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# Regulatory Factors in Shaping New Towns of Malaysia

# 말레이시아 신도시 주거단지 계획에 영향을 미치는 법률적 요소

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## Abstract

The post-war period has witnessed the emergence of new towns in a number of countries in Southeast Asia. New town development started in Malaysia with Petaling Jaya as a satellite town in 1953 to accommodate the rapid growing population of Kuala Lumpur. New towns have been designed in accordance with the British town planning principles, based on the modern ideal city. Nonetheless, they have constituted a regional character as they have incorporated local factors such as local technologies as well as site and climatic conditions. In the shaping of the new towns in modern cities, regulatory aspects have played important roles. The regulations decide the basic framework for planning of new town, block plan and unit plan. The ultimate goal of this study is to understand the identity of the new town planning of Malaysia. As a first step, we reviewed the local regulations, standards, and design guidelines which are applicable to the new town planning from the national land use to local plans. As a result, we categorized the guidelines into four areas: urban space, site plan, street system, block plan and unit plan. We expect this study to provide the framework of the Malaysia's new town planning from the perspective of the local regulations.

Keywords : New Town Planning, Regulations, Malaysia
주 요 어 : 신도시 주거단지, 법률, 말레이시아

## I. Introduction

Since World War II, many countries in Southeast Asia have experienced urbanization problems that resulted from the rapid population influx in cities and changes in the industrial structure. New towns started to develop as one of the solutions to reduce urbanization problems. Kuala Lumpur, the capital city of Malaysia, also experienced urban sprawling because of this rapid population influx. Accordingly, the Malaysian government introduced new town development projects as an initiative to improve unfriendly urban and dwelling environments. In this development effort, the government adopted the British urban planning system and regulations. With the progress of development, the central role of the land use planning process started to be complex and required town planning systems of anticipatory control of various land use patterns, density, height, building types, circulation, building block and unit design.

The urban planning system in Malaysia was initiated in 1921 with the establishment of a town planning department in Kuala Lumpur. It aimed at setting out a systematic and orderly arrangement of towns in line with the modern town planning practice (Mohd, 2008).

Regarding the shape of the physical structure of new towns and the form of house, regulatory factors such as town planning regulation and building codes played an important role. Town planning regulations determined basic guidelines including prerequisites such as land use, density and population, and building codes and detailed guidelines control building layout, block design, and unit design. Even though architects had the freedom to design single houses, the urban structure of the new towns was decided by the regulations of the region. The regulations of the country were developed and modified according to the special circumstances and social changes where they belong. Therefore it can be stated that the physical form and structure of new towns was formulated by the specific regional or national policy and regulations developed

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through the contextual modernization process of the country.

The ultimate goal of this study is to understand the identity of new town planning in Malaysia in the aspect of housing design. But as mentioned above, the regulatory factors such as town planning principles and building codes and local acts determine the basic framework of urban, town and building design. Therefore in this study, we reviewed the regulations, building codes and design guidelines that must be applied to housing clusters in new towns from national land use to local plans to understand the prerequisite condition before architects start designing buildings. The regulations which impact strongly on the forms of housing clusters and unit design can be categorized into four areas: urban space, site plan, block plan and unit plan.

This study aims;

First, understand the system of regulations of Malaysia

Second, understand the prerequisite conditions for planning the new towns in the perspective of urban development.

Third, analyze the regulations and buildings codes to identify the planning principles of housing cluster, block and unit design.

Finally, identify unique characteristics of new town development in Malaysia.

We expect this study to provide the framework for understanding Malaysian housing design from the perspective of regional regulations.

## 1. The Scope and Method of the Research

The exact scope of study is the new towns[1)] built in two major cities; Kuala Lumpur, the capital city of Malaysia and Putra Jaya, a new planned Federal Government Administrative City.

