

Transit-Oriented Development Opportunities for Yangon's Pyay/Insein Corridor Bus Rapid Transit

DRAFT FOR DISCUSSION, August 2019





Preface

This work was carried out primarily during early 2019 as part of research funded by the Rockefeller Brothers Fund to promote best practices in Bus Rapid Transit (BRT) and Transit-Oriented Development (TOD) in the region.

Far East Mobility and BRTPlan were both involved in BRT planning in Yangon, with Far East Mobility producing a Feasibility Study for BRT in the Pyay Road corridor in 2018 followed up with institutional, regulatory and operational plan inputs by BRTPlan. The feasibility study included public transport priority, pedestrian facility improvements and parking system recommendations, focusing primarily in the CBD area but also including the Pyay Road and Insein Road corridor.

As discussed in this report, none of the current urban development, mass transit or TOD plans for Yangon have considered the BRT corridor, which has not yet been formally approved or adopted. A key weakness of various urban design plans in the CBD area is that bus-based transit is ignored. Meanwhile the BRT planning carried out during 2018 incorporates many elements of TOD, including transit, parking and pedestrian facilities, but does not comprehensively address TOD and the opportunities for BRT station area development.

This report aims to at least partly fill this gap and complement the BRT planning work, providing a mechanism for Yangon to achieve TOD focusing on the BRT corridor. Many of the same approaches can also be applied to the ongoing circular railway system upgrade.

Please send feedback on the report to tod@fareast.mobi.

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INTRODUCTION 1.1 Yangon in 2019



Figure 1. Yangon's Sule Pagoda

Since Myanmar's transition to democracy and an open economy, the economy has been growing at about 6% per year, and poverty rates in the country have been dropping. Yangon is the most populous and important economic center in Myanmar, with an official population around 6.2 million and unofficial estimates at closer to 7-8 million. Myanmar is relatively under-urbanized due to its many years of economic isolation, but urbanization has picked up since 2000, with urbanization rates around 2.6% a year from 2000 - 2010, and this trend is likely to accelerate. With a surge in urban development likely in Yangon it is time-critical that Yangon put in place the infrastructure, planning and regulatory structures required to guide this urbanization process in an equitable and sustainable direction.

Yangon is governed by the Yangon Region Government, which is similar to a provincial or state-level government, and headed by a Chief

Minister from the leading parliamentary party, the National League for Democracy (NLD). Transportation operations are under the authority of the Yangon Region Government, while infrastructure, planning and land development are primarily managed by the Yangon City Development Committee (YCDC), a nominally autonomous body which is half – elected and half appointed, that serves as the government of Yangon municipality.

Yangon currently lacks an agreed-upon spatial planning and development framework to guide priorities for future transportation and development. While a spatial planning and development framework has been developed by the Japan International Cooperation Agency (JICA) in cooperation with YCDC, and some pilot zoning efforts sponsored by the Paris-Yangon Sister City initiative, it has not been enacted nor does it seem to guide development. Yangon also lacks a zoning code, which would help define the appropriate urban functions of each district. Myanmar has a national building code, and YCDC also has some building codes that have some influence over the development process, but they are antiquated, minimal, and not particularly enforced. Yangon also has policies around historic preservation to protect its many Buddhist and British monuments and historical buildings,

but they affect relatively few buildings. As a consequence, most development in Yangon is occurring in a haphazard and automobile-oriented manner.

While Yangon has an enormous highly affordable bus network thanks to low CNG prices, and while the bus sector has been significantly modernized in recent years, Yangon has no mass transit system, and traffic congestion is a significant daily irritant to most Yangon residents. Moreover, both public and private bus operators are facing mounting financial difficulties as their fleets age and congestion worsens. Plans for a Bus Rapid Transit system on the Pyay Road/Insein Road corridor were developed by Far East Mobility with some outline information at <u>www.yangonbrt.net</u>, and were greeted positively when presented to the Chief Minister and key agencies in December 2018, but have yet to be officially endorsed by the Yangon Region Government. Similarly, plans to upgrade the city's aged single-gauge circular railway have long been discussed and work is ongoing, though at a relatively slow pace.

The time is therefore right for Yangon not only to initiate some key new mass transit initiatives like the planned Pyay Road/Insein Rd BRT system, but also to develop a spatial development strategy that encourages Transit-Oriented Development (TOD) around these stations and other frequent bus routes, as well as the circular railway stations. This report outlines recommendations for how this might be accomplished.

1.2 Transit-Oriented Development

Transit-Oriented Development (TOD) refers to the process of building sustainable and livable developments and communities with a design orientation towards the users of the available transit service.

General guidelines for TOD best practice in an emerging economy context are only recently emerging. This report follows the Institute for Transportation and Development Policy's *TOD Standard*, which contains a scoring mechanism for evaluating TOD projects that was developed by a panel of internationally recognized experts to be generally applicable to emerging economies. Other similar standards, such as the LEED-ND standard developed by the Green Buildings Council, are too grounded in the specific US or European context to be applicable to emerging markets.

The TOD Standard sets out eight general principals of TOD design which apply to urban redevelopment projects focused on the station area of a rapid transit station or high frequency bus stop:

- **Walk**: The TOD Standard has very detailed design guidelines which enhance the walkability of the zone, including not only high-quality sidewalks and crosswalks but also visually active street frontage, numerous entrances and exists to surrounding buildings, and shaded and weather-protected walkways.
- *Cycle*: This metric involves the availability of safe and protected cycleways and bicycle parking in close proximity to the transit station, and cycle parking availability in and at surrounding buildings.

- **Connect**: This metric measures the size of blocks. The smaller the block sizes, the easier it is for pedestrians and cyclists to reach a transit station by the most direct route. If blocks are permeable by pedestrians and cyclists, this privileges access to the transit station by walking and cycling.
- **Transit**: This metric defines the minimum standard of transit to qualify as TOD, as well as defining the orientation of building access points. Buildings must have main entrances and exits on the side of the building closest to the transit station to minimize walking times.
- *Mix*: This metric measures the mix of land uses in the transit station area. A TOD should allow for office, residential, and community functions such as schools and day care in close proximity to the station area in order to minimize trip distances and convenience to the transit station.
- **Densify**: This metric measures the degree to which the residential and commercial density meets or exceeds densities in pre-existing best practice for similar circumstances, which needs to be established for the case of Yangon.
- **Compact**: This metric measures the degree to which the site selected for a TOD project is in the already built up area of a city. A greenfield site that is served by a rapid transit link scores lower than a site on a brownfield in the built-up area of the city.
- **Shift**: This metric measures the amount of land and meters of building dedicated to roads and parking for private motor vehicles in the site. The lower the amount of land and building meterage dedicated to automobile parking, the higher the score. This metric also places limitations on driveways crossing walkways

The higher the TOD score, the more the station area is considered to be transit-oriented. Implementing a successful TOD project can result from a coordinated joint intervention of a municipal authority and a consortium of private developers, or it could be a private sector response to a carefully specified zoning code in a location where those metrics under government control have already been met.

To date the TOD standard does not provide clear guidance as to how it might best be translated by municipal authorities into a specific transit-station "overlay" zoning code. The concluding section of this report makes a tentative first attempt.

1.3 Framework of this Report

This report makes specific recommendations regarding how Transit-Oriented Development (TOD) can best be achieved along the Pyay-Insein corridor, and more broadly in Yangon as a whole. Chapter 2 provides an analysis of current building codes in Yangon. Chapter 3 reviews the current state of spatial planning and zoning, which, since Yangon lacks formal zoning, looks primarily at proposals advanced by international partners with YCDC participation but not necessarily endorsement.

Chapter 4 focuses on existing development projects in Yangon and the developers behind them. Many high-density, modern buildings have gone up in Yangon in the past decade. Some of these projects meet certain elements of the TOD Standard well, and others less so. The focus of this section is to assess existing large developers in Yangon and their recent projects in the context of best practice TOD, given what information was immediately available.

Chapter 5 assesses the optimal locations on the Pyay-Insein Road corridor for TOD projects based on proximity to the proposed stations in Far East Mobility's Pyay-Insein BRT corridor plan, proximity to the City Center, land availability, market-readiness for TOD development, and neighborhood character and context.

Chapter 6 makes specific recommendations for a performance-based zoning code in specified areas, which would be implemented as part of ongoing city-wide efforts to implement a zoning code.



Figure 2. The station locations along the Pyay Rd/Insein Rd. BRT Corridor proposed by Far East Mobility

2. BUILDING CODES AND THE DEVELOPMENT PROCESS

2.1 Background

Yangon does not currently have a functional zoning code. As such, land development tends to be guided by the building codes. In Myanmar, there are national building codes established by the Myanmar Engineering Society (MES) which nominally govern all construction throughout the country. There are also Yangon-specific building codes created by YCDC. These are established by the Committee for Quality Control of High-Rise Building Construction Projects (CQHP). The Committee is empowered to define guidelines regarding the design of High-Rise Building in Myanmar, which must be observed by Project Supervisors and Site Engineers. For any "major land use development, including new construction, extension, retrofitting, increase of floor area, and



Figure 3. New development, Yangon city center.

changes in usage of buildings/land",¹ developers are required to submit a conceptual design of their planned development, and request a Planning Permit, to the relevant authority.

Since building codes are universal, and not location specific, building codes can lead to context-insensitive regulation of land development. In this sense, much of what is currently contained in the building codes would be more appropriately governed by location-specific zoning codes. Zoning codes not only allow land developers to take certain actions 'as of right' without seeking permission from planning authorities, they also allow city authorities to control the type of development allowed in a particular way in specific locations that is appropriate to the neighborhood context.

