Identity In Cityform: The Politics of Building Height

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ABSTRACT

This thesis proposes physical form for the proposed new state capital KT City of the State of Johor in Malaysia by clustering building heights to achieve an appropriate identity for the city center which will symbolize the whole city image. The factors that influence building heights are discussed in terms of a balance of power between economic and the socio-political forces. Following the observations made on four American cities as case studies, a street pattern was generated in response to the local landform, location, climate and the desired city structure. The three-dimensional cityform was generated by varying domain heights on this street pattern to distribute the densities that plausibly reflect the total floor space demand projections for the city center.

Generally, the limit of human perceptual effectiveness depends on the compatibility of his own body scale in relation to the physical dimensions of his built and natural environment. Those most intimate dimensions appear the most meaningful while those overwhelming him create physical and psychological discomfort, unless the latter are viewed from afar. The acceptance of dimensions much larger than the commonly tolerable would be subject to judgment in relation to conflicting interests of different social groups. Such public competition operates politically to minimize the heights of buildings to counter economic pressures tending to optimize building heights to increase private profit. The Power to decide this balance between the socio-political and economic factors governs feasible building heights.

However power enables influential groups to either sway this balance by exceeding the accepted height limits to promote individuality or maximize economic returns, or by suppressing the heights of surrounding buildings to secure visual prominence to advance and sustain political domination. Such violations are common but unpredictable in established cities where the most powerful builders vie for the choicest locations as thrown up by rapidly changing market and social forces. A distinctive building height distribution that caters predictably to future growth yet based on reasoned responses through its street pattern, such as suitable street widths to accommodate expected building heights and their orientations appropriate to site topography and climate is proposed in this thesis. The new capital KT City offered the opportunity to anticipate afresh the creation of an identity enjoyable by pedestrians within the city (i.e. at human scale), and whose profile quality at the skyline level is memorable at a distance from major points of approach. To this end height control was advocated over FAR for achieving city identity in terms of its density clustering.

Thesis Supervisor: Jean Pierre de Monchaux
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To my mother Tok Ah Ying and
in memory of my father Chew Theng Seong
who gave me love and taught me life,

to my children, Hui Lin and Wei Hao
for their inspiration,

and none the least my wife Cher Sock Lang
for her patience and affection.

C O N T E N T S

PART III

PART IV

A C K N O W L E D G M E N T

My tight schedule would have been impossible without the kind assistance of caring faculty like:

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P R E F A C E

1 THE MOTIVATION

Too often designers hang their hopes on the ability of a single structure to solve the problems of an entire area. As only individual buildings can be designed at a time without any control over adjoining site parcels, it is unrealistic for designers to recommend an urban fabric beyond his own site. Even before design begins, the envelope of the structures that the designer can put on the site is somewhat already controlled by a planner. I wish to understand the rationale behind the process of decision-making in arriving at those "planning parameters" pre-controlling a site. If there is an apparent divergence between the designers' emphasis on design aesthetics and the planners' emphasis on non-design issues, I hope to reconcile the two, to make the designer less naive and the planner more design sensitive. The density controls for the conceptual master plan (CMP) I did previously then seemed indefensible since they were limited to an aesthetics basis without other considerations beyond the design factors.

2 THE GOALS

2.1 Aesthetics in design issues are mainly concerned with style and character. Planners are more concerned with 'non-visual' issues such as sociology, economics and politics to formulate policies for allocation of resources. The two sets of values, between the designers' hardware-values (visual/physical considerations) and the planners' software-values (non-visual considerations such as socio-political and economic factors) need to mutually reinforce, rather than contradict one another, to achieve good city form. To comprehend the inter-relationship between policy-making and design, I will explore how these visual and non-visual considerations combined shape policies related to building bulk to determine the final form of a city.

2.2 I wish to unravel the potential of building height as the parameter prescribing the form of a city. From a fuller comprehension of the operation of height controls based on visual considerations, but as modified by non-visual ones, this exercise would enhance my fluency in building height as a planning tool needed for deliberate intervention to achieve predictable results like sculpturing realistic cityforms in the future.

3 THE PREMISES

3.1 During the drafting of the 1972 San Francisco Bulk and Height Ordinance, Jacobs recalled that one of the greatest fears of representatives of downtown interests was that "only aesthetics and not economics will be the standard of the Ordinance."[21] The major premise of this thesis is that height control would be less vulnerable to accusations of being *arbitrary* if its basis is not restricted to only *visual* or "design" intentions.

3.2 Unprecedented economic growth has precipitated a sudden demand for space and caused chaotic growth as occurred in the national capital of Kuala Lumpur from the lack of anticipatory planning. "Kuala Lumpur's lack of a master plan and detailed local plans had led to the developments that are ad-hoc and which do not relate to each other, leading to uncontrolled expansion along major roads. As a result the city lacks a distinctive and dignified urban form."[1]

3.3 Visual prominence due to sheer bulk and a distinctive profile are the most conspicuous characteristics of the three dimensional form of a city. The vertical dimension of height is the most evident attribute that will best manifest a city's urban form. In creating a city of distinction, the planned control of building heights is arguably the most evident and lasting attribute of a city in terms of its recognisability due to its massive scale even from a distance which must also be reflective of the character of its streetscape proportions.

3.4 The site is located just off two divergent growth corridors one each to the east and the west so it had long been bypassed by development. So there is a dearth of information on this particular site. The *a priori* assumption is that the existing capital city is so severely constrainted by its urban problems to be literally unable to accomodate much more new development. The space projections for Johor Bahru is presumed to be transferable to the new state capital city to a certain extent, which is infact its purported function.[2]

4 OBJECTIVES

4.1 General Objective:

At the end of the thesis experience I expect to have acquired valuable insights in the **principles** that govern the formal character of the selected case study cities and other capital cities, by scrutinizing their height controls and street configurations. Besides incorporating the non-visual considerations now, it is also necessary to generate a street configuration to be used as a suitable base plan to illustrate my findings for this study.

4.2 Specific Objectives:

I will attempt to answer the following questions -

4.21 What are the various factors which influence building height decisions, which would form the basis for the design of building height controls?

4.22 What is the net feasible building height from a balancing of the combination of factors that increase and those which decrease it, inclusive of the visual considerations? The extent of this sway between these two groups of factors particular to a city is expressed as its resultant feasible heights that reflects and becomes part of the city's identity.

4.23 Which is the predominant factor that decides this sway, if any?

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[1] Kasi, 1985. p44

[2] The existing planning framework for Johor Bahru is applicable to KT City; both are within the same state. Any disparity is unlikely even between different states within a small country like Malaysia where central authority is paramount except for some state autonomy regarding land and religious matters; for the latter, the Sultan is the authority in each state.

4.24 How effective is the use of the building height control tool in achieving a desired identity and how successful can the tool be for sustaining the identity of a cityform?

4.2 **The Findings:**

The proposed answers to these questions are -

4.21 The factors can be categorised into three groups: economic, socio-political, and power. Economic factors tend to centralise density and maximise height; socio-political factors tend to disperse density and minimise height; and the power factor is capable of either maximising or minimising agreed building heights to accentuate or diffuse central core formation depending on political ascendancy.

4.22 The tallest buildings or the lowest densities are seldom justifiable by primarily economic nor socio-political considerations. In existing cities, the greater the authority and influence of the proponent the more likely any height limits could be violated.

4.23 Power is the dominant factor capable of overriding each of the two groups of factors or moderate by deciding the sway between the two groups of factors combined.

4.24 Rather than FAR,[3] height control is the more sensitive and reliable tool to regulate *for identity* of a cityform achieved by *composed density* or clustered concentrations. In a new city it is best sustained by simulating the topography as a massive permanent base on which to create a simple but clear initial pattern for locating densities which could be easily continued and enhanced by predicting the probable city structure for channelling future growth to minimise wilful violations.

5 THE SCOPE

5.1 The coverage of the base plan used as the vehicle for this study will be limited to the city's central district comprising the government complex and the commercial center.

5.2 By city form is meant a city's three-dimensional volume enveloping macro urban-blocks, of the maximum concentrations of the tallest buildings as against individual buildings, obtained by the vertical projection of a two-dimensional base plan of the horizontal city. The street pattern serve as this horizontal base to demarcate the private space for individual buildings as distinct from the circulation and open public spaces defined by the street widths in relation to tall buildings edging them. The quality of the pedestrian experience stems largely from the effects of building height fronting these circulation spaces. I will look at the broad location of zones in the case studies where the tallest buildings are clustered corresponding to the characteristic distribution of the highest densities in broad relation to a city's street configuration rather than the individual parcels which constitute the fine grain or detailed texture of a city.

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[3] Floor Area Ratio is the ratio of the floor area in a building to its lot size.

5.3 This will **NOT** be an urban design exercise to prescribe an ideal city based on the issue of identity. The formal qualities of the city achievable by the deliberate application of building heights as the regulatory tool will demonstrate concerns sympathetic to the pedestrian experience which is what constitutes the identity as defined at the closeup level. The suggested cityform proposes density locations rather than a plan for detailed height control which requires a more comprehensive study. However this preliminary city form is essential to the future prescription of specific height limits. The obvious variation in conclusions pertaining to the proposed density distribution relative to different street patterns will need to be the object of another exercise.

5.4 Those technical height constraints originating from telecommunication constraints, security restrictions, and flight paths will be excluded because of their usually non-negotiable nature.

5.5 Case studies serve to throw light on the play amongst the economic, socio-political and power factors to support the application of height control as the parameter most effective for prescribing cityform instead of storey height or FAR. Since bulk is a volumetric quality, related attributes such as FAR, lot coverage, minimal lot size, floor-to-floor height ("story height"), and number of storys, which account for the reciprocal effect of lateral spread of mass and thereby the consequent modulation of height, also need to be considered where appropriate, especially at the ground or footprint level. The study will finally recommend certain principles to sharpen the implementation of building height control.

5.6 This study will not address whether "Cities can be designed?" Rather, if there is a need to create an identity for a designed city, building height control is one way.

6. ORGANIZATION

This study has been organized into four main sections:

Part I The background. Issues and definition of Identity.
Part II Case studies of some American cities. Factors that affect building heights.
Part III The site, and floor space projections. The street pattern used as the base plan.
Part IV Cityform suggested by height variations on the base plan. Evaluation, recommendations, and conclusion for using height controls.

P A R T I

CHAPTER 1

INTRODUCTION

CHAPTER 2

ISSUES OF IDENTITY

CHAPTER ONE

I N T R O D U C T I O N

This topic may provoke as many individual perceptions on the subject as there are points of view. To shape the window by which the outcome of this excercise should be viewed, the context of this undertaking need to be laid out first in order to prepare the appropriate frame of mind for sharing in an exploration rather than for receiving any conclusive set of recommendations. What were the changes in Malaysia's urbanisation process and how has that led to the present concern on their building heights?

1.1 THE MEANING OF HEIGHT CONTROL

People tend to build to the limit allowed. Without height control they will build as high as they desire, resulting in apparent chaos. The Mansard roof evidence people's tendency to maximise floor space by sneaking in another story within the roof space and yet complies with Paris's height mandate. Refering to the case of New York City, Tunnard[4] said that the "disorder from the tremendous density is America's most magnificent contribution to world architecture." But when Marshall said, "New York's skyline is the most dramatic when viewd at a distance but it is the most chaotic at close up," he could imply that in reality, few actual cities measure up at both scales. The criteria for good city form should then be the quality of its identity from both far and near. Few people complain about any apparent disorder regarding skylines which are viewed from a distance. However, even moderately high buildings viewed close up often provoke negative reactions. Probably the reason lies in the relative scale of buildings to people. Any mass when viewed from far enough appears to be in "human scale," and thus is less repulsive. The issue of height then must be assessed at both the human scale and the distant scale of the skyline. As part and parcel of a city's identity, the skyline is the sky connection which,

[4] Christopher Tunnard, "American Skylines," 1953.

more than any, reveals the overt character of its man-made environment. Height control enables one to sculpture a specific profile according to the character of the high and lows of urban densities that correspond to that specific blend of the socio-political and economic conditions within a city. Having good identity could mean that given a skyline one can tell to which city the skyline belongs and from its skyline the quality of its streetscape. Why is it we can tell one city from another just by looking at their skylines? Are good skylines consonant with good streetscape and vice versa?

1.2 THE ULTIMATE AIM OF IDENTITY USING HEIGHT CLUSTERING

I will show in chapter 7 that without relying on the mixed architectural quality of individual buildings, clustering of buildings by their heights does afford definite functional and aesthetic benefits on the cityscale. The following principles of height control will be demonstrated on the street pattern to illustrate how they will help create KT's intended identity comprising of the sum of its qualities at its street and skyline levels.

(a) skyline:
1.21.1 Extent of concentration to optimise economic priority.
1.21.2 Extent of deconcentration to counter heights through socio-political uniformity.
1.21.3 Extent of Modulating effect of power between maximum and minimum heights.
1.21.4 Grouping of height cluster to accentuate city structure and visual prominence.
1.21.5 Strategic location of highest building clusters to create a reproducible silhouette.
1.21.6 Heights attainable by confining their spread for walkable city size.
1.21.7 Heights of buildings should simulate the landform.
1.21.8 Concave height diminution to signifiy civic importance.
1.21.9 Convex height increments to signify commercial image.
1.21.10 Prediction of new locations to channel future high density growth

(b) streetscape:
1.21.11 Orientation of steet walls to catch prevailing wind.
1.21.12 Orientation of building height to promote shade.
1.21.13 Placement of height clusters to frame specific views.
1.21.14 View corridors using streetwalls aligned with street grids for internal orientation.
1.21.15 Stepping of street wall height/continuity using covered walkway for shelter.
1.21.16 Internal place orientation by relative location of height zones.
1.21.17 Street widths in proportion to heights of buildings placed along them.
1.21.18 Complexity of building block sizes in relation to number of street intersections.
1.21.19 Flat height limits over whole areas to define district character.

1.3 THE BACKGROUND OF THE NEW CAPITAL CITY PROPOSAL

A sketch concept for a master plan (CMP) was prepared in June 1993 for a private landowner of a 6669 acre (ac) (2704 hectare (ha)) site in Malaysia's most southerly State of Johor. Johor Bahru, its present capital city, is just across the Straits of Johor separating the island Republic of Singapore from Malaysia (fig 1). Due to its haphazard organic growth over time within a valley between the steep topography to the west and the Malayan Railway reserve to the east, and the former government policy favoring the deconcentration of growth from the established traditional centers, Johor Bahru's city center has been deemed unable to cope with any further orderly development.

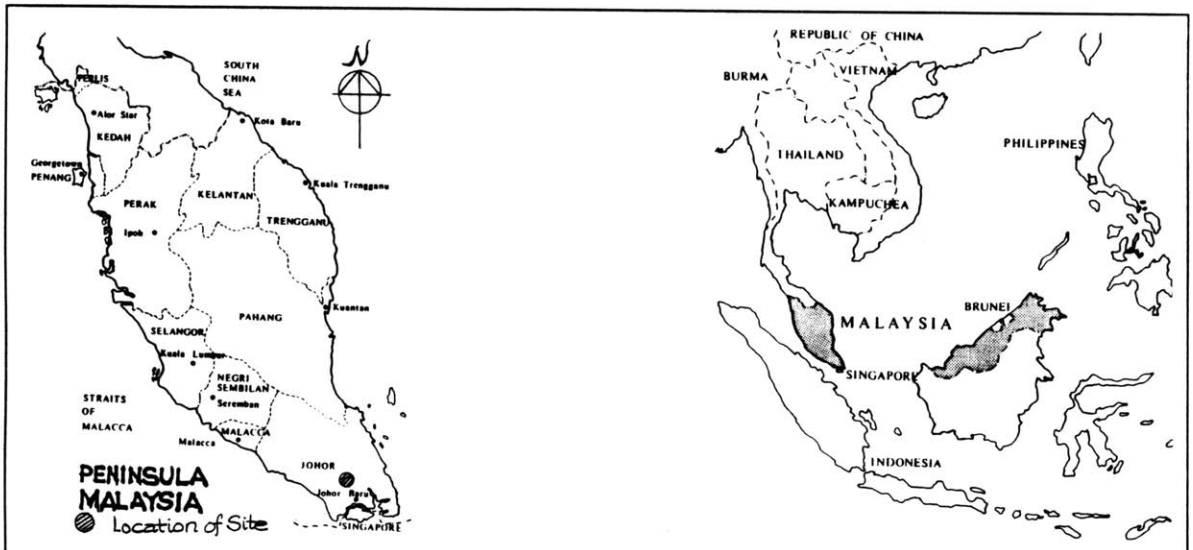

fig 1 Location of Johor State. Johor State is located at the southern tip of West (Peninsula) Malaysia just north of Singapore; its capital city Johor Bahru is the Southern Gateway to Malaysia.

The brief was to explore the feasibility of building a new self-contained township whose town center would incorporate a government complex on 297acres (ac) (120hectares (ha)) of land to be ceded to the State in exchange for including development rights to an odd corner to the south of the site. The government complex would serve to accommodate the public agencies transferred out of Johor Bahru to take advantage of the opportunity to be relocated into a well integrated complex in the new capital city. The land so vacated in Johor Bahru would then make room for the expansion of mostly commercial developments which are in great demand due to proximity to the economic dynamism of

Singapore. The goal was to create KT[5] City, a new State Capital City as the administrative, cultural and commercial center for the State of Johor while Johor Bahru will continue to be the financial hub for the Southern Region.

