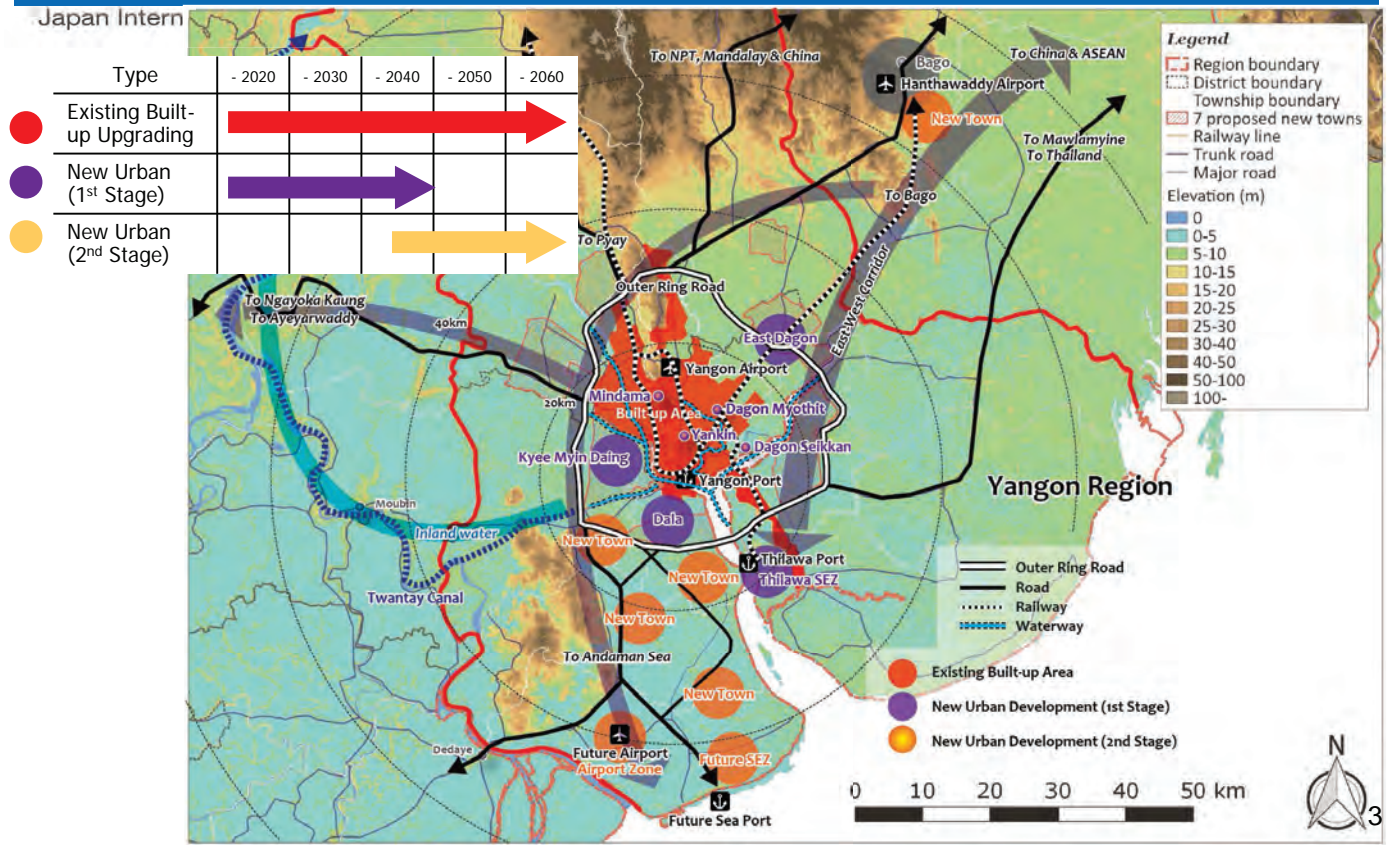


Figure: Schematic Structure

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# Development Vision

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Figure: Development Vision

## Principles

1. Compact  
Urban expansion shall be basically limited inside of the outer ring road
2. Decentralization  
Urban center function shall be dispersed to outer areas
3. Four Growth Axis  
Four axis along trunk roads and railways shall be strengthened.
4. Four New Cities  
Four new cities of suburb shall be developed with large-scale.
5. CBD Renovation  
Current CBD shall be renovated as more pedestrian, cultural ecologically-friendly.
6. Transport Linkage  
Bus, railway, waterway and other public way shall be improved.

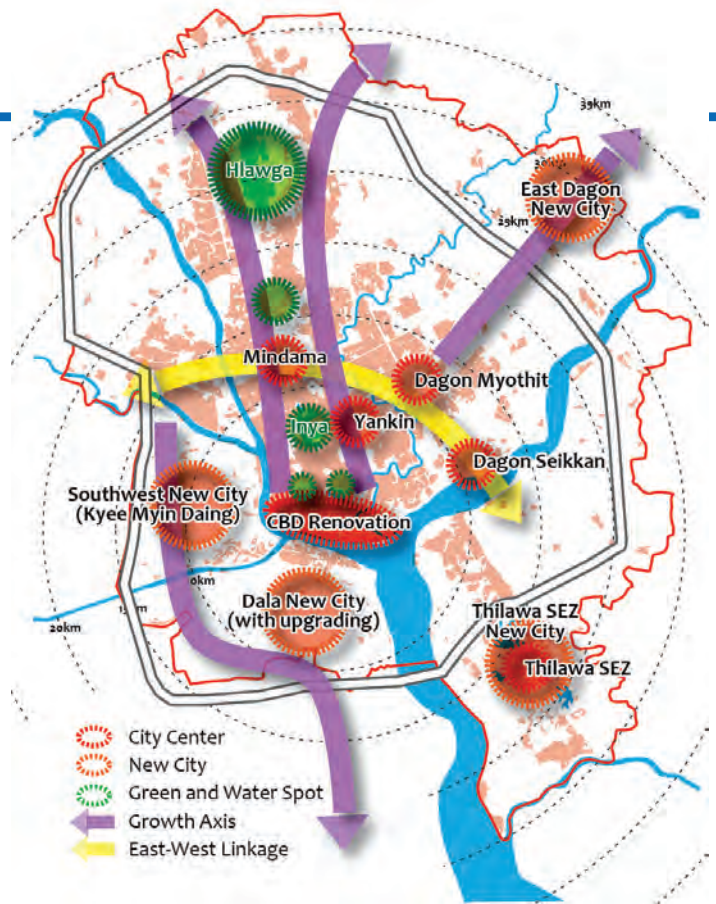


Figure: Development Direction

## Future Population

1. Baseline population is 5,538,448 (National Census in 2014)
2. Applying 2.60% of annual growth rate, the population of 2040 will be 10,794,920
3. New built-up areas shall be allocated to accommodate 5.2 million (increase population by 2040) in total.