2.2 Mixed-Use Development

The national building code sets out a list of possible land use classifications that can be used, were zoning codes to emerge. Those included are fairly standard. To implement successful TOD, 'mixed use' needs to be a possible zoning category. In Yangon, mixed-use is recognized as a legitimate zoning category. Most appropriate for a TOD zone is the following allowable land use designation:

¹ 2016 Building Codes Myanmar, p. 14

"I(b) Mixed Residential Use Zone". Except from Building Code text below:

<u>Use Zones I(b) Mixed Residential Use Zone²</u>

Uses Permitted

- All uses permitted under Use Zone (a) i.e. Primarily Residential Use Zone
- All buildings belonging to R-6 of (PART2)
- Community Halls, and Religious buildings, welfare centres and Gymnasium
- Recreation clubs, Libraries and Reading rooms
- Clinics (PART-2), Dispensaries and Nursing homes
- Government, Municipal and other institutional Sub-Offices
- Police Stations, Post & Telegraph Offices, Fire Stations and Electric Sub-station
- Banks and Safe Deposit Vaults;
- Educational institutions
- *Restaurants, Hotels and other Boarding and Lodging Houses*
- Petrol filling and Service station
- Departmental stores or supermarket or wet market, shops for the conduct of retail business

In other words, a zone or an individual building it seems, can be designated as Zone I(b) without reference to any zoning code or map. The provision for mixed-use residential including retail as a secondary use is encouraging for TOD.

2.3 Parking Requirements

The minimum parking requirements in Yangon have been established by YCDC in the building codes. In the absence of any zoning code, or any special overlay zoning district for TOD, these guidelines would nominally apply to all high-rise buildings where YCDC building code is in effect. The sections relevant to TOD are highlighted.

Type of use	Minimum Parking	Additional Requirements
Residential	1 unit per room	Additional 20% of total
		parking provision required
Commercial - Office	1 unit for 100 sqm (1076	
	sqft)	
Commercial - Retail	1 unit for 100 sqm (1076	
	sqft)	
Commercial - Restaurant	1 unit for 50 sqm (539 sqft)	Additional 20% of total
		parking provision required
Commercial - Hotels	1 unit for 200 sqm (2153	Additional space per 8000
	sqft)	m ² of landing space.
		Additional 20% of total
		parking provision required.

Figure 4.	Existing	Parking	Requirements in	Yanqon
g un e	_/y			. angon

² 2016 Building Codes Myanmar, p. 29

These parking requirements are extremely high, on a level similar to those in heavily caroriented cities in the developed world, despite the fact that only a small percentage of Yangon residents own and drive automobiles. This can not only encourage people to purchase, own and operate private motor vehicles, it can also significantly increase housing costs, as developers pass on the cost of parking construction to tenants. Such parking requirements also tend to undermine the project's placemaking ability by requiring a significant amount of parking infrastructure, which is usually placed on ground-floors where otherwise retail and public services such as day care could be offered that would better activate the public space around the development.

Current state-of-the-art for TOD is to *replace these parking minimums with parking maximums in all TOD overlay zones*. Most TOD-incentive parking maximums cap the number of parking spaces somewhere around 50% of the existing parking minimum, but ideally parking minimums are set based on their relationship to a parking cap set based on the amount of newly generated traffic that the surrounding road system can absorb without congesting, or some other socially desirable outcome.

In Figure 5 below, Yangon's parking requirements are compared to other select ci	ties.
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City	Commercial/Office Parking	Residential Parking
Yangon	No less than 1 space per 100	No less than 1.2 spaces
	m ²	per unit
Amsterdam	No more than 1 space per	No more than 1.2 spaces
	250 m ²	per unit
London	No more than 1 space per	No more than 1 space for
	1000 m ²	units with 1 or 2 beds; 1-
		1.5 for units with 3 beds;
		1.5-2 per unit with 4 or
		more beds
Hong Kong	No parking required	No parking required
Paris	No parking required if within	No more than 1 space
	0.5km of a Metro stop	per unit
San Francisco	No more than 7% of total	No more than 0.25
	floor space to be used for	spaces per unit
	parking	
New York	No parking required	No more than 0.2 spaces
(Manhattan below 60 th		per unit
Street)		

Figure 5. Comparison of Yangon parking requirements to other select cities

In Yangon, given the weak regulatory environment, it is probably preferable that the current parking regulations remain unenforced, and the decision about how much parking to provide be left to the market, as it is likely to result in less unneeded parking than would result from the current regulation.

2.4 Setbacks and Height Limits

One of the objectives of building codes and zoning is to ensure that buildings are built properly and to ensure that property developers do not build their buildings so large on their land that their building obstructs all air and light from the adjacent building and the street.

This is done generally by regulating the amount of the plot covered by the building (the building coverage ratio), by limiting building heights, and by requiring set-backs from the street.

In fact, much of the downtown of the Yangon CBD is covered by such pre-zoning, prebuilding code buildings.



Figure 6. Yangon CBD buildings are built over nearly 100% of the lot, with no setback, limiting light and air for many apartments, and inhibiting free access to critical utilities.

YCDC's Building Codes aim to avoid these problems. They do this by placing restrictions on lot coverage, requiring set-backs, and limiting building heights.

The Pyay corridor and several other main thoroughfares have setback requirements of 20' from the property line, while minor roads have setback requirements of 12'. While this setback requirement aims to ensure light on the street, and to allow access to utilities, in practice this sort of set-back requirement often ends up serving as an unregulated car parking zone that can badly deteriorate the walking environment and the streetscape. These set-back requirements are now generally discouraged in TOD zones; instead, property developers are required to build their property out to the property line in TOD zones at the ground floors, with set-backs required only on the upper stories.

The building code also sets a uniform height restriction to double the width of the street in front of the property. In other words, if the street is 30 meters wide, the building can be a maximum of 60 meters high. Yangon also has a "slenderness" ratio which requires building heights not to exceed three or four times the width of the façade, depending on the depth of the building's foundation.

In the developed world, there has been a rethinking of these 1960s era set-back requirements in recent years. The original set-back requirements, first articulated in the New York City zoning ordinance of 1916, set limits on the height of the front façade, to roughly double the street width, but allowed upper floors to rise to higher levels at angles that allowed a certain minimum amount of daylight to hit the street.



Figure 7. Setback provisions in the 1916 Zoning Ordinance.

The 1916 Ordinance, however, always maintained the street wall. The setback was not at ground-level, it only began at the top of the front façade. This ensured that the street façade was maintained, but did not restrict the height of buildings, the mass of the structures, or the lot coverage. This changed in the 1961 New York Zoning Resolution which introduced many of the zoning and building code concepts being proposed for Yangon. The 1961 New York

Zoning Resolution put controls on lot coverage, height, and building mass (floor – area ratios). While it did not require the building to be set back, many buildings were designed with setbacks in order to comply with the required open space ratios. The requirements often meant that the building was set back from the street, interrupting the street wall.



Figure 8. Building resulting from New York 1961 Zoning Resolution

The 1961 Zoning Resolution was criticized for ignoring the character of certain neighborhoods and allowing the construction of skyscrapers in otherwise low-rise neighborhoods so long as there was a sufficient setback.

While the 1961 Zoning Resolution is still the basic legal zoning code in New York City, it has been modified several times, most critically in 1987 when the Quality Housing Program was established. Special zoning designations were created where the Quality Housing Program applied. Urban, transit-oriented districts are generally identified as districts covered under the Quality Housing Program.

This program defines that the building needs to be built to the 'red line' or the edge of the property line to maintain the street wall. It also regulates



Figure 9. Diagram of the effect of the Quality Housing Program from the New York 1987 Zoning revisions

the height of the building and the maximum height of the base of the building so that a developer cannot build a skyscraper in what has historically been a low-rise residential neighborhood (like Greenwich Village).

For 'primary commercial streets' in New York there are further 'context' specific provisions. 50% of the ground-level of the buildings must have transparent surfaces (shop windows) and security gates are not allowed for night. Furthermore, parking garages cannot front onto a primary commercial street: rather, they must be

R6B **R8 Non-contextual Residence District R6**B R6B 4-41 C4-4A Contextual Commercial District 22.72 R6B V C4-4 Non-contextual **Commercial District** R6B Contextual Residence District 144 5

surrounded by at least 30' of depth of an allowable land use.

Figure 10: Overlay of 'contextual planning districts' allowed New York City to modify only parts of the 1961 Zoning Resolution rather than rewrite the entire code

The lot coverage is regulated, but it can be as high as 80%, or even 100% in downtown areas. All the context zoning codes require building to the 'red-line' so there is zero setback in the front of the building. In the rear of the building there is a setback requirement.

Air and light requirements are optimally met by performance-based targets, such as requiring that a minimum percentage of rooms in a residential unit have a minimum number of hours of access to direct sunlight. Such codes provide maximum flexibility to developers to meet the standard in the most context-appropriate manner, but they are fairly complex to regulate. For this reason, most cities continue to rely on height and setback requirements on upper stories.

Whether or not Yangon moves to implement its proposed zoning code and better enforce its current building codes, it should consider creating a TOD overlay zone designation where the building codes and zoning codes would be selectively over-written by a TOD zone specific ordinance; recommendations for which are outlined in Chapter 6.

