

GUIDELINES FOR URBAN PLANNING

PREPARED FOR THE REPUBLIC OF THE UNION OF MYANMAR

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UN-HABITAT | LAB
urban planning and design



Initiative by



ARCADIS with UN-Habitat

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INTRODUCTION

UN-Habitat supports city, regional and national authorities to improve and adopt policies, plans and designs for more compact, socially inclusive, better integrated and connected cities that foster sustainable urban development and are resilient to climate change. As Myanmar is pushing for a sustainable approach to urbanization, it increasingly needs planning capacity. This document is intended to support such development of technical planning expertise.

The document should be disseminated to those in charge of planning in their cities and townships, to act as a handbook for the initial research and design phases of planning.

The Guidelines for Urban Planning are based on five principles for sustainable urban development that UN-Habitat promotes for the 21st century's urban development. It also proposes a step-by-step method for review and development of current and future plans that can be adopted by local planners. This planning and review approach is illustrated by comments and analysis on the plans of Pyay and Kalay both in citywide and city extension scales. Finally, it provides a set of references for sections and blocks that can be implemented in new developments in Myanmar.

TABLE OF CONTENTS

Introduction	PAGE 4
UN-Habitat and Myanmar	PAGE 6
Sustainable Planning Principles	PAGE 8
Guidelines for Urban Planning	PAGE 10
Step-by-step planning	PAGE 12
Case Study Kalay	PAGE 22
Case Study Pyay	PAGE 26
APPENDIX A / Block Improvements	PAGE 30
APPENDIX B / Reference Street Sections	PAGE 32
Further Reading	PAGE 38



workshop Naypiday 2015 by Rogier van den Berg

UN HABITAT AND MYANMAR

In addition to UN-Habitat's continuous presence in Myanmar, over the course of recent years, UN-Habitat and the Government of the Union of Myanmar met several times to determine the potential scope of collaboration and to determine how UN-Habitat can best provide technical and advisory support on urban issues. Building on that, UN-Habitat HQ conducted a mission in Myanmar October 5-16, 2014 and met with several government agencies to discuss Myanmar's current planning challenges and needs. Based on these mission findings UN-Habitat made the following three propositions where UN-Habitat can possibly support and contribute:

- Developing a National Urban Policy
- A full-phased Capacity Development Programme
- Guidelines for Township Urban Development Plans

At present, the Ministry of Construction (MOC) is preparing township development plans for 81 cities with limited manpower and technical capacity. The majority of these plans are ready and pending approval from the Ministry of Construction. However, these plans can clearly be improved upon by applying sustainable urban planning principles. During the HQ mission in Myanmar, an expert team visited Kalay and Pyay towns for which MOC has prepared plans for both the city-wide and city extensions scales. During this visit, UN-Habitat team met with agencies and individuals who were involved both directly and indirectly in the plan-making process. UN-Habitat proposed

to develop guidelines based on these sustainable planning principles to review and improve the existing plans and guide future sustainable plans in Myanmar.

The results of the plan analysis have been shared with relevant ministries and technical agencies for validation through a series of participatory workshops in Myanmar. This workshop took place in 2015 under supervision of UN-Habitat and ARCADIS Shelter Program. After the workshop, the recommendations and comments from the participants have been received and have been finalized in this document.

The first section of this document explains the five principles for sustainable urban development that UN-Habitat is promoting for the 21st century's urban development. The second section recommends a step-by-step approach for urban planning that can be adopted by local planners in Myanmar. The third section will provide comments and analysis on the plans of Pyay and Kalay both in citywide and city extension scales based on the five principles. The fourth section sums up the planning lessons in a set of guidelines that can act as reference for planners in Myanmar.

PLANNING CONTEXT IN MYANMAR

Strategically, Myanmar is located as a potential land bridge between South and Southeast Asia as the country shares borders with Bangladesh, China, India, Laos and Thailand. At present, the total population of Myanmar is 54.4 million, and the 2014 Census revealed that just under 30% of the population lives in urban areas.

Following the initiation of the reform process by the Government of the Republic of the Union of Myanmar in 2011, the country has seen a general trend towards social and economic liberalization, a more market-oriented economy, and a goal of decentralization of government functions. Although still a predominantly rural based country, urbanization and urban development have become key drivers for the country to address development challenges like providing jobs, the provision of socio-economic services and managing the environment. However, Myanmar's rapid economic development will accelerate urbanization and will also increase the size of the cities and urban centres, putting additional pressure on existing urban infrastructure and services.

At the present population growth rate, the urban population will reach around 36% by 2030. Research has suggested that number of people living in large cities with over 200,000 population will double from 13% to 26% in this time. In this urbanization process, small and intermediate towns play an important role as a bridge between the rural population and larger cities as they are generally more accessible to this population. However, the small townships struggle to manage the resulting growth, and have difficulties meeting the demand for housing, attract investment, land tenure, infrastructure and basic urban services.

While the government has devoted itself to leading sustainable urban development in Myanmar and preparing township plans for the next 20 years, it should also consider how rural-urban linkages can play a role in the development process of these small and secondary townships.

UN-Habitat can assist in designing tools and systems that help cities and towns leverage urbanization for sustainable growth by securing public space and effective street networks, promoting land tenure security, developing plotting systems that accommodate mixed-use economic development and land tenure tools that respond to the needs and issues of the potential rural-urban relation for small towns/townships in Myanmar.



Yangon by Rogier van den Berg

SUSTAINABLE PLANNING PRINCIPLES

The planning practices in the twentieth century were characterized by an urban planning model that caused fragmented and zoned built environments with sprawling low-density residential areas and disconnected high-density residential areas. Separation of functions has affected the liveability of the city by segregating urban functions and neighbourhoods. This has led to an increase of energy consumption and a reduction of productivity. As sprawl made public transportation and service delivery often unaffordable, connectivity in the twentieth century planning model mainly relied on the car as mode of transportation and created streets with little economic activity or vibrancy.

Addressing the problems caused in 20th century, UN-Habitat developed sustainable urban planning principles to guide urban development of 21st century. The main objectives of these principles are:

- To promote compactness and maximize land efficiency;
- To promote diverse, and thriving communities;
- To encourage walkable neighborhoods;
- To promote street connectivity;
- To foster employment and local consumption and
- To provide a diversity of housing options that are adapted to the social needs.

FIVE SUSTAINABLE URBAN PLANNING PRINCIPLES:

1. ADEQUATE SPACE FOR STREETS AND AN EFFICIENT STREET NETWORK

UN-Habitat considers the street as the most important public space where people interact on a daily basis. The street is a structural element that shapes urban form and determines the pattern of development of blocks, streets, buildings, open spaces and landscape. Sufficient space allocated to streets contributes to improved connectivity, which fosters economic development. As an indicator, in developing countries land allocated to streets is low, varying between 6-12%, compared to cities in developed countries where it averages 29%. Additional 15-20% land should be allocated for other open/green public spaces. Specifically, street connectivity refers to the density of connections and nodes in a street network and the directness of the links between settlements and correlates positively with increased efficiency (and multi-modality) of flows and access to jobs and services. As connectivity increases, travel distances decrease and route options and travel modes increase, allowing more direct travel between destinations, creating a more accessible and resilient system. This principle proposes a grid and a hierarchy of streets with arterial and secondary roads that are well connected through intersections

2. MIXED LAND USE AND LIMITED LAND-USE SPECIALIZATION

Mixed-use development is aimed at developing a range of compatible land uses and functions and provides a cross section of residential, commercial and community infrastructure in a building, block or neighbourhood while reducing the demand for commuter travel by reducing the distances between the vertices of the so-called 'home-work-services' triangle, and facilitating agglomeration economies. Translated in guidelines, it proposes that at least 40% of total floor space should be allocated for economic use both on the city and neighborhood level plans and designs. It also recommends to minimize single function blocks to not more than 10% of total land use.

3. SOCIAL MIX:

This principle aims at promoting cohesion and interaction between different social classes in the same community and to ensure accessibility to equitable urban opportunities by providing different types of housing. Social mix provides the basis for healthy social networks, which are the driving force of city life. The objectives of the social mix areas are to promote more social interaction, avoid exclusion, to attract a diverse array of services, and to foster multi-level employment within the community. The principle suggests that 20-50% residential space should be reserved for affordable housing.

4. ADEQUATE AND WELL-DESIGNED DENSITY:

By creating high-density areas, cities can accommodate population growth and ensure land is used in accordance with demand. Furthermore, a planned densification strategy significantly minimizes the cost of providing key urban services such as urban infrastructure. For example, the cost for providing water supply and disposal facilities, sewerage network in high-density area is lower than in a sprawling area because of proximity and integration. UN-Habitat's density principle proposes at least 15,000 people/km²,

5. CONNECTIVITY:

Strengthens the physical, social and virtual relationship between people, places and goods. At regional level, connectivity links centres of production and consumption with the view of strengthening systems of cities and urban-rural linkages. At city level, connectivity is closely related to mobility and the permeability of an area. The design of the street section is crucial to be able to foster walking and the use of multiple modes of transport. An adequate street network as mentioned earlier is essential but it needs proper street design and public transport. Furthermore there should be a clear connection between the building and the street. This avoids dark and unsafe streets, makes streets attractive and encourages economic usage of the plinth of buildings. The principle promotes a focus on public transport. It also promotes walking distances to public transport centers and local services. This reduces the reliance on cars, increases street activity, and allows vulnerable groups to make a livelihood by making jobs more accessible.

PRINCIPLE 1

Adequate space for streets
30-35% space for streets
15-20% open/green space
At least 18km of street / km²
At least 100 intersections / km²
Short building blocks

PRINCIPLE 2

Mixed land Use
at least 40% economic use
30-50% residential use
Avoid zoning and avoid
dividing neighborhoods
<10% single use blocks

PRINCIPLE 3

Social Mix
20-50% of residential area for
low-cost housing
A range of different rent levels
Spatial combined rental and
ownership property models.

PRINCIPLE 4

Adequate Density
Around 15.000 people/km²

PRINCIPLE 5

Connectivity
Provision of public transport
Emphasis on walking
distances.
Clear connection building-
street

URBAN PLANNING GUIDELINES

If done well, urban planning contributes to improved economic and social prosperity and to a better use of scarce resources. These planning guidelines are a reference framework for improving policies, plans, designs and implementation processes for cities that are more compact, inclusive, connected, and resilient to climate change.

It should be taken into consideration that in addition to these guidelines, the successful implementation of plans always requires strong political will, appropriate partnerships involving all relevant stakeholders and three key enabling components:

1. An enforceable and transparent legal framework
2. Sound urban planning and design.
3. A financial plan for affordability and cost-effectiveness.

1. ADVANCE PLANNING

Plan in advance of urban population growth through the layout of adequate extension or infill areas, particularly in areas with rapid ongoing urbanization processes to ensure sufficient supply of serviceable plots, and to prevent the formation of slums. Make population growth projections and spatial scenarios for accommodating the anticipated population numbers. Prioritize and plan phasing for the desired spatial outcomes within adequate time spans based on appropriate feasibility studies. Approve, keep under continuous review and update (for example every 5 years) urban and territorial plans under the relevant jurisdiction.