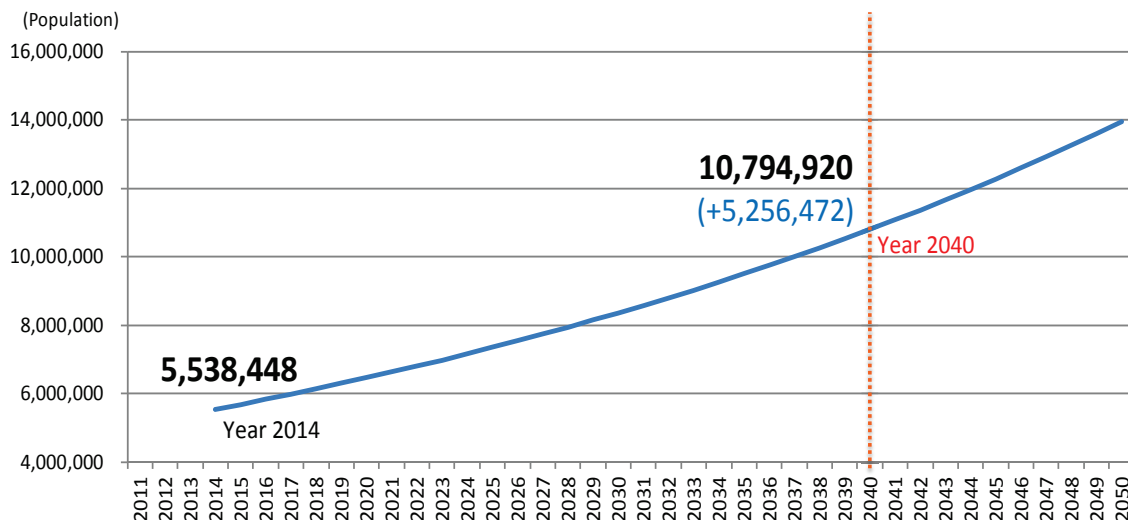


Figure: Population Forecast toward 2040



## Concept

### Sub-center with Green Isle System

- The proposed urban structure aims at decentralizing the urban center.
- Five sub-centers will be developed around 10-20 km radius area from the CBD.
- The urban structure also aims at controlling urban expansion by means of creating outer green belt.
- An outer ring road will be provided and future urbanization along the outer ring road will be promoted.
- Green areas including high productive agricultural areas will be conserved as much as possible.

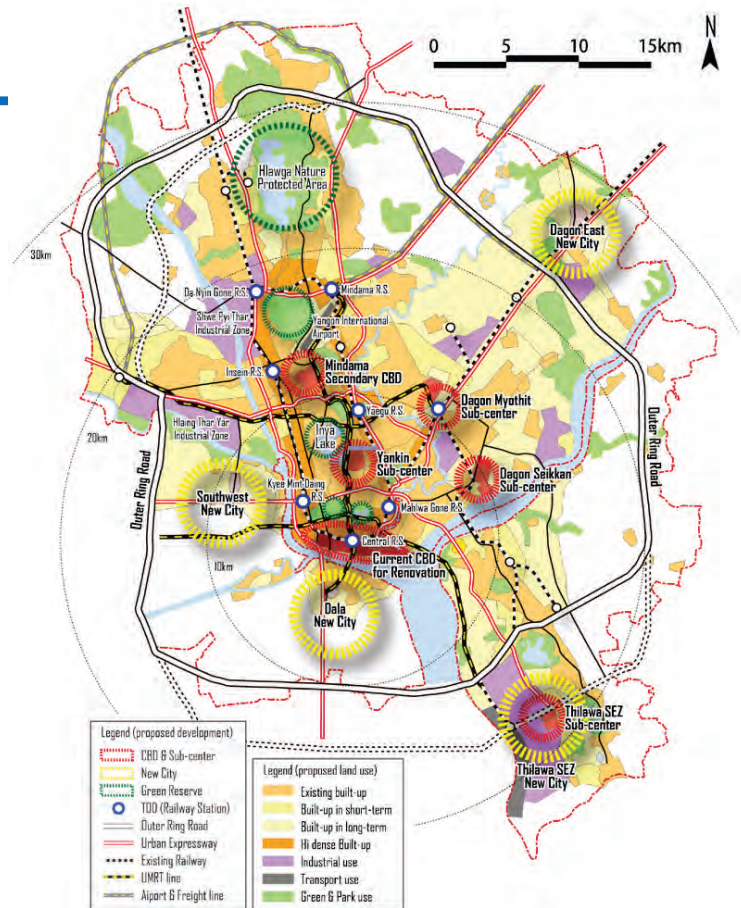


Figure: Urban Structure Plan 2016

# Sub-center Development

## Policy

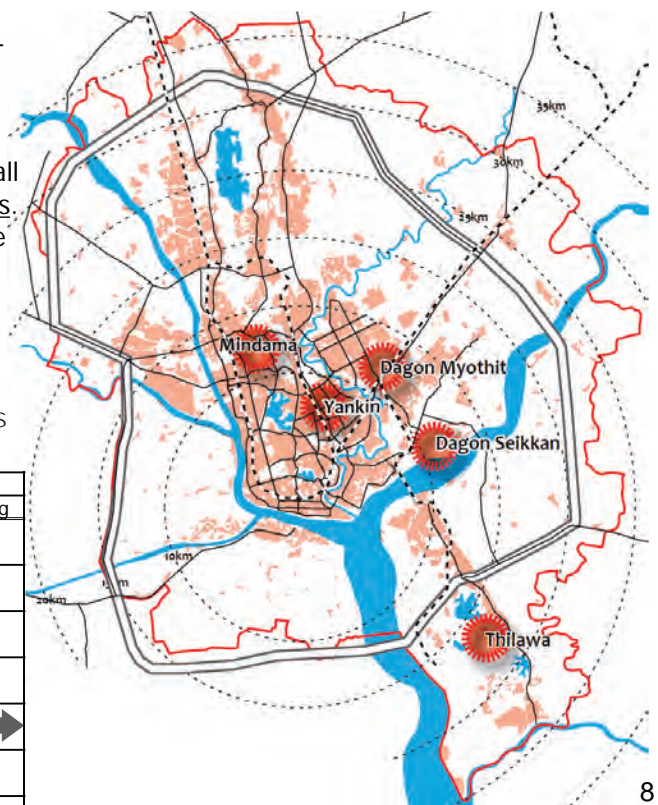
1. To promote decentralization, five sub-centers are designed around 10km distance from the exiting CBD.
2. To accelerate economic activities, commercial and business function shall be accumulated in public-owned lands.
3. To stimulate people's attention for the future, advanced and well-designed urban facilities shall be introduced.