Is the proponent's vision too novel to be feasible at all? The urban problems of Johor Bahru are notoriously real and the validity of the new city idea can be supported by ample precedents in Malaysia's consistent tradition of creating new cities[6] motivated more by the government's avowed political objectives enshrined in its NEP to urbanise the aggrieved ethnic group who have been traditionally rural dwellers, than by purely economic reasons. Gelang Patah, the Malaysian end of the second causeway[7] with Singapore will also be developed into a new town in line with the new cordiality to promote regional cooperation (fig 2). For the purpose of further absorbing some of Kuala Lumpur's growth, the "latest"

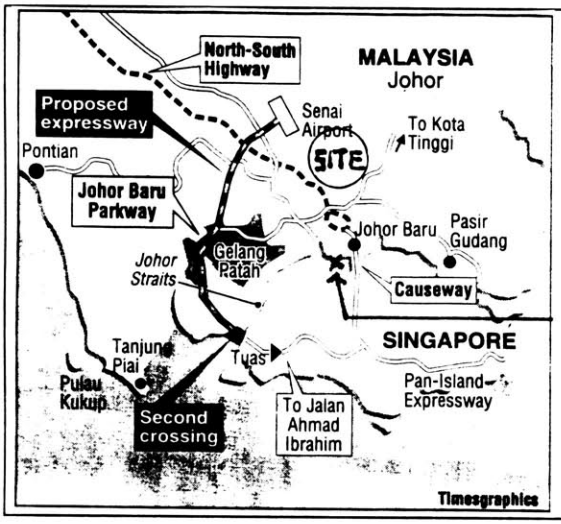

fig 2 Location of the Second Causeway. "The second crossing linking Singapore with Malaysia will spur the emergence of a new southern industrial corridor for Johor." Malaysia and Singapore will respectively have 70% and 30% stake in the US$1.5 billion bridge to be completed by 1997 while the development of the proposed Gelang Patah township there will take 25 years.

THE STRAITS TIMES, SATURDAY, MARCH 26, 1994

Second link will spur growth of new Johor industrial corridor, says MB

[5] The city would be named Kotaraya Takzim (KT, the "City of Tranquility") in line with the vision to promote it as the new provincial capital for the State of Johor Daarul Takzim ("Johor the Tranquil State").

[6] Lee p153. 50 new towns in Malaysia have been developed over the last 40 years mostly in line with the New Economic Policy (NEP) objectives, if including those sited in frontier areas to provide urban services to the agricultural populace who have been resettled in the various regional development schemes such as Bandar Pusat (Jenka Triangle), Bandar Muadzam Shah (Pahang Tenggara), Bandar Tenggara (Johor Tenggara) and the petroleum-based Kerteh (Trengganu). [The primary goal of the New Economic Policy (NEP) was to provide opportunities for Bumiputra ("Prince of the Soil," in referrence to the majority group who are Malays) participation in the ownership and control of commerce, industry and other urban developments. As perceived by indigenous politicians in power the race they represent had been severely disadvantaged by the allegedly divisive strategy of the former colonial government in maximising its economic exploitation through concentrating development in the urban areas whilst neglecting the development of rural areas which are predominantly inhabited by the aggrieved group now singled out for previledge under remedial socio-economic policies.]

[7] The Straits Times, Mar 26, 1994.

in the government sponsored new city series is Berang Besar[8] which covers 10,000ha, for a target population of 120,000-350,000 and situated 40km south of Kuala Lumpur but just 8km away from the new Sepang International Airport.

1.4 HISTORY OF URBANISATION IN MALAYSIA

1.41 Historical Profile Of Johor State

Modern Johor evolved its own identity only after the fall of the Malacca Sultanate to the Portuguese in the 16th century[9]. Malacca's Sultan refused to recapitulate and fled to Johor. When the Portuguese sacked the capital at Johor Lama, the Sultan moved his capital 30km further upriver. Johor has an unusual air of Western influence attributable to Sultan Abu Bakar who reigned from 1862. Educated by English clergy and influential in European business circles, it was during his rule that the foundations of modern Johor were laid. Though he was a personal friend of Queen Victoria, he never accepted a British Resident. In 1866, he moved the capital to Johor Bahru. He was personally keen in the planning of the capital complex comprising the Istana Gardens, the former royal Zoo, the Istana Besar, the Abu Bakar Mosque, the Royal Museum, the royal residence Bukit Serene, the Sultan Ibrahim Building (fig 3) and the Law Courts. The Istana (Palace) especially was furnished with the impeccable taste of an Englishman, unlike many of the Moorish-style palaces throughout the country. Today this neo-Palladian palace precinct (fig 4) situated on manicured slopes overlooking the Johor Straits stand out elegantly east of the mess in the city center.

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[8] Lianhe Zao Pau, July 13, 1994.

[9] Guiness, p7. During the 15th century Malay activities were centered further south on the island of Riau, where first the "sea peoples" and then the Bugis from Sulawesi established supremacy. Except for the sea peoples who probably formed the naval strength of the Johor-Riau Sultanate before 1760 with their temporary bases there, Johor remained largely uninhabitated until the 1840s. With the need to finance his ailing administration resulting from the over harvesting of his latex forest, Temenggong Ibrahim, the then Ruler of Singapore and Johor turned to the Chinese gambier and pepper planters in Singapore who then moved to Johor with their crops along with their opium and gambling monopolies. Concerned over their increasing influence the Temenggong soon require all boats trading between Johor and Singapore to stop at Tanjung Putri, the site of the government later to be called Johor Bahru. The recent expansion was mainly dependent on large scale immigration of Chinese needed for plantation labor. With the collapse of gambier and pepper prices around 1890, many switched first to pineapple, then rubber and now oil palm cultivation.

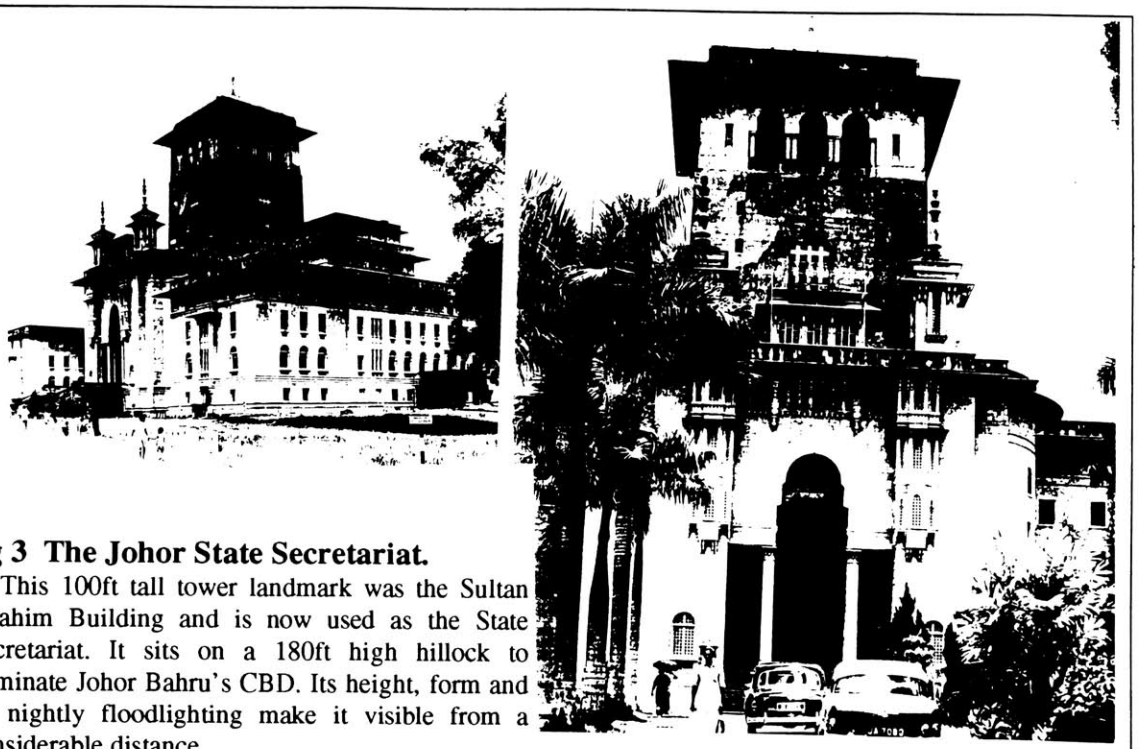

fig 3 The Johor State Secretariat.

This 100ft tall tower landmark was the Sultan Ibrahim Building and is now used as the State Secretariat. It sits on a 180ft high hillock to dominate Johor Bahru's CBD. Its height, form and its nightly floodlighting make it visible from a considerable distance.

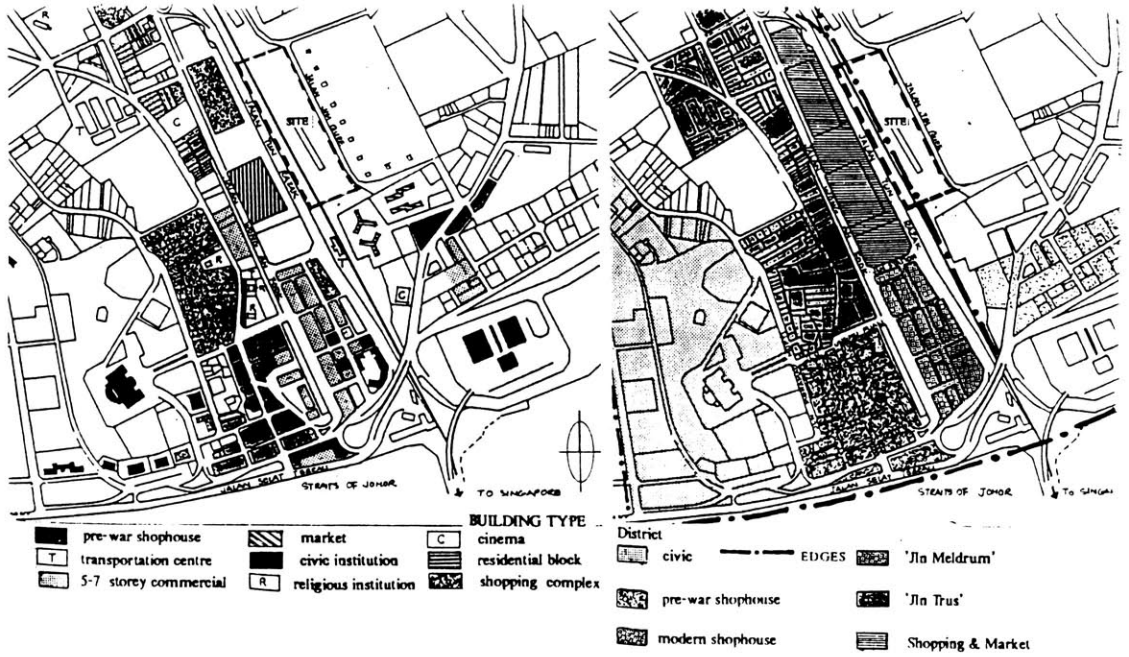

fig 4 Location of The Present Civic Precinct. The plans show the extent of Johor Bahru's city center by building type with the central business district surrounding the civic precinct in the southwest quadrant where the latter overlooks south to the Straits of Johor. The causeway to Singapore in the south is to the bottom right-hand corner. The State Secretariat is the one with the largest footprint shaded black with a "semicircular head" dominating other civic buildings by its size and own building height and its location atop the hill, to the south west of the city center.

1.42 The Malaysian Experience In New Towns

A period of Emergency was declared when Malaysia's rural population was beset by communist insurgents in the 50s. To prevent civilian assistance to the communists, large numbers of dispersed rural dwellers were gathered into so-called Resettlement New Villages, which led to a disproportionate increase in urban population. In addition the insecurity of the countryside encouraged the migration of large numbers of the rural population initially to the smaller centers and later to the bigger urban areas, especially Kuala Lumpur, resulting in a disproportionate growth of squatter settlements and slums. These urban problems motivate building the first new towns, Petaling Jaya[10] in the early 50s, and Shah Alam in the mid-60s. Sited on the fringes 10-30km from large metropolises, they and the newer towns like Bangi (Klang Valley), Senai (Johor) and Bayan Lepas (Penang) have become precedents primarily for absorbing metropolitan congestion. Initially covering an area of 3,000ac[11] Petaling Jaya's attractiveness for locating industries was boosted by the Federal Highway, though its bisection of the city by the link beween Kuala Lumpur and Port Klang provided a lesson to locate future new towns slightly off the main transportation axes connecting established centers (fig 5). As Petaling Jaya did not really solve Kuala Lumpur's urban congestion[12] problem as compounded by intense rural-urban migration and natural population growth, it was necessary to spread urban development to reduce the concentration of population and urban activities. The original

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[10] Situated 11 km from the federal capital of Kuala Lumpur, Petaling Jaya was based on principles similar to those of the British New Towns, which were being built at the time in increasing numbers following the New Towns Act of 1946. Initially planned to be self-contained, with a wide range of commercial, residential, industrial, administrative, and recreational functions it soon attracted offices, banking, educational and medical services.

[11] Landuses consisting initially of 67% residential, shopping and administrative (2000ac), 19% resettlement (575ac),. 7.5% parks and gardens (225ac) and 6.5% industrial (200ac). Petaling Jaya is now quadri-nucleated,[11] comprising the Old Town Center, the New Town administrative area, the SS2 commercial complexes, and the westernmost center of Kelana Jaya. Petaling Jaya is now (80s) more than $30km^2$ in area, almost 5 times its original size in the early 50s. Residential land comprises the largest proportion (60%), followed by industrial land (13 %). The propinquity of the new town to the major employment nodes made it an ideal dormitory settlement. It has grown from being one of the least populated towns in the country to become the fourth largest city in Malaysia.

[12] In fact Petaling Jaya attracted more population from other parts of the country than from Kuala Lumpur (the 1983 Census showed only 25%) as Petaling Jaya was not effective in siphoning off excess population from Kuala Lumpur leading to enormous urban problems in Kuala Lumpur. [T.S. Bahrin, "*Taking a Second Look at the Jenka Triangle: A Report on Research in Progress*" paper presented to the UN University Workshop on Resource Use of Frontier and Pioneer Settelments, Kuala Lumpur, 1985]

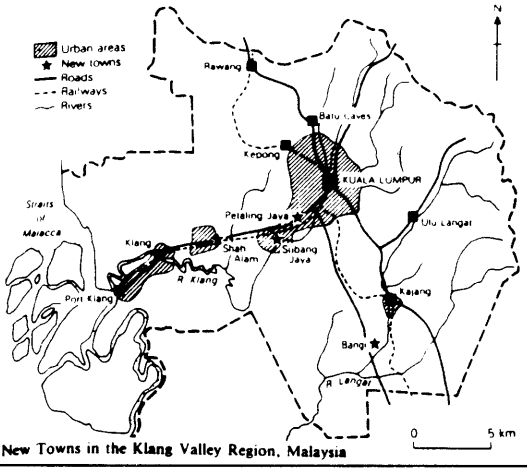

fig 5 Location of Petaling Jaya, Shah Alam and Kuala Lumpur along the Klang Valley.

Excellent accessibility by siting the new town directly on the main transportation axes would actually facilitate more in-migration to the old city to exacerbate its congestion problems. Also the close proximity to Kuala Lumpur resulted in the eventual merger of Petaling Jaya with Kuala Lumpur.

objective of resettling squatters and slum dwellers was superseded by the growing demand for better quality housing resulting from the emergence of a rapidly burgeoning middle class. Since the mid-1960's, the supply of housing for Malaysia's growing urban population took the form of urban scatter in extensive medium density private *housing estates* built around the city fringes. Although Malaysia's first new town Petaling Jaya failed as one of the inevitable responses to the challenge of solving the congestion of the nation's capital city, its growth as a new town is remarkable.

In contrast Shah Alam has not yet achieved its expected growth; the thrust of the new development is over-reliant on government initiatives. *Shah Alam* was developed by the Selangor State Government in 1966 for a target population of 200,000 by 1990. It replaced Kuala Lumpur as the new State Capital of Selangor on the declaration of the Kuala Lumpur Metropolis as the Federal Territory to become the National Capital of Malaysia. Located "ideally" between Kuala Lumpur and Port Klang, 15 km west of Petaling Jaya, its original 5,000ac now include 1200 acres of land for industries to become the fastest growing industrial center.[13] Located about 30km from Kuala Lumpur and

[13] Despite this, Shah Alam has yet to achieve its target population even after many State Government departments have shifted over from Kuala Lumpur and Petaling Jaya, and schools and commercial cpmplexes have been developed. The slow growth was due to the intensive development of housing estates nearer to Petaling Jaya, such as Subang Jaya, the lack of faciliites and a resident population. Because it was easy to commute to and from work in Shah Alam, the industrial employees continue to reside in the established centers of Petaling Jaya, and Port Klang from where they were drawn from.

planned in 1975 to cover 1,612ha and for 100,000 persons, for the same goal of drawing population away from congested areas, *Bangi* was especially targetted to achieve the objectives[14] of the NEP. The location of the National University of Malaysia in its immediate vicinity led to the decision to plan Bangi as a university town which helped to attract training and research facilities to locate there. Despite the high demand for its industrial lots, the overall population residing in Bangi remained well below its target due to the delayed provision of lowcost housing for the factory workers and lack of downtown facilities.[15] Unable to create its own economic and functional independence Bangi's population growth has also been disappointing. The proximity and accessibility of Bangi to other surrounding major centers also permit its workers to live away from their workplaces.

As the receptacle of urban in-migration embracing the most successful new towns besides the established centers, the Klang Valley dominated the urbanization process in Malaysia. Petaling Jaya has succeeded in becoming an attractive satellite city with a comfortable mix of well distributed urban amenities and industrial uses well spaced apart in between elegant green open spaces without feeling like an industrial estate. Its intensity of urbanistion is also tempered by its wider open spaces and parkland to appear just right for pleasant residential use without the usual din and dust associated with urban congestion. But Shah Alam's level of urbanisation was embarassingly slow to give any urban quality except for its landscaped parkland occupied by monumental buildings (fig 6) of the state government complex. The plans of the designed cities of Petaling Jaya and Shah Alam clearly show the preoccupation with the transportation network using large loops in the arterial roads system (fig 7). Nevertheless the most drastic change in

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[14] Lee, p158. "Whilst growth in Kuala Lumpur and Klang were to be restrained," two more towns were built (Shah Alam in1965, Bangi in 1975) to absorb as much of the Klang Valley's expansion as possible.