2. PROCESS

People who live, work, and do business in a city are in the best position to know what its problems are, what it does well, and how it can be improved. Engage in dynamic partnerships from the onset of the planning process, including with the private sector and civic society, to ensure that urban and territorial planning coordinates the spatial location and distribution of activities and services and to ensure that all voices from the community are heard and all affected citizens included. Set up frameworks for negotiating contestable issues between affected stakeholders. Make sure vulnerable groups such as informal settlement dwellers, women, children and the disabled are included. Promote strategic and iterative planning processes that foster stakeholder engagement to improve plan endorsement and implementation. Communicate clearly and share information on plans as part of basic right to information. Create dedicated taskforces that coordinate decisions and drive and guide the planning process. This helps to speed up the process, reduces the implementation costs and prevents conflict and protest.

3. INTEGRATION

Ensure that land-use plans, the development of basic services and infrastructure planning are geographically interconnected and implementation is coordinated. Collaborate with service providers, land developers and landowners to closely link spatial and sectorial planning and to promote coordination between services such as water, sewerage and sanitation, energy and electricity, telecommunications and transport. Make sure all ministries are engaged and collaborating in the planning process.

4. LAND MARKETS

Use urban planning to reduce land speculation by managing land markets, and creating and guiding a market for development rights.

5. IMPLEMENTATION

Include a clear and detailed component on investment planning, including expected contributions by the public and private sectors to cover capital, operation and maintenance costs to mobilize appropriate resources (local taxes, endogenous income, reliable transfer mechanisms, etc.). Create clear legislation and regulations that are practical and easily enforceable to ensure implementation.

Ensure legal protection of public space, social mix, affordable housing and basic services for disadvantaged and low-income groups.

Promote compact cities and control urban sprawl by developing densification strategies and limit, where appropriate, the footprint of urban areas to mitigate climate change and reduce disaster risks, protect natural open spaces, enable the affordable provision of basic services and easier access to social facilities. Design neighborhoods of adequate density through infill or planned extension strategies to trigger economies of scale, reduce travel needs and the costs of service provision, and enable a cost-effective public transport system.

6. COMPACTNESS/DENSITY

Create an adequate street pattern with short block sizes and sufficient intersections to increase walkability and connectivity, and reduce traffic congestion and pollution. Create a regular street network that can support the installation of basic services such as water, sewage, waste water and solid waste management. Recognize that a major role of urban and territorial planning is to constitute the basis for efficient trunk infrastructure development, improved mobility and the structuring of urban nodes. Secure adequate space for streets, in order to develop a safe, comfortable and efficient street network, allowing a high degree of connectivity and encouraging non-motorized transport. Design streets that encourage walking, the use of non-motorized transport such as cycling and public transport. Provide dedicated sufficient space for pedestrian and bike movement, as well as access for disabled people.

7. CONNECTIVITY/STREETS

Provide good quality public spaces, improve and revitalize existing public spaces, such as squares, streets, markets, green areas and sports complexes, and make them safer, in line with the needs of women, men, youth, and the disabled. Streets are public spaces and often places for income generation and have proven to add value to surrounding property. Active streets and ground floors also increase public safety and security.

8. PUBLIC SPACE

Consider ecosystem and ecological dynamics as important spatial elements and integrate this perspective in planning at different scales. Identify, revitalize, protect and produce high-quality public and green spaces with special ecological or heritage value, to avoid the creation of heat islands, protect the local biodiversity and support the creation of multifunctional public green spaces, such as wetlands for rainwater retention and absorption.

9. GREEN/BLUE NETWORK

Develop and implement policies and regulations that encourage social integration and mixed land use to offer an attractive and affordable spectrum of services, housing and working opportunities for a wide range of the population and different income groups, planning sufficient low cost and affordable housing. Plan mixed-use blocks and plots, increasing easy access to different services, such as shops, bars, sports or culture. Take advantage of progressive zoning regulations, such as form-based code or performance-based zoning.

10. MIXED USE/SOCIAL MIX

Assess the implications and potential impacts of climate change and prepare for the continuity of key urban functions during disasters or crises. Plan based on environmental conditions that prioritize the protection of ecologically valuable areas such as agricultural land and important water streams.

11. ENVIRONMENT

Recognize the local specificities and cultural heritage to protect, advance and integrate it into the plan.

12. HERITAGE & IDENTITY



Yangon by Rogier van den Berg

STEP-BY-STEP PLANNING

The goal of this planning method is to create a preliminary design based on the information available. The planning method recognizes the importance of urban form in sustainable urban development. The resulting design can then be used as input for further research, for example the confirmation on the ground of the assumptions made. This step-by-step planning approach is designed to speed up the planning and design process by taking the actual plan as point of departure. It can be used in an initial desk-research and design phase. The design should also be used for discussion and negotiation with other stakeholders, such as technical experts, developers, decision makers and civic society.

The method is based on the philosophy that design is the point of departure from which through debate and reflection, testing and improving, a common vision is reached. If design is integrated throughout the whole process - from research phase to detailed phase - it can propose tangible negotiable directions, define problems and provide momentum to every phase of planning. Following this step-by-step approach is the first step in such collaborative planning approach.

The approach is based on four steps: analysis, projection, design, and implementation. First the physical layout of the city should be determined to understand the possibilities the city form allows. Afterwards, a realistic projection of population requirements should be made, to calculate future land-use. The following step is to determine the location of the infill or extension, after which decisions can be made regarding urban pattern and street sections. Finally, a realistic implementation plans should be proposed.

STEP-BY-STEP PLANNING PROCESS

1. PHYSICAL LAYOUT

goal: city-wide analysis and identification extension/infill area.

- Identify main access points (roads from city to highway);
- Identify important areas (river, water, infrastructure, built-up area);
- Identify legal restrictions (rural, national parks, legal boundaries);
- Identify important economic areas (CBD, income generation areas, areas of growth, agricultural land);
- Map potential locations for extensions and/or infill.

2. PLANNED CITY EXTENSION / PLANNED CITY INFILL.

goal: realistic assessment of required land.

- Determine expected future population and population growth;
- Calculate land requirements with three different densities;
- Add land requirement for housing backlog in the projected period;
- List necessary public program for expected population (e.g. schools, parks, firestation etc.).

3. URBAN PATTERN AND FABRIC

goal: mixed use, social mix, sufficient land for public space.

- Determine street network and main streets;
- Determine block size and draw in plotting for one block;
- Determine road widths and street profile;
- Determine location of main open spaces and their linkages;
- Determine green/blue network.

4. IMPLEMENTATION

goal: realistic implementation plan.

- Discuss phasing / designing a timeframe for plan implementation;
- Identify public and private investment;
- Propose funding mechanisms for the public investments;
- Propose mechanisms for regulating land for private development;
- Propose form-based codes / design codes / design guidebooks

1. PHYSICAL LAYOUT / CITY WIDE SCALE

1. Identify main access points and infrastructure (roads from city to highway).
2. Identify important areas (river, water, built-up area)
3. Identify boundary of urban growth and footprint of built-up area.
4. Identify important natural constraints (topography, rivers, parks, forests, wetlands, agriculture)
5. Identify environmental and other threats and risk areas.
6. Identify legal restrictions (protected natural areas, heritage sites).
7. Identify important economic areas (CBD, income generation areas, areas of growth, agricultural land, industrial areas)
8. Indicate bigger areas of vacant land with potential for development into extensions and/or infill.

City extensions and infill developments need infrastructure to serve the needs of households, businesses and social facilities. If the extension or infill connects to existing infrastructure and is close to existing economic centers, this saves costs of building infrastructure and reduces the distance to jobs for new residents. This can often mean that it is better to create a city extension area, rather than a new town or an urban area at a distance from the existing city.

Areas prone to risk, such as watercourses, steep hills, or flooding areas should be indicated on the map. These areas should be excluded from building. River, waters and green area's constitute the 'green and blue' infrastructure of the city.

Economic and service areas, such as industrial zones and airports should be mapped because they can produce disagreeable odors or noise or other kinds of pollution. This makes an area unfit for extension. See **FIG 1** as example.

Based on the mapping of the potentials and restrictions above, it should now be possible to identify locations with potential for a city infill or extension.



FIG 1. INFRA, LANDSCAPE, BUILTUP

- Main Infrastructure
- Built-up Area
- Forrests and Green

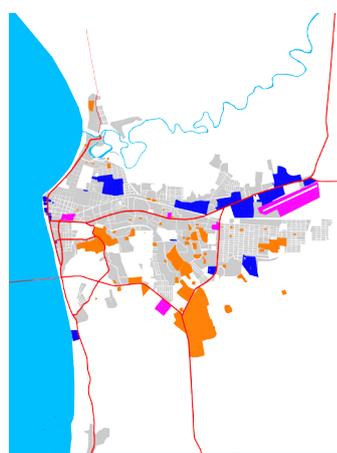


FIG 2. SERVICE AREAS

- Service (Airports, etc.)
- Religious
- Institutions

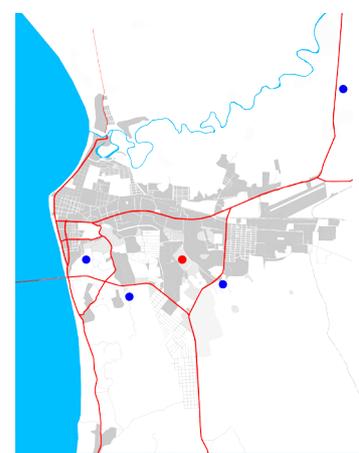


FIG 3. POTENTIAL AREAS

- Potential Extension Area
- Potential Infill Area

2. POPULATION PROJECTION

1. Determine expected future population and population growth.
2. Calculate land requirements with three different densities.
3. Add land requirement for housing backlog in the projected period.
4. List necessary public program for expected population (e.g. schools, health centers, parks)

The expected future population can be determined by the current population and the expected yearly population growth. Calculate the additional population ten, twenty, and thirty years into the future with different growth scenarios. For example, the population growth in 30 years be calculated using the following formula:

Future population = present population x (1 + growth rate)^{years}

With 1% growth: $200.000 \times 1.01^{30} = 269.500$ -> Increase of 69.500.
 With 2% growth: $200.000 \times 1.02^{30} = 362.200$ -> Increase of 162.200
 With 4% growth: $200.000 \times 1.04^{30} = 648.600$ -> Increase of 448.600

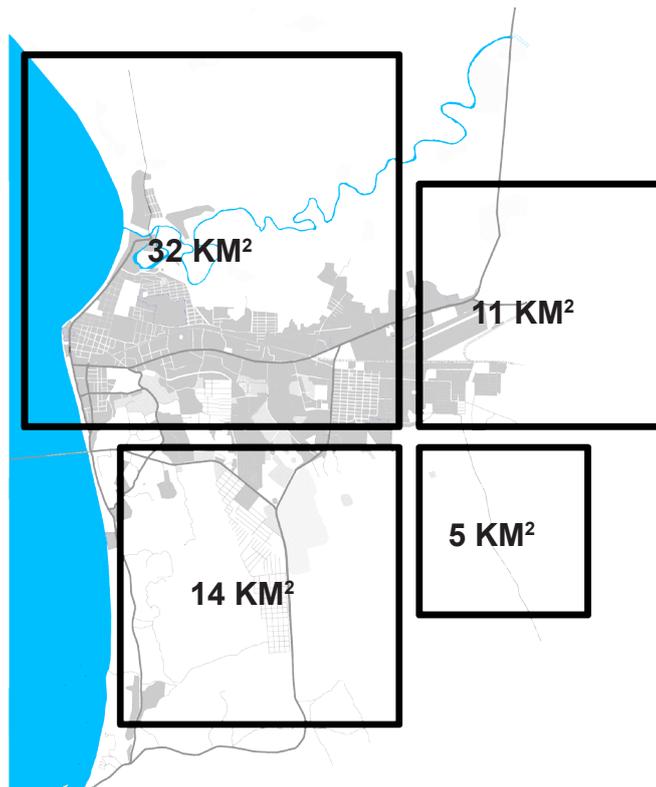
Based on the expected population, we can calculate the land requirements by choosing the density of the extension/infill. UN-Habitat advises 15.000 inhabitants/km², but in some cases lower densities, such as 5.000 inhabitants/km² can be chosen if this fits better with the local context.