## Spec

Total Site Area: 360ha (900acre)  
 Total Floor Area: 1,350ha (3,375cre)  
 No. of Estimated Labors: 270 thousands

Table: a List of Sub-centers

Name	Township	Net Area	Schedule		
			Sht	Mid	Lng
Mindama Secondary CBD	Mayangon	20 ha (50 acre)	→		
Mindama Secondary CBD	Insein	60 ha (150 acre)		→	
Yankin Sub-center	Yankin	80 ha (200 acre)	→		
Thilawa SEZ Sub-center	Thanlyin	40 ha (100 acre)	→		
Thikawa SEZ Sub-center	Kyauktan	80 ha (200 acre)			→
Dagon Myothit Sub-center	North Dagon	40 ha (100 acre)		→	
Dagon Seikkan Sub-center	South Dagon	40 ha (100 acre)		→	





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## Policy

1. To accommodate an amount of more population, 4 remote areas having a plenty of unused lands and farmlands are designed as new cities.
2. To be independence from exiting built-up, urban function for stand-alone shall be provided in close connection with work place and residence.
3. Rich green and water in the urban area shall be designed and provided.

## Area Spec

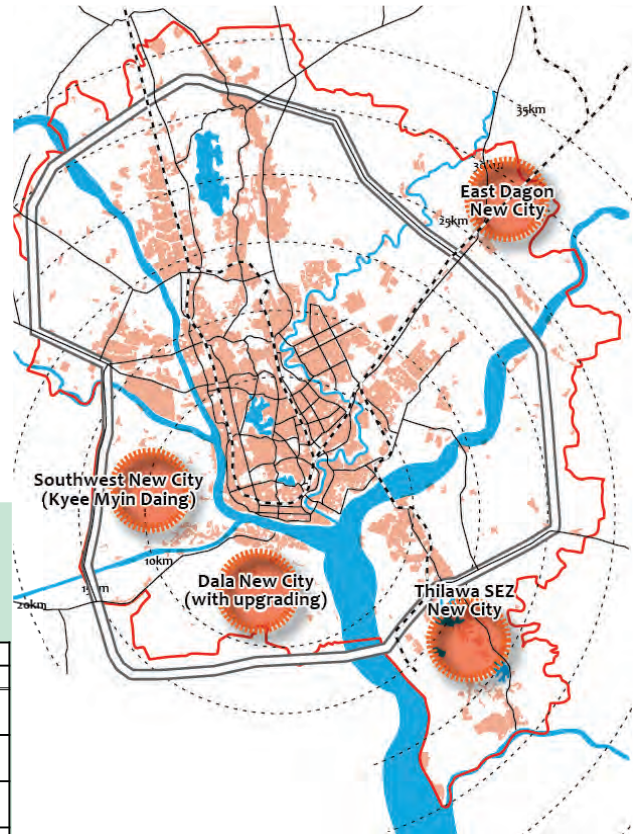
Total Site Area: 9,400ha (23,000acre)  
No. of Estimated Population: 1 million

## New Town Core

Total Site Area: 250ha (625acre)  
Total Floor Area: 680ha (1,700acre)  
No. of Estimated Labors: 136 thousands

Table: a List of New Town Cores

Name	Township Location	Net Area	Schedule		
			Sht	Mid	Lng
Kyee Myin Daing New Town Core	Twantay	50 ha (125 acre)	➔		
Kyee Myin Daing New Town Core	Kyee Myin Daing	50 ha (125 acre)		➔	
Dagon East New Town Core	East Dagon	100 ha (250 acre)		➔	
Dala New Town Core	Dala	50 ha (125 acre)			➔



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## Policy

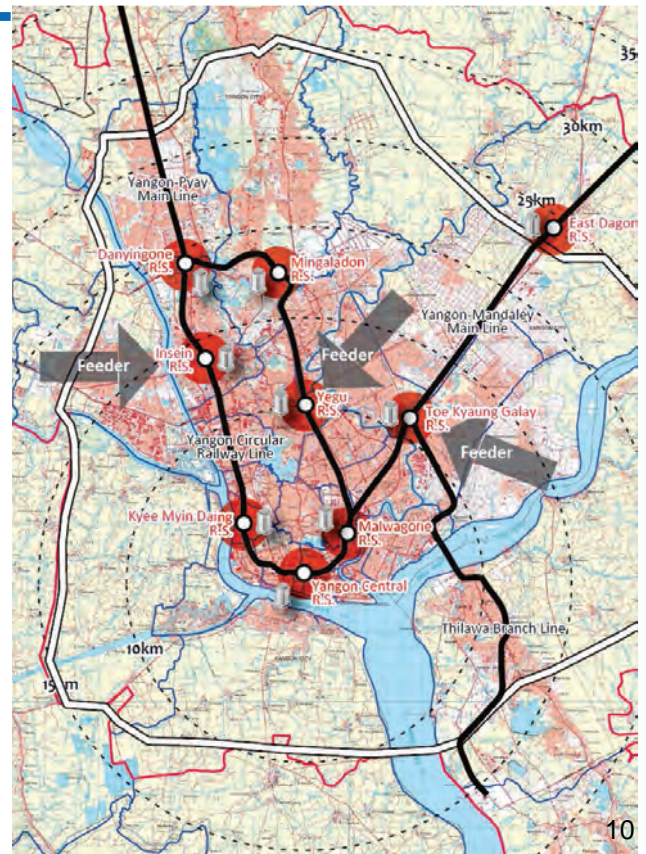
1. To function railway well and increase ridership, 7 railway station areas of YCR are designed for commercial/business and transit node.
2. To promote transit oriented development (TOD) coming from surrounding areas by feeder, multi-modal function shall be provided in the areas.