2.5 Regulating Density

National regulations indicate that allowable floor area ratios (FAR) and building coverage ratios (BCR) are at the discretion of the local development authority and/or its zoning regulations. YCDC's regulations for high rise buildings (CQHP) specify a maximum BCR of 80% and a maximum FAR of 12. FAR and Building Coverage Ratios (BCR) are linked to the type of zone, as outlined in the following table:

No.	Category of Land Use Zones	Max: Floor Area Ratios (FAR) (%)	Max: Building Coverage Ratios (BCR) (%)
1	Exclusive Low-storey Residential Area	50, 60, 80, 100, 120	30, 40
2	Low-storey Residential Area	50, 60, 80, 100, 120, 150	30, 40, 50
3	Mid-storey Residential Area	50, 60, 80, 100, 120, 150, 200, 300, 400, 450	30, 40, 50, 60
4	Medium-High Rise Residential Area	100, 200, 300, 400, 450	30, 40, 50, 60
5	Informal Residential Area		
6	Mixed Use Area (Residential & Commercial)	100, 200, 300, 400, 500, 600, 700, 800	30, 40, 50, 60
7	Neighbourhood Commercial Zone	100, 200, 300, 400, 500, 600	40,50,60
8	Commercial Zone	100, 200, 300, 400, 500, 600, 700, 800, 1000, 1200	40,50,60,80
9	Controlled Industrial Zone	100, 150, 200, 300, 400, 500	50, 60
10	Industrial Zone/ General Industrial Zone	100, 150, 200, 300, 400	50, 60
11	Exclusive Industrial Zone/ Special Industrial Zone	100, 150, 200, 300, 400	30, 40, 50, 60

Figure 11:	FAR and	BRC Maximums	by Land-Use	Category

FAR = Total Building Floor Area / Plot Area BCR = Building Footprint Area / Plot Area

Density guidelines are typically provided as a range of allowable FAR. However, some cities, such as Seattle and Charlotte (US), are experimenting with minimum FAR only in order to incentivize density in TOD-designated areas. Seattle's minimum FARs are tied in to building height, with a different FAR required dependent on the pre-zoned building height limits, which may differ from lot to lot. These minimums range from 1.5 to 2.5 FAR, ensuring that developers take advantage of the height limits they are provided. Charlotte's program establishes a standard, though much lower, 0.75 FAR for any development within ¼ mile of a transit station and 0.5 FAR for development between ¼ and ½ mile of a transit station. It is suggested that YCDC adopt a minimum FAR and retain its existing BCR requirements for its TOD-overlaid areas.

Plazas and open space are considered one of the aesthetic components of TOD, which should figure in density requirements as well. Space for outdoor recreation, events and informal gathering, while part of TOD design guidelines, should be exempted from FAR/BCR.

In summary, national and city building codes currently provide a very loose framework for development in Yangon. Some of these codes are reasonable, others are out of date and need to be revised. The extent to which these codes are enforced is unclear and needs to be further studied.

3. AN EMERGING ZONING CODE IN YANGON

3.1 Existing Ad-Hoc Regulation

Yangon currently has no spatial development plan and no zoning code. As such, land development is regulated by the YCDC on an ad hoc basis. There are draft strategic plans and zoning plans reflected in the Japanese International Cooperation Agency's (JICA) Strategic Urban Development Plan for Greater Yangon of 2014 that cover the Central Business District (CBD), there are further plans for the Hlaing area in a study by APUR. These will be discussed in turn.

3.2 YCDC and JICA's Strategic Urban Development Plan for Greater Yangon



In May 2013, at the initiation of JICA, the Yangon City Development Committee (YCDC) established a Land Use, Zoning, and Urban Design Review Working Committee to consider a comprehensive height control and zoning plan for broader Yangon. The membership included Yangon Heritage Trust's Director, Daw Moe Moe Lwin, representatives from the Department of Human Settlements and Housing Development, the Ministry of Science and Technology, Japan International Cooperation Agency (JICA) and the Association of Myanmar Architects (AMA). Their general approach was to restrict very high buildings in the historically and culturally significant areas of the urban core, while allowing modern high-rise development in the areas immediately surrounding.

JICA focused on three areas with this Working Committee that are relevant to the Pyay/Insein Rd BRT corridor:

- Plans for the CBD
- Plans for the Hlaing Area
- TOD Plans around the circular railway

This JICA report outlines a strategy to build the institutional capacity of development & zoning regulation as a means of stimulating growth and generating development in Yangon. To do this, they focused their planning efforts on these areas as an example of what can be done throughout the city.



Source: JICA Study Team



3.2.1 JICA-led proposals for the Yangon CBD

The core of the Yangon CBD are some 20 square city blocks of high-density mixed-use development (as shown in figure 4 left and figure 5 in pink below). Much of Yangon was destroyed by allied bombing during World War II, so most of the buildings date from the Post-World War II period. Only a relatively small number of buildings survived World War II and thus predate the War.



Figure 13. Current Yangon CBD Density, from JICA 2014

There are low density lots surrounding this area. In the northern part of the CBD (in yellow) there are a number of institutional campuses, such as the Yangon General Hospital. Along the Yangon River, there are a number of port and ferry-related land uses.

The JICA-led Land Use, Zoning, and Urban Design Review Working Committee proposed that the Yangon CBD be divided into several sub-zones based on functional designations. Based on this proposed zoning and Far East Mobility's proposed busway routing³, the Pyay/Insein BRT would traverse the Social & Cultural, the Mixed Use and the Business & Commercial Zones. The latter two are optimal for TOD both due to the provisions of medium- to high-rise buildings and the institutionalization of mixed-use in the entire neighborhood.

The multi-directional corridors in the CBD area, on Anawrahta Road (WB) and Maha Bandula (EB), run primarily through the Mixed-Use Zone, though it borders the Social and Cultural Zone to the South.



Figure 14. JICA-led functional classification for Yangon CBD (Proposed BRT corridor shown in yellow)

The JICA plan includes a zoning map developed by the Land Use, Zoning and Urban Design Working Committee.



Figure 15. Zoning map proposed by the Land Use, Zoning, and Urban Design Working Committee (Top line is FAR and bottom line is the building coverage ratio)

³ Yangon Urban Transport Project Pyay Road Bus Priority Concept Design, Far East Mobility, 2018, p.9

This zoning plan allows for significant increases in building heights and density in the areas shown in red and gold above, and the existing density and land use in pink above.



Figure 16. Rendering of built out development plan, JICA, 2014

When built out, it would look something like the rendering shown above. Much of what was driving this was to keep the building heights in the area around the Sule Pagoda to largely the same height or lower in order to preserve the historical character of the neighborhood and not build higher than the Pagoda.



Figure 17. Existing landscape, Yangon CBD

When comparing Figure 14 (plan) to Figure 15 (Google Earth image, current), one can see the proposed zoning plan allows for high rise modern development along the two East-West Arterials down which the BRT would travel, with some entire blocks reconstructed at significantly higher density.

JICA's team objects to adding greater density than is allowed in their zoning plan on the grounds that it would generate additional traffic congestion. They state the following:

"Looking at the recent trend of development proposals, a number of plans showed the

intention to introduce high-density high-rise buildings. If such a plan will be formulated for the central part of CBD, the more concentrated traffic and increased demand for car parks would take place, and would worsen the already crowded CBD area. To achieve a balanced development in Greater Yangon, such development is not desirable in the central part of CBD,

but will be implemented at subcenter areas or on the western or eastern fringes of CBD. In the

JICA Report 'Strategic Urban Development Plan of Greater Yangon', the central part of CBD, where many heritage buildings exist, would be restrained and controlled under land use regulations such as those on coverage ratio and floor volume ratio." (JICA, 2014, p.2-10)

Indeed, given the minimum parking requirements embedded in the YCDC building code (see Chapter 2 above), and in the current absence of any mass rapid transit infrastructure, it is likely that building at greater density than shown above would aggravate traffic conditions considerably. However, this problem is much better mitigated by implementing the planned BRT system and replacing the parking minimums with much lower parking maximums in the station areas, to ensure that any new development does not further encourage the residents and customers from driving to and from their destinations.

As such, the allowable floor area ratios (the ratio of the building's usable floor area to the size of the lot) shown in figure 11 above, which range between 3 and 7 in the CBD, are consistent with the TOD Gold Standard, and could even be selectively increased.

However, as there was no BRT proposal envisaged at the time that the JICA plan was developed, there is no relationship between this development plan and the BRT corridor. We would therefore propose that TOD overlay zones be created around the proposed BRT stations in the CBD that are not in the Social, Cultural, or Historical zones. The JICA plan did propose TOD around the circular railway stations. These are discussed in the next section.

3.2.2 Hlaing Area in the JICA Plan

The other area that was reviewed in detail in the JICA plan that overlaps the proposed BRT project is the Hlaing Area. This area is currently largely mid-rise residential. The draft zoning proposal for Hlaing Township developed by the Land Use, Zoning, and Urban Design Working Group zones most of the area, including the area along the Insein Road BRT and the Yangon Circular Railway, as medium and low density residential, with FAR limited to 2. This zoning, were it to be enacted, would foreclose any opportunity for TOD in Hlaing Township. JICA, in workshops, proposed several modifications which would have allowed for TOD around the YCR and a proposed metro rail transit (MRT) line which currently is not an active project.

The general approach of JICA, to introduce mixed use zoning around planned rail stations, is a good one, but it ignores the BRT proposal. As there is no active MRT proposal or any funding for it, we will propose similar rezoning but around select BRT rather than the MRT station.