[15] The CBD still failed to develop by 1987 because the threshold of 30,000 persons to generate a viable demand was not attained. It could be necessary not to intensify housing initially, but to provide sufficient facilities in tandem with population growth by appropriate phasing of the city center. "Inadequate shopping facilities, especially in the frontier towns, has made them closed subsystems which are virtually incapable of generating local demand and the basic dynamism needed to boost growth." So KT may not absorb 100% of the space all at once. [*A Glimpse of Ketengah,* Middle Trengganu Development Board, 1982]

Malaysian cityscapes will arguably be in the emphasis on building bulk and height at the expense of human scale.

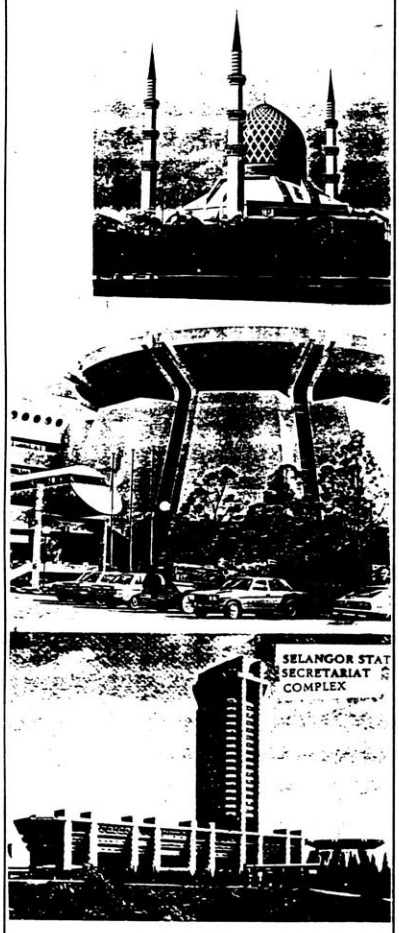

fig 6 The Selangor State Government Complex at Shah Alam.

To speed up its growth, *half* of the State Government's expenditure in 1984 was directed towards construction of these gigantic buildings.

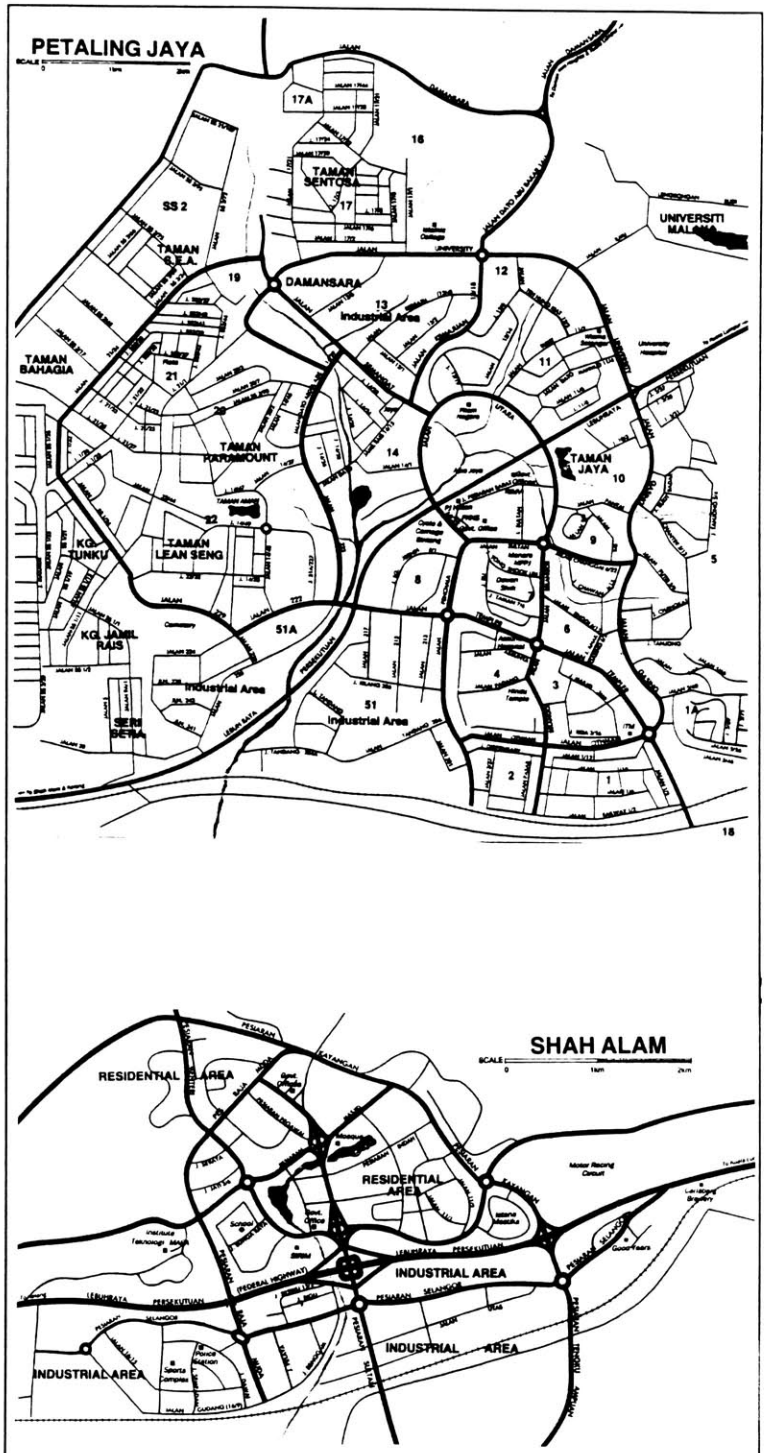

fig 7 Configuration of Designed Cities in Malaysia.

Loop arterials replaced the traditional grid and semi-radial street patterns. The obligatory "Municipal Padang" (colonial civic/sports field) so typical of the evolved cities have also been omitted.

New cities tend not to grow if their locations are too near established centers and there is insufficient private sector participation. Whether planned on the fringes of metropolises or in the rural outback, new towns in Malaysia have not achieved their population and other objectives[16] due mainly to the lack of a more holistic conception at the national level, where their development was undertaken under separate agencies responsible to the various state governments.[17] From a concern with the absorption of population overspill, new towns became tools to develop frontier regions and as a means of providing affirmative economic opportunities to specific sections of the populace where the Malays recorded the fastest rate of urbanization.[18] But to what extent could the habitat from which the Malays emigrated be translated for contemporary urbanisation?

1.43 General Features Of Malaysian Cities

British colonial policy necessitated the growth of only one city in the region to act as the major link to the west. In the colonial period, Singapore dominated the region, with smaller cities, such as Kuala Lumpur acting as subregional centers in the urban network.

> "The urban system of Malaya did not develop upon an indigenous urban base; the social, political and economic forces operating before the advent of the immigrants and the British failed to generate a traditional urban system. The present system of cities emerged within the framework of a colonial economy which provided the necessary infrastructure."[19]

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[16] Population size alone is not a sufficient determinant of urban growth. Later towns which amassed rural workers have also not prospered. 15,000 persons had been suggested as the minimum threshold for viable new towns. Factors such as the quality of services provided, the existing system of production, and the economic structure of the hinterlands all have relevance. [Azman Awang, *"Small Towns, Old and New: Their Status in the National Settlement Structure in West Malaysia,"* in Equity with Growth: Planning Perspectives for Small Towns in Developing Countries, Bangkok, (ed. Kammeier) AIT, 1984.]

[17] Suburban new towns (200,000 persons) are more successful in providing employment, since they are geared towards manufacturing industries and assembly plants whereas the frontier towns are smaller (70,000) and agrobased and do not attract urban industries nor business ventures. [Mohd. bin Abdul Rahman, "New Towns in Malaysia: Problems, Failures and Achievements," in Urban Innovation Abroad: Problem Cities in Search of Solutions. (ed. T.L. Blair) Plenum Press, New York, 1984.]

[18] This resulted from the deliberate stategies of the NEP with the overidding goal of national unity among the various ethnic groups through eradicating ethnic imbalances where occupations are identified with race and geographic location. This prompted new population redistribution policies to achieve a more equitable growth distribution between and within the states, using rural development. [Mohd. Rosli bin Buyong, *"Policy, Approach and Strategy for the Development of New Town,"* paper on Development of New Towns, Kuala Lumpur, 1978]

[19] Lim, *History of Urbanisation in Malaysia*, p270.

Though, the indigenous Malay village may be construed to be less appropriate as a model for modern (high density) city design,[20] it is highly adaptable as infill within the existing urban fabric at the scale of a housing neighborhoods which can provide a rich environment with its many transitional[21] spaces to foster a strong sense of community. The residential areas surrounding a Malay palace comes closest to the indigenous urban form as it was arranged centrifocally with the palace and the mosque at the core. That is immediately enclosed by a residential ring of housing whose residents serve the needs of the palace complex. This ring was in turn surrounded by more houses which eventually dissipate into sprawling groups of villages. In marked contrast to the informality of the Malay village, Malaysian cities are rigidly structured with clear grid circulation systems and property boundaries to be an important urban model. Although introduced by the British, the city form has grown up to accommodate early Chinese immigrants in the late 19 century who brought in the differentiated house lots and rectilinear circulation system of the strong commercial tradition of southern China.[22] The Malaysian city is generally a rectilinear layout of main roads with fronts linked by a covered sidewalk or verandahway[23] raised slightly above street level and service back lanes running between rows of houses placed back-to-back whose consistency of design in height and story height was encouraged by the regular division of lots for buildings and by a very strong building type for a house.[24] Just as the house is defined by the property line, the block is defined by the

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[20]Choo, p31. Chinese settlements were an outgrowth of the concept of land as a commercial commodity. The Malays' value of land was oriented to agricultural produce.

[21] Ibid, p75. The Malay house is raised off the ground on columns with a six feet clearance to create an outdoor room which has an important role in the social structure of the village. During the day it provides a cool, shady place where outdoor chores are performed, as playroom for children or storage space and in recent years a garage. It helps to ease the passage from outdoors to inside, from the bright noisy public world to the cool dark privacy of the home. Except, for the surrounding railings, it is completely open to the outside to provide a comfortable place to relax and watch the world go by."

[22] The Chinese medieval cityform has a perimeter wall enclosing a dense urban space laid out within a grid which gives a clear boundary definition.

[23] It has origins in the courtyard houses and commercial streets in British India, Dutch Batavia, 18th century southern China, and in the "serambi" or shaded porch and covered terraces on the northern side of the traditional Malay house. The 1822 regulations by Sir Stamford Raffles of Singapore had the effect of citywide control requiring collonaded streets and uniform facades. Today it continues to link pedestrian movement at ground level, provide a continuous facade, form multi-layered terraces above or below ground, or bridge important junctions as an organizing device to give a distinctive identity to whole cities.

[24] Arranged as rowhouses along the street, the Chinese house is typically inward looking with spaces looking onto an interior courtyard which is practical for bringing in air and light into the interior of the disproportionately deep and narrow structure. The density of house frontages along the streets makes these

streets which border it. As British colonial policy encourage Chinese involvement in the commercial sector of the economy while Malays in the agricultural sector, these shophouses came to form the commercial core of cities throughout the Malay peninsular.

The verandahway is already an inherant architectural part of the Malaysian streetscape, serving as transitional space that has mutifunctional uses and connectivity. It is visually identifiable and can give a clear unifying and cohesive image. Its form is derived from the traditional shophouse archetype which is an important existing part of the urban heritage of all Malaysian cities. Its configuration respond to the Malaysian climate[25] by providing a covered pedestrian walkway and semi-enclosed shelter from the sun and rain. It helps building closer to the site bounadry to foster the human scale and street wall without being bland since its upper floors have louvered windows and the lower floors have rhythmically spaced pilasters and collonades acting like transparent screens. Its overhangs could also break up the monotony of rows of freestanding towers. Being safe and pedestrian freindly, it encourage people to leave their cars and walk.

There is however an increasing functionalist trend to do away with the colonnade by just cantilevering the higher floors above the arcade. Except for this set back shop front in the ground story, contemporary housing estates could be read as just a monolitic mass of houses and shops that increasingly look like each other, adding new meaning to the term "shophouse." Identity seem to be monotony itself when all blocks are required to be of uniform size (so also height) with rows on rows of identical houses on 80ft x 20ft plots

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buildings particularly applicable to commercial use as shophouses often with the first floor as the public room and the private space maintained upstairs.

[25] Mean monthly temperature 23°C in October (73.4°F), 25°C in April (77°F). Mean annual temperature range 1.4°C (2.5°F). Average total annual rainfall 232.7cm (91.6in). July is driest month, Dec is wettest month. Prevailing winds - Southwest Monsoon (Mar-May), Northeast Monsoon (Nov-Jan).

lining the 40-50ft wide roads[26] in conformity with the antiquated and restrictive planning laws.[27]

> " The housing estate urban sprawl transformed the landscape like an amorphous creature, ever growing and spreading, whose images of these faceless and nameless human settlements are by now deeply etched in our psyche. In spite of their myriad appearances, these housing estates have essentially the same layout.."[28] (Wong 1985)

The idea of a satellite city is certainly plausible though the question of whether it will be accepted as an alternative capital for the state will be more an issue for the politicians in power to contemplate. In fact if that is the case, it affirms the hypothesis here that power is the most significant factor that will decide the very location of a site for such a city, if not yet the heights of buildings in it. The problem of feasibility is only an economic one, which I will subsequently show that economic motives are not quintessential in the realm of decision-making for large scale developments such as large urban complexes, let alone cities. Whether the proposed new city could be a capital city or not, the only difference would be a matter of scale of the development and more significantly the density of civic symbolism expected to create a collective identity largely based on the clear visibility of composed densities through their clustering.

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[26] The most noticeable characteristic of this form of settlements is the absence of *meaningful spaces.* In the modern housing estates, after the buildings and their little fenced-in gardens, what is left is completely occupied by the roads. The roads are the dominant features and the determinants of form and buildings are relegated to a secondary role. Control by means of the mandatory 7.5ft setback instead of by site coverage make it impossible for courtyards.

[27] Contemporary terrace housing estates paralleling older urban house forms have become a large scale planning precedent in subdivision of land, roads and back lane layouts, and at smaller scale of single houses in its strong separation between neighbors. Tay lamented that existing local laws still prevent canopies from extending beyond the roads because those laws are not tropical responsive. Property lines now become the definer of the limits of extension, and therefore the definer of the environment, rather than the environment stimulating the production of laws that allow forms to respond properly by linkage and connectivity, or by shade and compactness. Improving responsiveness requires volumetric modeling, vertical zoning, horizontal and vertical connectivity and micro-climate creation.

[28] Wong Chee-Chong, "20 Years of Housing," in Majallah Akitek, April 1985.

CHAPTER TWO

I S S U E S O F I D E N T I T Y

What is KT's desired identity if its purpose is to guide the particular manner in which the total volume of space required is to be distributed over it? In a multi-racial country like Malaysia, is it appropriate to favour the cultural symbolism of any particular racial group? If it is not, is the egalitarian ideal adequate justification for not emphasing traditional sources of symbolism or that of a particular ethnic group? In view of a cityform that would inevitably change over time, a more permanent reference that is intrinsic to the character of the location and more endurable in its effect is the landform. It is less controversial yet more politically acceptable as compared to ethnic or traditional sources. Besides some already mentioned elements typical of local cities, what other sources and considerations are pertinent to this identity?

2.1 THE NEED FOR AN IDENTITY

Skylines and streetscapes have become universal due to rampant style importation changing Asian cities into places that deny their roots and razed the regional environments to appear homogenous and anonymous. Variety and complexity of streets and buildings have been replaced by Modern[29] buildings with no identity and context. This lack of soul in Malaysia's built environment incited the search for identity, initially in architecture and then in city design. Malaysia's pursuit for identity did not originate in the late 70s from the architectural far less the planning professions, but with politicians calling for a National Identity to promote racial unity created around particular ethnic components.

New capital cities around the world have been infamous examples of desolate places especially in their formative years. To enhance their initial attractiveness needed for

[29]Modern architecture has been mainly about economics - functionalism, rationalism, and standardisation - things which make life tedious and oppressive. Ambiguity, humor, sensuality and ritual - elements concommitant with art or culture that make life interesting are missing.

continued prosperity, identity could inculcate in its inhabitants a clear sense of collective belonging to an imageble coherent[30] environment. Height controls could mould the height variations needed to orchestrate the pedestrians' experience within the streetscape created by respecting site characteristics, especially topography. The resulting *total image* stems from nurturing *a pedestrian-sensitive environment partly defined by a strategy by which heights of buildings edging the street spaces is also legible in the skyline.* Identity provides the direction to select those building height variations in relation to the settlement pattern consistent with the desired form of the city as **seen from the closest points of approach**. Why should the *issue of height* be of any concern to the site, when there are a myriad other probably more pressing development problems in Malaysia?

2.2 THE ROLE OF BUILDING HEIGHT IN IDENTITY

Firstly, as one of the major symbols[31] of American civilisation, the skyscaper and its skylines[32] come most immediately to mind while one is in America. Secondly, the dimension of height presents a very *tangible* bone of contention when manifested at the massive scale of whole cities. Unless one is capable of a bird's aerial vantage, the footprints of physical development cannot provide visible clues on their elevational aspects or heights, to help grasp its scale for assessing the size of their impacts on the environment. Thirdly the development envisioned for this site is not that unique in view of its lack of an established socio-cultural context which can be considered special to Malaysia as a whole. Except for its topography, the surroundings practically consists of the ubiquitous type of housing estate found in most parts of the country. Because Malaysia is a small country, the site could be treated as a typical place which would face

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[30]Identity is not just the difference in appearance, but the degree to which a place is vividly remembered, identified with and thus engaging to each inhabitant of the city. Identity establishes a coherent theme to synthesize the considerations on building height which need to be positioned within the context of a physical overall layout in the form of a plausible street pattern which is emblematic of the site showing how solids and voids are integrated by a circulation system laid along with the terrain.

[31] Clark, p150. "Skyscraper Architecture is America's major contribution in any field of creative art."