## Spec

Total Site Area: **150ha** (375acre)  
Total Floor Area: **500ha** (1,248acre)  
No. of Estimated Workers: **100 thousands**

Table: a List of Railway Station Areas

Name	Township	Net Area	Schedule		
			Sht	Mid	Lng
Yangon Central R.S.	Mingalar Taung Nynt	15 ha (38 acre)	➔		
Kyee Myin Daing R.S.	Kyee Myin Daing	5 ha (13 acre)		➔	
Malwagone R.S.	Mingalar Taung Nynt	40ha (100 acre)		➔	
Insein R.S.	Insein	20 ha (50 acre)	➔		
Yegu R.S.	Mayangon	10 ha (25 acre)	➔		
Mingaladon R.S.	Mingaladon	50 ha (125 acre)		➔	
Danyingone R.S.	Insein	10ha (25 acre)		➔	



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## Policy

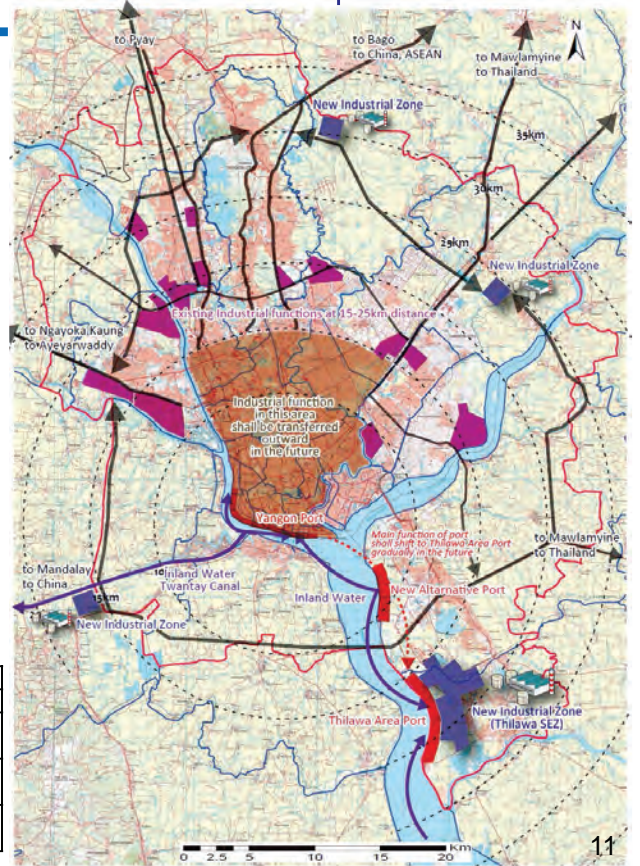
- Existing industrial zones shall be improved with advanced technologies, especially at Hlaing Thar Yar IZ and Shwe Pyi Thar IZ.
- To accommodate more factories and labors of secondary sectors, development of 3 new IZs is proposed along the outer ring road.
- By transferring logistics function of Yangon port to others, center area shall be free from logistics vehicles and industrial function.

## Spec

Total Site Area: 8,400ha (21,000acre)  
 No. of Estimated Labors: 609 thousands\*  
 \*80% of whole labors in secondary sector

Table: a List of Industrial Zones

Name	Net Area	Labor Pop	Schedule		
			Sht	Mid	Lng
Existing Industrial Zones	5,100ha	315,000	→		
Thilawa SEZ	2,400ha	218,000		→	→
3 New Industrial Zones (East Dagon, Twantay, & Hlegu)	900ha	76,000			→



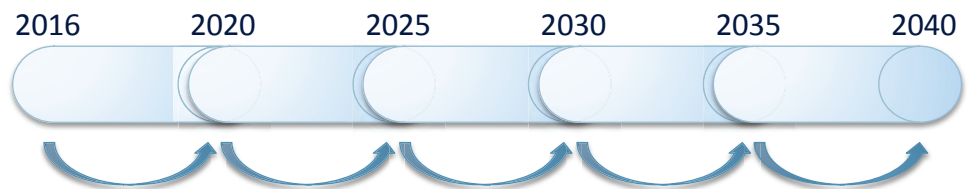
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# Priority Projects

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## Basic Concept

To achieve the development vision and realize the urban structure proposed in the SUDP, 42 priority projects, which are focal actions to be commenced by 2020 are selected. It is recommendable that the priority projects are to be planned, reviewed and updated every five years.



Key Project shall be planned every 5 years

From urban development management sector, 25 projects consisting of 1) urban development, 2) CBD renovation, and 3) social service and management, are proposed.

From infrastructure development sector, 17 projects, which are not only improvement of the existing infrastructure, but also strengthening of disaster resilience, are proposed.

## Summary

Total cost to conduct proposed priority projects for urban development management from SUDP is approximately 2,684 million USD as public investment.

**Table: Cost for Priority Projects**

Sector	Estimated Cost
Urban development management	885 mil USD
Urban Development	(480 mil USD)
CBD Renovation	(249 mil USD)
Social Service and Management	(155 mil USD)
Infrastructure development	1,799 mil USD
<b>TOTAL</b>	<b>2,684 mil USD</b>

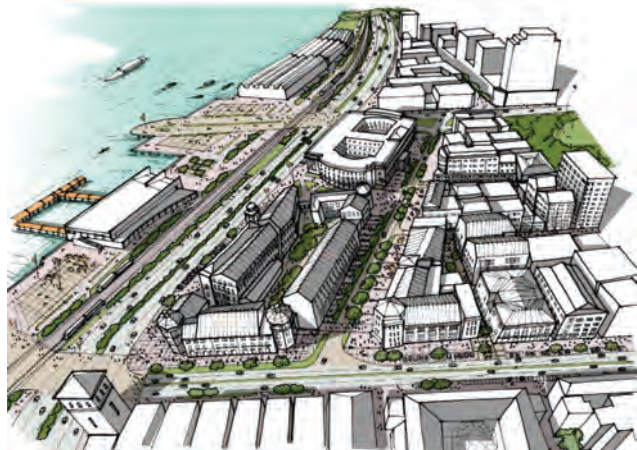
## CBD Renovation for 2020

### Objectives

- To improve the quality of roads, streets and public spaces
- To improve the environment of Sule Pagoda, the focal point of the city
- To begin to transform the waterfront to be a world-class city gateway