Now determine the land requirements for the extension/infill by using different growth and density scenarios. E.g. low density and 1% growth is $69,500/5000 = 13.9\text{km}^2$.

Land requirement for different growth and density scenarios

	LOW DENSITY 5.000 people/km ²	MIDDLE DENSITY 10.000 people/km ²	HIGH DENSITY 15.000 people/km ²
1%	14 km ²	7 km ²	5 km ²
2%	32 km ²	16 km ²	11 km ²

FIG 4. REQUIRED LAND
Indicative area of required land in the next 30 years for Pyay, assuming a population of 200.000 in four different land requirements scenarios.



3. URBAN PATTERN AND FABRIC

1. Determine street network and main streets.
2. Determine block size and draw in plotting for one block.
3. Determine street profile.
4. Determine location of main open spaces and their linkages.
5. Determine green/blue network.

1. Determine street network and main streets.

In new development areas, width of the roads should be determined by road hierarchy. Uses or activities that generate a lot of traffic should be located along or near a main road, and easily accessed by public. FIG 5 shows typical road widths for five categories of road.

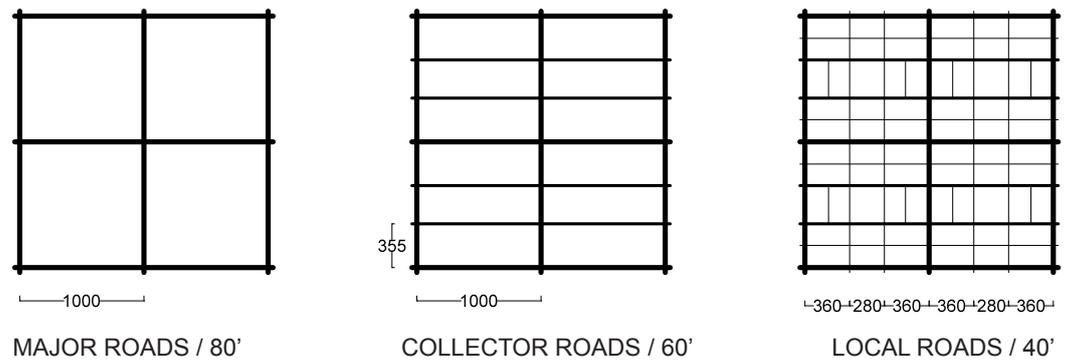
Distributor roads are through roads that go from one part of the town to another, in which ease of movement is prioritized over access to individual plots. Access roads provide access to individual plots, in which local spatial and environmental quality is prioritized and through traffic is discouraged.

When planning the road layout, topography should also be carefully considered. Roads should be planned perpendicular or parallel to the slope direction, so that water can run off the street.

Indicate the main streets for economic activity. If possible, the main road orientation should follow the prevailing wind direction to assure natural ventilation and dust removal for all buildings along the road.

FIG 5. ROAD HIERARCHY

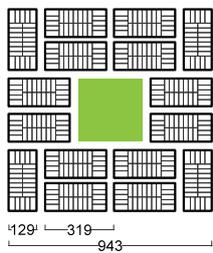
In this example of a road hierarchy the major roads are spaced 1000', collector roads 355' and local roads 180'. Regular spacing allows for easy application of block modules.



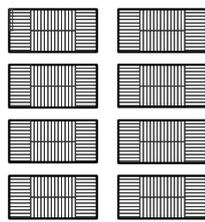
ROAD CATEGORY	ROAD FUNCTION	RESERVE WIDTH	SPACING
Major Road	Arterial Distributor	100-150 ft	1500-2000 ft
Major Road	Secondary Distributor	80-100 ft	1000-1500 ft
Minor Road	Local Distributor	60-70 ft	300-1000 ft
Local Street	Acces Road	40-60 ft	At building blocks
Pedestrian/Cycle	Acces Road	10-18 ft	

2. Determine block size and draw in plotting for one block.
 In urban settings, small plots and different plot sizes are preferable to large plots with single use. Rectangular plots with the short side to the road are preferable to square plots because this fits more plots along a road, and reduces the costs of utilities. Plot front size should be no more than 32'-50' meters, and can be as low as 16'-19' meter in residential areas. Short blocks (300'-500') increase the walkability of a neighborhood, as shown in the reference blocks in **FIG 6**.

In general, small plot sizes enables higher densities and make plots more affordable. See also **ANNEX A**. Within one block, different plot sizes should be provided. As large plots are more expensive than small plots, different plot sizes allow a mix of different income groups.



VILLA EL SALVADOR
 plot size: 22'x56' / 385 plots

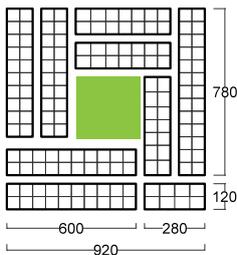


MANHATTAN
 plot size: 16'x100' / 424 plots

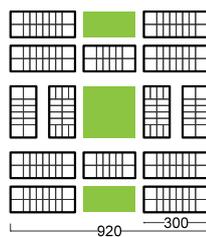


COMPARISON PLOTS

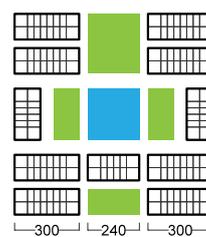
FIG 6. BLOCKS & PLOTS
 Compared to Manhattan or El Salvador, blocks and plots in Kalay and Pyay are relatively large, leading to low amount of plots per block and lower densities.



ORIGINAL BLOCK PYAY
 plot size: 60'x60' / 156 plots

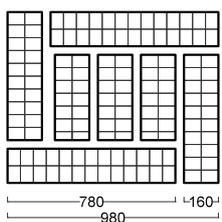


MODIFIED BLOCK PYAY
 plot size: 20'x60 & 60x40' / 207 plots

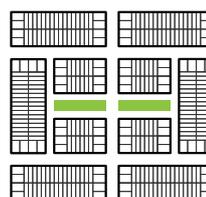


VARIATION PYAY
 + public function in centre

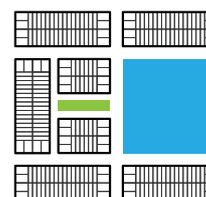
FIG 7. BLOCK PYAY
 The block is modified by reducing block sizes, increasing connectivity by adding more streets, and providing public space along the edges of the block.



ORIGINAL BLOCK KALAY
 plot size: 60'x80' / 134 plots



MODIFIED BLOCK KALAY
 plot size: 20'x60 & 60x40' / 330 plots



VARIATION KALAY
 + public function at edge

FIG 8. BLOCK KALAY
 The block is modified by adding public space at the centre and reducing block sizes. In the variation, a public functions, such as school, is provided at the edge.

3. Determine street profile.

In many development plans worldwide, the space for cars is often planned too wide. If wide roads are planned in new settlements, it is important to consider that these encourage fast traffic and increases the cost of each plot. Roads that are too wide also encourage encroachment by street vendors.

The layout of the street section should also be carefully planned. In a good urban street section, the gutter is placed on both sides of the road, in between the road and the sidewalk (not between shops/houses and the sidewalk). This fosters economic activity by enabling easy access of the plot front from the sidewalk. Because standing water after rainfall damages infrastructure, roads should slope at least 2% to ensure water from the road to the sewage.

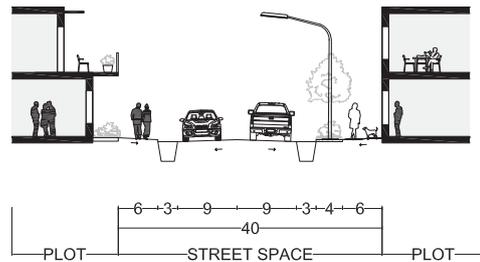
In an urban street section, street lighting should also be added. This is a relatively low-cost installation with significant social and economic benefits as it enables evening activities and increases security.

For more examples of sections, see also [ANNEX B](#).

FIG 9. SECTIONS

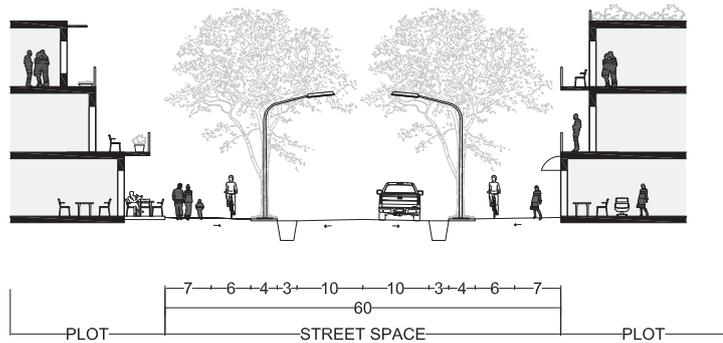
40' LOCAL STREET

Local street with lamp-post at one side. Small sidewalks can be given more space by offsetting the building on the the plot.



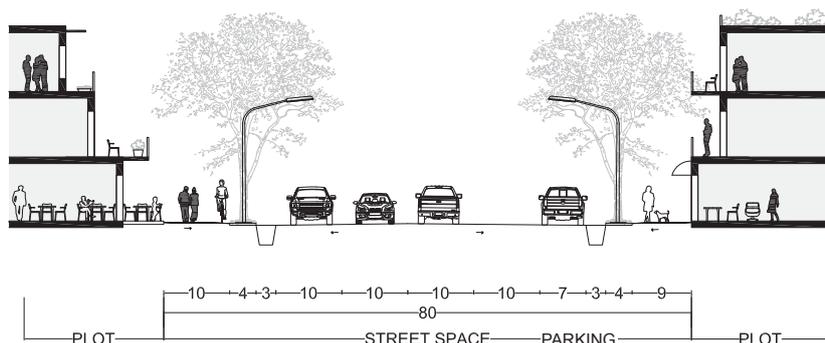
60' MINOR STREET

Minor distributor street that serves the neighborhood scale. This option has no parking, giving more space for pedestrians and allowing for activity in the plinth to spill over on the sidewalk.