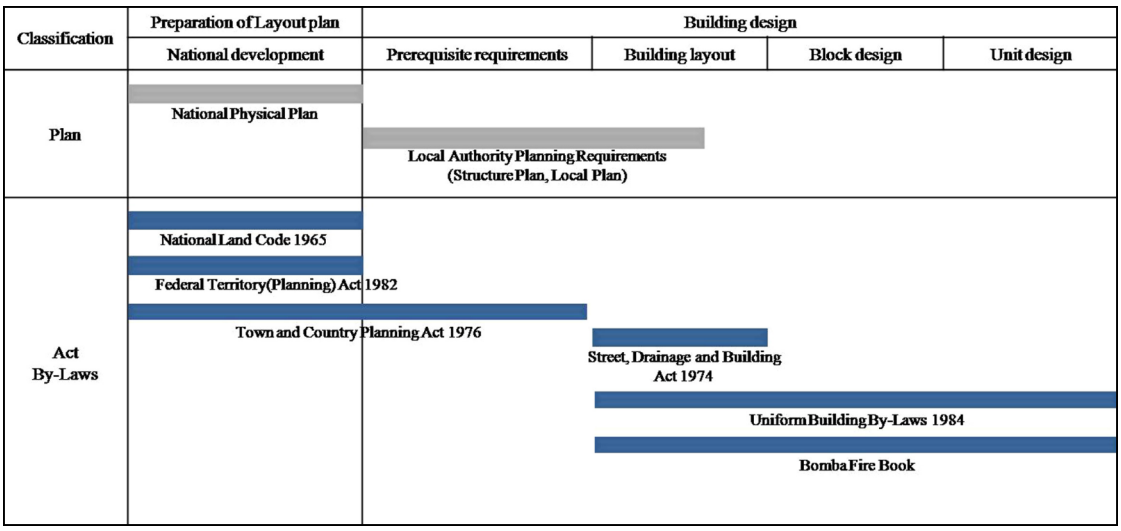
Table 1. *Framework of Analysis*

| Urban Space | Site Plan | Block Plan | Unit Plan |
|---|---|---|---|
| Density<br>Population<br>Land Use<br>Layout<br>Public Facilities | Density<br>Site Layout<br>Public Facilities<br>Parking<br>Road System | Block Layout<br>Air Well<br>Cores<br>Corridor | Typology<br>Façade Design<br>Unit Layout<br>No of Rooms |

We reviewed all regulations that have an important impact in shaping the physical environment of new town plans from national land use to local plans.

Typically, the legal components required to develop a city can be categorized into urban space, site plan, block plan and unit plan. The framework of analyzing the regulations was based on these four viewpoints. Detailed information of what regulations were selected in each categories and how they were analyzed is shown in <Table 2>. The study employed the literature review based on this framework. Houses can be classified into two types; landed properties (bungalows, semi-detached house and terrace house) and strata properties (apartment and condominium). In this study, we analyzed all regulations applied to design both landed and strata properties. But in the aspect of block and unit design,

Table 2. *The List of the Regulations Analyzed*




1) The reason that we limited the research scope on the new towns is that the old urban housing areas had formed for a long period and there are squatter area illegally developed, therefore it is not easy to find the clear relationship between the regulations and urban forms. The development of new towns in Malaysia had started since 1950s, based on the systematic development policy. Therefore the new towns were selected to study the interrelationship between regulations and physical housing environment.

we focus on the building codes and legal acts related with strata properties such as apartment and condominiums in this study.

## II. Planning System in Malaysia

The system of administration in Malaysia consists of three parts; the federal government, the state government and local authorities; city, municipal and district councils. Malaysia is comprised of 13 states and 144 local authorities. The planning policy of the government is largely set out in the National Development Plans that comprises the National Development Policy. Plans such as the Five Year Development plans and Vision 2020 were issued by the Federal Government.

Among these plans, physical planning applies to the development system of Malaysia in terms of substance. Physical planning includes the development plan system, which consists of four major levels of planning; the National Physical Plan, Structure Plan, Local Plan and Special Area Plan (Mohd, 2008).

The National Physical Plan (NPP) is a written statement of strategic policies regarding physical development and conservation throughout the Malaysian peninsular. The plan was approved by the NPP Council on April 26, 2006. The main goal of the NPP is to create an efficient, equitable and sustainable national framework to guide the overall development of the country towards achieving a competitive developed national status by the year 2020.

The Structure Plan explains strategic policies and actions concerning land use development in urban and rural areas, including steps to establish general objectives, policies, suggestions and frameworks for the preparation of local plans.

The Local Plan is under the Local Authorities territory. It serves as a detailed plan that interprets policies and suggestions contained in the Structure Plan. Local plans constitute guidelines for arranging and controlling development in areas covered by the plan.