### Work Scope

1. Design and complete street improvements to Mahabandoola Park St, Bank St, and lower Pansodan St
2. Complete Waterfront Sule Landing Square and Warehouse 2









# *Appendix 3*

*Project Brochure*





# Yangon 2040 Attractive International Port and Logistic Hub Yangon

—A City of Blue, Green and Gold—

**The Updated Strategic Urban Development Plan of the Greater Yangon**

The Project for Updating the Strategic Urban Development Plan of the Greater Yangon

**Yangon Region Government**

**Yangon City Development Committee (YCDC)**

**Japan International Cooperation Agency (JICA)**

**JICA Study Team / NIPPON KOEI Co., Ltd.**

Kisho Kurokawa Architect & Associates

International Development Center of Japan Inc.

ALMEC Corporation



# 1. Introduction

## Background

Yangon Region, the largest economic center of Myanmar, has a population of approximately 7.4 million in 2014. The current rapid urbanization and increasing population are putting more pressure on the existing old infrastructure. Under such circumstances, The Project for the Strategic Urban Development Plan of the Greater Yangon (SUDP) was carried out with Yangon City Development Committee (YCDC) as its counterpart in order to proceed with efficient urban development for the Greater Yangon Region in 2013. Yangon Regional Government (YRG) adopted proceeding with urban development in Yangon under the direction of SUDP at a Cabinet meeting. Later, however, economic growth and rapid and massive changes in urban development happened in Yangon and private companies have been planning high-rise or large-scale urban and building development. The new administration of Myanmar, established in April 2016, strongly recognized that revised urban structure planning and enforced urban development management are necessary.

## Objectives

The primary objective of SUDP for the Greater Yangon are as follows:

- To present a comprehensive development vision in long term, targeting the year 2040,
- To present an urban structure for the realization of the development vision,
- To present development policies of urban function and infrastructure development,
- To identify necessary priority projects in short-term, targeting the year 2020, and
- To present strategies of urban development management for promoting implementation.

## Target Area

The target area is Greater Yangon, including Yangon City (829 km<sup>2</sup>) and parts of the six periphery townships of Kyauktan, Thanlyin, Hlegu, Hmawbi, Htantabin, and Twantay, which have a total area of approximately 1500 km<sup>2</sup>.

## Content of the Plan

- 1) Current Urban Conditions
- 2) Development Visions and Structure Plan
- 3) Urban Development Master Plan
- 4) Urban Infrastructure Development Strategy
- 5) Urban Development and Management Programs
- 6) Conclusions and Recommendations

# 2. Current Urban Conditions

## Socioeconomic Environment

### Socioeconomy

The Yangon Region has approximately 14% share in the national population and approximately 22% share in the country's gross domestic product (GDP). For this reason, Yangon is referred to as "the Economic Center of Myanmar". Yangon City has experienced rapid population growth in the past decade from 3.69 million in 1998 to 5.53 million in 2014. The average annual population growth rate in Yangon City between 1998 and 2014 is 2.09%. The average population growth rates of the central business district (CBD) and older suburbs zone are -0.10% and -0.03%. As of 2011, the ratio of the labor population to the total population in Yangon City was 50.8% (2.61 million). The labor population in the suburbs has been growing rapidly in recent years. Additionally, nearly 70% of the working population (1.78 million) is engaged in tertiary industries.

## Urban Planning and Land Use Conditions

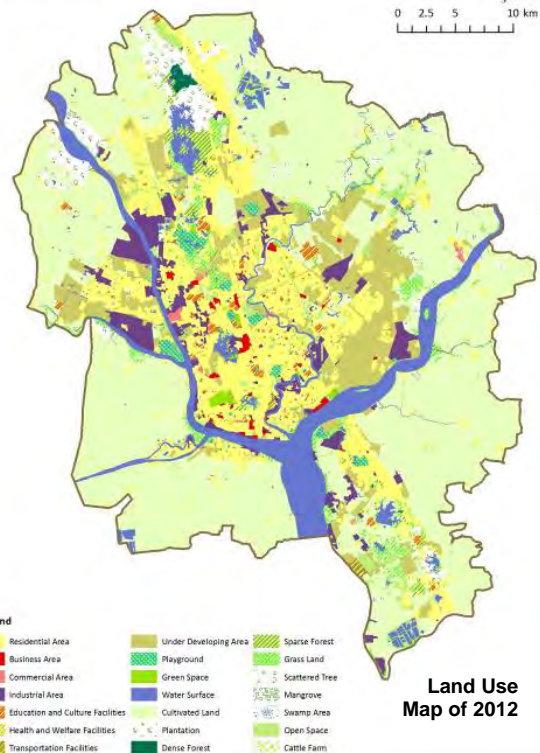
### Urban Planning

The State Constitution was ratified and promulgated in May 2011. With the adoption of the new constitution, relevant laws and regulations need to be enacted or modified. However, this process often takes a long time.

### Land Use

Regarding land use in 2012, agricultural areas occupied 51% of the total area, followed by urbanized areas which occupied 31%. It is somewhat unavoidable that the ratio of urbanized areas will increase in the future, while agricultural and open spaces will decrease gradually.

Land Use 2012





## Urban Infrastructure Conditions

### Urban Transport

Public transport in Yangon City accounts for over 90% of the total modal share. The most used public transport is bus (over 80%); however, the aged buses with crowded and unsafe operations are challenges. The circular railway (3%) is not functioning well as a public transport.

### Road Network

As the Greater Yangon area is divided by the Yangon River, Bago River, Hlaing River, and others, the development of the transport network is important to connect the separated areas. Due to the recent rapid increase in the number of cars, serious traffic jams have been observed especially during peak hours at main intersections and road sections. Road widening, construction of flyovers, reconfiguration of intersections, and advanced signal systems are therefore required.

### Railway

The current railway network in Greater Yangon is composed of 8 lines, which include 3 main lines and 5 branch lines (total of 148.3 km, 80 stations). It is absolutely insufficient considering the present population and urban structure in the future. Thus, it is required to construct new railway lines, Urban Mass Rapid Transit, and feeder transports such as monorails and Light Railway Transit.