80' MAJOR STREET

Major distributor street that links neighborhoods on a city-wide scale. Includes four lanes for improved traffic flow.



4. Determine location of main open spaces and their linkages.

Public and open space, such as squares and widened pedestrian areas allow for economic activity and create leisure and meeting points for residents. Public spaces are not necessarily parks, but the addition of trees often makes them more comfortable to reside. Add larger public spaces among main roads, and smaller ones on neighborhood level. To create a network of connected spaces, ideally large public spaces are connected by main roads. Ideally, an inhabitant should be able to reach a public space within 0.25 miles.

5. Determine green/blue network.

Parks and trees reduce heat in urban areas during hot periods by creating shadow and the cooling effect of green. As such, they increase quality of life. Areas around river and watercourses can flood during rainy periods. However, they also give opportunities for recreation. Therefore, a buffer zone around watercourses should always be considered. Connecting green areas creates continuous ecological corridors, which encourages biodiversity and creates high quality recreational public spaces.

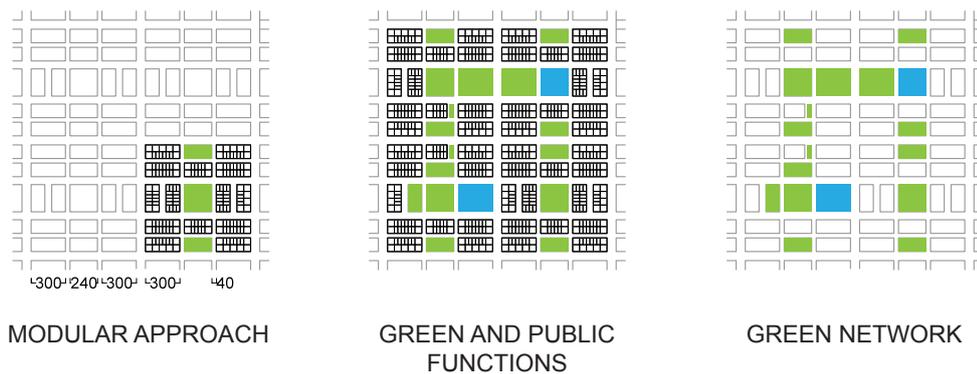


FIG 10. OPEN & GREEN

If grid spacing is regular, block modules can easily be multiplied over the grid. Modules can be varied by adding green spaces and public spaces, and public functions.

4. IMPLEMENTATION

1. Discuss phasing / design a timeframe for plan implementation.
2. Identify public and private investment.
3. Propose funding mechanisms for the public investments.
4. Propose mechanisms for regulating land for private development.
5. Propose form-based codes / design codes / design guidebooks

1. Discuss phasing / design a timeframe for plan implementation.
Design a feasible timeframe for the realization of the plans and use it to set the priority actions and investments. For example, in a planned city extension, the first phase of development entails building roads, infrastructure and basic services. These are followed by basic social services, such as health and educational facilities. Residential development follows these investments, as private developers need to have the right conditions in order to invest in an unpopulated area. Large extensions are best built in phases.

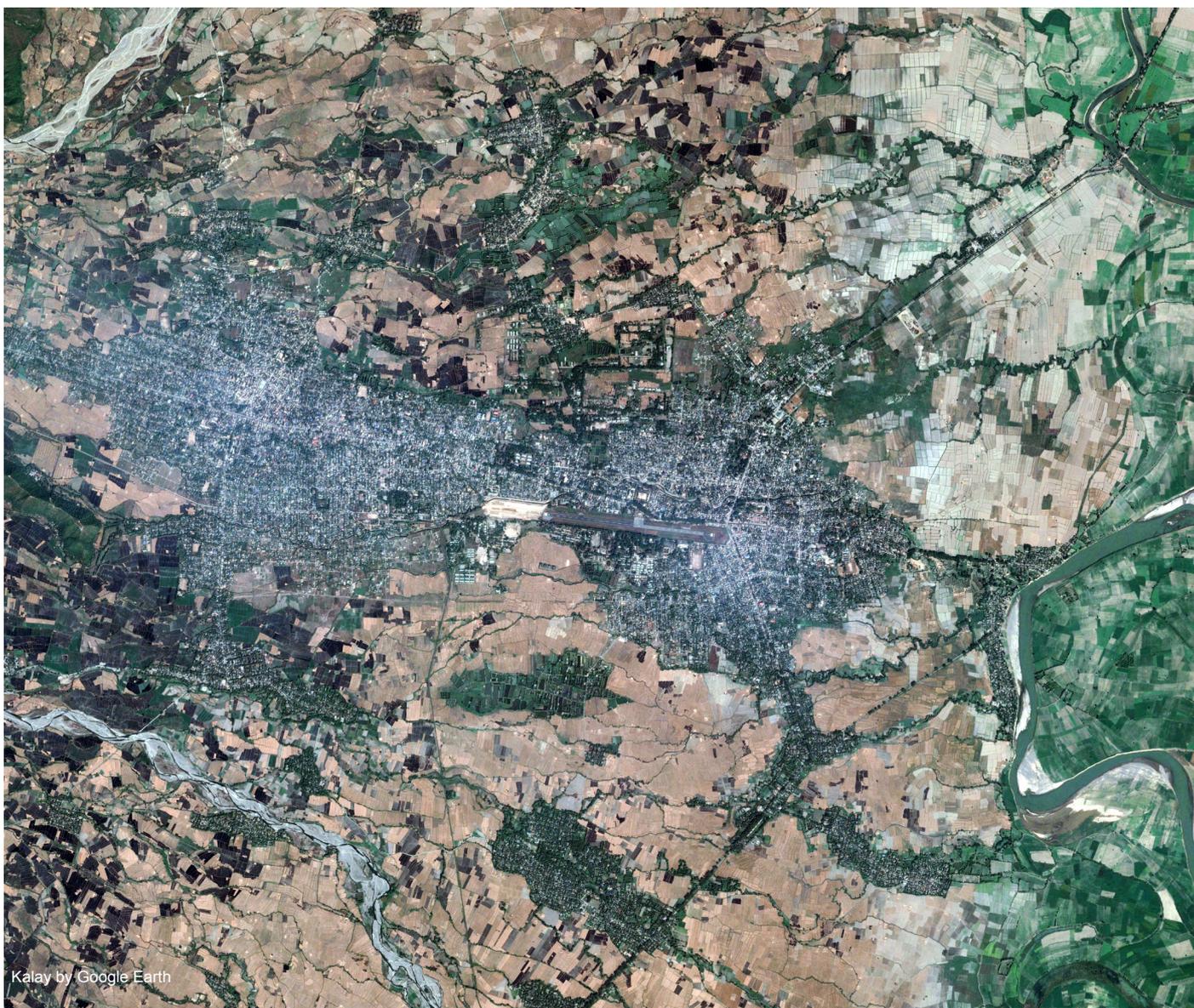
2. Identify public and private investment.
Urban plans are implemented by public bodies, private investors as well as public-private partnerships. Identify which parts of the urban plan can be public investment. These can be local, regional or national funds. Normally, public investment is focused on infrastructure, public transport, basic services provision, public parks, squares, public buildings, cultural, educational or health facilities, social or low-cost housing. Many of these facilities have the potential to be funded by public-private partnerships.

3. Propose funding mechanisms for the public investments.
Public investments can be funded if the raise in land value caused by urban planning is captured by taxation. Revenue can also be generated through sale or leasing of public land, or from land registration and taxation. As a general principle, costs of new infrastructure provision should be recouped from the developers of serviced land so that it is cost-neutral on municipal finances

4. Propose mechanisms for regulating land for private development.
Land for private development is developed by private investors that gain building permissions and building rights from the local governance/municipality/responsible authority. Discuss the conditions for releasing building permissions. The conditions for building permissions can be used in order to achieve a set of public, social or environmental goals. For instance, on bigger plots intended for bigger multi-residential or mixed-use developments, the building permission can be conditioned by the investor developing 20% of the plot into a publicly accessible park. Or bigger plots meant for residential development can be conditioned by the provisioning of 20% of low-cost dwelling units.

5. Propose form-based codes / design codes / design guidebooks
Tools for controlling the overall streetscape, quality of public and private space, livability of streets and neighborhoods, accessibility should be introduced. These tools are a set of rules and restrictions regarding building dimensions, street front alignment, the relationship between private and public spaces, the public areas, ground floors etc. Design codes can apply to both public and private spaces and buildings. For instance, for a street: the building offset and height can be determined making a harmonious street front; there can be mandatory commercial on the ground floor, making the street attractive and livable; there can be mandatory ramps on the building entrances ensuring accessibility for all, as well as a mandatory line of trees on the streets.





Kalay by Google Earth

CASE STUDY KALAY

The plans of Kalay and Pyay have been analysed by a UN-Habitat expert team, in line with the sustainable urban planning principles. The team has used both secondary and primary data sources to analyse the plans, including detailed reviews and a number of interviews.

As mentioned before, the plans of Kalay and Pyay have been analysed based on the sustainable urban planning principles. UN-Habitat expert team has used both secondary and primary data sources to analyse the plans. The team has carefully reviewed the plans in both drawing and reports and has conducted several interviews during their visit in Kalay and Pyay. This has supported an understanding of the local context and the background of the plan making process. In addition, team members have conducted an intensive field survey to understand the two cities' growth patterns and urban life.

KALAY TOWNSHIP DEVELOPMENT PLAN (CITY WIDE SCALE)

Kalay is located in the Northwest region of Myanmar. Its population is 101,300, and has a housing requirement of 10,000 in the next 20 years. Because of its location in the trading route between India and Myanmar it is an important commercial town. The economy is mostly dependent on agriculture supported by the area's high productivity of rice and oil bearing crops.

Key urban functions have determined the direction of growth of the city. For example, location of the airport in the centre of the city hinders development of the CBD area because of air traffic control considerations. As a result, most developments have been taken place in the northern part of the town. To address this, the development plan proposes a ring road to ensure a balanced development on a city-wide scale.