Even in an optimistic scenario of a YCR upgrade within the next 8 years, it would be more sensible to orient TOD around the bus stops along Insein Road, because with or without a

BRT project there are already over 15,000 passengers per hour (counting in two directions past a single point) riding up and down the corridor on normal buses.



Figure 18. YCDC's preliminary zoning proposal for Hlaing Township (proposed BRT and BRT stations shown in red)



Figure 19. JICA-proposed revision of zoning plan for Hlaing Township (proposed BRT in red)



Figure 20. Most transit trips are currently on buses on Insein Rd through Hlaing Township. With or without BRT, TOD should be oriented to this high volume of passengers, rather than the relatively fewer passengers likely to take the circular railway

3.2.3 JICA-proposed TOD at Circular Railway Stations



Figure 21. Yangon Circular Railway (Orange loop), development sites (light blue) and the BRT corridor (red)

JICA's primary rapid transit proposal is the upgrading of the Yangon Circular Railways. JICA's transportation plans also involve BRT, not on the Pyay Road/Insein Road corridor, but rather as feeder services subordinated to the railway. The JICA strategic development plan report therefore anchors all of its proposed TOD projects in the station areas of the JICA-proposed upgrade of the Yangon Circular Railway (YCR). The YCR is a 49 km narrow gauge rail line which loops around Yangon. It currently provides a low quality of service with an average speed of only 16 km/hr and service provided only roughly every 90 minutes per direction.

The relationship between the Pyay Rd/Insein Rd BRT and the Circular

Railway Upgrading proposal by JICA are shown in Figure 10 (left). In the JICA plan, the YCR would be double-tracked, the tracks would be replaced (probably with a wider gauge), signals would be replaced, and the rolling stock would be modernized using diesel-electric multiple units (DEMU). These changes are estimated to increase the YCR's average speed to approximately 50 km/hr, as well as permit greater frequency of service and much higher capacity. These upgrades are estimated to cost \$300 million, which would be financed in part through land development of sites along the YCR.

The YCR upgrading plan would relocate the current rail yards outside of the urban core, where they are currently immediately adjacent to station areas on potentially valuable real estate, to new locations in the north of the city where cheaper land is available. Most critical is the Yangon Central Rail Station, which is currently the subject of a major redevelopment project (further discussed below).

The sites identified for TOD in the JICA plan have the significant advantage that there are large parcels of land owned by the Myanmar National Railway that are already assembled under a governmental entity that would make the redevelopment of the land comparatively simple.

Figure 22. Yangon circular railway

Only two of these sites have any overlap with the CDIA/Far East Mobility BRT corridor: the Insein Rd. station, for

which JICA did a case study, and the Yangon Central Rail Station, where the proposed BRT corridor currently terminates.

The JICA proposal for TOD sites does not include any specific TOD zoning overlay; as there is no zoning, there is no need to change zoning to achieve a TOD project. Their vision of TOD, however, differs substantially from that which we are recommending. While their proposal includes a mix of uses compatible with the 'Mix' imperative of the TOD standard, the orientation of the proposed development is entirely towards the rail station and private motorists. Even if the BRT project were not to move forward, the vast majority of transit trips in the area will continue to be bus trips operating on Insein Road, so the orientation should be both towards the rail station and to bus services (and potential BRT) on Insein Road.

They are proposing bus services that solely bring passengers to the rail line, while our vision is for multi-service BRT as a primary, rather than an ancillary transportation service.





Figure 23. JICA vision for TOD at Insein Road YCR Station: Feeder Buses



Figure 25. JICA vision for TOD at Insein Road YCR Station: Park and Ride

Figure 24. JICA vision for TOD at Insein Road YRC Station: Mixed Use

In addition, the JICA proposal includes a large number of parking spaces, with an assumption that many rail passengers will take their private cars to the train station and to the destinations in the new development. It would thus not meet the 'Shift' criteria of the TOD standard. Normally, a TOD project will significantly reduce the amount of parking supply in the development, with the expectation that people would walk to the bus or train station, or take another bus. (Such rail stations in Japan are almost entirely devoid of car parking, though they have ample

bicycle parking.) There is insufficient detail with respect to the other metrics to determine how well the design would perform under the TOD standard.

3.3 APUr/PYUC Pilot Zoning in Hlaing Township



Figure 26. APUR pilot zoning plan for Hlaing Township

Another, more recent participant in the zoning discussion in Yangon is the Paris-Yangon Urban Cooperation (PYUC), a product of the Atelier Paris d'Urbanisme (APUr), which first performed a lot-by-lot analysis of Hlaing Township, (see Figure 17 below). They set out to prepare a zoning map for Hlaing Township as a guide for YCDC to do the same in other districts. Their work encountered so many difficulties in simply creating a set of accurate geo-coded plot-level base maps that they never proceeded to the stage of actually developing proposed zoning for the area. The APUr work showed that there was considerable new high-rise residential towers being built in Hlaing Township that bear no relationship to any of the

Working Group-proposed zoning nor to the JICA-proposed zoning.



Nor does the actual development bear any relationship to any planned rapid transit improvements, either on the YRC or the BRT corridor.

Figure 27. Detailed lot-by-lot GIS mapping of Hlaing Township done by APUr, with BRT overlaid in yellow



Figure 28. New, very high-density development off Insein Rd., Hlaing Township, also showing the proposed BRT station platform location (GEMS Garden Condominium, see Section 4.3.4)

Many of the new housing estates being constructed are creating mega-blocks, closing existing streets without any opposition from YCDC, and blocking access to Insein Rd. from surrounding properties. They thus violate the concept of "Connect" in the TOD standard.

These mega developments are also further worsening the problem of lack of public greenspace for recreational purposes.

It is unclear whether the work of APUr is continuing or has been discontinued. Certainly *the continuation of its GIS efforts are critical to the success of any future zoning regime.*

3.4 Summary

The nascent zoning efforts initiated by YCDC with the support of JICA, which have been developed for a few pilot zones, have not yet come into force. In some cases, this is just as well, as the preliminary zoning concepts could be updated to be more consistent with best practice. Difficulties in establishing the baseline geocoding of lots and surrounding streets also remains a significant obstacle to implementation of a state-of-the-art successful transit-oriented zoning code. Specific recommendations follow in a later section.

4. URBAN DEVELOPMENT PROJECTS IN YANGON

4.1 Background

Most land development efforts currently underway in Yangon are developer-led projects with a relatively limited role played by YCDC. Most of these private-sector led developments are targeted to higher-income groups, and while the provide transit-supportive density and mixed use, most also are oriented to private motor vehicle travel rather than nearby bus corridors. Many developers are displacing the local resident population, and often taking control of local streets and creating gated communities that are not permeable by surrounding residents.

The Yangon Regional Government (YRG) and YCDC will need to take a more active role if they would like to shape urban development more pro-actively towards more socially desirable outcomes

Private developers will certainly be responsive to YRG and YCDC transportation developments, should these be made clear and should they see concrete progress towards their implementation. The YRG and YCDC have yet to decide on whether to move forward with the Pyay Road/Insein Road BRT and/or the upgrade of the Yangon Circular Railway. As such, private sector land development is not connected to either of these planned transit improvements.

The two main projects involving government entities are the New Yangon City project of the YRG, and the Yangon Central Station project, which is being developed by Myanmar Railways under a publicly awarded tender. The TOD potential for these projects is reviewed next.

4.2 Government-Led Development Projects

4.2.1 New Yangon City

New Yangon City is an effort to develop 20,000 acres of primarily vacant land to the west of the current CBD into a multi-function urban district. This would be an entirely planned new town currently beyond the built-up areas of Yangon. As such, it would perform poorly under the "Compact" metric of the TOD standard, regardless of how well the site is otherwise developed.

The effort is being undertaken by New Yangon Development Company (NYDC), a 100% Yangon Regional Government-owned corporation. NYDC's vision is to create "a safe, smart and clean city that will serve as an example of efficiency, integrity and accountability."



Figure 29. New Yangon City Project Area is disconnected from the current urban transit system

The centerpiece and catalyst of New Yangon City is a planned six-lane mixed-traffic bridge connecting New Yangon to the old city across present-day Bagaya Street.



Figure 30. New Yangon City: Preliminary concept

NYDC also plans to extend New Yangon into a much larger second phase which will extend the urban core further out into the Irrawaddy delta as follows in the figure below.



Figure 31. Long range city development plans

The bridge crossing the river will have a direct connection with Pyay Road, the proposed BRT corridor, but not with the CBD. As a result, any transit running from New Yangon to the CBD could theoretically run along the Pyay BRT, although there are more direct routes into the CBD.

The NYDC's plan for transportation to New City includes: "connectivity within the city will be via electrically operated trams and/or (electric) buses, while connectivity to Yangon will be established via rail and/or bus in the mid to long term."⁴ Goals include "90% access to public transport" and "Minimum time spent in traffic congestion."⁵ There is not much concrete visioning for what New City should look like; in particular, language surrounding transit is mostly "visual" as opposed to "technical". Buses are mentioned as a principal mode but there is no suggestion of BRT. "Trams" are mentioned but it is not suggested how these would operate, especially with the single planned river crossing. The website and SEMP highlight, in multiple locations, the "26 km of artery roads" planned as part of New Yangon but leave transit very much on the backburner.