### Ports and Logistics

To meet the recent rapid increase in cargo-handling volume, the expansion and modernization of the existing port facilities are necessary. Also, truck centers have become congested due to the rapid increase of cargo and truck sizes.

### Water Supply

Service coverage of the water supply system is about 33% in 2014. People with no service obtain water from other water sources like wells, ponds, and rain. Developing additional water sources, reduction of non-revenue water rate, and rehabilitation of aged pump stations in reservoirs and main transmission pipes are required.

### Sewerage

Service coverage of the existing sewerage system is merely less than 10%. Also, 120 years have passed after the construction of the existing sewerage collection system. Improving of existing sewerage system and providing new sewerage where necessary is required to meet the demand of the developing city.

### Power Supply

It is a very important and urgent issue to solve the shortage of power supply capacity with consideration of the increasing electricity demands in the future. The rehabilitation of existing and deteriorated power stations, and the development of new hydropower and gas turbine power stations, shall be the main solutions for such shortage.

### Solid Waste Management

As the current method of waste collection is heavily dependent on human workforce and time, efficient waste collection system is necessary. Also, as the vehicles for waste collection and transportation are very old, their replacement is required.

### Telecommunication

Progress of telecommunication sector can be found. However, improvement of regulations and institutional framework of both regulatory bodies and carriers are needed. Telenor and Ooredoo have entered the mobile phone business in Myanmar since September 2014. There are three carrier including the MPT at present. It has caused drastic increase of subscriber of mobile phones. Approximately 70% of the total population in Myanmar owns their mobile phones as of May 2016.

### Drainage and Flood

Flooding in Yangon is caused by several conditions such as harsh natural conditions, rapid urbanization and poor capacity of drainage system. Tentative phase planning of flood management programs should be implemented to reduce the flood inundation issues.

### Disaster Risk Management (Earthquake)

Yangon is located adjacent to a high-probability area of Sagaing Fault that has potential risk of earthquake in the future. According to research, soft layer or alluvium soil spreads out along rivers in Yangon. Thus, a seismic property of city infrastructure and buildings need to be improved for Yangon to achieve sustainable development.

### Disaster Risk Management (Fire)

In Yangon, about 200 fire accidents occur and about 20 people die every year. Though there are few number of deaths, markets and factories burn down every year. Generally, as the buildings are mostly constructed in concrete and bricks, there are only few fire spreads. Although the fire safety of Yangon is in good condition, enforcement of urban fire prevention provisions and introduction and implementation of the Fire Safety Code should be done for the future developed city.



### 3. Urban Development Master Plan

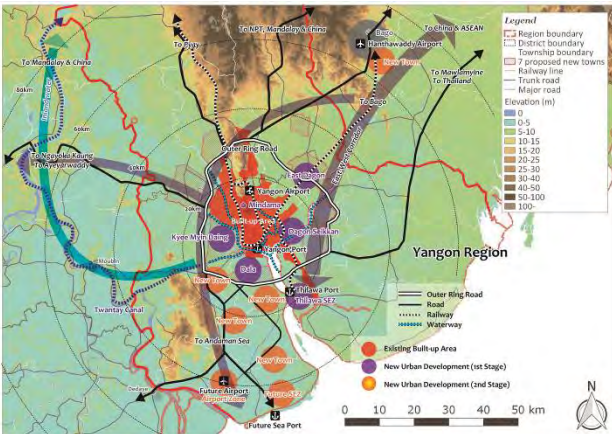
#### Schematic Structure

A schematic structure of the whole Yangon Region with its surrounding area shall be discussed in long-term span in order to draw the big picture of the future urban image of Yangon. Drawing and sharing different kinds of viewpoints and approaches are being considered and determining which directions and areas are to be developed as urban areas in the future. To achieve the future urban image requires a long period.

Currently, Yangon Region consists of a total of 44 townships, where, 33 townships are covered by the YCDC service area, which is Yangon City. Yangon Region has a population of approximately 7.4 million and the YCDC has a population of approximately 5.2 million. Applying an annual growth rate of 2.6%, the future population for year 2065 will be 27.2 million in the Yangon Region which means that there will be an increase of 20 million in the population.

To manage such large city and to accommodate such large number of population properly and actively, step-wise urban development with appropriate infrastructure provision must be conducted together with governmental initiative in good relation with positive private activities and citizen's understanding and cooperation.

The following schematic structure shows the future image of Yangon in 2065.



Schematic Structure of Yangon Region

#### Development Vision for 2040

In consideration of the discussions among YCDC, the Ministry of Construction and other relevant organizations, the slogan “Yangon 2040, Attractive International Port & Logistic HUB, A City of Blue, Green and Gold” was set, aiming to achieve peace through Myanmar democratization and making the city beloved by all its citizens. The slogan also consists of rich green images of natural environment and gold lighting of Shwedagon Pagoda. Based on the slogan, the four pillars of development vision are summarized as follows:



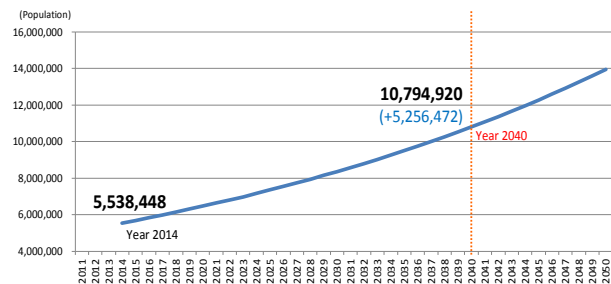
Development Visions (One Statement and Four Key Drivers)

#### Socio-economic Framework

**Population:** The population forecast was revised from year 2013 based on the latest census collected in 2014. The future population of Greater Yangon is estimated to be 10.8 million in 2040, considering the past average growth rate of 2.6% (same level as the past trend of the Bangkok Metropolitan Area).

**Labor Force:** The labor participation rate will improve gradually from 50.8% in 2011 to 55.0% in 2040. At this rate, the future labor force was estimated to be 6.45 million people based on the population projection.