[32] Attoe, 1981: "The skyline stood for the generic city in contrast to the country, because it represents the important visual image of a city from a distance that spectacle of lights that marked the fact of people living together in community. The way a city's skyline elevates human earthly existence at the junction of land and sky is one of the meaningful measures of human civilization."

similar problems experienced by other locations in Malaysia. Here building height is viewed as a measure of the ***overall volume*** of space provision since to a large extent Malaysia's current urban problems is a consequence of the sudden[33] and sheer amount of physical development. Most significantly, a city's attitude with respect to building heights tells volumes about its whole web of values.[34] Malaysian attitudes to building heights tell a lot about the current state of Malaysia's socio-political and economic development (fig 8).

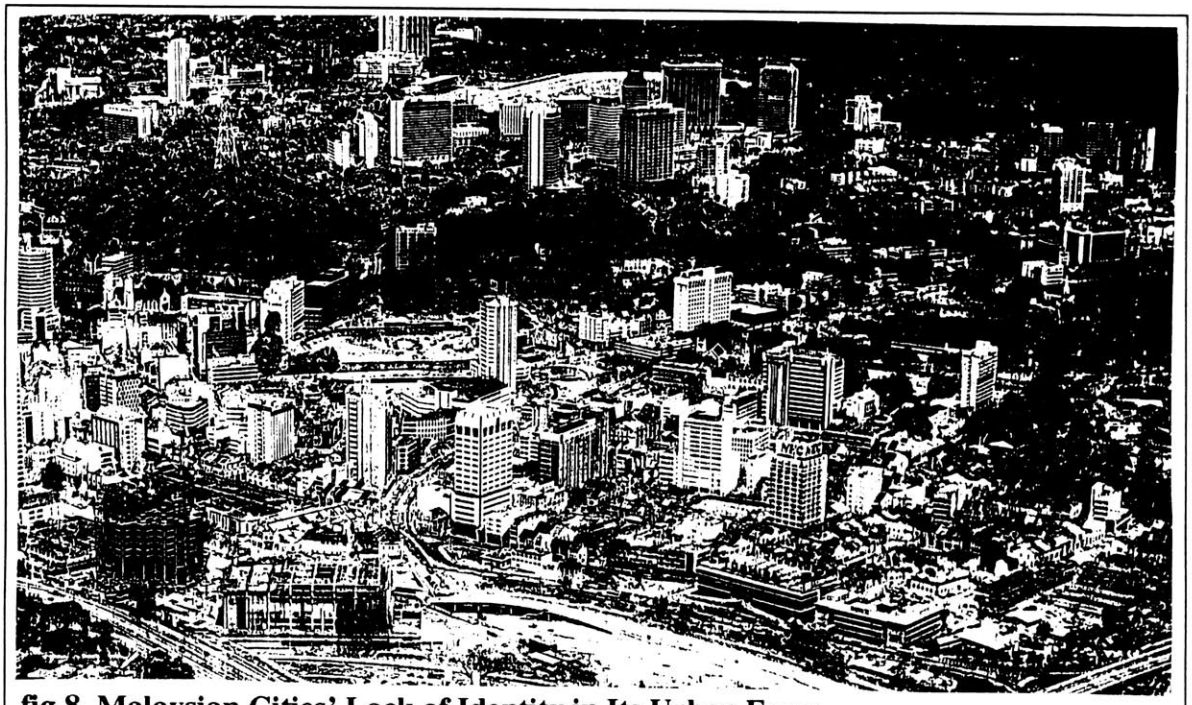

fig 8 Malaysian Cities' Lack of Identity in Its Urban Form.

Typified by development in Kuala Lumpur, one need to look at the problem now as the trend of **scattered** highrise development seems chaotic without any apparent order. Probably, the intended identity is anywhere and everywhere, and the meaning of place is nowhere, anyway?

> "The high holding cost from the accrued interests sustained during the recession in the mid 1980s caused the doubling of *land prices* in the late 1980s, which in turn resulted in the need for *increased plot ratios* in land utilisation. Construction of tall buildings intensified in the 1980s and continue into the 1990s with design proposals for 60-80 story buildings. The City Center of Kuala Lumpur changed from an essentially horizontal city to a cityscape of skyscrapers with other Malaysian cities following suit. The shortage of local precedents for a Malaysian highrise led to a heavy dependence on imported models resulting in many plain and boxy structures."[35]

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[33] If this has being undertaken within a very short time, it is more than likely that not enough thought nor preparation has occured before their implementation.

[34] For example, by referring to the "Manhattanization" of say Boston, we are actually simultaneously describing at least two cities relative to each other in terms of their economic values rather than talking about any single aspect in isolation about each city at one time.

[35] Yeang, 1992, p340.

The issues are not limited to aesthetics; real environmental problems have already taken their toll. A decade ago, there were already signs which prompted such warnings: "It took us a hundred years to build up that density in New York City; you are going to get it in fifty or less, so you had better start worrying about it now."[36]

> "In September 1994, Southeast Asia has had an unpleasant lesson on the consequences of wanton tree chopping and building. Severe air pollution has kept people in their homes and threatened to close schools. Due to low visibility, KL's main airport reported two "near misses" in less than a month. The haze that is blanketing much of Malaysia, Singapore and Indonesia comes from massive fires in Sumatra. The smoke from the fires has trapped the by-products of the region's development - car exhaust and industrial fumes - close to ground level. 'Vision 2020[37] is only three years old, can you imagine what things will look like in 25 years?' "[38]

"The Director of the Meteorological Services Department said that the probable causes is a combination of four factors - dry weather, polluting emissions (including car exhaust, industrial fumes, dust from construction land clearing), stable wind conditions and international pollution.[39] Foreign expertise is sought since the National Haze Committee (NHC)[40] has been unable to come to a conclusion," reported the New Straits Times. But geophysicist Sham Sani said, "When the surface of the terrain is altered, climate will be altered as well," his context was that the man-made environment including the massive constructions in Malaysia's urban centers constitute artificial topography which had generated measurable increases in urban temperatures and through friction impedes pollutant dispersion by ventilating winds, or the so-called "stable wind condition." Nestled in the Klang Valley, Malaysia's capital city of Kuala Lumpur, is a place conducive to trapping of suspended pollutants especially on windless days when dry weather prevails.[41]

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[36] Le Messurier, 1968, p58.

[37] Scientific American, March 1994, vol 270, No.3, New York. Malaysian Advertising Section Supplement, "Technological Competitiveness Towards 2020: The Prime Minister said, "Malaysia has formulated a strategic plan to become a fully developed (industrialised and advanced) nation by the year 2020. We call it Vision 2020 and it requires concerted development in all areas, especially a strong capabilty in science and technology."

[38] "*Pollution: Some Vision.*" The Economist, Oct 8th, 1994, Vol 333, No.7884, p36.

[39] On the Pollution Index Standard, the present haze has exceeded the "unhealthy" level of 100 and had threatened to exceed the halfway mark to the "very unhealthy" level at 200. Readings taken on 5th Sept 1994, showed levels of 316umgm compared to the average of 89umgm, or 3.5 times higher than the normal level. In some locations, visibility had reduced from the usual 20km down to 1km.

[40] The New Straits Times, Sept 5, 1994. "Haze: Foreign Help Sought." The committee was formed in 1991 when enough hysteria was generated by a similar but less serious haze but was then attributed to forest fires in Kalimantan. This time the source is also attributed to forest fires but in Sumatra. Instead of the NHC, Danish experts are now involved at the stage of "firming up the terms of reference."

[41] Also see 7.41.7 in chapter 7 on building heights to simulate landform.

The consequences so far have fortunately being limited to lowered harvest of some crops, cancelled flights, and increased medical bills for certain respiratory complaints.

2.3 THE NATURE OF THE APPROPRIATE IDENTITY

For Malaysia's multiracial society, social identity should be based on a *pluralistic identity* rather than a single dominant national identity[42] and four aspects regarding the nature of identity in the built form are notable. Firstly, because identity is a product of isolation arising from poor communication modes in the past, an identity that draws from historical heritage is becoming increasingly difficult because of rapid globalization in social communication and information proliferation. Identity is more likely to be achieved instead by emphasizing locational uniqueness, especially the physical and climatic[43] conditions of the site. Secondly, identity is the sum of local cultural traditions such as the traditional Malay village, and inherited historical influences including those foreign influences from the colonial legacy, the modern movement and the contemporary vernacular exemplified by the housing estate terrace house and the urban shophouse, as forms with tropical responses relevant to a wet place. Thirdly, the aspired identity is concerned with the *expression of power* often involving singular grand gestures to communicate the aspirations appropriate to a capital city where its sense of political control is epitomized by *centrality*. In contrast, the business identity is associated with private investment which is represented by freer configurations in keeping with free-enterprise. Fourthly identity has its material dimension involving forms constituted of appropriate materials which have soft[44] edges, umbrella-like that include nature as opposed to hard-edge modernist buildings of planar forms that exclude nature.

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[42] This was established by the Seminars on Identity under the auspices of the Aga Khan Program held in Kuala Lumpur in 1983 and 1985.

[43] Sani, 1986, p67. Climate is in part determined by a set of complex interactions between atmosphere and topography. Since a large city is bound to exert a pronounced influence on the climate both in the city and beyond, it is meaningless to merely create micro-climate using buildings, which is but artificial topography, if the much more extensive original natural topography was not respected in the first place.

[44] These soft built forms and their configurations are concerned with shadows, sun-shading, fenestration, cross-ventilation, heat-buildup, street and building orientations, interior light wells, internal courtyards and air-wells.

Since the conception underlying the creation of our environment has to change along with the evolving social and physical needs of a multi-racial Malaysian society, *identity has to respond to the mixed cultural styles, the local climate and locational characteristics* rather than by an over dogmatic approach *centered on one dominant ethnic*[45] *or prescribed national style* to avoid a boring homogenous result. In its function to project an image communicated through built form, identity comes from the three factors of (i) *symbolism*, (ii) response to *site* and (iii) *economic* constraints[46] Especially with commercial projects, buildings are constructed for their rental or resale value to optimize investment returns where the *economic factor seem to* **contradict** *the other two factors* in their contribution to identity.

2.4 TOPOGRAPHY: THE PROPOSED BASIS OF THE DESIRED IDENTITY

On the imageability of a cityform, the San Francisco Plan began by propounding that the "relationship of a building's size and shape to its visibility in the cityscape, to important natural features and to existing development determines whether it will have a pleasing or a disruptive effect on the image and character of the city." Jacobs noted that the best streets have noticeable changes in elevation; topography and slope help by increaing views and addding *drama*. San Francisco as an extreme example has "hilly streets that offer wonderful views which might even take one's mind from the reality that the street itself is less than it could be."

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[45] In terms of the need for identity, especially in contemporary cityforms constantly subject to rapid socio-economic and technological changes, Adami stressed that the purpose of having Identity is to allow a culture to grow by responding to stimuli and challenges from outside without losing its soul in the process. In "Criticism in Architecture," Peter Davey believed that in an age of pluralism, a plural expression of different cultures and identities within each culture, and also individual identity against the mass should be allowed. Frampton argues that the concept of a local or national culture is a paradoxical proposition because all cultures depended for their intrinsic development on a cross-fertilisation with other cultures. An escape into the past is also untenable given the scale of technological innovation and the expansion of the urban environment.

[46] Yeang, 1981. To be an effective enclosure, the form must be responsive to the behavioral patterns of use in terms of spatial, equipment and micro-climatic requirements of that activity and to the locational factors affecting that envelope.

Assuming that identity as defined here stems from an overall distinguishable physical form, we could consider the built form as man's contribution added onto the existing landform in the natural topography. Man's presence is most distinguishable from the natural landscape by the dense collection of tall buildings in the city center, by making the city more comprehensible by either effectively suppressing or reinforcing it. Urban form is most identifiable when its concentration[47] is further dramatized by the ever increasing building heights. Via human sensory perception, the human psyche has been conditioned to be intuitively impressed with size; his own in relation to that of nature. One way for man to assert his sense of insubordination to nature is to maximize his own visibility, if not prominence, by transitioning his relative scale through the largest buildings he created whose scale in turn could be closer to nature's.

Since the built form is man's largest physical creation, its most prominent parameter used to express his desire to elevate himself from being constrainted by *gravity* is surely building height. Unlike the *permanence* of a given landform, climate can be controlled though such climatic change is not visual nor as dramatic. Further, a sense of identity is preserved through familiarity that *continuity* supplies by retaining the best features of the area, including the natural vegetation.[48] The prevailing trend in construction starkly contradicts the traditional attitude towards natural topography. It has been proven expedient and cost-effective to bulldoze hills into terraced platforms for building on than to engineer individual buildings to sit on the hill. This domineering approach destroys all site vegetation[49] which provide shade and great temperature differences thus created discourage outdoor activity and pedestrian movement and cause soil failures.[50] Cities

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[47] Comparing the urban perpendicularity to the "channels of productivity of an expanding nation," Attoe was convinced that the "horizontal being linear and passive," could not adequately epitomize the *aggressive verticality* of man's massive additions to the landscape.

[48] Lewcock, 1986, p87.

[49] Choo, 1982. p28. The sandy soil of the Malay peninsula is weakened by the removal of the protective top layer of vegetation resulting in a series of landslides from failure of embankments such as the one near collapse involving the Prime Minister's own suburban home.

[50] New Straits Times, Malaysia, May15, 1994. The worst such tragedy was the recent total collapse of a hillside condominium tower block at Ulu Klang (the United Highland Condominium) which claimed a total of 53 lives and allegedly due to its toppling over by the sheer pressure of earth from the eroding upper slopes under land clearing for new development.

which do not respect the existing topography do not necessarily lack identity in their form but that is akin to unreasonably denying a given foundation[51] for accumulating the future city form. T*he topography-sensitive city begins with instant identity which is already endowed with uniqueness, and only remain to be reinforced through strategic placement of buildings.*

Identity is then a matter of achieving the crucial balance between distinguishing nature by highlighting the landform or conquering it by man-made structures squashing the land (fig 9). Philosophically, in a man-versus-nature line of thought, it is desirable for man to be in harmony whether or not he would be rewarded with environmental benefits. Physically or visually, the sum of built form enhancing nature would give a greater whole,[52] than for them to annul one another. In terms of scale, permanence and uniqueness, the most appropriate foundation for manmade forms to be identifiable must be the form of the land.

fig 9 Respect For The Land.

Maybank "added" several storys to its already tallest building height in the 80's by appropriating the height of the hill by its flared base to the extent of obliterating it.

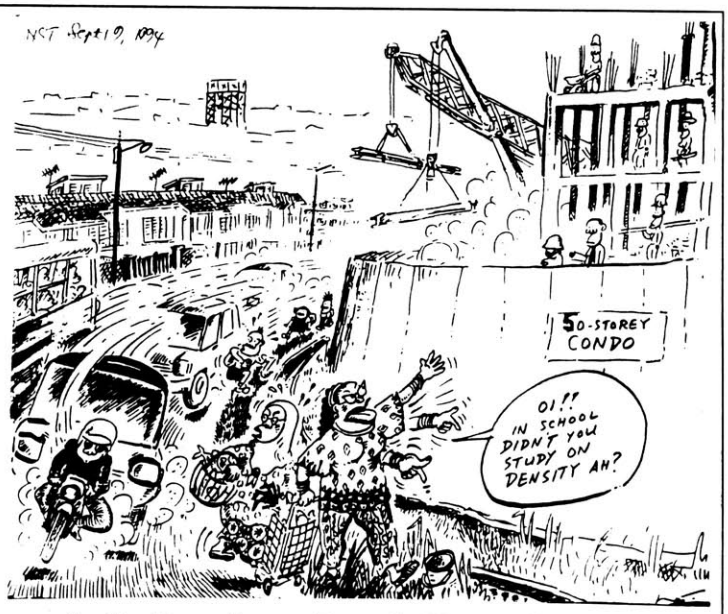

fig 9a Reacting to Drastic Urban Change.

A topical comment on the scale and impact of rapid change in the physical environment by a popular local cartonist.

[51] Hertzberger, 1964. p195. "City" is the integrity that results from the intense contouring of the ground's surface where our environment is created by chiselling out and stretching it like a fold in the ground. Because natural topography is intrinsic and atypical of any site, it provides the greatest opportunity to create identity where the first lead is given by the contours of the ground itself.

[52] Even a modest building on a hill gives it increased significance in many ways. A large tower on a mountain give them both as a whole a commanding presence.

Hence the best *Identity results from the enhancement of the topography of a site by the conscious placement of building volumes, expressed as sensitive streetscapes that are moulded by distinctive height variations visible in the city's skyline.*

2.41 Precedents Of The Use of Topography In Capital Cities

Vale traced the topographical and political origins of the word "Capitol," which connoted a citadel on a hill, to Rome's Capitoline Hill as the site where the senate occasionally convened. Capital cities are often created as *defensive* gestures where influential groups display their prestige by placing their buildings on high ground, to be literally above challenge or just to have the capitol dominate the city. Modern capitols have repeatedly retained the vestiges of the earlier notions of citadel where the capitol designate the *head* of the capital city.[53]

Before L'Enfant developed the gridded plaid and the diagonal avenues to connect the various nodes, he established these nodes upon which the monuments and squares would be constructed by first identifying them with the site's most prominent topographical features and viewpoints (fig 10).[54] Griffin's plan maximized the use of Canberra's topography by siting the main ceremonial axis of the city to align visually with distant mountain peaks and envisioned a cross-axis formed by water. Contained in a triangle set off by the water axis and the two grand converging diagonal avenues that bridge it were the most important government buildings intended to symbolize the center of the nation based on a grand triangle of functions.[55] New Delhi's grand linkages of institutions appear less convincing in three dimensional reality though clear and powerful in two dimensional plans. Whenever the landform has fewer prominent features, as in Washington, New Delhi,

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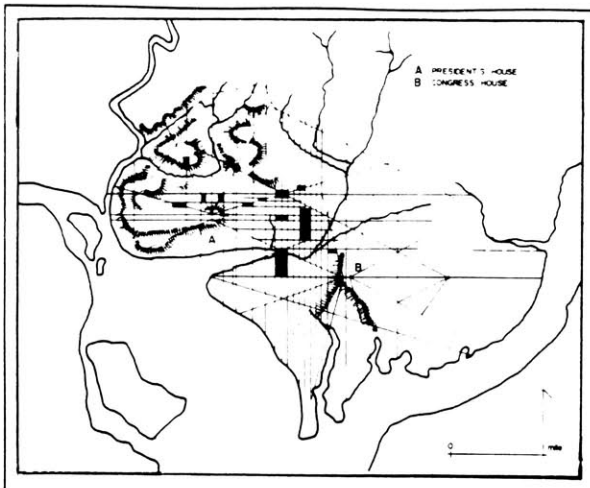
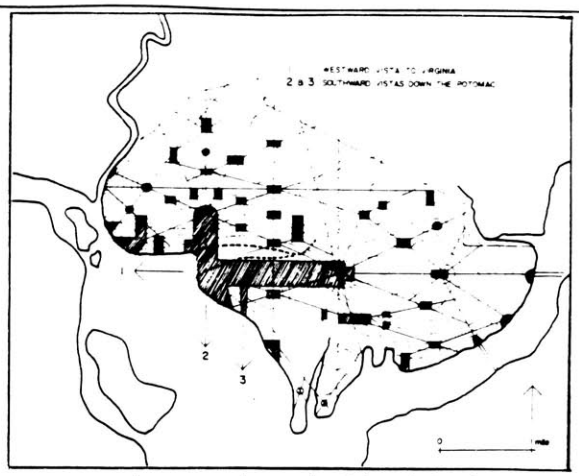
[53] Vale, 1992. p14.