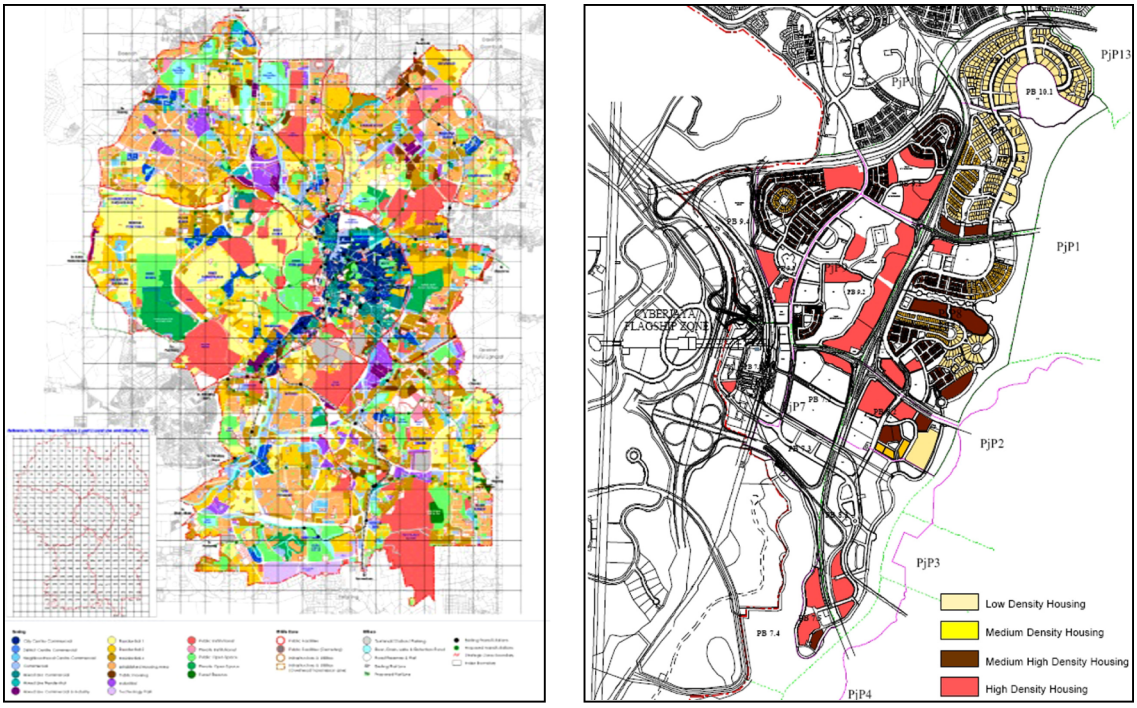
The special area plan serves as a more detailed guideline compared to the Local Plan. The special area plan contains detailed guidelines with regards to streets, drainage, buildings, uniform buildings by law, and fire books.

## III. Analysis

### 1. Urban Space

1) Land Use

The Draft of Kuala Lumpur City Plan 2020 envisions Kuala Lumpur as a world-class city with its residents living quality lifestyles despite a projected population increase of 600,000 by 2020. According to town planner




a) *Kuala Lumpur Land Use* b) *Putra Jaya Land Use*

Figure 1. *Land Use*

Norliza Hashim, to become a world-class city, there must be a more flexible approach in terms of land use zoning. Some of the coordinated efforts in ensuring and supporting the city's growth to cater the needs of its population include allocating land for future requirements, facilitating use of land and buildings, regulating incompatible land use and activities, integrating transport and spatial development, encouraging mixed-use development, and transforming and regenerating Brownfield sites and urban villages.

Kuala Lumpur is divided mainly into 6 zones based on its land use; residential, commercial, institutional, open space, infrastructure & utilities and industrial. The total area of Kuala Lumpur is 24,22.05 hectare (ha) under the management of Kuala Lumpur city government (DBKL)[2], where 24.06% is residential and 6.92% is open space.

Meanwhile, Putra Jaya (PPJ)[3], a planned city, is located at the heart of the best growing high-tech industrial area in Malaysia, called MSC.[4] This region was designated as federal territory to make it as a Federal Government administrative center that would replace the already-saturated city of Kuala Lumpur. In 1991, Prime Minister Tun Dr Mahathir Ohammad established a national development 30-year plan called "Vision 2020", and launched the construction project for a new administrative capital that would assume administrative and judiciary roles, excluding legislation, to solve the dense population problem in the capital area and to realize balanced development and government. 2.98% of the city area is under government jurisdiction due to the administrative component of the city, and 28.51% is planned as open space under the conception of a garden city. Putra Jaya comprises an area of 4,931 ha consisting of 15 central business zones and 17 peripheral residential zones.

The success factors of Putra Jaya included establishing detailed guidelines such as environmental management guidelines, traffic handling guidelines, plans for guide mark and night illumination including urban design guidelines for major city-design elements that constituted the identity of the whole city, and planning an integrated design by reflecting the traditional Malaysian architectural identity on contemporary buildings.