**Economy:** The GRDP of Greater Yangon was estimated to be USD 112,295 million.



Future Population Forecast

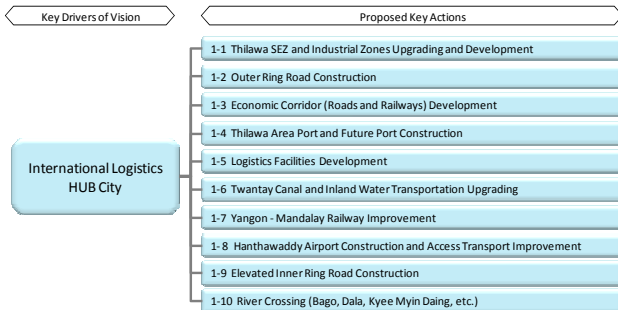




## Urban Development Strategy

### To be an International Logistics Hub City

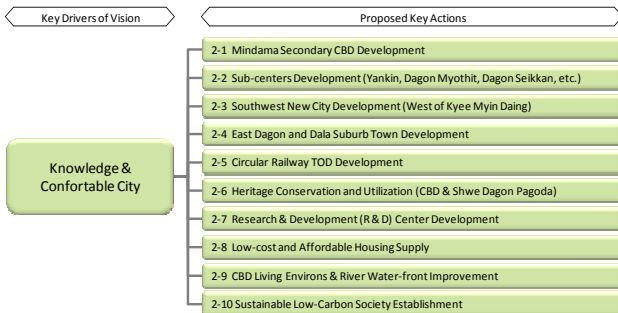
Yangon is expected to be an “International Logistics Hub City” with attractive and competitive urban and logistics functions. It is also expected to be an international business city with integration of Information Technology (IT), manufacturing and service industries.



Proposed Key Actions for International Logistics HUB City

### To be a Knowledge and Comfortable City

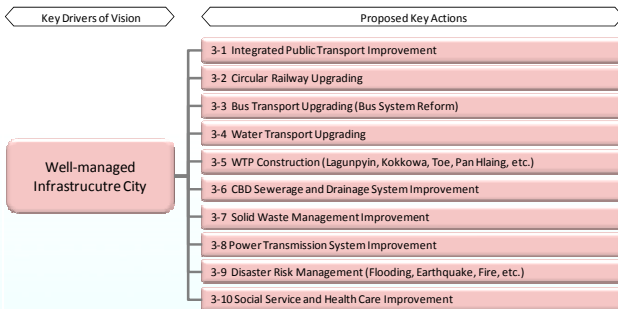
Yangon is expected to be a “Knowledgeable and Comfortable City”, where everyone who lives and works in Yangon should be able to demonstrate their potentials and abilities and to enjoy a more comfortable living in consideration of environment and social aspects.



Proposed Key Actions for Knowledge and Comfortable City

### To be a Well-managed Infrastructure City

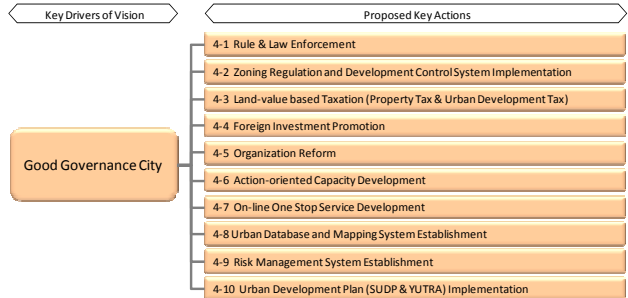
To achieve an International logistics HUB city, urban infrastructure development must be the focal factors. To provide a safer, more reliable and convenient urban life and to realize economic development and industrialization, the vision of becoming a “Well-managed Infrastructure City” must be realized for the future, especially in transportation and road, electricity and water supply. A concept of “public safety” should be thoroughly considered by securing safer sanitation.



Proposed Key Actions for Well-managed Infrastructure City

### To be a Good Governance City

To establish a good city both for living and business, to be a “Good Governance City” is an indispensable key factor. To realize this urban development activities and building constructions based on land use plan and implements infrastructure development and social service projects based on the development strategies and action plans. A concept of “Social Benefit” should be thoroughly considered.



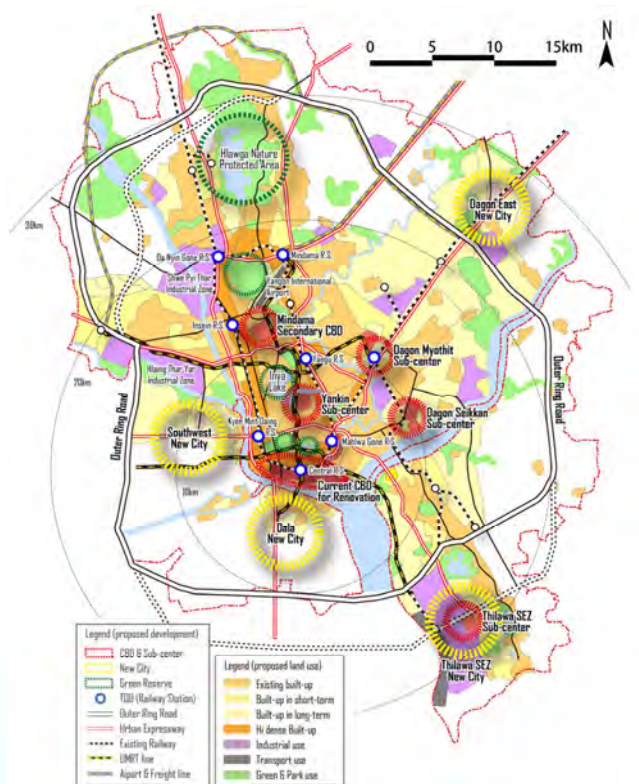
Proposed Key Actions for Good Governance City

## Land Use Plan

### Land Use Plan

The proposed urban structure aims at decentralizing the urban center. Five sub-centers will be developed around 10-20km radius area from the CBD.

In line with development principles future urban structure plan for the Greater Yangon is formed through discussion with the YRG, the YCDC, and other related organizations.



Urban Structure Plan of the Greater Yangon in 2040



## 4. Urban Infrastructure Development Strategy

### Water Supply

**Provision of safe and clean water to more citizens with appropriate volume, pressure, and price; and realization of sustainable management**

- 1) Development of water resources of Lagunbyin Reservoir, the Korkkova River, the Toe River, and the Pan Hlaing River.
- 2) Development of transmission/ distribution system to cover 73% of the total population in the Greater Yangon.
- 3) Enhancement of management capacity and reduction of NRW ratio to 15% in 2040 for proper management.
- 4) Improvement of water quality control for serving safety water with 100% compliance with World Health Organization (WHO) guidelines.