[54] Peets: The Congress House appropriately attained the pre-eminent hill position and the White House the less prominent high ground to the west. Sensitive to the structure of the US Constitution, the executive departments are grouped around the White House away from the legislatives' hilltop precinct.

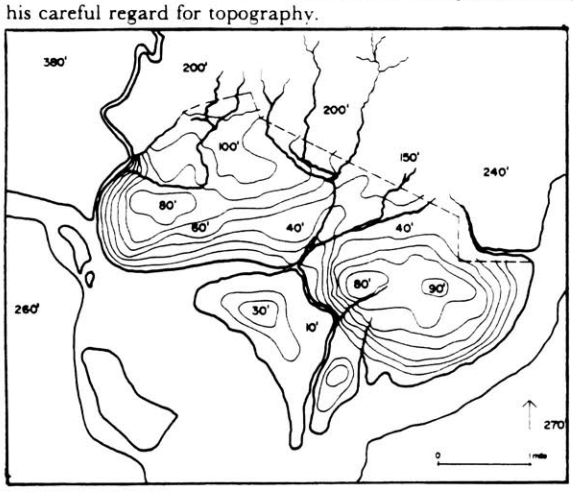
[55] Op cit, p67. The three nodes were Government Center, Market Center and Municipal Center. The manufacturing section was located to the northwest and public gardens and various civic institutions were placed north of the water water axis. Griffin reserved the prime symbolic location at the highest point on Capital for a public park and ceremonial area but placed the Parliament House atop the lower Capital Hill or the hilltop placement could appear too domineering for a democracy. However Fisher regrettted that it still "spoke an imperial design language even while democracy was intended."



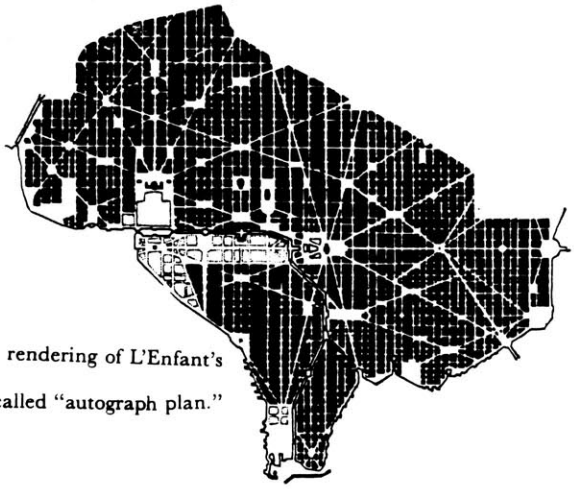
A rendition of L'Enfant's first draft plan, showing his careful regard for topography.



A comparative study of the relation between topography and the principal elements of L'Enfant's design—avenues, plazas, and major central axes.



Topography of Washington.



A rendering of L'Enfant's so-called "autograph plan."

fig 10 The Topographical Basis of L'Enfant's Conception of Washington DC. L'Enfant had assumed that the area east of Jenkins Hill would become the commercial center with the harbor on the Anacostia. He then placed the Capitol on Jenkins Hill facing the commercial center to the east and the park to the west. The Executive Mansion was placed on another hill to afford a fine view down another park to the Potomac. These two major buildings were connected with the grand Pennsylvania Avenue. From each of the two buildings, avenues would radiate at the same angle to the building's center lines as Pennsylvania Avenue is to the Capitol's center line. Other avenues were planned to take into account of other vistas, natural promontories and existing roads to other places. A rectilinear grid pattern of major streets was then superimposed. Finally parks and circles were placed at each avenue intersection where major buildings or monuments would form the focal points of long vistas.

Canberra and Chandigargh,[56] there is the need to exaggerate building heights to reaffirm the ancient association of height with power

By focussing highrise ministries on axial malls, more prominent ones uphill and more centrally, with the national assembly at its apex, Abuja is used by the ruling regime to consolidate power. The incorporation of a high density CBD reflects the usual mindset with a *head* symbolism of modernity to symbolize Nigeria's aspirations to unity and greatness. The association of topography with political power maintained the hierarchical separation between the ruler and subject. Instead of Abuja's mall flanked by highrise-megastrucutres, Dodoma abounds with low structures to respect the land and the people according to socialist principles. "Dodoma was to undulate and curve with the forms of the existing topography," besides rejecting man-made geometrical grid and radial forms. However its major buildings and the parliament are located well outside the pedestrian capital center so that even this most understated capital city still deliberately isolate the elite.[57] What are the other aspects of this identity?

2.5 THE IDENTITY OF SOME DESIGNED CAPITAL CITIES

The promotion of national identity (read *national unity*) is the professed rationale when using the construction of civic buildings and districts to serve as settings for binding individuals and events into a consolidated collective identity vital to the continuity or even legitimacy of a ruler's hold on to power. Notions of pride and hope are symbolized through meanings from buildings associated with ceremonies and events. Malaysia too had suffered from post independence racial strains so that exhortations for national unity in the name of equal opportunity is a major political slogan. The choice of a national symbol to demonstrate cultural uniqueness to project national uniformity reveals socio-economic

[56] Vale related that Mayer originally set Chandigarh's Capitol Complex against the backdrop of hills on a dramatic ridge north of the city, but Corbusier replaced it at an elevated level to the northeast of the city and used artificial topography to block views to lesser structures to the south, but not the north which opens to emphasise the view beyond to the dramatic landscape.

[57] Vale, p152.

tensions during the search for legitimacy. National identity is not advanced when determined unilaterally by a singular national culture for a plural society as determined by the leadership to promote its own legitimacy, since then personal cultural affinities are imposed onto the state.

The intentions of the designer and the politician-client cannot be apolitical since design is merely the process of decision-making involving the balancing of conflicting priorities within the context of the client's own political agenda.[58] According to Vale this follows from the decisions of choices to represent the (i) cultural diversity competing within the state, and (ii) political system of the country spatially in juxtaposing its institutions in relation to their visual importance where pluralism is often denied by stressing the dominance of the privileged group in a miniature of the state. Besides the goal of national identity, the other identity is in the eyes of the international audience. As visible symbols of economic development, probably resulting from effective leadership, Vale said that highly visible public works[59] are supposed to promote national pride by bringing *international recognition.* The aim for the identity to be noticed demands that the identity be publicly and internationally acknowledged as part of the desire to exercise world influence. The central symbolic buildings of government complexs are seldom placed within the general fabric of a capital city, "as if deserving a separate category of land use."[60] Vale concluded that if designers of capital cities persistently follow their intuitive ideal of

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[58] Vale, 1992. p49. "The symbolism of capitols is a product of (i) the subnational group allegiances and preferences of the sponsoring regime, (ii) the priorities of the designers's long term design agenda, and (iii) the government's interest in pursuing international identity through modern architecture and planning tied to issues of economic development. In other words, what is passed off as a quest for *national identity* is in reality a product of the search for subnational, personal, and suprational identity."

[59] In the case of Kuala Lumpur City Center (KLCC), the choice of Ceasar Pelli, an American architect with international standing, well served the apparent purpose of enhancing access to the world wide power of the American media.

[60] To illustrate the revelation of the "cultural balance of power" within a pluralist society where the physical environment is designed to serve politics, Vale wrote that "despite the use of modern architecture and urbanism to create a symbol for progress and national identity," Brasilia's and Chandigargh's plans still clearly affirms traditional *hierarchy* and *segregation* based on rank in relation to location of residence type. Instead of the ineffective monumental plazas in Brasilia and Chandigarh for public participation, Dodoma's government institutions are intermixed with civic and commercial activities to encourage public gathering in the capitol complex in its abhorrence of a monumental city and emphasis on non-hierarchical residential communities. But even in the professedly most egalitarian modern capital of Dodoma, the masses is again detached from the government center.

providing free access despite the consistent practice of the eventual users to limit public access, designers should consider gradations of accesibility from the outset. Due to the priviledged position of one ethnic group over others, the identity of KT inevitably ought to express the domination of this group but predominance should not be to the extent of complete denial of its plural social make up.

Capital cities often distinguish themselves also by having generous amounts of space. Unlike Washington and Canberra which envisioned streets lined with low buildings, Imperial Delhi's plan even ignored future increasing building densities or a greater range of urban functions "in concentrating on the creation of images of authority of the new state." Further there is the usual dilemma as in Chandigargh and Brasilia of the more prominent skyscraper housing the bureaucracy overwhelming the lower but more significant assembly buildings as in the United Nations Headquarters. Irrespective of how long democracy had been established, the tendency to focus power in a prominent place has so far found no alternative to communicate the "patterns of dominance and submisssion." John Reps wrote on Washington DC that, "It was a supreme irony that the plan forms originally conceived to magnify the glories of despotic kings and emperors came to to be applied as a national symbol of a country whose philosophical basis was so firmly rooted in democratic equality."[61] To depart from this traditional centrality but still effectively display power could be the next challenge in capital design.

2.6 THE DESIRED IDENTITY

The appropriate identity for a state capital city would need to show more control manifested as a higher sense of order rather than the lack of it, while at the same time adopt nature-inclusive forms that exhibit soft concerns like responses to topography and climate. The many intervening streams in Mount Austin are expected to impose considerable constraints in terms of costs required for bridges and earthworks if the conventional method of construction on level platforms is used. Therefore the approach is

[61] Reps, John W. *Monumental Washington, The Planning and Development of the Capital Center*, Princeton University Press, Princeton, 1967. p21.

to build with the land. For instance the two highest hillocks with panoramic views towards Johor Bahru City should be retained as scenic look-out points. Opening up of building masses and volumes will not only facilitate natural air movements, ensuring maximum cross-ventilation, but may serve to break the monotony of rows of free standing highrise towers. Besides appropriately orienting the basic street pattern, covered porticos in the middle or ground levels of large buildings create visual gateways to spaces or other buildings behind which might otherwise be blocked, and provide shelterd public space by creating microclimates through funnelling and directing wind to encourage air circulation at activity zones especially at the pedestrian level. KT will have a citywide verandahway system for continuity of a four-six-ten story streetwall and as a coherent transitional element to the higher storys. Height incentives could be given to encourage transparency including development across plots, to connect and respect neighboring buildings and share infrastructure and facilities to produce valuable economies.

Traditional sources may be less valid for the larger developments because, "when the scale is stretched from the smaller projects to highrise buildings (where it rings hollow), there are few traditional forms which can be adopted. As such the historical approach for highrise buildings is not applicable."[62] Nevertheless, Vale stated that, as a symbol, a capital city must have an "easily reproducible and memorable silhouette" where the capitol as the focus of great symbolic worth should be of deliberate choice. A mosque say, as the focus may explicitly accept the ascendance of a certain ethnic majority. However the central placement of the Sultan's Palace[63] or City Hall is more fitting as representative of the entire state. Topography will be the major though not the sole basis for identity. The preferred cityform will favor, but not be restricted to only, physical influences such as *landform* and *climate* over parochial and more controversial influences from ethnic or

[62] Tay, 1983. p48.

[63] In Malaysia's system of Constitutional Monarchy, the Sultans of each state making up the Conference of Rulers revolve amongst themselves once every five years to become the Agung, the National Head of State. Beyond its ceremonial function, this office commands great legitimacy as it is held in the highest regard by all Malaysians as the ultimate national symbol above partisan politics. It is no wonder that opposition politicians often cite the Agung as the sole effective ballast to check against the powers of the executive.

historical heritage in its criteria for assessing city identity while not forgetting the useful lessons that could be culled from case studies of foreign examples.

How possible is it to ensure that such a required identity could be achieved by just looking inwards only? If other cities[64] have gone through similar processes in the evolution of their respective cityforms, how could KT benefit from their experiences? The following case study cities differ by age and have had their present forms moulded over different paces of growth. Their characteristic density distributions associated with their respective street patterns (appendix I) would throw up suggestions for strategies to achieve a unique city form for KT city. Comparing amongst the cityforms of the case study cities could provide lessons on the volumetric configuration of their spatial distributions of floor space to reveal useful insights on the factors and mechanisms that have produced their sets of height characteristics. Specifically, they will be scrutinised on two aspects: their (i) street pattern, and (ii) skyline.

[64] In an opening speech during a Seminar on Identity in Jan 20, 1981, the Malaysian Prime Minister said, "Asian cities are 'fair copies' of Western cities." So instead of looking at the bad (local) imitations, studies of even the poor (Western) originals could be much more enlightening.

P A R T I I

CHAPTER 3
THE CASE STUDIES

CHAPTER 4
FACTORS THAT AFFECT BUILDING HEIGHTS

CHAPTER THREE

C A S E S T U D I E S

What then has influenced the choice of the following cities as case studies? The tallest building type, the skyscraper is an American invention and their cities have the most and the best tallest buildings. Because of their longest pedigree, they had imbibed the most comprehensive experiences to control the impact of building heights. These cities are of direct interest because of their maximum contrasts in building heights and uncommon concentrations (Fig 11) between the tallest buildings allowable by technology in New York and the lowest buildings dictated by political subservience in Washington DC. While Boston is acclaimed for its historic significance and urban design quality, particularly in height control, San Francisco is a contemporary city famous for its hillside quality and its pioneer city-wide Building Height Ordinance of 1971.

3.1 THE CASE STUDIES

3.11 BOSTON

Strongly shaped by its topography, Boston has grown from a colonial town in 1630 into a multifaceted city of distinctive urban pattern of pleasant streets and public spaces. As a cityform with a strong identity which is experiencing change[65] in its building heights from its historic lowrise skyline, Boston's formal qualities are of special pertinence to this thesis. Boston is a unique city because of the strong residential character of its neighborhoods partly due to their uniform building heights. Its Downtown Plan has ordinances that provide for planning by districts where the key elements include (i) district height limits based on historic standards, (ii) incentives to channel growth to areas that can best accomodate it, and (iii) protection for open space and conservation uses across the city. Boston's containment on a peninsula by the natural water masses - Boston Harbor, Fort Point Channel and the Charles River - has led to its compactness and vibrancy but

[65] Height prominence passed first from church buildings, to the State House with its golden dome, and now to the largest financial institutions downtown, signifying the sacred, the civic and the commercial.

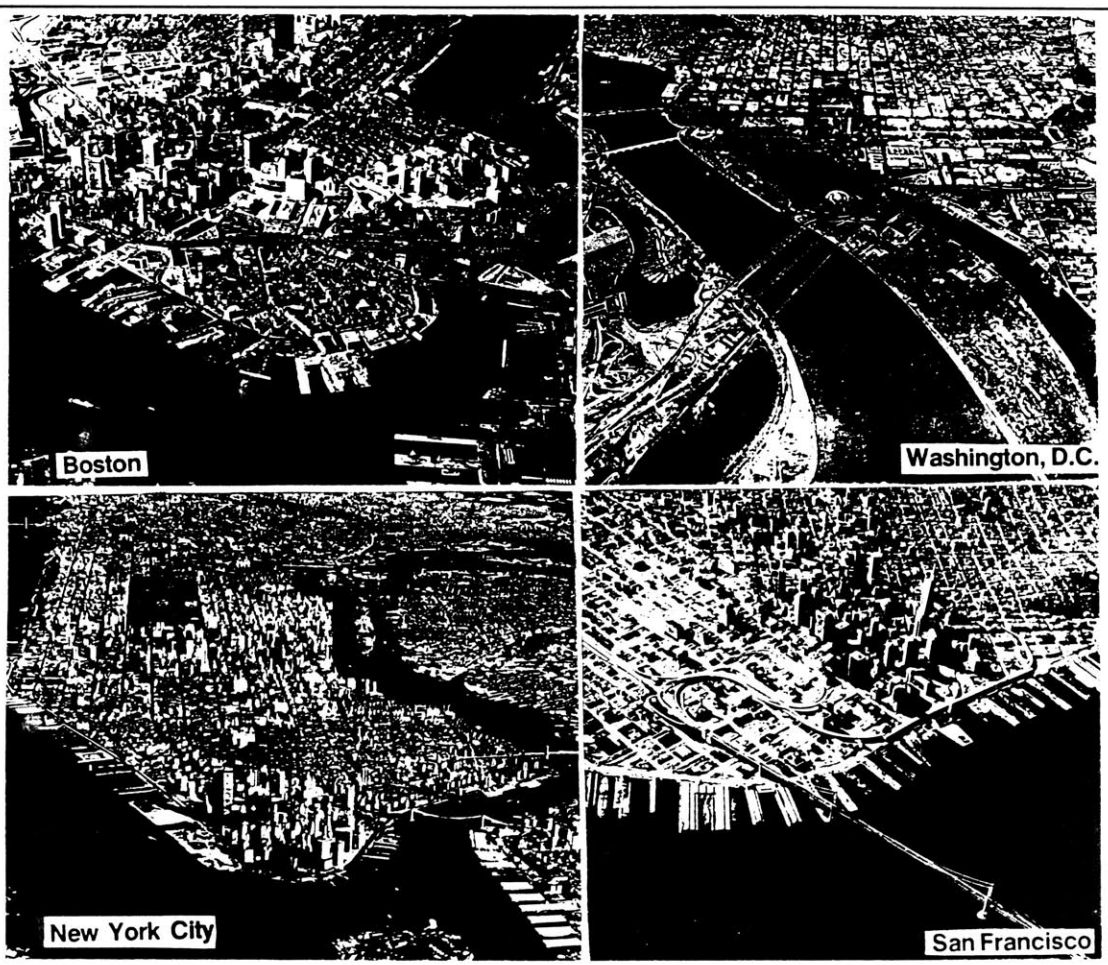

fig 11 Cities of Great Identities. Each of these case study cities have dealt substantially with building height concerns. They project distinguished identities associated with distinctive images, respectively the "City of Heritage," the "City of Federal Power," the "City of Private Enterprise," and the "City on the Gold Hill." Excepting Washington with the relatively small Potomac, is it any coincidence that as if to affirm the importance of topography, three of the four case studies selected for their most overt identities from among many American cities, all have large expanses of water around them?

also to the continual threat of overcrowding at its center being repeatedly countered by expanding into newly filled areas at its edges. In terms of its form and structure Boston is still endowed today with (i) a continuity with its historical heritage which serves as a general framework for projective decision making, (ii) a city size, density and intimacy at the human scale, (iii) a socially-knit community of characteristic neighborhoods and active local pride, and (iv) an imageable sense of place and *identity* of the city's parts as well as the whole. Boston's streets and squares reveal the city's *history* and *topography*. It is a city made accessible thereby enjoyable by its pedestrian-friendly public spaces. Capturing Boston's source of identity, Jane Kay said,

"Because it is compact and coherent, Boston is unlike the two models of American cities: NewYork is dense and urban but too oversized for its parts to cohere; Los Angeles is so automoble based, so lacking a center, that it is anti-urban. Bostons's livability stems from its form as a pedestrian place which is traverseable by foot in 30 minutes. Boston's uniqueness is largely the result of its intricate web of residential neighborhoods in close proximity to the commercial and business centers."