The Kalay Township Development Plan that should guide development for the next 20 years has a major focus on balanced urban growth and sustainable urban development. UN-Habitat’s main comments on the plan are:

- *Street connectivity:* Kalay city is geographically and strategically well-placed, and has potential for growth. Nevertheless, the proposed ring road is out of scale in relation to the size of the township. The construction of the ring road will require huge financial investment that could be better used to improve connectivity in the inner city areas. Thus, the need for the ring in what is a fairly small city should be carefully assessed.
- *Street connectivity:* The connection between the existing city and new extension site is vital. The plan proposes two roads that connect the main city with the extension site. (FIG 12) Additional connectivity, in the form of streets between the extension and existing area should be considered. At the same time, connectivity in city wide scale should be also improved by upgrading existing streets streets in accordance with the plots discussed in Section 3: Urban Pattern and Fabric.
- *Mixed use:* The proposed plan relies too much on single-use residential blocks. Mixed-use blocks should be considered to maximize economic benefits. The locations of key urban services can also be improved upon. Some key urban services should be relocated in order to ensure adequate integration of residential and commercial uses. For example, the hotel zone, which has been planned outside of the city, should be relocated to in or near the CBD area to accommodate tourist’s interest in the city life and promote local businesses. (FIG 11)
- *Public spaces:* Currently, the city provides no or insufficient bike lanes, footpaths or open space. The needs for those services should be carefully assessed and planned accordingly. The extension plan should also provide reserved spaces along the street network that in future could be used for road widening or for commercial purposes (e.g. street shop along the road).
- *Natural resource management:* Water management should also be considered for city-wide planning in Kalay. Kalay’s soil type is very suitable for agricultural uses. In addition, there are some ponds, irrigation channels, sluice gates and natural tributaries at important locations. The proposed industrial area (FIG 11) might interrupt the natural water flow and rain water towards highly productive agricultural land and could negatively affect the agricultural productivity. There is also a major risk that the industrial activities pollute the water flow and the wetlands. An initial assessment should be conducted to understand the level of risk. The results of this assessment should inform a systematic planning of water and drainage management that does not interrupt the productive agricultural land.



FIG 11. INTEGRATE HOTEL ZONE WITHIN CITY
Integrate hotel zone with city;
re-consider placement industrial zone.

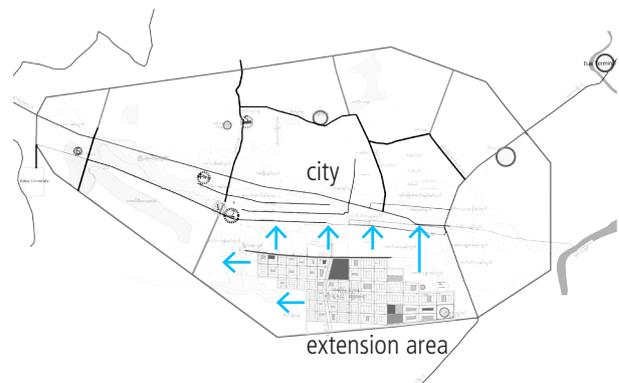


FIG 12. BETTER CONNECTED EXTENSION AREA

KALAY CITY EXTENSION PLAN (CITY EXTENSION SCALE)

The city extension site is located in the southern part of the city. Its aim is to provide 7828 plots with necessary key urban services in the next 20 years. The plan proposes two different sizes of plots and which are 60' x 80' and 40' x 60'. Main comments on this extension plan are:

- *Efficient density:* The proposal on plot sizes should be carefully reviewed based on an assessment of demand. Small plot sizes (such as 40' x 60') help to increase density and thus contributes to a reduction of cost of infrastructures and services.
- *Mixed use:* In the present extension plan, only 18% land is allocated for commercial use. This should be increased to allow local businesses and ensure economic sustainability of the extension site.
- *Location of key urban services:* In the proposed plan, the connection between residential use and key urban services is weak. Most of the key services and facilities are proposed in the low-density neighborhoods (60' x 80' plots) whereas little facilities and services are proposed in the high-density areas (40' x 60' plot) (FIG 13). The location of key urban services and facilities should be reassessed based on demand, public space network, and integration with existing city.
- *Public spaces (park/open spaces):* In the proposed extension plan, the provision of public spaces is limited, with only 5% land allocated to public space. Furthermore, the proposed public spaces are internal in nature. (FIG 14). This means that the spaces are designed only for the residents of the neighborhood. More public space should be provided for residents as well as visitors and should be integrated into a functional system of public spaces that foster commercial activity.
- *Street Connectivity:* The proposed grid is characterized by non-continuous streets and internally oriented blocks. With future economic development, this could lead to gridlocks. A revision of this basic street pattern should be considered.
- *Social mix:* The issue of social mix is insufficiently addressed in the proposed extension site. There is a risk that the large plot size (60'x 80') will be affordable mainly for high-income groups and that it restricts access to low-income groups. An adequate strategy for affordable land housing for low-income groups should be formulated to ensure social mix in the extension site.
- *Location of a specific service:* The railway line that passes through the extension site might cause problems for some land uses. For example, the office compound, sports facilities and residential plots adjacent to the railway line may experience problems with noise pollution. Furthermore, the railway divides the planning site in two. If insufficient crossing possibilities are provided for, the railway will effectively segregate the western part of the development from key urban functions.
- *Natural resource management:* If the location of the extension site interrupts the natural drainage system/water flow for irrigation, it would be advisable to re-consider the location of the extension site. An Environmental Impact Assessment (EIA) should be undertaken to scope the risk of the proposed development and to find out possible solutions.

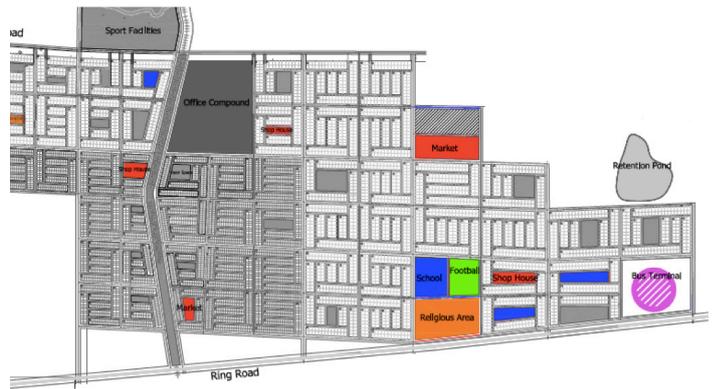


FIG 13. CURRENT PLAN MAIN FUNCTIONS
Add public space along main road.



FIG 14. CURRENT BUILDING BLOCK KALAY
Segregated plot sizes, very large blocks and very little public space.

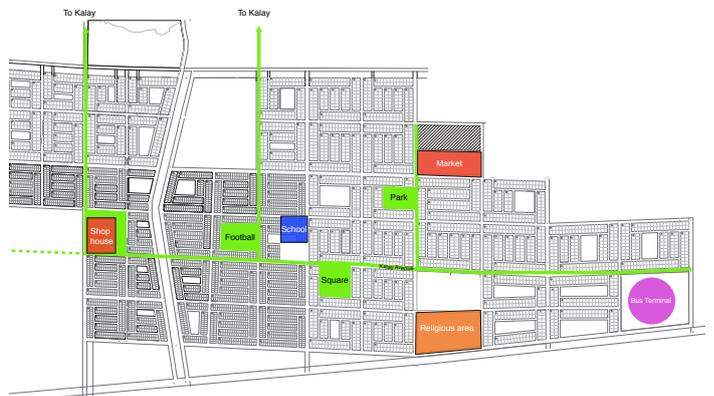


FIG 15. PROPOSAL STREET NETWORK
Add public space along main road and distribute main functions.

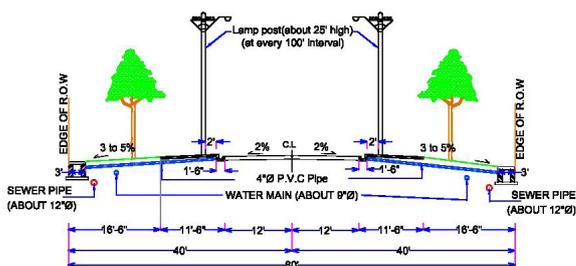


FIG 16. CURRENT STREET SECTION
The current section is a rural street section.

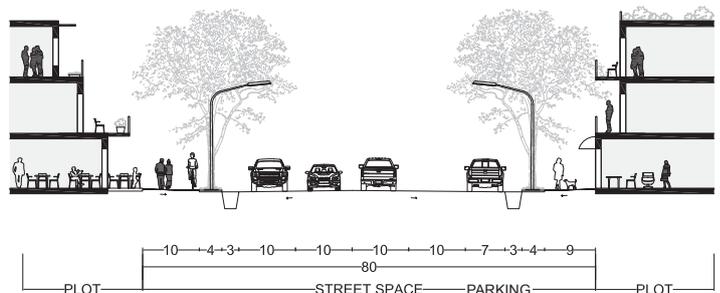


FIG 17. PROPOSAL URBAN STREET SECTION



CASE STUDY PYAY

Pyay is the principal town in the Bago region. The town is about 6.6 square miles with a current population of 218,250 with 111,260 people living in urban areas (51%). The rest of the population lives in the surrounding areas. The projected population for 2043 is 150,000, based on a 1% growth rate. The Pyay Township Development Plan aims to increase the tourism potential by improving the transportation network and by conserving the civil heritage site. The plan also intends to create a systematic development of the housing sector and to provide for balanced township development within the planning period.

PYAY TOWNSHIP DEVELOPMENT PLAN (CITY WIDE SCALE)

- *Street connectivity:* Pyay town is located in a very good strategic and geographical location. Because of the business opportunities and surrounding agriculture, the city has robust potential for growth. However, in the proposed plan there is a lack of sufficient public space (street network), which currently covers only 2% of total land use. The existing street network has insufficient street connectivity on both city and neighborhood scales. To improve connectivity on both city and neighborhood scale, more land should be dedicated to streets and the quality of roads should be upgraded. Improved connectivity will help to maximize the use of land and thus contribute to economic development for the city. (FIG 18)

- **Street Connectivity:** The proposed grid is characterized by non-continuous streets and internally oriented blocks. With future economic development, this could lead to gridlocks. A revision of this basic street pattern should be considered.
- **Land use and land speculation:** In Pyay town, land speculation is a serious challenge for future urban development and needs attention by the government. Municipalities should take necessary steps and introduce enforceable norms and rules to free land close to the center of the city that can play vital role for future development in the city. Further investigation is needed to identify the drivers behind the speculation and to move forward to address this. With that regard, appropriate tools for land management should be developed and it should be investigated if an involvement of the private sector can contribute to solving this problem.
- **Efficient density:** The overall density of Pyay town is low at 30 people/acre. For sustainable urban growth and balanced development, the plan should consider densification of the existing urban fabric rather than extension. This will allow the town to protect productive agricultural land which is important to the local economy.
- **Efficient density:** In Pyay, a lot of land with high potential is underutilized, for example the industrial area has a low density. By considering the needs and demands, land use in the industrial area could be reorganized to release land for other uses, such as the rehabilitation of poor people who are landless or now living in the forest.
- **Zoning:** The plan also proposes a rigid zoning that is unfavorable to sustainable urban development. For example, the plan proposes a separate hotel zone that is far from the CBD area. This discourages tourists to explore the CBD area and may have a negative impact on the local economy. The plan should consider locating hotel facilities in or closer to the CBD.
- **Social mix and affordable housing:** The plan also proposes a highly subsidized housing project for government employees. Similar subsidized housing projects should be considered for the poor to ensure affordable housing for all.
- **Tourism potential:** The potential of historical sites should be leveraged for the attraction of tourists by creating a tourist hub. This hub should be carefully designed and planned in such a way that it connects the World Heritage site to the CBD/town center with proper accessibility to public and commercial services.