Thus, it seems as if NYDC has yet to fully understand or determine what the role of transit in their community will be. If it is developed as expressed in the SEMP, it is likely that New Yangon will become a city designed for the private automobile.

The New City project has faced controversy since 2014, when then-Yangon Chief Minister Myint Swe signed a controversial contract to develop the site with a little-known local firm with whom he had personal ties. This contract was later rescinded due to public outcry over the lack of transparency and the lack of a competitive tender for the development site. The same issue occurred in 2019, when a contract was controversially issued to the Chinese

⁴ NYDC Socioeconomic Master Plan, p.13

⁵ NYDC Socioeconomic Master Plan, p.24

Communications Construction Company without a tender, but with an opportunity for other firms to issue counter-proposals.

4.2.2 Yangon Central Station



Figure 32. Rendering of the Yangon Central Station redevelopment project

More promising, and more relevant to the Pyay Rd/Insein Rd. BRT project, is the planned renewal and revitalization of the Yangon Central Railway Station (YCS). YCS is the main station both for intercity and commuter passenger travel in Yangon. Myanmar Railways (MR) is the sole operator of the country's passenger rail network, which includes the Yangon Circular Railway (YCR), the city's primary commuter line, and intercity routes to Naypyidaw, Mandalay, and other towns and cities.

The plan is to create a mixed-use development centered around housing, office space, and commercial amenities over 25 acres. As part of this development project, the existing opencut railway will be decked over to create a primarily pedestrian mall. The centerpiece will be a brand-new, modern station building surrounded by over a dozen residential and commercial high-rise towers.

YCS is located at the "dog-leg" southern terminus of the Pyay/Insein Road BRT and will, given the scale of the development, be a significant generator of trips on the BRT corridor. BRT will also serve as a primary means of access from the western CBD to the station area. Designs for the Pyay Road/Insein Road BRT Corridor do not yet include designs for a terminal at the Yangon Central Station, though many services are planned to terminate there

DEVELOPMENT TYPE VERALL **GFA BREAKDOWN** ZONE 4 ZONE 6 **ZONE 1** ZONE 5 ZONE 3 ZONE 2 OFFICE GFA: 157,703m2 (14.5%) RESIDENTIAL GFA: 401,467m2 (36.8%) SVC APARTMENT GFA: 150,835m2 (13.8%) HOTEL GFA: 48,135m2 (4.5%) PODIUM GFA (RETAIL): 192,347m2 (17.6%) PODIUM GFA (MSCP): 130,487m2 (12.0%) TOTAL GFA: 1.091.319m2 (100%) STATION GFA: 7,346m2 (0.7%) TOTAL CFA: 1,481,954m2 ting to CFA (beyond GFA TOTAL BASEMENT AREA: 282,614m2 OTHERS: 108,021m2 UTILITIES GFA: 3,000m2 (0.1%)

Figure 33. Yangon Central Station development concept

This is considered one of the most symbolically important projects taking place in Myanmar as it will be the largest public infrastructure project undertaken by the Suu Kyi-led government. MR, as the landowner of the property, is the government agency that is responsible for the construction tender. The tender process took three years and resulted in the selection of the Central Transport Development Consortium (CTDC), a three-way joint venture between Min Dhama Co. (Myanmar), Oxley Holdings (Singapore) and Sino Great Wall (China).

As part of the agreement, the railway improvements and new station will take place before the land transfer takes place to allow private development. This phasing plan allows MR to ensure it receives the public benefits before turning over the land for the office space. MR will also receive a cut of CTDC's real estate profits as a value capture mechanism.

As of October of 2018, the consortium that won the tender had only just begun detailed topographical surveying of the site. The project is estimated to take 8 years. If this project moves forward, and the BRT project moves forward, it is critical that the redevelopment make the BRT services and related stations integral to the design of the development. Further, this site might be an excellent opportunity to use the TOD standard as a metric for guiding the development towards more socially desirable outcomes.

4.3 Single-Developer Projects

Most land development in Yangon is led entirely by private developers with a very limited regulatory role played by the YCDC. The focus of this section is to assess the degree to which large developers in Yangon are already orienting their projects towards Yangon's already high frequency bus corridors. This section is a qualitative look at the history of several existing large-scale developments. This review shows that several of Yangon's developers have the requisite expertise and experience to accomplish complex, mixed-use development projects appropriate to TOD development.

4.3.1 Marga Group

Marga Landmark Development Co. Ltd is the real estate wing of Marga Group, one of the largest conglomerates in Myanmar. Marga Group is an international corporation that owns several subsidiaries, working in real estate and the telecommunication sector in Myanmar.

Based in Yangon, Marga focuses on mixed-use and high-end property developments. The team of directors includes several members from Australia, UK, Hong Kong, Korea, and other countries. In Myanmar, all Marga real estate projects are concentrated within Yangon, where they've developed several large residential and retail projects in recent years.



Figure 34. The Central Development Project (rendering). Ground was broken in May 2017. The lower-rise commercial complex partially opened in December 2017. The first residential tower opened in February 2018.

Marga Landmark Development is best known for their in-progress flagship project, The Central, is a mixed-use project. The project consists of several residential towers, a commercial office space, and a shopping mall. It is—like many of the ongoing projects in Yangon—focused on the luxury market.

The Central is located in the Surinam Park neighborhood of Yangon, to the northeast of the city. As such, it has limited transit options — the developers are effectively building TOD-level density and mixed-use without the supporting transit component. Instead, the Central features a 2000-car secure garage.

4.3.2 Shwe Taung

Shwe Taung is a major conglomerate in Myanmar, with several subsidiaries working in real estate, engineering, distribution, building materials, lifestyle, construction, and infrastructure investments.

Shwe Taung has operated in Myanmar for around five decades, with several major infrastructure projects to their name. It started as a small shop in Yangon in 1970, founded by Mr. Aik Htun. In 1992, the company entered into the construction business with two small-scale projects in Yangon.

A 2015 Myanmar Times article discussed how this development allowed Shwe Taung to be propelled forward as it was one of only a couple developers not affected by US trade sanctions designed to impede companies with attachment to the nation's former military junta.⁶ These sanctions were since lifted in 2016.

Shwe Taung Development is known for mixed-use large scale projects, which include Junction City, one of the biggest mixed-use development projects in Myanmar. In addition, Shwe Taung constructed the Union Business Center and Union Financial Centers in Yangon. Shwe Taung has more than 7,000 employees, making them the biggest private employer in the country.

For Junction City, Shwe Taung entered into a joint venture with Keppel Land, a well-known international developer based in Singapore, which operates in Myanmar as well as China, Indonesia, Vietnam, Philippines, and United Kingdom. Keppel Land is a real estate arm of Keppel Group, one of Singapore's largest conglomerates and is also considered to be one of the most well-known and recognized property developers in Asia, best known for commercial high-rise development.

⁶ https://www.mmtimes.com/business/property-news/17898-shwe-taung-launches-300m-project-in-downtown-yangon.html



Figure 35. Junction City Mixed Use development. Also shown is the main bus stop in front of Junction City, which is inadequate and inappropriate for the high demand levels.

Junction City is a large shopping center project completed in 2017. Located in a market quarter of the CBD in close proximity to the YCS site (previous section) and the commercial core, Junction City is one of the first major modern development projects in Yangon.

Junction City is has high-rise office and residential towers overlooking a shopping mall that itself features street-level retail. The complex also features a five-star hotel.

In addition to real estate developments, Shwe Taung is also spearheading infrastructure projects such as the present Deedoke hydroelectric dam project, for which they serve as the principal construction contractor. Shwe Taung was also one of the winning bidders on the contract to upgrade the Circular Railway, responsible for the work on the eastern section of the line.

4.3.3 Yoma Strategic

Yoma Strategic Holdings Ltd is a large conglomerate that owns several companies and subsidiaries working in different sectors. In addition to real estate, the group owns subsidiaries working with financial services, consumer services, automotive & heavy equipment, and investments. Yoma Strategic has built several hundred-plus acre housing estates in the Yangon region and continues to increase its portfolio across various asset classes.

Yoma Strategic's largest project at the moment is the mixed-use Landmark Complex. Landmark is just a few blocks from the similar Junction City project, however it involves an additional historic preservation element. The Landmark Development is so-named as it involves the historic preservation of the former Burma Railways headquarters building, which, like Junction City, will feature a five-star hotel upon project completion.



Figure 36. The Landmark Complex as it encircles the historic, preserved railway headquarters building.

Junction City and Landmark are located in districts where enclosed shopping is commonplace. Across the street from Junction City and just adjacent to Landmark, the Bo Gyoke Market is well-known for its tightly packed rows of small businesses and craftspeople. By creating large indoor centers of commerce, Junction City and Landmark both bring a modern touch to the existing neighborhood. As a result, these projects fall short on the sidewalk activation aspect of TOD, focusing more on drawing pedestrians into their interior spaces.

In addition, the lack of transit connectivity in Yangon and the luxury market to which these developments cater means that mobility to and from the project site is automobile-focused, with large underground parking garages.

Both of these development projects represent an ideal form of density and land use diversity that could be implemented in other desired locations throughout Yangon, such as in proximity to the BRT corridor and/or alongside the improved YCR. Both of these projects take place within JICA's designated "mixed use" neighborhood and are examples of what high-quality, modern, mixed-use development can be like.

4.3.4 Capital Development

Capital Diamond Star Group, also known as CDSG, was founded in 1960 as a small trading company. It is also one of the oldest companies in the country. CDSG is a group of companies that work in different sectors, including real estate. CDSG owns several subsidiaries working in retail, food, home care, personal care, financial services, telecommunication, and several other industries.