Boston's Civic Design Commission was established in 1986 to carry out public review of the design of significant projects and of district guidelines developed by the BRA[66] partly to ensure (i) new buildings respond to the height, scale and streetwall plane of existing buildings, (ii) tall buildings are on targetted sites to avoid adverse environmental impacts, and (iii) significant view corroidors are protected. Boston is also a city structured by its open spaces organised around the historic Boston Common; illustrating that a city's identity could also come from its open spaces rather than from buildings alone.[67] The key open spaces, main streets and monumental buildings combine to create a city's structure; the way buildings meet the street to form the public spaces create the distinctive urban fabric. Shun Kanda said,

"Although the tall buildings have gained some measure of superficial predominance, the Commons-Park Square still retains its importance as a major spatial landmark. In its overall form, Boston Common's location is logical and natural, a true crossroads of neighborhoods converging and public transit lines arriving from the suburbs. From its configuration on high ground and as the largest open sapce, city form is most imageable in the way civic open spaces relate to densely builtup areas by contrast."[68]

In terms of identity, the contribution from its clear height districts[69] in particular makes Boston unique. If the complaint was that the lack of light and air was detrimental to health in earlier times when transportation was dependent on the power of animals whose excrement smells accumulate when their ventilation was obstructed by buildings, the complaint today is that tall buildings accelerate winds at their base. Because the movement of fire trucks depended on street width, people imagined that tall buildings could visually

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[66] Boston Redevelopment Authority.

[67] In 1988 an open space zoning district and 9 open space subdistrict categories were created to protect existing open spaces from the pressures of development, maintain them for recreational purposes and protect the natural and scenic resources of the city.

[68] Similarly, New York's Central Park as if carved out from cliff-like skyscrapers edging it could well be the most interesting open space.

[69] Boston's earliest control on height limits was enacted in 1891, followed in 1896 by an act that limited the heights of buildings fronting on parkways, boulevards and parks to 70 feet. More detailed height regulations passed in 1904 and 1924, and stayed in place until 1965. In 1891 Boston became the first American city to restrict buildings in prohibiting buildings over 11 storys (125ft).

heighten the horrors of Boston's fire of 1872 and also the impossibility of timely evacuation which is exacerbated especially by Boston's crooked and narrow streets then. Before effective fireproofing technology was available, ten storys (100ft) seemed the limit as dictated by the reach of fire hoses. Fire underwriters also campaigned for a nation wide 125ft limit. The aesthetic reactions to the early skyscrapers were rooted in the culture at the end of the last century. Boston's own Back Bay realised the American urban ideal modelled on the delicately nostalgic Victorian skylines and the horizontal monumentalilty of London's residential squares and Parisian boulevards that culminated in the influential Columbian Exposition. Viewed as an even mass of buildings from which the domes of institutions and spires of churches protruded, the traditional skyline was indeed "sacred," relative to which, the taller buildings of that time looked bulky.

Unlike the markets in Chicago and New York City, Boston had no office boom. Boston's first tall buildings did not obtain good rentals on their investments. The old families who controlled three-quarters of Boston's real estate considered them first as land rather than as buildings, seeing risks to be greater where land improvements were worth more than the land. Their conservatism, skepticism to new technology such as the steel frame, lack of entrepreneurial spirit, aversion to new competition and the general weak market demand compounded the effect from a glut in newly reclaimed land in the Back Bay, South Cove and South Boston. Height restriction which spread commercial development fitted into Boston's established policy of decentralisation. When skyscaper proponents argued that height restrictions could discourage costly fireproofing, opponents argued that height limits prevent the destruction of more older buildings by spreading out new development.

After the height limit passed in 1891, William Minot, a member of the building commission who was the largest landowner in Boston, returned from a study tour of Europe's building laws to influence the commission to not only retained the 125ft limit but also further restrict heights on narrower streets. The appearance of the 11story Haddon Hall spurred a further round of height restriction because the 125 ft height limit, deemed appropriate for downtown, was not acceptable in a residential neighborhood with houses

less than half that height. Along the edges of parks the 1896 Parks and Parkways Act defined 70ft height districts. The imposition of such limits on Commonwealth Avenue forced apartment developments over to nearby Copley Square. In 1898 a 100ft limit was imposed on the square's north side and 90ft on the other three sides A 70ft limit was imposed west of State House in response to tall apartments in Beacon Hill in 1899. However a few years after the Westminster case, most of the city upheld the 'A' downtown district of 125ft and the 'B' district of 80ft (100 ft on very wide streets), until the establishment of comprehensive zoning.

Even though it was actually 5ft below the allowable 125ft limit[70], it was the Westminster Chambers Hotel which brought height restrictions to Copley Square[71] and became the first case on height restriction, directed at a particular building, that was pursued right up to the US Supreme Court. The proposed 12 story hotel was proposed for the site between the Museum of fine Arts and the nationally famous Trinity Church. The owners were prepared to build only to 7 stories but they want to sell the extra rights to the Trintiy Church. Viewing these buildings as objects of great urban pride and monuments of aesthetic taste whose beauty could soon be greatly impaired, a committee for protecting the Square was formed consisting of influential trustees from the Museum[72], the Public Library, and MIT.

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[70] Based on 2.5 times the width of the widest street there.

[71] It is located at the junction of two grids which had been laid out on reclaimed land in the 19th century; composed of the Back Bay and the South End, with the Copley Square area nearer the middle of Back Bay. Land values were higher in the Back Bay towards the public gardens, Commonwealth Avenue and the Charles River, but decreased from these points. Copley Square was distant from these highly valued areas. The sequential process of fill and build within the Back Bay and the South End areas in a westerly direction created an environment where within any block there were buildings of similar age and character except where the grids met at the Copley site which thus have a more complex architectural environment than within the grids itself. The initial phase included only public structures around a triangular vacant land parcel. Because this land has the lowest value, the Museum of Fine Arts was primarily conceived to improve it. With the completion of the Old South Church, the Chauncy High School and apartment hotels on the north side, the Trinity Church and the Museum of Fine Arts on the south side, and the Public Library on the east side, the enclosed urban space became an important architectural fashion center of the city and the value of this land rose rapidly. The area was also situated at the most aristocratic part of Back Bay besides being conveniently near the railroad station and electric car service. The commercial desirability of this location at the confluence of three major thoroughfares obviously overrides mere aesthetic sentiment.

[72] The Museum's complaint alleged that the Hotel would interfere with the light necessary for its exhibition rooms on the side of the Museum directly opposite to it. Opponents claimed that private owners

Although there was no evidence that the Square has been established as a public park which would then impose the 70ft limit along park edges, Westminster was already profitable at the 70ft limit enough for it to make a 400% profit. The 90ft limit was imposed on it after the developers amendment to 96ft was rejected. On the north side at Boylston Street, a 100ft limit was thought adequate to ensure light and air for public parks. The final result on the developer's appeal to the US Supreme Court was that the city had to expend $350,000 to compensate the developer's removal of the ornamental frieze.[73] Nevertheless the present occupant of the same site is 700ft taller, Boston's present tallest building, the John Hancock Tower. Though it shades and deflects wind into the Square, the Hancock Tower illustrates the point, "when it comes to the exploitation of political leverage, nothing's sacred."[74]

A *new aesthetic* soon emerged from the unexpected mass in the skylines of cities which allowed skyscrapers to challenged the ideal of the low orderly city. When previously it was important to have individual public buildings to project above a flat skyline, the skyscraper skylines now concern the sculpturing of slender free standing towers of wildly contrasting heights instead of low uniform facades. The extraordinary concentrations of tall buildings in New York City render the flat limits for low heights meaningless.[75] A new sophisticated regulation was needed which could accomodate maximum development so long as congestion and the lack of light could be addressed by settting back the upper floors.[76]

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owed a duty to those who have invested large sums of money in making Copley Square ornamental or else they would be ignoring the rights of society. Westminster would be profitting from value given to its location through enormous public expenditure in the form of books, statuary, manuscripts, paintings, donations and gifts of land. More than half the land was devoted to religious, educational and charitable public uses including the Natural History Building and the Normal Art School.

[73] The creation of a statute imposing height restrictions on the Square as a result of widespread opposition was secondary to the fact that the legal battle went on to the US Supreme Court which affirmed the constitutionality of zoning against building height.

[74] Levy, 1985. p127.

[75] When real estate demand rose in Boston to build to the limit, developers increasingly argued to put Boston on the same basis as other cities. Also "**circumventions**" began to appear such as the redrawing of the street line at State Street, redefining street widths and the construction of the 30story obelisk on top of the Custom House (as federal property it was exempted from city regulations).

[76] As a matter of "unconcious" policy, the absolute nature of Boston's land values was the product of 37 years of regulation which only ended in 1928. The 125ft limit created its own self interest in all owners whose land already has 11 storeys. A strong case of what influence could political power be brought to bear on raising building height limits was William McDonald's formation in 1927 of the New England

Previoulsy developers who own more than one acre of land anywhere within the downtown could build as high as 600ft to 800ft. Such developments are now limited to a 12 block area in the Financial District, and no building could be higher than 400 feet. In the case of Harbor Park, one of the main purposes of regulating[77] building height and massing is that structures do create high or dense walls along the *waterfront* that block sea breezes and airflows, or that obstruct views and access to the waterfront. Pei's Harbor Towers had often being cited as a major blemish at India Wharves for this reason. Joe Breiteneicher said, "Boston is a city to scale; its *humane*, it's a city of access to the sky, which meands this is not a city of 60-100 story towers but a city of 20-30 story towers punctuated occasionally by something taller and respects the pedestrian. It's a city that honors density in the right places." As we shall see this was in part due to the success in the prediction of the highrise spine to redirect growth from the traditional business district.

3.12 WASHINGTON DC

For the Capital to belong to all the people,[78] the Congress required that the capital be located on a navigable river far enough inland for protection. To convince Washington and Jefferson for it to embrace a larger part of the district than the original area along the Potomac so that pulic buildings could be constructed in the Tiber Creek valley and the Capitol on Jenkins Hill, L'Enfant said, "(Jenkins Hill was) a pedestal waiting for a

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Building Incorporated which was deliberately filled with regional business and civic leaders to propose the "world's largest building" at Park Square to demand for a 360ft skyscraper. The city consented because there would be no change in leasable floor area but instead focus on aesthetics to require the building be set back one foot for every two feet rise starting at the part above 125ft. However the present crop of skyscrapers were mostly built as late as the 1960s.

[77] The major provisions include, (i) 15 subdistricts with height standards from 49-70 ft and in major portions having a standard of 55ft, and (ii) no structures (except for maritime-dependent industrial purposes) could be erected within 35 feet of the waters's edge or seaward end of a pier (or within 212feet of any other edge of a pier). In developing Harborwalk with a continuous 8mi public walkway along the water's edge connecting 44 ac of open space, where ther unifying principle is public access, Boston continues its tradition of its Parks System from the 19th century Emerald Necklace, to the 20th century Charles River Esplanade, and to the 21st century Central Artery Plan. Open Space accounts for 3600ac or 11.2% of the total land area of Boston. In areas zoned as open space, such as air-transit corridors, at least 50% of any development must be devoted to parkland.

[78] The concept of a Federal City was born amid the struggles of revolution and grew as the American States formed their new government. The Continental Congresses which represented 13 separate colonies had to establish a single meeting place instead of 9 capitals. Delgates to the Constitutional Convention Charter of 1787 also realized that the government needed a permanent location removed from the sovereignty of any state.

monument."[79] L'Enfant was determined to create the national capital primarily as a seat of government rather than as a commercial center. It was the first national capital in history ever established by law (Residence Act 1790) and comprehensively designed.

L'Enfant's original concept based on topogaphical conditions[80] and logical site planning of symmetrical monuments on reclaimed land included a memorial to George Washington at the intersection of the President's or White House and Capitol axes,[81] lines drawn west from the Capitol and South from the White House. The Mall linking them was to provide an uninterrupted view westward from the Capitol to the Potomac and likewise the park for the President's House looking south. Besides providing direct access by connecting major building sites and giving unusual character and distinction to the plan by relieving the regularity of its rectilinearity, the diagonals[82] afforded "reciprocity of sight." There was also the unique differentiation in street widths: grand avenues (160ft), important thoroughfares (130ft), and other streets (110ft or 90ft).[83] L'Enfant refused to accept the authority of the early commissioners appointed by the President to direct and implement Washington's plans. The commissioners anticipated the early sale of lots as a means of financing the Capital; but L'Enfant refused to cooperate, fearing that his grand design

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[79] The National Archives and Records Service, 1981.

[80] Bartholomew, p12: "...a magnifient concept skillfully arranged, with the finest possible adjustment to the contour of the land and the huge scale of the site."

[81] Today the Capitol, Lincoln Memorial, the White House and the Jefferson Memorial are linked with the Washington Monument which serves as the pivotal point that punctuate the cross-axes in the composition of central Washington DC. To restore the visual alignment between the Washington Monument and the Capitol, the McMillan (Chairman of the Senate who ordered the development of the entire park system of the District of Colombia after the removal of the seat of government to Washington) Plan of 1902 called for reconstructing the axis between the two structures, thereby creating a new Potomac River shoreline from the reclaimed marshes extending to the monument's base. On the tip of the projected axis it proposed locating the Lincoln Memorial complemented by a riverside drive and a bridge spanning the Potomac to Arlington.

[82] The two focal points, the Capitol and the White House, were linked by a formal mall comprising parks, monuments, museums, and canals which were united by broad, diagonal intersecting avenues suggested parly by existing roads notably that from Georgetown to the ferry, what is now Massachusetts Avenue. Directly interconnecting public buildings lining the avenues, such as a National Cathedral, a university, theatres, and markets and providing pleasant vistas from every angle, a series of radial boulevards were superimposed over the basic grid system and supplemented by circles.

[83]The Act of March 1, 1899 prohibited uses as residence or hotel of non-fireproofed buildings exceeding 5 storys or 60 ft in height as compared to 75ft for business buildings, though buildings exceeding 75ft merely had to be fireproofed. However, the maximum heights along streets according to use were 90ft for residential, and 110ft for business (130ft for business streets 160ft wide) which can only be exceeded by spires or penthouses.

would probably be altered by land speculation. Most likely L'Enfant must have feared the commissioners' removal of most of his diagonal streets because they indeed produced many odd triangular or trapezoidal shaped lots which are much less suitable for conventional development than the usual straigtforward rectilinear grid pattern. So the involvement of politicians in building height control[84] began even before the capital city was laid out. Since then the preeminence of the Dome of the Capitol has dominated the height of both public and private buildings.

Zoning decisions help determine densities and building heights, the two factors of great significance in the design of the Federal City. If Congress did not impose height restrictions and if the zoning bodies did not use their authority to protect the city's role as the Federal City, the construction of highrise apartments and office buildings could drastically change the traditionally low-skyline of Washinton. Zoning also restricts the form of private development thereby establishing the image of Washingron as the National Capital. Through inaction, the Planning Commission affirmed the continuation of the low skyline as a dominant planning element.[85] In the District, the city's dual roles as the

[84] Building height control was probably the earliest tool imposed on American buildings. Only until the new zoning code of 1958 did density controls such as FARs and plot coverage appeared. Washington himself was keen to preserve a uniform building height on Pennsylvania Avenue, but his initial proposal to provide a minmum height of three storys on all buildings facing that street was not enforced. The 1910 Congress act limited the buildings fronting or abutting Union Station Plaza to 80ft. In 1920, Washington became the third American city (New York City was the first in 1916, followed by St.Louis in 1918) to adopt a zoning plan which reinforced the 1910 heights of buildings regualtions, apart from limiting apartment and row houses construction in the northwest area to stimulate new growth to the northeast. Passed to protect the borders of strategic open spaces like prominent plazas and parks, the Shipstead-Luce Act of 1930 imposed on the Commission of Fine Arts the duty to advise the Commissioners of the District of Columbia on the heights of private buildings facing public buildings and parks in areas between the Capitol and the Potomac. In 1938, the Act of Congress excempted Federal buildings from Zoning regulations but their building heights, number of storys, size and open space needed approval of the National Capital Planning Commission.