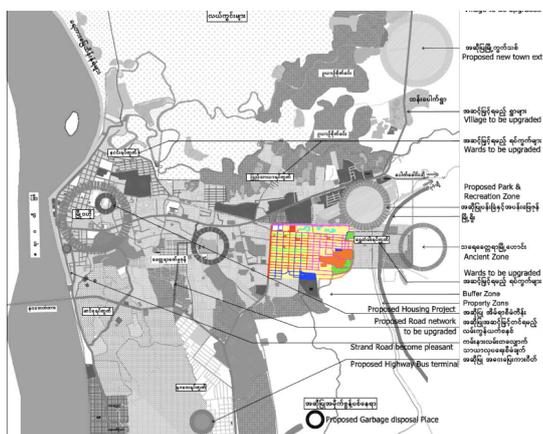


FIG 18. CITY SCALE
Improve street connectivity and quality of roads.

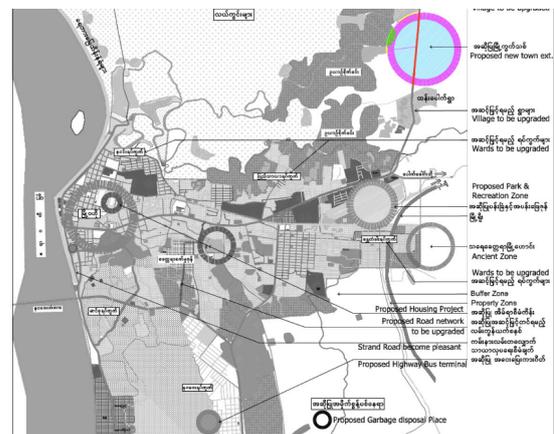


FIG 19. LOCATION EXTENSION
Extensions should not be built on agricultural land

PYAY CITY EXTENSION PLAN (CITY EXTENSION SCALE)

The proposed city extension site is designed to accommodate 20,000 inhabitants at a density of 137 pop/ha. The site is 5 miles away from the main city. The main objective of the city is to accommodate for the expected population growth of the next 20 years and to resettle people who are currently living illegally in the ancient historical sites. The major comments on the extension plan are:

- **Location:** The proposed extension site is located on a highly productive agricultural land. Since the economy of the town is greatly dependent on agriculture this might harm the local economy, unless sufficient provision for commercial activities and jobs is created. Moreover, the distance to the city center might cause difficulties for local job creation. The preferred solution in this case is an urban infill. However, in case an extension is the only viable solution, the amendments described below should be considered.
- **Mixed use:** The proposed land use is not well balanced with less than 7 percent of land allocated to commercial use. This percentage should be increased to ensure a vibrant economy in the extension site. Currently, commercial activities are only proposed along the main road services should be relocated to ensure an adequate mix and integration of land uses on both the town and neighborhood level.
- **Efficient density:** The proposed plot sizes and distribution of plots are not well balanced. Reducing the plot size will make more land available for other uses such as park/open space, commercial, affordable housing project etc. It will also reduce the cost of services and infrastructure.
- **Social mix:** The need for affordable housing should be carefully assessed. Planning authorities should ensure a sufficient amount of small plots to accommodate low-income groups. The provision of too many large plots may make land unaffordable to low-income groups and fosters segregation.
- **Connectivity:** The blocks should be well connected with the street network and should be better integrated with key urban services. A careful assessment on the functionality, pattern and design would be advisable.

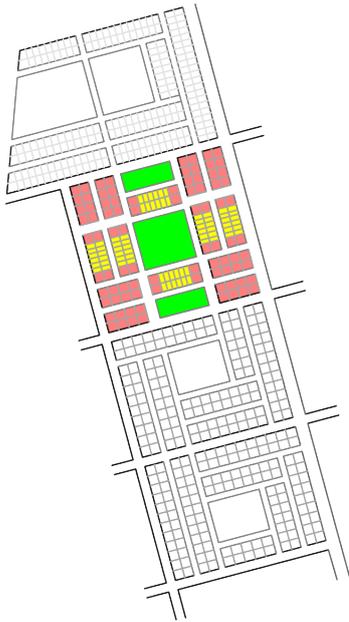


FIG 20. MODIFIED BUILDING BLOCK
 Redesign building blocks by mixing plot sizes, and providing for public space along the roads.



FIG 23. COMMERCIAL AREA
 Add commercial floor area, and allow commercial functions to settle along main road axes.

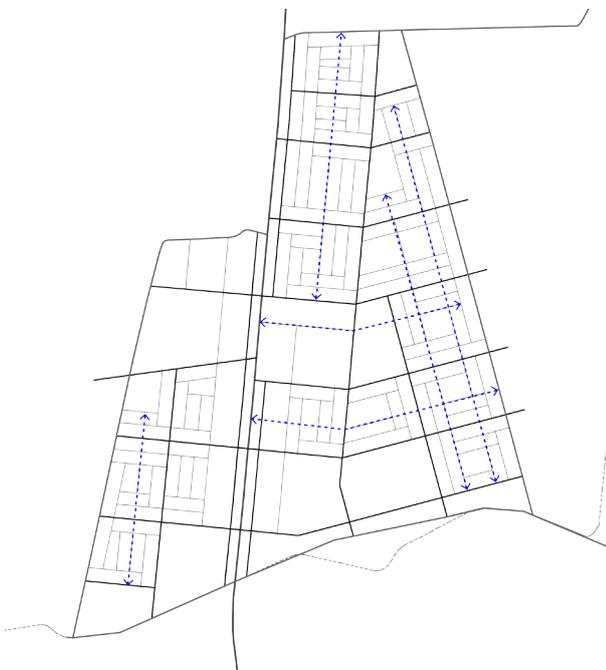


FIG 21. IMPROVE CONNECTIVITY
 Redesign building blocks by making them more accessible.

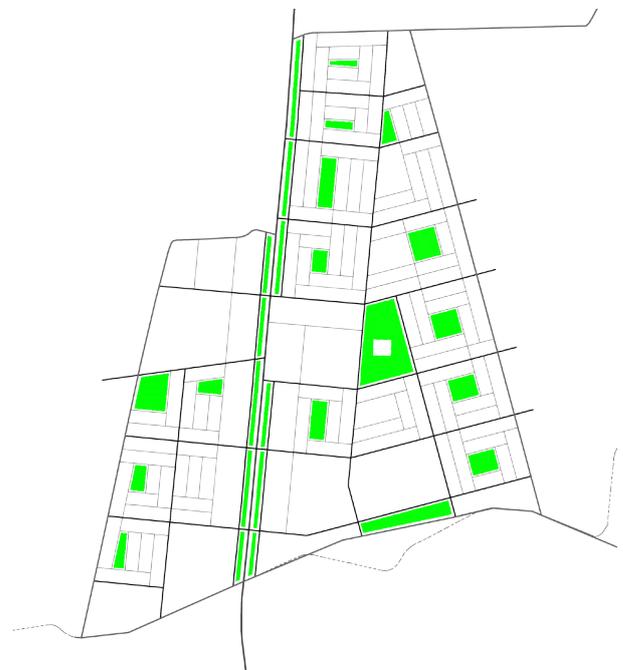


FIG 22. GREEN STRUCTURE
 Provide green, not only within building blocks, but also as public green along main roads.

BLOCK DESIGN

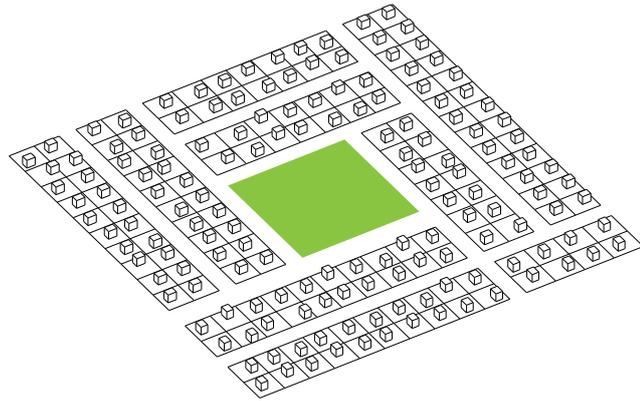
Simple adjustments in a building block can greatly increase density, proportion of commercial plots and contribute to mixed-use neighborhoods. Below are suggested adjustments for the blocks of Pyay with module size 940'x920'

original block

block size	120'x280-780'
plot sizes	60'x60/60'x70'
housing units	156
commercial units	0 / 0% of units
public space/park	9% of area
street space	24% of area
intersections	10
density*	8-9.500 p/km ²

*4-5 people/unit

Myanmar Census 2014



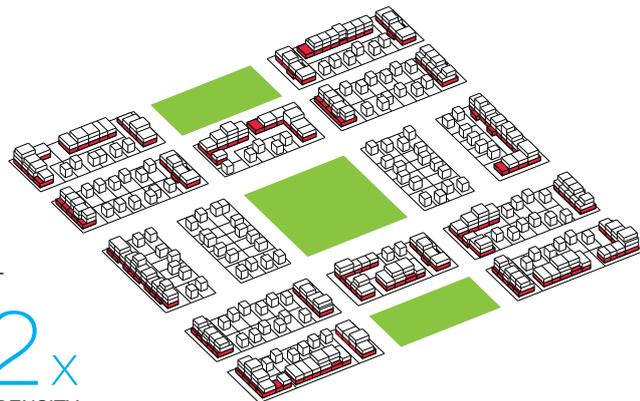
alternative 1

block size	120'x240'-300'
plot sizes	30'x60
housing units	366
commercial units	158 / 43%
public space/park	13% of area
street space	33% of area
intersections	12
density	18-22.500 p/km ²

- 2-3 layers at outer edges
- Continuous street pattern
- Extra public space
- Reduced plot sizes
- Walkable blocks

AT LEAST

2.2x
HIGHER DENSITY



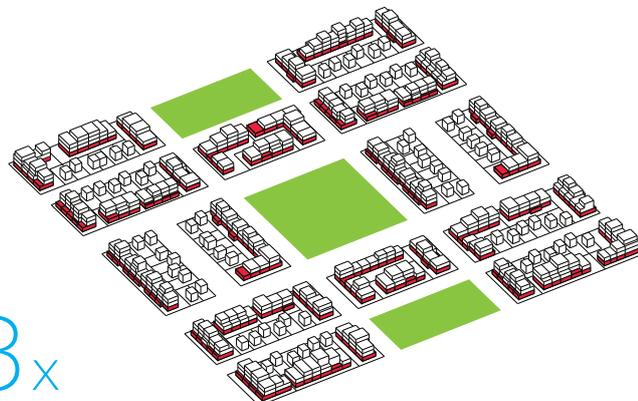
alternative 2

block size	120'-300'
plot sizes	30'x60
housing units	472
commercial units	216 / 46%
public space/park	13% of area
street space	33% of area
intersections	12
density	23-29.000 ppp/km ²

- 2-3 layers at inner edges

AT LEAST

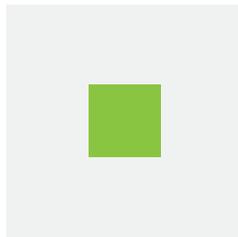
4.3x
HIGHER DENSITY



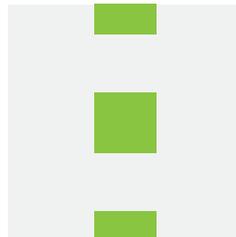
BLOCK DESIGN 2

Simple adjustments in a building block can help the block achieve the recommendations prescribed by sustainable planning principles.