Table 3. *Land Use Area*

| Types | Kuala Lumpur | | Putra Jaya | |
|---|---|---|---|---|
| | Area (ha) | % | Area (ha) | % |
| Residential | 5,489.56 | 22.66 | 281,06 | 5.70 |
| Commercial | 1,091.70 | 4.51 | 29.24 | 0.59 |
| Institutional | 1,620.80 | 6.69 | - | - |
| Open Space | 1,579.56 | 6.52 | 1,455.69 | 29.52 |
| Infrastructure & Utilities | 6,176.56 | 25.5 | 1,028.15 | 20.85 |
| Community Facilities | 1,382.44 | 5.71 | 179.97 | 3.65 |
| Industrial | 533.05 | 2.28 | 2.41 | 0.05 |
| Undeveloped Land | 5,756.74 | 23.77 | 1,746.29 | 35.41 |
| Squatters | 570.63 | 2.36 | - | - |
| Government Use | - | - | 175.39 | 3.56 |
| Special Use | - | - | 32.80 | 0.67 |
| total | 24,221.05 | 100 | 4,931.00 | 100 |

**Source*. Kuala Lumpur City Hall (1984) and Pebadanan Putrajaya (2002)

2) Density

Density is an important factor that determines housing types and building heights. Therefore, housing density is a key index to determine the quality level of the dwelling environment.

In Malaysia, all residential zones, except for those within the city center, are controlled by density. However,

Table 4. *Density Control and Housing Types*

| Location | Kuala Lumpur | Putra Jaya | Housing Types |
|---|---|---|---|
| Land use Zone | Density Range (units/ac) | | |
| Low Density | 1-10 | 1-8 | Bungalow, Zero Lot Line, Semi-detached house |
| Medium Density | 12-30 | 9-24 | Semi-detached house, Cluster Terrace, Terrace/Link, Town House, Walk-up apartment |
| Medium High Density | 40-100 | 25-50 | Terrace/Link, Town House, Apartment |
| High Density | | 51-75 | Affordable apartment, Apartment, Condominium |
| Public Housing | 100 | - | KLCH, Government |

**Source*. Kuala Lumpur City Hall (1984) Part 2, p. 2.8, Pebadanan Putrajaya (2002) p. 2.3

2) DBKL means 'Dewan Bandaraya Kuala Lumpur' and is referred to as 'Kuala Lumpur City Hall'.

3) PPJ means 'Perbadanan Putrajaya' and is referred to as 'Putrajaya Corporation'. As the biggest Malaysian city-development project, the relocation plan for the federal government was determined by the cabinet meeting in 1995 and 'Putrajaya Corporation Act' was established. The administrative city started forming its shape commencing by relocation of Prime Minister's Building in 1999.

4) As a part of the plan to enter into advanced countries in 21st century, Malaysia adopted MSC (Multimedia Super Corridor) for its basic tool of economic development.

for areas such as the city center area, commercial area, industrial area and mixed-use area, plot ratio is a super ordinate index that is controlled by the government rather than density.

In case of Kuala Lumpur, density control is divided into three categories; low, medium and high density. In most of the Selangor region including Kuala Lumpur, the residential density is around 60-70 units/acre, while in the city center of Kuala Lumpur, the residential density is around 200 units/acre. In general, bungalows and semi-detached houses are possible typologies for low densities; semi-detached houses, terrace houses and town houses are for medium densities; and apartments and condominiums are for high densities.

3) Plinth Area Ratio and Plot Ratio

Neighboring buildings are believed to provide mutual effects in aspects such as sunshine, natural ventilation, parking, fire, etc., provided there is no open space. Therefore, certain minimum criteria regarding open space are established for each lot to prevent any possible inconvenience.

Plinth area ratio is regulated to secure open space such as public space, green area, pedestrian ways, etc. In case of Kuala Lumpur, the industrial zone has the highest plinth area ratio of 70%, while the residential zone has the lowest ratio of 60%. Plot ratio is an important legal constraint to determine the volume of buildings. It is notable however that this constraint is not applicable to residential zones in Malaysia except for the city center. Household density is placed instead above the plot ratio.