[85] Ostensibly to encourage large scale residential, institutional or commercial developments, and a variety of building types, Article 75 of the Height Regulations in fact imposes a rigorous set of reviews regarding open spaces, height, bulk and densites. Noticing some high but dull blank walls, Row, a Chairman of the Planning Commission, initiated a study of city's skyline to review the 1910 law prohibiting buildings above 130ft. However this was abandoned when some areas around certain monuments begin to be surrounded by tall apartments. While one consultant warned against major changes in height limits, another consultant Chloethiel Smith suggested clusters of skyscrapers in certain areas of the city to provide dramatic entrances to Washington and to increase city accomodations.

"Federal City" and the "Commercial center and Residential community" often comes into conflict.

The 1985 Comprehensive Plan was sharply criticised by outgoing Commissioners themselves, saying it failed to deal with the critical issues of housing, densities, unemployment and poverty.[86] Critics challenged the demand for low densities, and cited the restriction of building height as a major block on the improvemnt of living standards of the District's low-income residents. Many planners disagree with the idea of highrise public housing contending that they would only aggravate housing problems.[87]

Most emblematic of the strong feeling special views generate and the controversy that resulting protective legislation can generate is a dispute over high-rise buildings in suburbs around Washington DC and their alleged impact on the Capitol and other nearby national monuments. Duerksen related the case of the 52-storys Port America Building in Prince George's County, Maryland. Designed by Johnson and Burgee, the project had the strong backing of the local government, which foresaw this massive development as putting their county on the map. Against the development were a group of preservation organizations and federal agencies, such as the National Park Service, which fear that this massive building will not only intrude on the low-rise skyline of the capital, but set a precedent for a ring of gigantic structures around Washington DC. Some Congress members have reacted in rage, introducing legislation that would levy a tax of US$1 million on every foot of building that exceeds a height limit of 140 feet. To Paul Goldberger, the main issue is the symbolism from the combined physical order of L'Enfant's layout with the symbolic

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[86] L'Enfant's plan established Washington as a capital with monumental features; the McMillan Commission further developed this view in line with the "city beautiful" planning movement and had proposed that Washington be treated specifically as a "work of art." Generally the American planning profession also supported this traditional approach through primary concern with the physical features of the urban area, oriented toward toward the placement of public buildings, monuments and parks.

[87] Harman, 1962. p61. The 1964 draft of the 1985 Plan called for massive rehabilitation over 25 years by cutting 20% of the low-income housing stock while increasing the moderate-income housing stock by 5% and the high-income housing by 8%. The planners had called for a reversal of the trend of the District becoming a predominantly low-income Negro City. However the Research Division contented that there was a critical shortage of affordable housing in the District for low-income families and held that the plan should view housing problems as a basic limitation.

order of public buildings presiding over all other structures that made Washington DC America's most ordered city for two centuries since it was laid out.

> "Because commerce in Washington lies low, the *skyline* of the city and the region preserve the illusion that it is the *public's* business, and not the private sector's that is the most important and powerful. That crucial illusion will be shattered if Port America's tower is built when, Washington will be admitting that it is just *like every other American city.* The skyscraper may well be the proud symbol of American commercial architecture, but Washington was not conceived as a commercial city." [88]

3.13 NEW YORK CITY

Comparing America's two largest cities, vertical New York and horizontal LA, representing their extremes in density, Daniel Burstein[89] might well be describing cities in two different countries,

> "The New York skyline is the most cohesive, memorable and aesthetically appealing in the world. Despite a "clump" of buildings erected in downtown in recent years, Los Angeles still does not have a skyline. New York is ideas, LA is trends. LA speaks to the world through Hollywood, New York through Wall Street. LA is light, low and expansive; New York is dark, high, and claustrophobic."

New York's 1916 zoning provisions was the nation's first to regulate the height and bulk[90] of commercial buildings. Their enactment itself was propelled by two political reasons. First, at the turn of the century the advertising value of holding title to New York's tallest building fueled increasing competition among developers for height preeminence. Second, garment manufacturers wished to locate close to the garment retail market in Midtown to reduce transportation costs and make transactions with the stores' management convenient. Dissatisfied with traffic congestion from garment trucks and factory workers and the negative effects from crowds of these workers on their retail

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[88] Paul Goldberger. The New York Times, August 12, 1986.

[89] Conde Nast Traveler, April 1990, Conde Nast Publications, NewYork, p154.

[90] The bulk regulations of 1916 which produced the stepped "wedding cake" buildings gave way to three new sets of rules. The first rule increased light and air to streets by enveloping the building within a sky exposure plane, lower the streetwall height to 86ft (or 6 storys), setting back initially 20 feet for narrow streets and 15ft for wide streets, and subsequent rise fixed at a ratio of vertical distace to horizontal setback which created multiple stepping. The second rule allowed greater heights for street level setback to mitigate the canyon effect by providing open space of 15 ft^2 for narrow streets and 10 ft^2 for wide streets. The third rule increased tower coverage to 40% (50% for smallest lots, 55% when bounded by two streets).

business and prestige value of the Fifth Avenue location, the Fifth Avenue Association began to agitate for height controls of 125 feet for all buildings in the Fifth Avenue district so as to make construction of loft factories there economically unfeasible.

The 1916 Zoning Ordinance specified three use districts: (i) Use Districts (residence, business and industrial uses), (ii) Height Districts (based on the Sky Angle to ensure light and air), and (iii) Area Districts (regulating yards and open spaces). Variance power was allocated to the Board of Standards and Appeals and rezoning and text change authority to the Board of Estimate. Office districts only require setbacks from the street line after a maximum streetwall height to the street-width of 2.5 times in Lower Manhattan and 2 times in Mid-Manhattan which has wider streets.[91] This means that with a 100ft street, a building could reach 25 stories (250ft) before requiring any setback. While the maximum lot coverage is 90%, a building's height is unlimited if it covers at most 25% because "thinner shadows would move faster." However the 25% coverage would require assembling enormous lots to build towers of economic floor size.

The 1916 Ordinance was replaced by the *1961 Ordinance* which combined permitted uses under R(residential), C(commercial), and M(manufacturing), bulk and density requirements (directly limiting floor area on any specific plot by FAR), and parking regulations into one unified zoning map. Conceived to circumvent the "uniform and non-arbitrary" zoning requirement by declaring that certain areas with unique circumstances need special zoning, the *Special District bonus* created 1.7 million ft^2 of floor space from waived height and setback regulations. Out of 17 such Special Districts, the effective 4 are for (i)Theatres[92] (because new theatres are viewed as unprofitable and old ones were threatened by office redevelopment), (ii) Lincoln Square (for mandatory amenities to entire area), (iii) Greenwich Street[93] (for mandatory and optional amenities[94] for entire

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[91] Again like Boston, Mid-Manhattan was targetted to absorb growth pressures from Lower Manhattan.

[92] Set at maximum 20% above the maximum 20% bonused FAR (eg overall 44% increase above initial 15FAR from 15 to 21.6FAR)

[93] Improvements in pedestrian circulation and retail use reservation, increased from 10 to 18FAR.

[94] These amenities included subway passageways, elevated plazas, through block arcades and an open air concourse.

area), and (iv)Fifth Avenue[95] (to be maintained as showcase for national retail shopping). *Special Permit* powers were added to enhance the flexibility of the Planning Commission's bargaining position with developers to increase tower coverage, and gave height and setback waives instead of increased FARs for lots of at least 40,000square feet. To encourage specific planning and design objectives, *Incentive Rezonings* are permitted to (i) stimulate development of an area (eg rationalise an irregular site at a strategic location, or rezone a larger area to avoid spot zoning), and (ii) include specific provisions for a desired amenity (eg. a school by bulk rezoning). Lastly, *Incentive Variances* could grant bonus office space under economic hardship or unusual circumstances such as practical difficulty.

The highest basic FARs in New York are 10 and 15 which are predominantly in the CBD. Although the FAR is the only mechanism to balance the intensity of office development with the City's infrastructure capacity, its derivation was "*pragmatic* and *intuitive*."[96] With only one 15FAR district, the Voorhees report proposed to exceed this maximum by 3 ft^2 bonus floor area per square foot of arcade or plaza on site. But these were actually increased to five 15FAR districts, plaza bonus to 10 ft^2 and the total bonus of 20% over basic floor area set at an 18FAR ceiling. The **permissive use of FAR** to stimulate intensive development in New York City was further propelled by overuse of bonuses through Incentive Zonings[97] including Special District, Special Permit, Incentive rezoning, and Incentive Variances. In exerting such power over CBD land values, FARs, height and setback rules have been coopted by the Planning Commission as its bargaining chip. Because most developers[98] used up the maximum 20% FAR for "as of right" *Plaza and Arcade bonus*, the average FAR increased enormously to 18 in the 15FAR districts, and 12 in the 10FAR districts.

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[95] Kayden. To encourage mix-use, requires minimum 1FAR of retail use (bonus residential if more), restricts to a maximum 10% banks and travel agency use.

[96] Ibid, 1978, p6.

[97] Incentive zoning can be defined as a manipulation of regulatory powers in the zoning ordinance to provide economic benefits, as a bonus in the form some waive of intensity control, for a developer who in return provides a public amenity. Private, instead of public capital is supposedly mobilized to create public benefits that otherwise would not exist.

[98] Ibid, 1978. p10: In 1963-1975, 70% of all offices incorporated a plaza in return for total of 8 million square feet of bonus floor area with 80% of all offices using some form of bonus.

"Incentive Zoning clearly contributed to the overbuilding boom that gathered speed and crashed into high vacancy rates and tumbling rental revenue in the early 70s. Not able to absorb the extra floor area, it led to a nine-year slump for the real estate industry... the bust part of the cycle resulted in lowered assessments that shrank New Yorks's commercial building tax base. The eventual occupation of the vacant space probably never make up the annual lost revenues for the City's coffers."[99]

Ostensibly, the plazas and arcades could more than offset the increase in congestion due to the bonused space to justify exceeding the established 15FARs.[100] In the long run, the developer will retrieve his extra capital spent on providing the amenity by increasing revenue from his bonused property, leading to the net effect that the amenity cost actually falls on the buyers or leasees of the property while the developer is left with a net windfall on top of already enhanced profits. But would not the public at large, and in turn the city itself, be actually on the losing end when the bonus is supposed to provide the amenity "without cost to the city?"

3.14 SAN FRANCISCO

"The visual appeal of San Francisco is based on its topography (its hills and ridges and their relationship to the ocean and the bay) and on the scale of existing development of a light-toned texture of separate shapes blended and articulated over the city's topography." (1971Comprehensive Plan).

The Plan's main objective was to use building heights to complement landform to create and maintain (i) an *urban form* for downtown that enhances San Francisco as "one of the world's most visually attractive cities"[101] by highlighting *topography* as an asset to

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[99]Kayden, p69: For 1973/4, the City lost $8.5 million in tax revenues from its incentive zoning policy, while bonus developers received a net subsidy of $182,4 million.

[100]On one hand, if the zoned FARs could be easily exceeded, then the credibility of the original intensities must be questionable or need not be respected. On the other hand, by allowing the developers to reach the "as of right" 18FAR through bonuses, the ordinance was recognizing the *political reality* that the real estate community would certainly reject the actual 15FAR. The plaza requirement was apparently added to obtain inexpensive public amenities by deliberately underzoning by 3 FAR. Although the incentive bargain seemed acceptable, the community may also have enough political clout to veto an outright 18FAR.

[101] San Francisco Downtown Plan: Regarding its second objective of pedestrian comfort, two policies promote forms that (i) maximize sun access, and (ii) minimize the creation of surface winds near the base of buildings. The first policy limits building heights, shapes and orientates them to avoid shadows and blocking of sunlight to public spaces. It's second policy discourages wide buildings with uniform facades which intercept the most wind. For the third objective on streetscapes, its three policies are (i) to maintain the traditional street-building relationship (to encourage building up to full frontage and height for street definition); (ii) streetwalls by setbacks above a building base (sets back intruding new taller buildings above the streetwall height from smaller older ones); and (iii) enhance the traditional projecting cornices

be seized upon to emphasize its primary objective of achieving an "attractive urban form." Tall buildings were not considered as necessary evils, but are beneficial to the city's image if they are consciously managed.

> "As soaring towers, in an otherwise light colored, low-rise city, tall buildings are a necessary and expressive form for much of the city's development as evidence of the city's economic strength. Tall buildings make economic use of land, offer fine views to their occupants, and permit efficient deployment of public services. If properly placed, tall buildings enhance the topographic form and existing skyline of the city."[102]

In response to public concern over the drastic change[103] which conflict with the civic objectives between fostering a vital economy versus retaining its urban patterns, the principal features of its "Downtown Plan" were to (i) reduce the overall allowable density through lowered base FARs; (ii) redirect downtown office expansion south of Market Street; (iii) require smaller, thinner, and more finely detailed buildings;[104] and new bulk controls that taper buildings at the upper levels (to give more expressive, sculptured building tops); (iv) create a new open space program;[105] and (v) preserving sunlight access to sidewalks, selected streets and open spaces.[106]

For the urban form objective, the Plan adopted four policies, namely that (i) building heights are related to the city pattern and character of existing and proposed development; (ii) buildings be less overpowering by sculpturing their tops; (iii) building towers have interesting terminations; and (iv) buildings be separated to preserve light and air. The first policy require downtown height controls to be consciously structured and varied to create specific areas which *simulate the natural hills* that characterize San Francisco. This means that the major group of tall buildings in the city (the downtown financial core) should

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on smaller buildings and belt courses on taller buildings (presumes that projections effectively terminate shorter buildings or define the base of tall buildings by interrupting the eye's movement up the facade from their bases).

[102] San Francisco Plan, p79.

[103] Very intense development pressures during the 60s and 70s had allowed a tough regulatory stance. San Francisco's height and bulk ordinance controls were also legislated in response to tall structures built on the edge of the existing downtown, particularly the Bank of America Tower and the TransAmerica Pyramid because their location at the edge of the financial district was seen as inappropriate.

[104] By lowering the maximum permitted heights in C3 districts.

[105] Requiring open space to be provided for new developments in proportion to the size of the building.

[106] By adopting height limits and solar access standards to assure direct sunlight during the critical times of the day.

taper down to the shoreline of the Bay and be kept separate from other less intense activity areas in surrounding low rise development. Also, other highrise nodes should be kept away from the base or sides of hills as far as possible, or should be restrained from further intrusion onto hillsides. The second policy assumes that buildings' bulkiness could be offset by modifying their silhouette by making their more visible upper portion increasingly slender and delicate with height. The third policy is intended to recall the "complex visual imagery of the surrounding hillsides and the complex architectural qualities of older San Francisco buildings" by discouraging the austere look of truncated flat topped box buildings. The fourth policy requires the provision of setbacks particularly on narrower streets to assure adequate separation between towers based on the need to respect existing and potential neighboring towers.

3.2 LESSONS FROM THE CASE STUDIES

3.21 Based on historic cornice lines, the height limits in **Boston** will help to preserve the predominant architectutral scale that gives quality to Boston's urban environment. The height limits help redirect growth to unoccupied or underutilized areas of downtown and to outlying neighborhodods that would benefit from development. This will, protect existing low scale residential areas and will encourage rehabilitation and infill development in historic commercial districts. Among the major zoning concepts in the neigthborhoods are height standards to send a clear signal to developers and the community on the growth and density that can be accomodated in an area and also serve to direct growth to sites of greater capacity and protect existing scale and character. Boston's downtown cap on heights for pushing development outside of downtown into the Southwest Corridor and South Boston is a good strategy, partly to link density with transportation nodes. This help explain why the "sickle-shaped" highrise spine of highrise above 200ft is not accidentally derived. Kobaysashi stressed that *building height control is effective for managing growth.*

> "The strategy the BRA took toward managing growth seemed to be conservative in the late 80s. Given the economic recession that has come about, however, the policy was wise. The BRA's strict controls on building heights and the provision of office space in the downtown area saved the city's office market from a crisis."

The Boston skyline has been dominated by the flat topped towers in the financial core until the strategy of spreading growth located another secondary highrise commercial cluster down south to the Prudential area. Boston's present skyline is unusually attractive even without relying on the usual singular spot concentration of density because the tallest buildings, the squarish Prudential Tower and the trapezoidal Hancock Tower are well spaced out to counter balance the dominant financial core to produce a predominantly low skyline but with pleasant vertical accents in the right places. However, the lack of transitions at the latter's base is not sensitive to *pedestrian scale*.[107] The Hancock Tower minimized its volume by making a sharp edged building; by presenting the minimum mass toward the Trinity Church and Copley Square it preserved the facade plane of the neighboring buildings.[108] By orienting the tower's long axis perpendicular to both the Atlantic Ocean and the Charles River, not only does it minimize obstruction of existing waterviews from surrounding buildings, this also present the building's shortest side to the Charles in order to preserve the skyviews over Backbay particularly when viewed from the Cambridge side.

The continuity of Boston's identity that so distinguish it from other great American cities was the result of constant and conscientious cultivation. Adopting the approach of public input and dialogue, the BRA had shaped growth policies whose central challenge was to *harness the forces of change and to balance economic development without sacrificing its's urban character*, whose overriding goal is to protect public interest while encouraging private enterprise and creative expression.. As summed up by Mayor Flynn, "Let it not be said of its political leadership, that in their time Boston won the search for new investment but lost sight of our unique heritage.[109]

3.22 **Washington**'s diagonals and squares were designed as focal points to reflect the separate interest of the States of the Union. Whilst the scattered states were encouraged to relate to the Federal establishment in the **center** rather than directly with each other, the

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[107] Trancik, 1991. "Exquisite tower from a distance but undesirable at street level, it simply sinks into the the ground by making no aknowledgement to its surroundings."

[108] Curtis, 1986. p19. "The Skyscraper and the City."