Capital Development Limited (CDL), the real estate arm of the CDSG, was established in 2008. Two other companies operate in the real estate sector, namely Capital Construction Ltd, and Capital Leasing Limited. Most of CDL's projects are centered within Yangon. CDL currently employs more than 7,500 people, making it one of the larger companies in the country.

CDL's largest project is the Gems Garden (also known as Capital City) development project just off the Insein Road corridor, opened in 2015. Gems Garden contains 584 residential units spread over 21 floors in three separate residential towers. Gems Garden is developed to a TOD-appropriate residential density, though it is a purely residential development, lacking any of the mixed-use development features that underlie any TOD project. Additionally, its location is off the Insein Road corridor on a side street and, with an entirely residential façade, fails to activate the pedestrian space on this side road, a missed opportunity.

The Gems Garden project demonstrates that CDL has the ability to build large-scale and high-density projects, although it shows that existing market forces have not fully incentivized mixed-use development or the walkability and livability improvements necessary to fully comply with the TOD Standard.



Figure 37. The Gems Garden development project undergoing construction on its final three towers

4.3.5 IME Property Co. Ltd.

Founded in 2013, IME Property Co. Ltd is owned by IME Holdings Co., Ltd, founded in 2011. IME is a private-owned group of companies working in several sectors, including real estate. IME Property represents their real estate wing.

IME's main project in Yangon is The Leaf Residence, which is one of the further-out residences in Yangon. The Leaf is located on side road off Insein Road, similar to the Gems Garden project, and similarly lacks good pedestrian facilities and activation of the sidewalk.



Figure 38. The Leaf Residence development project

5. ANALYSIS OF TOD SITES ON THE PYAY/INSEIN BRT CORRIDOR

5.1 Analytical Framework

This section evaluates the potential of sites along the Pyay Road/Insein Road planned BRT corridor for developing Gold Standard TOD in the station area.



Figure 39. BRT Stations by Station Type

Site prioritization should generally be made based on the following criteria:

• *Proximity to planned and existing rapid transit and high frequency bus corridors:* For a development to be TOD, there needs to be a transit station.

• Land parcels available for development: While developers can assemble land for a medium to large scale TOD project by purchasing the land from a multiplicity of owners, it is much easier to assemble land if there are already plots available for development, particularly if the land is held by the government.

• *Market potential:* If the area is already redeveloping, it is more likely to be desirable to other developers.

• Consistency with YCDC and its partners' spatial development plans: While there is no formal zoning, YCDC has done enough work on zoning and TOD potential to provide a preliminary indication of their priorities.

• Proximity to the built-up area of the city and consistency with surrounding neighborhood fabric: New development should target land closest to the city center first, and develop farther out only gradually. Consistency with the

surrounding neighborhoods is also important.

As too little is generally known about the parcels of land involved, this report will give more general observations about the TOD potential of various sites, starting from the CBD and moving outwards.

A preliminary analysis of available land via satellite image, existing urban policy and future zoning and land use plans allows us to construct a TOD Priority Metric to determine the optimal locations for BRT-anchored TOD on the Pyay-Insein Corridor. These are colorized by Overlay Zones A through G, which will be discussed in the next chapter.

Station		Proximity to CBD and Other Urbanized Land	Availability of Land	Indication of Market Interest	Consistenc y w/Gov Plans	Station Score	Final Score	TOD Zone
CBD	Central Station	5	6	5	5	1	96%	А
CBD	Latha	5	6	3	3	3	87%	В
Pyay 1	Saint John	4	8	3	3	1	83%	D
Insein 10	BOC	1	8	4	5	1	83%	G
Pyay 6	Nar Nat Taw	3	8	3	3	2	83%	E
CBD	Bandula Park	5	6	3	3	1	78%	В
CBD	San Pya	5	1	4	5	3	78%	С
Pyay 5	Seik Pyo Yay	3	6	3	3	3	78%	E
Insein 3	Than Lann	3	5	3	5	2	78%	F
Insein 2	Thukha	2	6	3	5	2	78%	F
Insein 4	Bar Tar	2	6	3	5	2	78%	F
Insein 1	Sin Yay Twin	3	6	2	4	2	74%	
Insein 6	Thamine	2	6	2	5	2	74%	
Pyay 2	Hel Pin	4	8	2	2	1	74%	
Pyay 7	Hledan	4	4	3	2	3	70%	
Pyay 4	Maha Myaing	4	4	2	1	3	61%	
Pyay 3	Myaynigone	4	6	1	1	1	57%	
Insein 8	BPI	3	6	1	1	1	52%	
Insein 9	Gyo Gone	1	6	1	1	1	43%	
Insein 7	Kalar Kyaung	2	4	1	1	1	39%	
Insein 5	Okkyin	2	2	1	2	2	39%	
Insein 11	Nant Thar Myaing	1	2	1	1	2	30%	

Figure 40. TOD Priority Scoring by Station

The best potential anchor sites for TOD are revealed to fall under three categories which will be delineated in the following sections:

- Yangon CBD near San Pya, Bandula Park, Latha and Yangon Central Station (TOD Zones A, B, C)
- Pyay Road South near Saint John BRT (TOD Zone D)
- South Kamayut Township near Nar Nat Taw, Seik Pyo Yay BRT (TOD Zone E)
- Plots with greater land availability (TOD Zones F and G)

5.2 BRT-Anchored TOD potential in the Yangon CBD (TOD Zones A, B, C)

The proposed BRT corridor passes through the Yangon CBD on two parallel East West arterials and terminates at the planned Central Station redevelopment.



Figure 41. Current zoning proposal, CBD, and BRT corridor (in black, station locations shown as red circles)

The BRT corridor begins at the Central Railway Station which is a major redevelopment project. It passes along streets that are tentatively zoned for mixed use, commercial and business use, and high density residential, as shown in Figure 38 above. This proposed zoning implies that some of the station areas in the CBD are likely to redevelop without extensive intervention by the government. The proposed zoning is compatible with TOD development around the station areas being proposed by the BRT project.

However, to be a successful TOD requires more than just mixed use and sufficient density. These areas will become, with the introduction of BRT and the upgrading of the YCR system, the most transit-accessible locations in Yangon. As such, they should not require much, if any, parking for private motor vehicles in order to be financially successful. Further, these areas also require an urban design orientation to pedestrian and cycle trips and their access to the station area.



Figure 42. Proposed TOD zoning overlay districts

In Figure 39 above, three proposed TOD Overlay Zones are proposed. If these areas were zoned as proposed, but with a TOD Overlay Zone as will be defined in the next section, the area would be more likely to develop commercially in a manner consistent with making the area livable and transit-oriented. The first area, Zone A, encompasses the Central Station area and the FMI Landmark Development project, which may be too far along to change at this point, but the designs are not so bad from a TOD perspective. This new overlay zone would ensure that this area is developed with a transit, rather than automobile orientation.

TOD Overlay Zone B would govern the two BRT stations currently serving the central market. This area is likely to redevelop over time.

The third TOD Overlay Zone C is currently zoned for high density residential and also encompasses an area reserved for bus transfer and layover. This zone would encompass a TOD built on top of the proposed bus terminal and ensure that the proposed high-density residential areas develop with a transit orientation.



Figure 43. The FMI Landmark project would be improved by maintaining the street wall

5.3 TOD Potential Along Pyay Road South

5.3.1 Saint John and Pyay Rd Circular Railway Station (TOD Zone D)



Figure 44. Proposed TOD Overlay Zone D at St. John and the Pyay Rd Circular Railway Station



Saint John is an excellent candidate with wide-reaching regional connections due to the colocation of the BRT and YCR Pyay Road station. This district would be a natural westward extension of the CBD to the northwest, following the modernized BRT and YCR corridors.

To the north of the railway crossing, the Taw Win Center provides a model for transitsupportive density, with residences, a hotel, and street retail. (1) This has begun to spill over to the south of the railway, with a modern-looking shopping center being built across from the Saint John bus stop. Opportunities to expand this commercially focused TOD trend exist adjacent to the proposed station with a large, undeveloped greenfield (2) that could be developed with multiple buildings if desired. Another opportunity exists to the NW of the station along the railway line, with multiple large open plots (3) perhaps awaiting development due to the "cleared" nature of the land. All of these projects could be connected as joint BRT / YCR supportive TOD projects. Heading northbound, the next area along the BRT corridor is the National Museum, the Yangon Regional Parliament, very high income residential, and the People's Park which offer few opportunities for development.

5.3.2 Seik Pyo Yay and Nar Nat Taw (TOD Zone E)

The next area with development potential is the Seik Pyo Yay and Nar Nak Thaw area. A TOD overlay district is also recommended for this area.

TOD Overlay District E:

Seik Pyo Yay and Nar Nat Taw



Figure 45. Seik Pyo Yay / Nar Nat Taw TOD Station Overlay Zone E

Seik Pyo Yay and Nar Nat Taw are rapidly redeveloping areas to the immediate West of the Yangon University campus. The area encompasses the Junction Square development, a midrise (4-10 floors) pedestrianized mall with shopping, office and residential space. There are several large plots of vacant land in the area, and other lower-value properties that are likely to be sold for redevelopment. This area is likely to continue developing rapidly. Regulating land development in this area to have an orientation towards the planned BRT and existing bus services on Pyay Road is thus a priority. The University itself might think of eventually breaking up the enclosed and gated campus in favor of a more open, urban campus that would allow people to make greater use of the campus as a green space and more directly access the stations from points to the East of Pyay Road. The University could even spearhead development of mixed use real estate around this station, following on the efforts of several universities along the Health Line in Cleveland, USA.