Table 5. *Control of Plinth Area and Plot Ratio*

| Types | Plinth Area (%) | Plot Ratio |
|---|---|---|
| Commercial | 70 | 1:0.5, 1:1, 1:2, 1:3, 1:4, 1:5, 1:6, 1:7, 1:8, 1:9, 1:10 |
| Residential | 60 | 1:0.5, 1:2, 1:3, 1:4, 1:5, 1:6, 1:7, 1:8 |
| Industrial | 80 | 1:2 |
| Mixed Uses | 70 | 1:2, 1:4, 1:6, 1:8 |

**Source*. Kuala Lumpur City Hall (1984) Part 3, p. 3.10-3.15

## 2. Site Plan

1) Roads & Setbacks

The land for a building should be adjacent to a road that enables cars and pedestrians to access the site. Buildings should be set back the boundary lines for possible construction by a distance equal to 1/2 of the road width. If the road width for example is 4 m, a 2 m distance between the building and the boundary line should be provided[5]. The street is designed to fit into the road hierarchy system of the Local Plan. <Table 6> shows the widths of roads normally provided. However, since the allowed width varies depending on land condition, it is necessary to refer to the related authority.

Normally a building line is designated with a setback of 6 m from the main road and 3 m from small secondary roads. Kuala Lumpur does not have any detailed regulation for setbacks, but in the planned city, Putra Jaya, there exists general constraints regarding residential lots. Lots should provide a front setback of 4.5m and a rear setback of 3.5 m. The sum of both setbacks cannot exceed 9 m, and any wall that does not share a party wall should provide a 3.5 m setback.

This background explains that the majority of housing in Malaysia is terrace house and semi-detached house, which can save the space for side setback.

Table 6. *Road System*

| Road Types | Kuala Lumpur (m) | | Putra Jaya (m) |
|---|---|---|---|
| Local Road | 12-15 | | 22 |
| Access Road | 12 | | 16 |
| Internal Road | 1-way | 6.5 | - |
| | 2-way | 12 | |
| Pedestrian Walkway | 6-14 | | - |
| Cul-De-Sac & Avenue | - | | 15 |

*Source*. Pebadanan Putrajaya (2002) p. 2-10, 2.3.1

2) Open space

Open space includes all land not occupied by any building. This includes spaces such as parks and playgrounds as well as roads, pedestrian ways, green areas, etc. Depending on the size of land and building area, more than 10% of the land should be planned for landscape and open space according to the criteria stipulated by the local authority.

A guideline known as the 'Hierarchy of Recreational Areas' suggests 7 steps for open space town planning in Malaysia, according to users, locations and service of recreational areas. According to these steps, neighborhood parks, playgrounds and play lots/sport facilities are typically planned in individual housing clusters.

3) Carpark

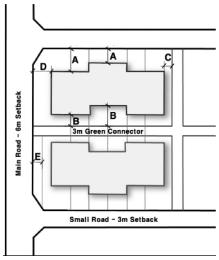
Carpark is a heavy burden element when architects design housing clusters. According to the classification of DBKL, the carpark regulations are varied according to the price of each unit in the housing cluster.

The dimension of carpark is provided with 2.4 m×

5) Legal Research Board (2008b), Section 38,39,40

Table 7. *Setback for Residential Buildings*

| Type | Minimum Setback | | |
|---|---|---|---|
| | Front/Rear | Non-party/ side boundary | street boundary |
| Detached/Bungalow | A-4.5 m<br>B-3.5 m<br>A+B<9.0 m | 3.5 m | D-6 m<br>E-3 m |
| Semi-detached | | | |
| Terrace | | | |
| Town House | | | |
| Zero Lot Line | A-4.5 m<br>B-3.5 m<br>A+B<9.0m | 3.0 m | D-6 m<br>E-3 m |
| Condominium | 6 m | - | 6 m |
| Apartment | | | |




*Source*. Pebadanan Putrajaya (2002), p. 2-5, 2.2.4.

Table 8. *Hierarchy of Recreational Areas*

| Types | Acre (ha) | Population catchment | Functions |
|---|---|---|---|
| Play lot/sports facilities | 0.2-0.8 | 300-1,000 people | For children and sports court |
| Playground | 0.6-2.0 | 1,000-3,000 people | For sports and informal activities |
| Neighbor-hood park | 2.0-8.0 | 3,000-12,000 people | sports and for passive recreational activities for neighborhood |
| Community Park | 8.0-40 | 12,000-50,000 people | Planned sports and recreational area for community activities |
| Town Park | 40-100 | >50,000 people | Various planned activities (seasonal or large activities) |
| Regional park | >100 hectares | All population within a region | For active and passive activities with either natural or manmade environment |
| National Park | No limit | No limit | Natural area at the national level. |

4.8 m on average, but can vary to other dimensions such as 2.5 m×5 m or 2.5 m×5.5 m depending on the size and price of each residential area. As an average, 1 carpark should be provided for 1 unit. But for luxurious clusters, minimum 2 carparks sometimes more should be provided for successful marketing.