PUBLIC SPACE 9%



PUBLIC SPACE 13%



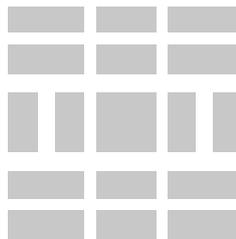
UN-HABITAT RECOMMENDS

15-20% open/green space

STREET SPACE 24%



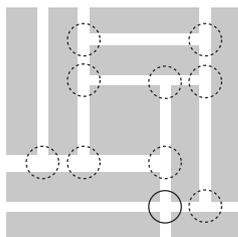
STREET SPACE 33%



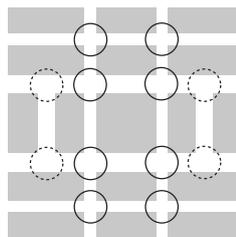
UN-HABITAT RECOMMENDS

30-45% space for streets.

CROSSINGS 1+9T



CROSSINGS 8+4T



UN-HABITAT RECOMMENDS

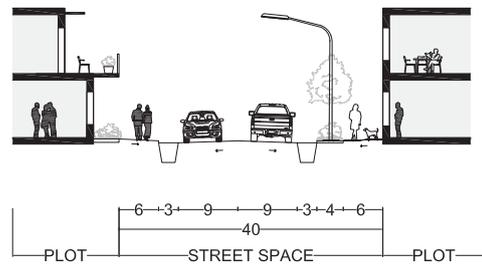
at least 100 intersections/km²

SECTIONS

The street section is one of the most important elements determining the living quality of a neighborhood. In many contexts, streets are made too wide, with little space for pedestrians. In these recommended streets sections special attention is given to the placement of the gutter where there is parking alongside the road. Attention should also be given to the cover of the gutter and its maintenance. For most sections different parking options are proposed which can be chosen depending on local parking requirements.

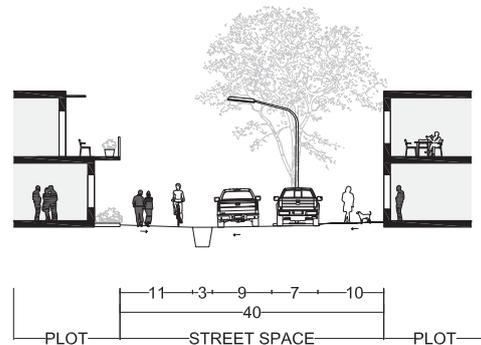
Section 40'

Local street with lamp-post at one side. Small sidewalks can be given more space by offsetting the building on the plot.



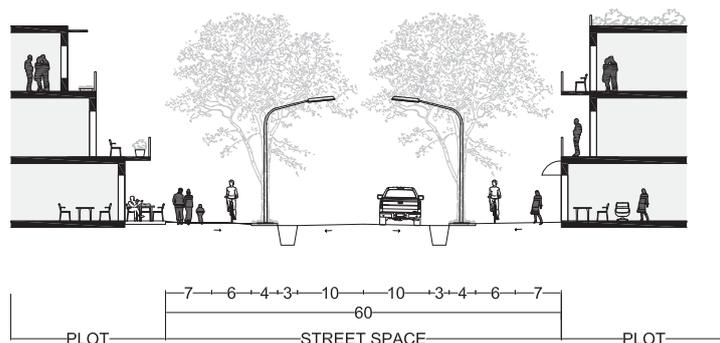
Section 40' / one-side parking

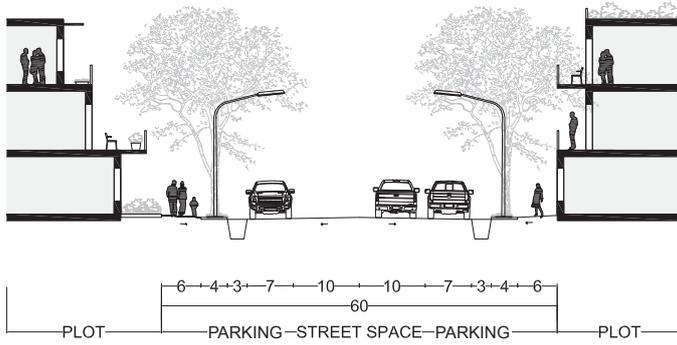
The small size of the street allows for using only one gutter. Parking can be done on one side. The small street size makes the street most suitable for one-way traffic.



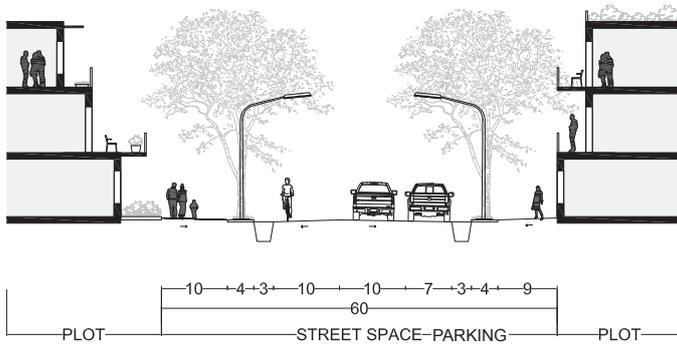
Section 60'

Minor distributor street that serves the neighborhood scale. This option has no parking, giving more space for pedestrians and allowing for activity in the plinth to spill over on the sidewalk.

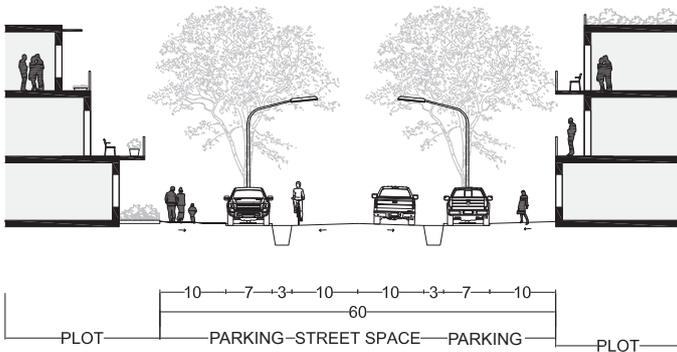




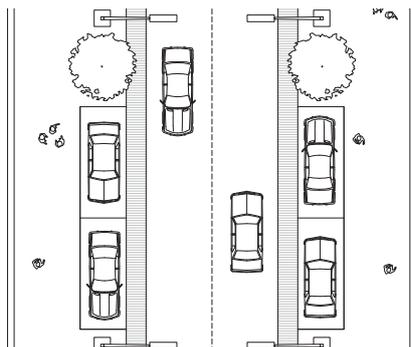
Section 60' / two-side parking
Distributor street with two side parking. To be used in areas where parking requirements are higher.



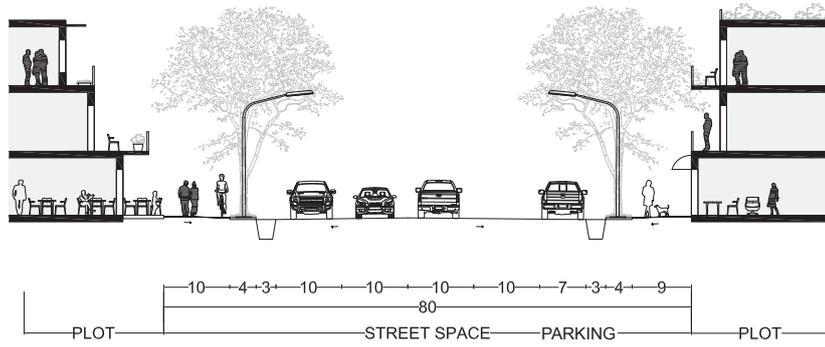
Section 60' / one-side parking
One side parking gives more space to one sidewalk, and makes this more suitable for for example street vendors.



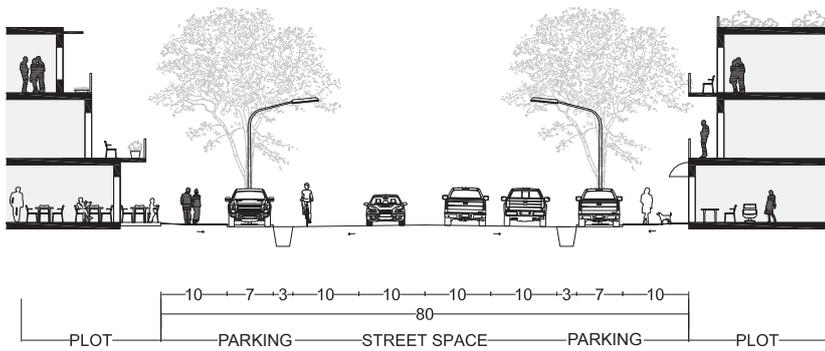
Section 60' / pocket parking
Pocket parking creates small pockets of parking space interspersed with parts of extended sidewalk. Attention should be gutter that continues from the sidewalk past the parking plot. This prevents that cars will park on the gutter, which may damage the gutter cover.