Low-Density Residential areas Hodium-Density Residential areas High-Density Residential areas High-Density Residential areas High-Density Residential areas Hodium-Density Residential areas High-Density Residential areas Hodium-Density Residentiala areas Hodium-Density Residential area

5.4 TOD Potential in Hlaing Township (TOD Zone F)

Figure 46. Proposed TOD Overlay Zone F in Hlaing Township

In Hlaing Township, particularly in the southern part of Hlaing, the tentative zoning along the BRT corridor is all for low or medium density residential. We recommend that this be over-ridden in the areas indicated above by TOD overlay zones that would allow for mixed use development, higher density, and parking maximums replacing parking minimums, and that overlays be created near the Bar Tar, Than Lann and Thukha stations.

There are significant examples here of existing dense, built-up housing, such as the GEMS Garden Condominium. While GEMS and many of the multi-story residential uses around it provide density that is useful to transit, only the developments with street frontage on Insein provide commercial space. There is significant and seemingly planned multi-story apartment housing, particularly on the west side on Insein. (1)

Immediately in front of GEMS is an industrial brownfield. (2) Given the fact that luxury residences in proximity to an industrial zone are not optimal allocations of land use, this may be an optimal location to implement a similar high-rise / TOD project to remove industrial zones from these primarily residential and retail surroundings.



Figure 47. Thukha area as it exists: massive high rise luxury residential developments are already being developed

Presently, the only other large open space for development near Thukha is a greenfield space behind current high-rise mixed-use developments to the south of the station, along Insein Road (3). If this were to be developed, it would likely be as an extension of the existing complex.



5.5 TOD Potential in Insein Township (TOD Zone G)



Figure 48. Proposed Insein North BRT/YCR Station Area Overlay Zone G

While much of Insein was already identified by JICA, there is a significant amount of potentially developable land around the Insein Road YCR Station which also corresponds to the BOC station in the proposed BRT Corridor. While far from the CBD, the large amount of available land for development make this an attractive site to develop into a transit-oriented sub-center.

6. RECOMMENDATIONS

6.1 Regulatory Environment

Yangon must finish its progress towards the completion of a basic zoning code and zoning map, and all of the required steps that this would entail. This includes completing the process of updating the cadastral survey of the city and digitizing this in GIS maps by lot.

Then, the zoning code should specifically allow for the creation of 'TOD Overlay Zones'. The map would then designate the areas identified in Section 5 (or whatever areas are identified in subsequent processes established for this purpose by YCDC) as 'TOD Overlay Zones' in the zoning map.

In these zones, TOD zone specific regulations would over-ride all other zoning and building codes in areas where there is a conflict between them. These regulations are divided into two broad categories:

- The TOD Zoning Code
- TOD Zone Road Design Standards

The TOD Zoning Code regulates the actions of private property owners interested in developing their properties within the TOD zone. Only some 69 of the 100 points in the TOD Standard are under the control of developers.

TOD Road Design Standards govern government road design standards on public rights of way in the TOD zone. These road design standards, or the actions of government, must be consistent with the remaining requirements of the TOD Standard as specified below.

Some elements of the TOD Standard are automatically achieved by the pre-selection of appropriate locations where the TOD Overlay Zone is to be applied. As such, they are not reflected in the TOD Overlay Zoning Code. These include those elements listed under "7 – Compact" which ensures that the development is near transit and surrounded by the built up areas of the city on at least three sides.

6.2 The TOD Zoning Code

The TOD Zoning Code is a 'Performance-Based' Zoning code the aim of which is to reduce the amount of private car trips made to and from the TOD zone, in order to maximize the number of trips made by transit. It does not govern other socially desirable outcomes of development on the site. The TOD Zoning Code is a tool currently under development by BRTPlan and the Brooklyn Institute for Urban Practice, and is presented here in a preliminary form.

Performance-Based TOD Zoning is divided into Requirements and Bonuses. Developers are required to comply with all Requirements in order to receive a building permit. Developers receive 100% of available Points for compliance with a Requirement. Developers may receive additional Points for outperforming a requirement.

Developers are not required to comply with all Bonuses. However, developers must receive enough total points in the form of both requirements and bonuses to achieve an adjusted TOD Standard rating of bronze, as explained below.

Some of the aspects of the TOD Standard fall under government responsibility, such as provision of public transit. These aspects should form the central design guidelines for the government's planning agency (in the case of Yangon, the YCDC) to implement as it undertakes the shift from a conventional zoning code, or a lack of code, to a performance-based TOD zoning code. This responsibility is further detailed in Section 6.2.1.

With the maximum number of points attainable by a developer in the absence of government support is 67 points, it is recommended that to receive a building permit in a TOD zone the development must reach the adjusted number of TOD Standard points listed below from those points that are controlled entirely by actions of the developer.

MINIMUM Developer Points

Developer's Full Compliance with TOD Standard (100%)		67	pts
Compliance with TOD Gold	58-67		pts
Compliance with TOD Silver	48-57		pts
Compliance with TOD Bronze	37-47		pts

Figure 49. Proposed Scoring Brackets for Performance-Based TOD Standard Zoning

In other words, a developer must reach 37 TOD Standard points from the points that are controlled by the developer, as outlined below in order to be given a building permit in a TOD zone.

This step-by-step process would work as follows:

- 1. The government defines an area as a TOD Overlay District within which Performance-Based TOD Standard Zoning will apply.
- 2. The developer uses the required TOD Standard level within its design and planning process, knowing that its design must add up to a certain minimum level of Developer points.
- 3. The government determines if the developer has reached the required level of Developer points, and if so, issues a building permit.
- 4. The government monitors compliance with the initial approved design and the TOD Standard requirement throughout the construction process.

The proposed framework of the TOD Standard zoning policy is shown in the following table. Certain elements of the TOD standard which would not relate to zoning policy are also shown for the sake of consistency with the established metric. The framework is shown sorted in the same order as the metrics used to evaluate development projects within the context of the TOD Standard. The enforced performance is indicated under "Scoring Notes", with the "Score" being the maximum attainable score for that category.

METRIC	DESCRIPTION	GEOGRAPHY	RESPONSIBILITY	IMPLEMENTATION	IMPLEMENTATION NOTES	SCORING NOTES	SCORE
1 - WALK							
1A1	Percentage of walkway segments with safe, all- accessible walkways.	DISTRICT	GOVERNMENT	NON-ZONING			3
1A2	Percentage of intersections with safe, all-accessible crosswalks in all directions.	DISTRICT	GOVERNMENT	NON-ZONING			3
181	Percentage of walkway segments with visual connection to interior building activity.	LOT	DEVELOPER	BONUS	Encourage visually active façades to increase engagement and commercial activity.	2 pts for 50% visually active frontage, plus 1 pt for every additional 10% up to a maximum of 90%	6
182	Average number of shops, building entrances, and other pedestrian access per 100 meters of block frontage.	LOT	DEVELOPER	BONUS	Encourage permeable street frontage.	1 pt for 3 entrances per 100m of frontage, with 1 additional point for 5 or more	2
1C1	Percentage of walkway segments that incorporate adequate shade or shelter elements.	LOT	DEVELOPER	BONUS	Encourage shaded, climate- appropriate walkways.	1 pt for 75% or more of walkway segments shaded	1
2 - CYCLE							
2A1	Access to a safe cycling street and path network.	DISTRICT	GOVERNMENT	NON-ZONING			2
2B1	Ample, secure, multi-space cycle parking facilities are provided at all transit stations.	TRANSIT	GOVERNMENT	NON-ZONING			1
282	Percentage of buildings that provide ample, secure cycle parking.	LOT	DEVELOPER	BONUS	Encourage safe and secure cycle parking.	Add 1 pt for secure cycle parking in 95% of buildings	1
283	Buildings allow interior access and storage within tenant-controlled spaces for cycles.	LOT	DEVELOPER	BONUS	Encourage interior bicycle parking in a tenant- accessible space.	Add 1 pt for cycle access required by lease/bylaws	1
3 - CONNECT							
3A1a	Length of longest pedestrian block under control and design of the government.	DISTRICT	GOVERNMENT	NON-ZONING			5

3A1b	Length of longest pedestrian block under control and design of the developer.	DISTRICT	DEVELOPER	BONUS	Encourage short blocks.	Add 1 pt per 20' decrease of longest block below 200'	5
3B1a	Ratio of pedestrian intersections to motor vehicle intersections under control and design of the government.	DISTRICT	GOVERNMENT	NON-ZONING			2
3B1b	Ratio of pedestrian intersections to motor vehicle intersections in land under control and design of the developer.	DISTRICT	DEVELOPER	BONUS	Encourage high number of pedestrian intersections and low number of auto intersections.	Add 1 pt per increase of ratio of 2	2
4 - TRANSIT			-				
4A1a	Walking distance to the nearest transit station.	TRANSIT	GOVERNMENT	REQUIREMENT	Requirement for consideration	Requirement for consideration	0
4A1b	Development entrance(s) located as close to transit entrance(s) as technically feasible.	LOT	DEVELOPER	BONUS	Encourage easy access between development and transit.	Add 1 pt for entrance located within 10% of lot area closest to transit station	1
5 - MIX		<u>.</u>					
5A1	Residential and nonresidential uses within same or adjacent blocks.	DISTRICT	DEVELOPER	NON-ZONING			8
5A2	Percentage of buildings that are within walking distance of an elementary or primary school, a healthcare service or pharmacy, and a source of fresh food.	DISTRICT	DEVELOPER	BONUS	Encourage the development of community facilities within walking distance of the site.	For each aforementioned facility within 200m of the site or within the site, add 1 pt	3
5A3	Percentage of buildings located within a 500-meter walking distance of a park or playground.	DISTRICT	DEVELOPER	NON-ZONING			1
581	Percentage of total residential units provided as affordable housing.	LOT	DEVELOPER	BONUS	Establish an affordable threshold (as a function of AMI or local CPI, and if undecided, use 0.7 AMI) and establish a minimum requirement of units as percentage under this threshold	For each additional 2.5% (of total units) of affordable housing beyond the minimum percentage required, add 1 pt up to a total of 20% below the minimum	8