Table 9. *Carpark Requirement*

| Price (RM) | Carpark(cp) Required |
|---|---|
| <42 k | 1 cp for 1 unit |
| >42-60 k | 1 cp for 1 unit |
| >60-100 k | 1 cp for 1 unit+10% visitor |
| >100<250 k | 1.2 cp for 1 unit+20% visitor |

4) Public Facilities

Malaysia is a unique country of plural society[6]. Therefore it is unique that the essential element of public facilities in housing cluster is the religious facility. Generally in other countries, the religious facilities are not included in public facilities. The main reasoning behind this was that the construction of worship facilities, mosques, educational centers and others facilities was thought to influence the formation of human values and ideals[7]. The objective of town planning therefore was to create a balance between physical development and human development in terms of spiritual and noble universal sustainable values for the purpose of continuous national development[8]. Therefore a surau (Muslim praying space), a Chinese temple, or a Hindu temple is an essential element in its own ethnic community. Besides, multi-purpose spaces, shops and solid waste facilities are also included in public facilities.

Table 10. *Public Facilities for Residential Development*

| Types | Kuala Lumpur | Putra Jaya | |
|---|---|---|---|
| | Requirements | Requirements | Minimum size |
| Surau | 1 | 1/500*** | 0.25 ha |
| Mortuary | - | 0.11/1**** | 16.45 sq.m |
| Kindergarten | 0.1/100-500* | 1/500** | 0.20 ha |
| Launderette Room | - | 0.18/1**** | 87 sq.m |
| Cafeteria | - | 1/1000** | 179 sq.m |
| Multi purpose Hall | 1/100-1000** | 0.45/1**** | - |
| Management Office | - | 1 | 40 sq.m |
| Shops | 1/30** | - | |
| Solid Waste System | 1 | - | |

*: hectare/residential unit; **: unit/residential unit, ***: 1/dwellings, ****: sq.m/dwelling unit
**Source*. Kuala Lumpur City Hall (1984), Part 8, p. 8.8.

Usually on the ground floor of high-rise apartment, the cafeteria and small shops are located for casual eating for resident. This is one of the unique housing cultures of Malaysia, where people enjoy outdoor eating nearby their residence.

5) Height

In high-density cities, building height is an important

6) The population of Kuala Lumpur, Malaysia consists of Malays (56.1%), Chinese (33.1%), Indians (10.29%) and other minority groups. MTR (Mid-Term Review) of the Fourth Malaysia Plan 1981-1985, 1984

7) The Total Planning and Development Guidelines, The Department of Town and County Planning, Peninsula Malaysia
http://www.townplan.gov.my/english/guidelines_total.php

8) It is Based on Piawaian Perancangan Kemudahan Masyarakat JPBD and based on the Physical Planning Guidelines for he Multimedia super Corridor.

index to control the height in cities. While building height is controlled by plot ratio in other counties, the only strict height control zones in Malaysia are the Petronas Twin Tower, KL Tower and KL Tower view corridor, Hills backdrop, Istana Damansara reserve, Historical zones and Sungai Besi Airport in the Metropolitan area[9].

Table 11. *Maximum Height Elevation for Respective Landmark Buildings*

| view | max height (ft) | m |
|---|---|---|
| Petronas Twin Tower | 688.97 | 210 |
| KL Tower | 452.00 | 138 |

**Source*. Kuala Lumpur City Hall (1984), Part 6, p. 6.9.

In typical residential areas, there exists a floor constraint instead of building height as shown in <Table 12>: 2~2 1/2 stories for low-densities such as detached houses, semi-Ds and terrace houses; 8 and 12 stories for condominiums and apartments respectively.

Table 12. *Maximum Height for Residential Buildings*

| Dwelling Type | No. of Stories |
|---|---|
| Detached/Bungalow | 2 |
| Zero Lot Line | 2 |
| Semi-detached | 2 1/2 |
| Terrace | 2 |
| Town House | 2 1/2 |
| Condominium | 8* |
| Apartment | 12* |

**Source*. Pebadanan Putrajaya (2002), p. 2-5, 2.2.4.

## 3. Block Plan

As architecture is getting higher, larger and more complex, the most important issue of concern is security and safety. Flow plans for emergency evacuation should be established to move residents from internal building spaces to fire lifts, staircases or lifts in the shortest time possible in case of fire. Block of housing should be designed in such a way that residents can move safely and quickly to the ground floor through stairs or lifts.