### Drainage and Flood

**Resolution of “frequent flood with small damage” in priority areas and Preparedness for response against “infrequent flood with large damage”**

- 1) Flood risk assessment to establish fundamental information for urban development plan (land use and infrastructure) and disaster preparedness measures.
- 2) Structural measures for flood inundations in the priority area (first: CBD) and lowlands in the periphery areas to be newly developed as subcenters of the Greater Yangon.
- 3) Arrangement of safety nets for human life against flood disasters in flood prone areas.
- 4) Capacity development of human resources of related authorities to manage flood.



### Sewerage

**To create clean and safe water environment**

- 1) Development of sewage collecting system targeting for the total coverage ratio of 59% of the total population in Greater Yangon (approximately 4% as of 2016).
- 2) Development of sewage collecting system at New Town, namely Kyee Myin Daing, East Dagon, and Dala New Town, will be studied in consideration of developing conditions at these new town accordingly.
- 3) Development of Waste Water Treatment Plant with development of collecting system.
- 4) Improvement of situation, organization, and human resources.



### Power Supply

**Realization of a Stable Electrical Power Supply of High Quality and Sufficient Quantity for Securing Advanced Urban Functions**

- 1) Capacity development for planning and O&M for the electrical power system.
- 2) Development/improvement of the power stations  
Development/improvement of transmission/distribution lines and substations.





## Solid Waste Management

**Creating a clean and comfortable city on sound material cycle society through participation of citizens, enterprises and government**

- 1) Installation of necessary infrastructures.
- 2) Appropriate industrial and hazardous waste management
- 3) Restraint of waste generation
- 4) Promotion of 3R (waste reduction, waste reuse, and waste recycling)
- 5) Participation of citizens, enterprises, government



## Telecommunication

**Creation of Advanced Information and Communication Society**

- 1) Development of telecom network with high connectivity, stability, and speed
- 2) Enhancement of internet infrastructure and facilities  
Improvement of international telecommunication service



## Disaster Risk Management (Earthquake)

**Improvement of building seismic properties and construction technologies**

**Legal System Reform**

- 1) Establish building standards related law (MNBC is in the process of creation)
- 2) Establishment of construction status monitoring system
- 3) Institution to improve construction quality
- 4) Building quake-proof city
- 5) Establishment of disaster response policy and enforcement of reinforced aseismic capacity for existing buildings

## Disaster Risk Management (Fire)

**Provision of fire prevention for a safer city**

- 1) Enforcement of the urban fire prevention provision based on the policy of each area  
<High Dense Area>
  - Improvement of road environment for firefighting
  - To suppress a huge fire<Low Dense Area and New Towns>
  - To promote setting up of fire stations and towns having fire spread prevention function
- 2) Introduce and implement the Fire Safety Code





## 5. CBD Renovation

### Vision for the CBD

The overall vision for the CBD is to create a livable city that respects the community and cultural heritage of the CBD including its built heritage, which will continue to present a distinctive face of Yangon that will contribute, in a complementary way, to the economic development and success of the wider metropolitan region and country.

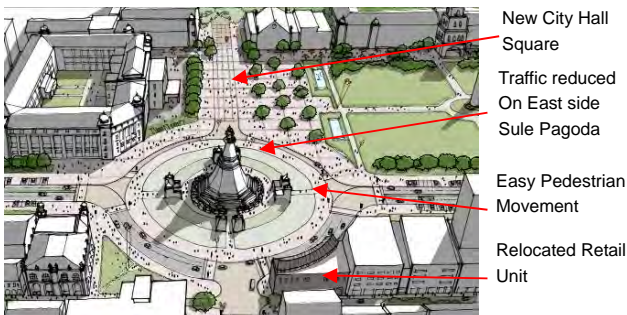
### Policies for the CBD

There are main policies for the development of CBD are Heritage and Design, Transportation and Road, Urban and Infrastructure Development and Urban Amenity and Tourism.

### Key Projects for the CBD

#### Sule Pagoda and City Hall Environs

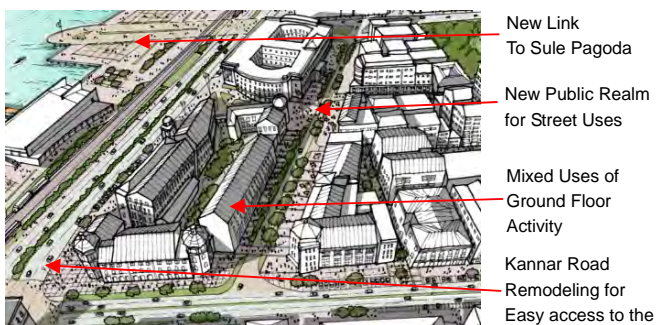
The main objectives of this project are to restore an appropriate setting for the Sule Pagoda, improve pedestrian access to the Pagoda, and create a larger pedestrian dominated civic space to the surrounding places and to place Sule Pagoda at the center of a larger project to illustrate how key north-south streets can be transformed into attractive, pedestrian friendly spaces.



**Sule Pagoda and Environs and Sule Pagoda Road Visualization**

#### Bank Street

The main objectives of this project are to regenerate Bank Street, bringing life and activity to an underutilized space, introduce a new mix of activities and building uses to show the potential for daytime and night time activity and use, show how buildings with heritage value can be adapted and reused to meet contemporary economic needs and integrate the building uses and the public realm and to show how the use of the public realm can vary during the day and the week.



**Bank Street and Waterfront Visualization**

## 6. Urban Development and Management Programs

### Priority Projects

To achieve the development vision and realize the urban structure, 42 priority projects, which are focal actions to be commenced by 2020, are selected.

The number of priority projects for different sectors are defined as follows:

- **Urban Development Management Sector (Total 25 projects)**

- Urban Development Projects – 9 projects
- CBD Renovation Projects – 10 projects
- Social Service and Management Projects – 6 projects

- **Infrastructure Development Related (Total 17 projects)**

It is recommendable that priority projects are to be planned, reviewed and updated every five years through monitoring regarding the progress of conducting projects and change of circumstances.

Version: February 2018