582	Percentage of households living on site before the project that are maintained or relocated within walking distance.	LOT	DEVELOPER	BONUS	Encourage developers to re- house displaced residents in the new development or provide appropriate compensation.	3 points for 100% compensated or within 250m; 2 points for 100% within 500m; 1 point for 50%, 0 points for <50%	3
5B3	Percentage of pre-existing local resident-serving businesses and services on the project site that are maintained on site or relocated within walking distance.	LOT	DEVELOPER	BONUS	Encourage developers to re- house displaced businesses in the new development or provide appropriate compensation.	2 points for 100% compensated or within 500m; 1 point for 50% within 500m, 0 points for <50%	2
6 - DENSIFY			j				
6A1 & 6A2	Density in comparison with best practice in similar projects and station catchment areas.	LOT	DEVELOPER	REQUIREMENT	Establish a minimum BCR, FAR, and a maximum product of the two (Xmax)	7 pts for compliance with requirement	7
				BONUS	Establish bonuses beyond requirement	0.5 pt per 0.5 FAR exceeding requirement, 1 pt per 0.05 BCR exceeding requirement, maximum 8 total add'l pts & maximum 5 add'l per category	8
7 - COMPACT							
7A1	Number of sides of the development that adjoin existing built-up sites.	LOT	DEVELOPER	REQUIREMENT	Establish a minimum adjoinment requirement of 50% sides	3 points for 50% adjoinment, 1 pts for each 10% additional to a maximum of 100% adjoinment	8
	Number of different transit						
7B1	that are accessible within walking distance.	TRANSIT	GOVERNMENT	NON-ZONING			2
8 - SHIFT							
			a l				
8A1	Total off-street area dedicated to parking as a percentage of the development area.	LOT	DEVELOPER	REQUIREMENT	Establish a maximum parking requirement and/or establish a Traffic Impact Fee regime	For each 10% that this project falls under the parking maximum, add 1 pt, up to a total of 80% below maximum	8

Total road bed area used for motor Image: Constraint of the second sec	NON-ZONING 6	
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6.2.1 Road Design Standards in the TOD Zone

In addition to establishing the TOD Overlay Zone and relevant zoning code for this district, YCDC should develop a specific TOD Zone Urban and Road Design Standard.

This Standard would state that all streets would have walkways and crosswalks compliant with TOD Standard conditions 1A1 and 1A2, would have bike lanes consistent with TOD Standard 2A1 and 2B1, the street grid would be consistent with 3A1 and 3B1, the proximity to parks and green space is in conformity with 5A3, and the amount of roads relative to developable land, and the amount of parking on these roads was consistent with 8A3.

These two combined regulatory frameworks would lay the groundwork for future development in the TOD zones that would reach a minimum TOD Standard of Bronze.

6.2.2 General Density Guidelines

In order to achieve optimal density and consistency with local and international zoning frameworks, it is recommended that density guidelines under TOD-based zoning contain internationally mandated density ranges which allow for change at the local level.

A challenge with density minimums in an otherwise unregulated environment is that they leave the door open for skyscrapers which could be contextually inappropriate, while setting specific caps on density can limit the construction of contextually appropriate buildings. In order to allow for regulation and market conditions to equally dictate the form of buildings, it is suggested to mandate the following for all lots within the TOD Overlay:

- A minimum Floor Area Ratio (FAR)
- A minimum Building Coverage Ratio (BCR)
- A **maximum** figure for the product of FAR and BCR, referred to as **X**_{max}. This value is a dummy variable that does not itself relate to any aspect of development form, but is a mathematical constraint which imposes certain form-based restrictions.

The result of this scheme is the organic creation of a height limit and the assurance that any buildings on the taller end of the allowed scheme will feature smaller lot coverage, thus ensuring access to natural light and reducing potential impacts on the sky exposure plane.

The number of permitted floors for a given construction is shown in the table below as a function of the per-floor area of the building, with sample values of BCR, FAR and X_{max} .

Model	Constraint
BCR _{min}	0.5
FARmin	3.0
X _{max}	4.5

X _{max}	Area of Lot (constant)	Area of Floor (x)	Permitted Stories	Resulting FAR	Resulting BCR
4.5	10000	5000	18	9	0.5
4.5	10000	5500	14	7.7	0.55
4.5	10000	6000	12	7.2	0.6
4.5	10000	6500	10	6.5	0.65
4.5	10000	7000	9	6.3	0.7
4.5	10000	7500	8	6	0.75
4.5	10000	8000 7		5.6	0.8
4.5	10000	8500	6	5.1	0.85
4.5	10000	9000	5	4.5	0.9
4.5	10000	9500	4	3.8	0.95
4.5	10000	10000	4	4	1

Figure 50. Example of Proposed Density Regulation in TOD Overlay Zone

An example of buildings that could be produced based on these permitted numbers of floors are shown in the figure below, with the same parameters as in the example regulation shown above. Their scoring within the performance-based zoning scheme is also displayed.



*A development cannot score more than 8 total bonus points or 5 per category.



In this example, the maximum building height would be 18 stories, given that the developer cannot reduce BCR below 0.5 or increase height beyond 18, thereby exceeding X_{max} . The minimum building height would be 3 stories, given that the developer cannot cover more space in the lot than is available but is required to maintain 3 FAR.

Under this model, the maximum number of floors (n_f) is given by the equation:

$$n_f = \frac{A_L^2 x_{max}}{A_f^2}$$

Wherein A_{L} refers to the area of the lot, A_{f} to the area of each floor, and x_{max} to the maximum product of BCR and FAR.

Market conditions would dictate the actual form of the building to be constructed from within the portfolio of permitted forms. In each case, the government would decide the appropriate BCR, FAR and x_{max} within the district. As a guideline for the choice of these figures, a sufficient x-differential should be retained to ensure the selection of appropriate values. The x-differential is given by the ratio below:

$$x_{diff} = \frac{x_{max}}{BCR_{min} + FAR_{min}} > 1$$

It is recommended that, in order to allow the greatest possible diversity of forms in construction, the x_{diff} exceed 1 enabling greater variability between FAR and BCR. At the same time, increases in x_{diff} enable taller constructions, so care should be taken to avoid excessively high values of x_{diff} .

6.2.3 Baseline Densities for Yangon

Based on the spatial development plan of Yangon, and the available opportunities along the Pyay-Insein Corridor as elaborated in Section 5 of this report, the following baseline figures are recommended for the TOD Overlay Zones.

Overlay	BRT Stations	BCRmin	FARmin	X _{max}	X diff	Resulting Range	Resulting Range
						of Permitted FAR	of Permitted
							Floors
А	Central Station	0.75	4	12	2.52	4 - 16	4 - 21
В	Bandula Park	0.75	4	12	2.52	4 - 16	4 - 21
	Latha						
С	San Pya	0.7	4	8	1.70	4 - 11.43	4 – 16
D	Saint John	0.6	4	5	1.09	4 - 8.33	4 - 13
E	Seik Pyo Yay	0.6	3	4.5	1.25	3 – 7.5	3 – 12
	Nar Nat Taw						
F	Bar Tar	0.6	3	4.5	1.25	3 – 7.5	3 – 12
	Than Lann						
	Thukha						
G	BOC	0.5	3	5	1.43	3 - 10	3 – 20

Figure 52. Proposed Density Values for TOD Overlay Zones

6.3 The Path Forward in Yangon

In order to achieve this, YCDC should significantly increase its capacity to plan, implement, modify and enforce its zoning codes and street design standards. Several significant obstacles remain to this. YCDC will need to hire or contract out the staff required to complete the process of cadastral surveying and GIS mapping of lots within the city of Yangon. It could start in the City Center, and in areas where preliminary work has already been done (such as Hlaing), and in the TOD zones. YCDC will then need to complete preliminary zoning plans, subject them to stakeholder input, modify accordingly, and finally approve them. They should also establish a zoning revision and review process, and secure the necessary trained personnel to manage this process. They then need to establish the necessary procedures for granting building permits to projects deemed in compliance with the zoning ordinance, and a system of penalties for violators of the zoning and building codes.

Adopting performance-based zoning and road design standards in the TOD Overlay Zones, aligned with the TOD Standard in the manner suggested, would allow Yangon to leapfrog to international best practice. It would put Yangon at the forefront of zoning reform efforts around the world, ensuring that as Yangon's economy develops and the city grows, it will grow in the manner most consistent with sustainable growth and human happiness, while leaving enormous flexibility to government officials and private developers to best determine how these desired results can be achieved.