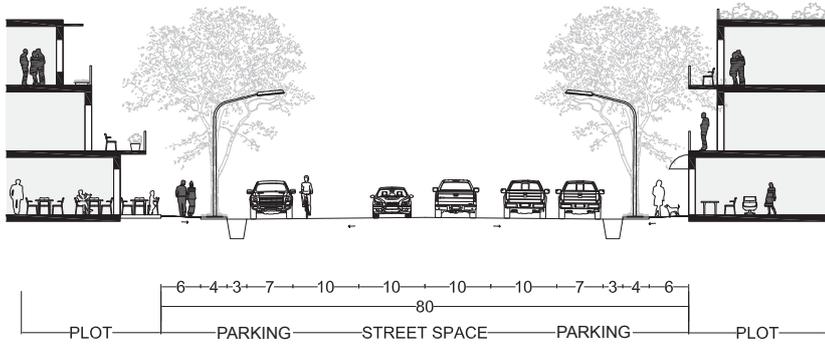
Section 80'



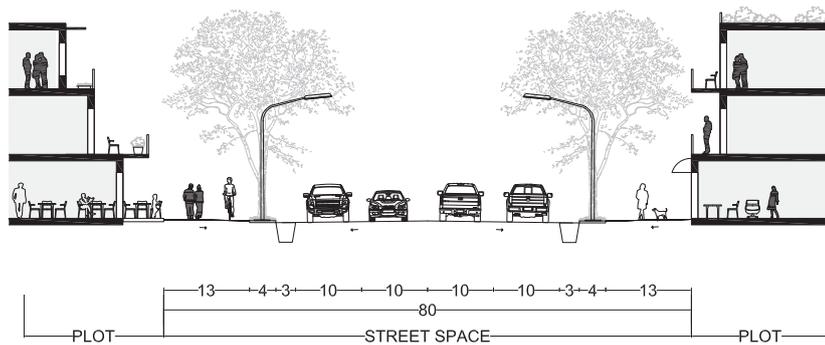
Section 80' / two-side parking

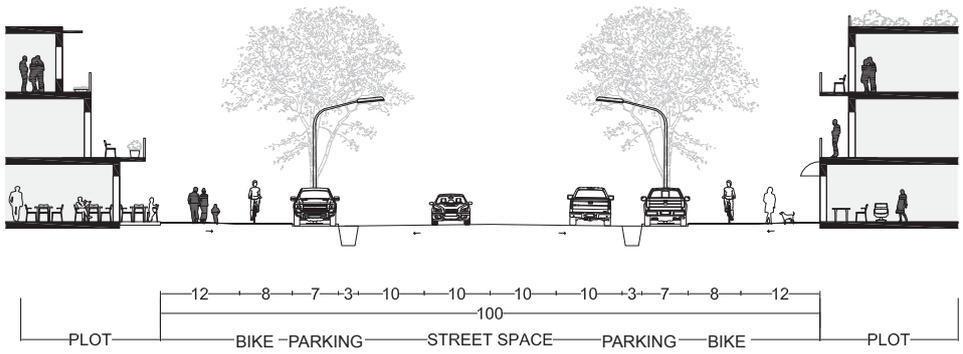


Section 80' / one-side parking

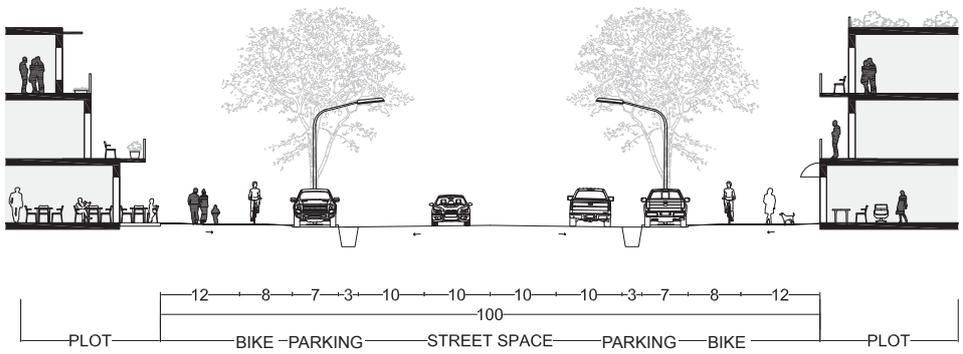


Section 80' / pocket parking

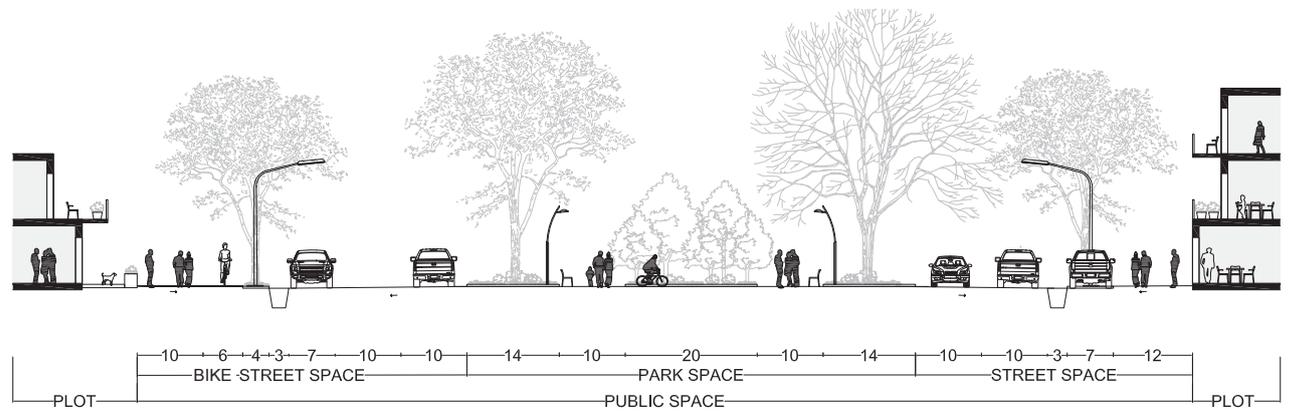




Section 100' two-side parking



Section 100' pocket parking



Section 160' two-side parking

3B. REFERENCE IMAGES

These references show desirable elements in street sections. They are not necessarily examples of the recommended sections presented above.

FIGURE 1:

Minor Rd. - Local Distributor

1. Indicated pedestrian crossing
2. Clear demarcation cars
3. Green buffer/ trees

FIGURE 2:

Minor Rd. - Local Distributor

1. Mixed-use street frontage
2. Wide sidewalks
3. Sidewalk furniture
4. Wide tree canopy
5. Four lanes vehicular traffic

FIGURE 3:

Minor Rd.

1. Commercial frontage
2. Parking on two sides
3. Street accessible to bicycle and car

FIGURE 4:

1. Green median
2. Dedicated bike lane



figure 1: Shanghai

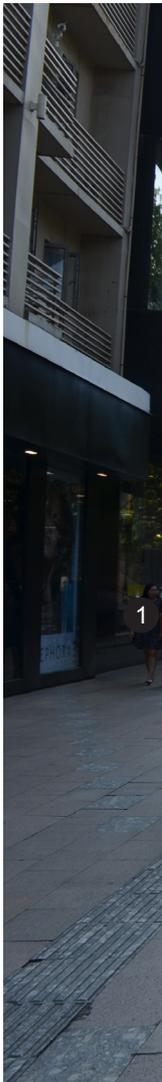


FIGURE 5:

Local access street

1. Green Canopy
2. Dedicated Parking Lane
3. Commercial Street Frontage

FIGURE 6:

Local access street

1. Small one-direction traffic lane
2. Broad sidewalk
3. Dedicated bike parking



figure 3 Shanghai



Photos by Mayshe Prashad.



figure 4: Singapore



figure 2: Shanghai



figure 5: Shanghai

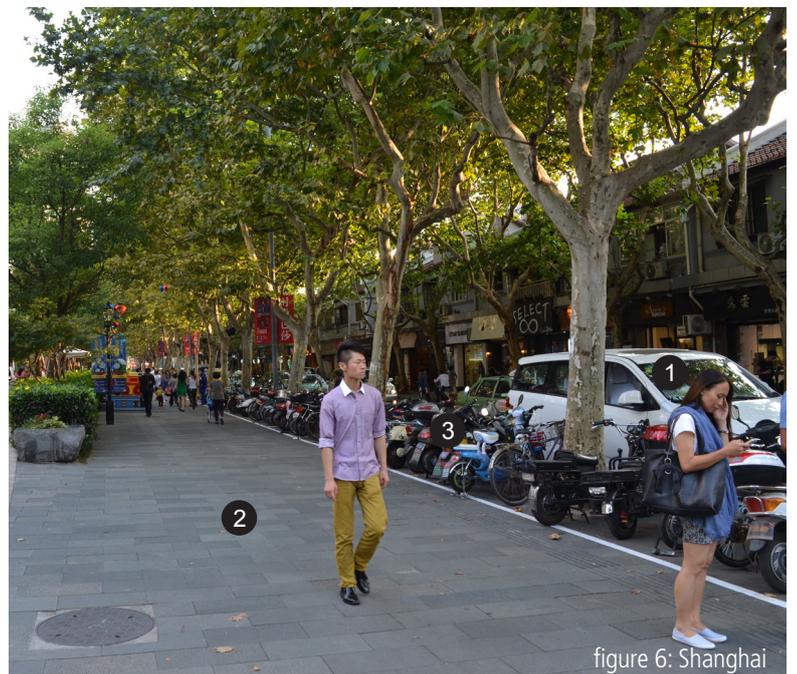


figure 6: Shanghai

FURTHER READING

Urban Planning for City Leaders. UN-Habitat (2013)

Urban Planning for City Leaders is a valuable source of information, inspiration and ideas on urban planning that is designed for city leaders and decision makers at a critical moment in human history.

unhabitat.org/books/urban-planning-for-city-leaders

Leveraging Density. UN-Habitat (2012)

This guide explores the compact city and its benefits within the developed and developing world's contexts. The guide illustrates how the compact city concept and planned (versus unplanned) urban extension can support sustainable urban patterns that benefit the functioning of developed as well as developing world cities.

<http://unhabitat.org/books/leveraging-density-urban-patterns-for-a-green-economy/>

International Guidelines on Urban and Territorial Planning. UN-Habitat (2012)

The International Guidelines on Urban and Territorial Planning serve both as a source of inspiration and a compass for decision makers and urban professionals when reviewing urban and territorial planning systems. The Guidelines provide national governments, local authorities, civil society organizations and planning professionals with a global reference framework that promotes more compact, socially inclusive, better integrated and connected cities and territories that foster sustainable urban development and are resilient to climate change.

<http://unhabitat.org/books/international-guidelines-on-urban-and-territorial-planning/>

Working with Nature. UN-Habitat (2012)

This guide focuses on the effect of unplanned, rapid growth of cities on the functioning of a city-region's natural systems. It outlines how guided development can maximise the ability of ecosystems to support sustainable human and natural processes.

<http://unhabitat.org/books/urban-patterns-for-a-green-economy-working-with-nature/>

Clustering for Competitiveness. UN-Habitat (2012)

This guide argues that strategic investment in physical infrastructure with the diversification of economies allows cities to play a specialized role in polycentric urban development. Furthermore, it suggests that green economic development can be achieved through the development of green clusters and green jobs. Finally, this guide argues that a number of green economy outcomes may be reached through efficiencies and shared infrastructure, rather than duplication.

<http://unhabitat.org/books/clustering-for-competitiveness-urban-patterns-for-a-green-economy/>

Optimizing Infrastructure. UN-Habitat (2012)

This guide proposes that cities can act as agents for change that allow their large populations to live less wastefully. It considers how infrastructure systems can be viewed as an opportunity to shift cities onto a more sustainable path by paying close attention to the resources that pass through them, and the manner in which they support the activities of the city. Each city context differs, based on stage of development, pace of growth and available resources.

<http://unhabitat.org/books/optimizing-infrastructure-urban-patterns-for-a-green-economy/>

Our aim is to support city, regional and national authorities to implement policies, plans and designs for more compact, better integrated and connected cities that foster equitable sustainable urban development and are resilient to climate change.

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