Any building with more than 4 stories should provide a lift[10]. Since it is not preferred to install stairs inside buildings due to poor natural ventilation, mechanical air conditioning should be provided separately. Since indoor stairs can be paths of fire or fire spreading, it is recommended that they be completely open and installed outside of the building. For this reason, it is typical to design public corridors and elevator cores of blocks to be open to the outside, i.e. as an open space without windows in Malaysia.

Stairs and corridors are important elements to perform the function of escape and safety, so shortest possible distances and adequate widths should be provided in case of buildings with many occupants. There is no regulation for maximum travel distance, but it is important in Malaysia to install emergency stairs every 60 m at least.

For lifts, the maximum distance between two lifts cannot exceed 60 m. The distance from each unit to any fire staircase should be less than 10 m. If there is an alternate escape staircase, the distance can be 30 m without sprinklers and 45 m with sprinklers[11].

Those regulations control the numbers of units and fire staircases in one floor and also the location of them.

Table 13. *Maximum Travel Distances*

| Purpose Group[12] | Limit when alternative exits are available | | |
|---|---|---|---|
| | Dead-end limit | Un-Sprinklered | Sprinklered |
| Small Residential | - | - | - |
| Other Residential | 10 m | 30 m | 45 m |
| Places of Assembly | - | 45 m | 61 m |

**Source*. Legal Research Board (2008b), Part VII, Sec. 188 and Part VIII

## 4. Unit Plan

In Malaysia, housing supply is determined according to housing price and the minimum size of house is also suggested depending on housing price.

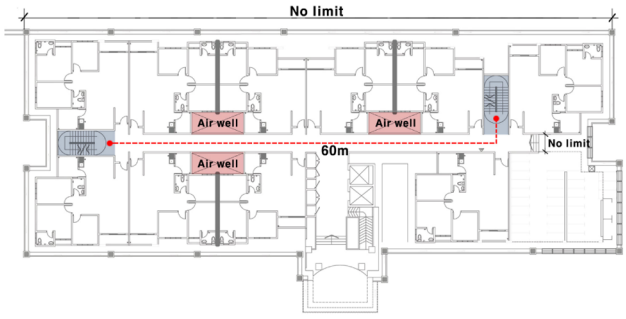



Figure 2. *Block Plan and Travel Distance*

9) Higher residential blocks up to a maximum height of 17 storeys can be considered by Perbadanan Putrajaya subject to various urban design aspects for further deliberation by Perbadanan.
10) Legal Research Board (2008b), Section 124
11) Travel Distance is distance from such area in residential building to safety space.
12) Buildings are comprised of Small Residential, Institutional, Other residential, Office, Shop, Factory, Place of assembly, Storage and general according to Uniform Building By Laws 1984, Fifth Schedule. we look into only residential part.

Generally, the preferred floor plan in Malaysia takes into account separating private space and public space by locating the rooms on one side. Due to the economic aspect of facility travel distance, locating bathroom and kitchen adjacent to each other is common. In Malaysia, there are regulations that define the minimum area and height for each room. Regulations stipulate that the minimum area of the first habitable room should be 11 $m^2$, the second habitable room should be 9.3 $m^2$ and the others should be 6.5 $m^2$ respectively. The minimum height should be more than 2.5 m for living room and bedrooms, 2.25 m for kitchens and 2 m for bathrooms. The minimum height for rooms is considered as an index to provide the least confortable environment for affordable housing.

Table 14. *Residential units size by Residential Cost*[13)]

| Residential Cost | Unit size | |
|---|---|---|
| Low Cost | 700 sq.ft | 65.03 sq.m |
| Low Medium Cost | 800 sq.ft | 74.32 sq.m |
| Medium Cost | 950 sq.ft | 88.26 sq.m |
| Medium High Cost | 1,000 sq.ft | 92.90 sq.m |
| High Cost | 1,500 sq.ft | 139.35 sq.m |

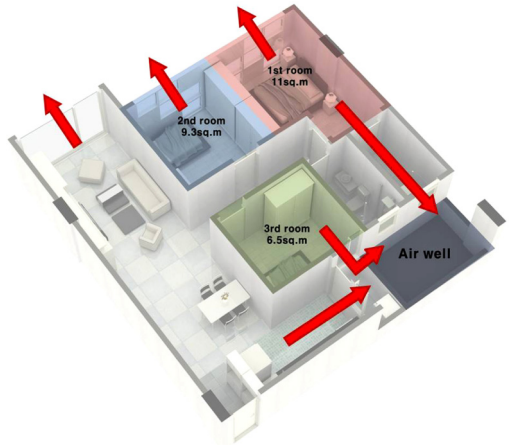



Figure 3. *Typical Unit Plan*

In a typical layout of a unit plan in Multi-family house, the two side separating walls of a unit are blocked and the unit frontage is limited, therefore providing windows to all rooms in a unit including bathrooms is impossible. But according to Malaysian regulations, more than 10% of the total space should be allocated for windows and each room including bathroom and kitchen should contain a window to allow for natural ventilation. Therefore to provide windows to all rooms in a unit, air wells[15)] and pockets between units are essential elements in Malaysian apartment planning.

Therefore, in a dwelling unit layout, an important issue is to make every room in direct contact with the exterior and get direct sunshine and ventilation, but the most distinctive difference from other counties' layout plan is the bathroom location. The layout plan of a normal apartment locates the bathroom at the front even if it hinders the view of a main bedroom, and locates an air well between corridors and each dwelling unit for the ventilation of the rooms located in the rear. This is an essential element for the dwelling plan in Malaysia where natural ventilation is mostly stressed.

Table 15. *Minimum Area and Height of Rooms in Residential Buildings*[14)]

| Types | Minimum Height (m) | Minimum Area ($m^2$) | |
|---|---|---|---|
| Living rooms, Bedrooms | 2.5 | 1st habitable room | 11 |
| | | 2nd habitable room | 9.3 |
| | | others | 6.5 |
| Kitchens | 2.2 | 4.5 | |
| Bathrooms | 2.0 | 1.8 | |

*Source. Legal Research Board (2008b), Section 40, 42

Table 16. *Minimum Size Air Well*

| Height (Stories) | Minimum size air well | |
|---|---|---|
| | buildings ($m^2$) | bathrooms ($m^2$) |
| 2 | 7 | 3.5 |
| 4 | 9 | 4 |
| 6 | 11 | 4.5 |
| 8 | 13 | 5 |
| more than 8 | 15 | 5.5 |

*Source. Legal Research Board (2008b), Section 40

## IV. Conclusion

By means of the analysis of regulations related to housing projects in Malaysia, this study summarized the basic guidance of physical housing planning principles

13) Housing Classification

| | |
|---|---|
| Non market Housing | Rented Public Housing |
| Affordable Housing | RM 42,001-RM 74,999 |
| Medium Cost Housing | RM 75,000-RM 250,000 |
| High Cost Housing | >RM 250,000 |

14) Uniform Building By Laws 1984 Section 40, 42, 86. The width of every habitable room shall be not less than 2.1 m and kitchen shall be not less than 1.5 m.

15) Air well is a space connected from ground floor to top floor for natural ventilation purposes. The minimum size of an air well depending on the height of each building is stipulated in the Article 40 of UBBL.

from the viewpoint of urban space, street system, housing blocks, and unit design.

The important findings of this study is as follows;

One of the uniqueness of new town planning in Malaysia is that the government controls the housing types and building heights by the population density and income level. Generally FAR (Floor Area Ratio) is an important legal constraint that determines the volume of buildings. However, it is noticeable that this constraint is not applicable to residential zones in Malaysia, except for the city center. In Malaysian town planning, the household density is considered more than the FAR.

Second, the representative housing typology in Malaysia is the terrace house. Tones of repetitive long blocks of linked (terrace) houses is the unique feature of new towns in Malaysia. In typical block design, the rear set back control and installation of back lanes must be followed for fire protection and sanitary purposes. Instead, in Malaysia setback for non-party side boundary is wide as 3.0-3.5 m, ignoring the basic housing structure.

In the strata properties such as apartment and condominiums, the unique design elements are air-wells in block and unit design. It is required on the guideline that all of rooms including bathroom should have windows and minimum size air-well. This guidelines reflects the ventilation issues. The regulation was customized to reflect the extreme tropical climate.

Regulations play a vital role in the development control system. These regulations are a type of grid which specifies where the buildings will be built or where rooms are located and how they should be organized. Therefore regulations are principally instrumental in guiding the design process and urban development, and in translating government policies into physical existence. We understand that the key physical characteristics of Malaysian housing development stem from these unique regulatory conditions.

In further steps, an analysis of comparative studies between regulations of other countries such as Britain and East Asian countries is planned to be conducted and expected to be integrated with the result of this study for more in-depth discussions.

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