[109] Raymond Flynn, 1987, p1. "Plan To Manage Growth," Reference Guide to District Planning.

diagonals helped the residents to find their way to the government.[110] These axial and radiating street lines enforces penetrating views like "gunsights" to compel the attention of the populace centrally toward the monumental buildings which symbolise the city's power at its heart. Conversely, they also provide those at the center with various perspectives only from where to survey and thus command the whole city. Only the 'City King' is worthy of that single view.

Because the Judiciary, being the third major arm of the government, was intended to be sited only on one of the other squares reserved for other public buildings, Washburn's[111] observation that the physical form of the L'Enfant Plan expresses the concept of the separation of powers and balanced federal-state relations created by the Constitution with the Capitol (the legislature) on the most prominent elevation (the highest) separated from the President's House (the executive) by the ceremonial Mall, is probably flawed.[112] Notwithstanding the placement of the Capitol and the White House on high ground does effectively used topography to dominate the composition L'Enfant's priority was with singular centrality rather than tri-policentricity. The intersection of those major axes in the whole scheme must be the most highly charged spot only deserving of Sun Kings. L'Enfant could have political motivations in the choice of that equestrian statue for that spot which portrays none other than the overidding power in the personality who is to approve his commission, the first President himself. As the most effective monument to power, that spot today is occupied by the obelisk, the established symbol of power - an

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[110]Concerning ***Washington's*** system of diagonal streets, Pope Sixtus V had already commissioned Domenico Fontana in the late 1580s to prepare a street plan for Rome to help pilgrims find their way to the principal shrines by cutting direct streets between certain churches and obelisks as visual markers. Influenced by baroque concerns for geometrical and symmetrical beauty, it relied on a radial-concentric plan to relate the diverse parts and their subordination to the center. Instead of the medieval curved steets and limited vistas, the straight baroque streets terminate in grand edifices. Other influences include the Versailles gardens where Le Notre and Le Vau gave a vast area of 250ac just for the axes and vistas to be designed for points of focus which always consisted of a north-south axis along the length of the palace and a westen axis extending from its terrace. Christopher Wren's unexecuted design for London after the Great Fire of 1666.

[111] Wilcomb E. Washburn, *"The Exhibition" in The Federal City: Plans and Realities,* Smithsonian Institution Press, 1976, p78.

[112] In fact the equestrian statue of Washington was the original central focus of the entire plan and not Congress nor White House. In a right-angled triangle composition, the right angle is to the Potomac, the smaller acute angle to the Capitol but the larger acute angle to the President's House.

abstracted form whose most prominent attribute is sheer height as if, to equate the power of unity in the whole concept of government, even **centrality** needed exaggeration by height. If Washington DC's famed height regulations permitted nothing higher than the Capitol, the 445ft tall obelisk is the only structure that could deliberately be allowed to upstage the Capitol itself.

The more plausible conclusion could be that despite his knowlege of the tripartite symbolism inferred by the Constitution, but since there were more than three high points to locate only two of the three most prominent buildings according to a cross axis concept, L'Enfant decided that respect for only two of the highest points in the topography is adequate as the paramount strategy to capture the desired identity particular to this site. The strong identity of the Capital is founded on L'Enfant's ingenius identification of the essence of the site's topography to focus on the Washington Monument as the critical central point of intersection from which to set off those two major axes, to capture that distinctive relationship between the Potomac and the land.

Regarding Washington DC's strong identity, the contribution from a predominance of architecture in a single neo-classical style cannot be overemphasised. "It was due to Jefferson more than any other person that (Imperial) Roman architecture was prescribed for Washington."[113] In contrast to the neutral syntax of contemporary highrise architecture, the pedimented style having a more ancient lineage, could probably better avoid the regional rivalries and political disputes over the stylistic choice of the required public symbolism. While the predominantly aesthetic approach in Washington does not

[113] Ziolkowski,1988. p205: George Washington had never been to Europe. Though L'Enfant could have drawn from his own childhood experience in a Parisian version of Roman grandeur, Jefferson was already under Palladian influence before he resided in Paris for five years. In more recent times, the World Columbia Exposition of 1893 helped to revive the Beaux-Arts tradition in the District of Columbia. The Lincoln and Jefferson Memorials are seen as important symbols of great aspiration and union for which purpose, their neoclassical temple style had been thought to be most appropriate. Unlike the efficient modern skyscraper which provided light, air, open spaces and good traffic circulation, Washington's neo-classical public buildings are expensive and monotonous, often having miles of unnecessary corridors and enormous courtyards in housing thousands of workers engaged in similar tasks who waste time spent on getting from one office to another.

totally ignore social problems, it often failed to addresss them directly.[114] At the pedestrian level, Washington presents few problems because of it abundance of wide open spaces and mostly very low buildings. In contrast, Manhattan's streetscape is one of the most compact which is exacerbated by its almost lack of vegatation. Moreover Washington has lots of greenery in addition to some sizable water bodies in the central area which affords a relatively more placid ambience to the city.

From the point of view of vehicular traffic circulation, the most awkward intersections and circles created by the grid and radial combination are a bane to smooth traffic flow. At those sharp street corners, wasteful pavements are created where the buildings have to be set back parallel to the grid street to avoid unuseable triangular interior spaces. Again the general observation is that symbolism usually **contradicts** with function. Nevertheless, function should not be the overriding priority in a city meant for symbolism anyway.

3.23 Due to its long and narrow geographic characteristics, **New York City**'s traffic problems could be related to errors in its original street layout. Only 2mi across but 13.5 mi long, Manhattan Island has more than 500mi of streets.[115] Since the dominant direction of traffic on Manhattan is north-south bound, the closer spacing should have been between the north-south avenues rather than between the east-west streets.[116] Moreover not only are the arterial highways conspicuously inadequate the street system is full of bottlenecks and dead end streets and the absence of alleyways has increased traffic congestion by throwing the unloading and unloading burden upon the streets. Although the grid street patterns in Manhattan organize the city and give a sense of succession by providing a regular arrangement of parts, the street block patterns are not particularly ordering when taken alone, being patterns without focus or contrast (fig 12). Broadway becomes the best Manhattan street by breaking New York's grid.

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[114] Commission members were architects, landscape architects and engineers, who were primarily interested in the physical design of the Capital. After 1952, the character of the Planning Commision changed substantially due to appointments of citizens with varied backgrounds; there were ten other non-design members. While before 1961, it was common to have only one member to reside in the District, now most members live in the District.

[115] Clark, p137.

[116] Perhaps in the belief of the continued importance of shipping along its long east and west sides.

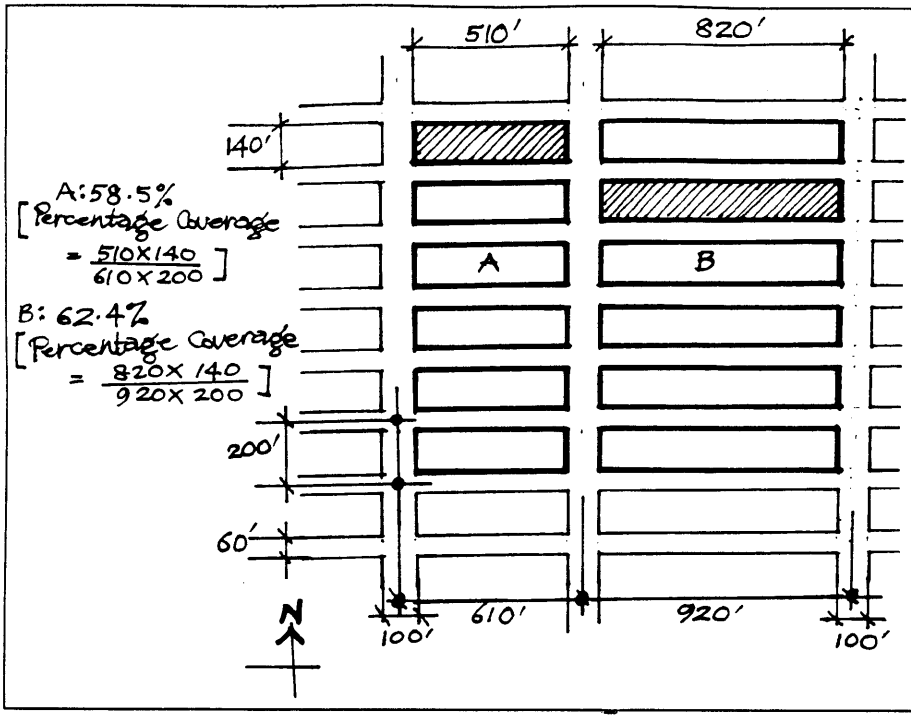

fig 12 Mid-Manhattan's Street Pattern. The 1811 street pattern south of Houston Street to West 155th Street is made up of a series of parallel north-south avenues, each 100ft wide and spaced 610-920 ft apart, while at right angles were located a series of east-west streets, 200 ft apart with widths of 60ft, except at intervals of 7 to 15 blocks where the widths are 100ft were established.

In terms of topography, New York City is flat relative to Washington DC. However, New York City's identity depends on two factors: (i) its extreme density, and (ii) its abundance of landmark architecture, which more than make up for its flatness. However topography in the form New York's narrow island nature dramatise these two factors tremendously to project New York City's powerful identity, which otherwise could be very weak without the effect of surrounding water from which it rises like a mirage. In fact New York City's skyline is heavily dependent on their concentrated packing enmasse and from amongst them the abrupt jump in height of the column like twin towers of the World Trade Center for effect despite their doubtful architectural merit. If there had been no incentive zoning, developers would have built 12.5 million fewer square feet of office space, New York City's skyline would have the same number of office buildings, but each incentive building would be 5 storys shorter.[117]

[117] Kayden, 1978. Assuming that the same amount of space would still be constructed in New York City even without incentive zoning, one view is that the incentive buildings would be 5 storys shorter, but 21 new buildings whose total area equal the bonused area, would have been added to the skyline. Because these 21 extra buildings would require 19 acres of land if built at 15FAR, the development on 19 acres of land had been sterilised by incentive zoning unless they could spillover into the fringes of the CBD. The supply of office space is based on the perception of future demand behaviour rather than the amount of space permitted on any individual plot. Also, the extra bonus space in CBD locations would shift demand from smaller developments in the outskirts to large highrise developments in choice locations. However a

Washington's identity is also dependent on individual architecture but more so by depressive height restriction over a substantial area. Therefore, in terms of their skylines, Washington could be said to have a stronger identity than New York City if both do not have to rely on the architectural quality of their individual buildings. This is because of Washington's strong focus on one single building which has a massive domed silhouette as compared to New York City's jumble of very tall but mostly flat topped buildings. Compared to New York City's constant chase for the the tallest height record which continuosly change its skyline, the contribution of the sense of **permanence** in Washington's lowrise identity is undisputable. Sheer building height may not neccesarily result in better or clearer identity. Rather than because of the sheer heights of its buildings, New York City's skyline is more memorable for its many elegatly tapered building tops, such as that of the Chrysler and the Empire State buildings.

That exciting *upwardly thrusting* identity that some perceive in New York City's skyline could be attributed more to the power of the images associated with big business, their jagged skyline representing their sense of dynamic rivalry. In terms of a vertical urban pattern, its overall massing changes so quickly that there is none at any one time. Though Manhattan's buildings are some of the tallest in the world, there are just too many of them which are as tall as their neighbors to allow any one of them to stand out.[118]

3.24 Between **San Francisco** and Boston, the latter has a stronger identity. Boston's identity could have been even stronger if not for her tradition of continuously expanding by creating extensive landfills using dirt from excavating several hills that used to be in the

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profit driven private developer would more likely risk an extra few storys on a planned project by taking advantage of whatever bonuses available to maximize building on the lot, than construct one of the new 21 extra towers on a new site. Due to general skepticism in demand projections, and secrecy in processes of land assembly and construction financing, developers would not be able to easily perceive any shortfall in the supply side equal to his individual bonus to construct new buildings for accomodating the expected demand. Moreover the temporal aspect on the supply side cannot be underestimated. During boom times, there may be a shortage of construction labor and land prices may soar too rapidly to complicate land assembly, and the new structures would never be erected once overbuilding becomes apparent. Supporters of the incentive zoning policy cited the ability to create public amenities, to increase the city's real estate tax base and to fund training programs. Opponents cited the already overtaxed and undersupported city infrastructure and increasing the office function without understanding its cost.

[118] Notably Boston's Custom House Tower achieved more presence than the taller buildings in New York which crowded out each other.

present city center and Boston Common. Boston cannot depend on the density of its buildings nor the quality of its boxy flat topped architecture like the Prudential and the John Hancock which moreover are deliberately spaced well apart. However Boston can rely on some building cluster effects especially of Back Bay and Beacon Hill which serve to provide district-scale contrast in building height to the CBD. San Francisco on the other hand has a consistent policy to build up its hummed skyline to simulate the silhouette of its hill top with the tallest buildings at the highest locations but its hill is too gentle. Besides its landmark Golden Gate Bridge, San Francisco's skyline has also being perked up by the TransAmerica Pyramid whose form is powerful enough to singularly take over its skyline.

In the same way that the thin slab Boston Hancock Tower minimized obstruction, San Francisco's height plan grouped the tall buildings into thin slivers of height districts which have their short side towards the Bay to maximize bay-views. The very wide slab[119] building type is the most anathema to the requirements of the San Francisco Plan where the ideal form should be slender, regularly shaped like the Prudential Building, so as to minimize blockage all round. The San Francisco Plan clearly demonstrated the desire to preserve seaviews by constricting most of the height districts into long strips, especially those north of Market Street, perpendicular to the bay.

As zones of "ambiguity," the districts of cities which transition between one grid pattern to another, often present the most potent arenas of conflict, which however are also areas which can effectively tie the disparate parts of a city together if carefully handled. In Boston it is off Copley Square. In San Francisco, it is Market Street. It is in these places, that crucial decisions are made in terms of drastic changes in the allowable heights. Special care should be accorded to these edges of distinct districts, where transitions in scale are especially important. Replacing existing heights forming a highrise spine along Market Street, new heights effect a distinct separation of a smaller cluster of highrises from the main concentration by lowering heights substantially and reducing the

[119] Largely based on the functionalist design attitude of the international style, building floor plans, especially of offices, tend to be linear with a double loaded central corridor and terminal service cores resulting in flat slab blocks.

area for highrise there to achieve a more sculptured urban form, ensure a more human-scaled and sunny environment for residential areas north and south of Market and preserves view corridors across Market Street.

The blockage of sunlight to St Mary's square caused by the Telephone Building on Pine Street, and wind currents around Fox Plaza and the Federal Building are examples of the impact of inappropriate building forms on the pedestrian environment. Streets in downtown San Francisco are laid out according to two basic patterns separated by Market Street, the Jeffersonian and Spanish grids. Streets south of Market run eastwest 45° of North in accordance with Spanish colonial law. Streets north of Market run northsouth and eastwest aligned 81° west of South. Although exposed to southwest and northwest winds the south grid is sheltered from the prevailing west wind which is strongly channeled along the east-west streets in the North grid.

3.3 INFERENCES

While San Francisco's skyline illustrates that topography can be an invaluable asset, Boston's is evidence that despite having a century-old man-made monotony resulting from flat height restrictions, clear height districts are desirable while once dull skylines can be remedied by strategically locating marker buildings along a consciously predicted spine. If Boston's city center lacks the dynamic quality of skylines comprising tremendous variations in individual building heights, it more than make up in the city as a whole with very strong district characteristics distinguished by clear height limits. So, if a city already posess a characteristic landform, its skyline is almost made by just enhancing it. Where topographical features are absent or drastically altered, such as in Boston, the man-made structures could still be relied on, albeit requiring more skill and care.

Surprisingly, the same arguments cited elsewhere in the nation did not carry the same weight everywhere. The particular resolution of each city came from the particular balance between opposing real estate forces. Just as opponents argued that restrictions drove investment elsewhere, proponents countered that it forced a certain amount of

development to spread out rather than up. Holleran concluded that Boston exemplified the case where height restriction actually "protected from unwelcome competition a familiar pattern of develoment which was mutually advantageous so long as all conformed to it...yet, the present quality of Boston's urban environment testifies that the skyscraper was not inevitable" Boston's real estate interest itself maintained the tolerance of height restrictions to establish the predictability of land values. Due to this stability, Boston was free from the sometimes devastating boom and bust cycles in other cities. The distributed value also benefited owners of fringe land. While New York's developers deliberately built tall to compensate for low rentals on their dark lower floors, Boston's developers were satisfied to see their competitors restricted.

While the rapid increase in the number of skyscrapers substantiate the futility of the anti-highrise movement against inexorable real estate forces, the wide adoption of height regulations is testimony to its many successes. The nations's first comprehensive zoning ordinance in New York allows skyscrapers but regulates their shape and location. The era of flat height prohibition practically ended when New York's ordinance became a model for all American cities except for the nation's last flat height restriction in Washington DC which has to persistently justify the need for the uniformity of control. The case of Boston's abandonment of 40 years of height restrictions in favour of a sophisticated zoning system shows the effect of change in values over time. Changing political pressures could also influence peoples' assessment of the impact of development.

New York illustrates the extreme case where power has swayed the balance between socio-political and economic forces towards the commercial, while the reverse is true for Boston. Washington is the classic case of political power above all else. To draw a parallel along the spectrum of influences from the political (unity in terms of control), to the economic (diversity in terms of freedom), Washington is "all for one," while New York City is "free for all." If economic forces reign supreme, a city like Washington could never be realised, let alone continue to persist, not in the contemporary world of profit-driven global business. If economic forces are undeniably the strongest in today's increasingly cost-and-benefit inclined world, it takes power as a greater albeit irrational

force to deny the rational cost-and-benefit analysis which may be less applicable in such ventures like building a capital city with identity. It is in this sense that *the power factor is the most potent.*

In the choice of an appropriate identity for KT city, which American city is selected as the model for *whichever qualities to emphasise, between commercial and socio-political* considerations, could thus inform *the basis of the decision* upon whether topography and or urban quality is the priority. If urban quality cannot be quaranteed, topography, unless it is absent, must be handled with the loving care it deserves. So if topography is already presumed to be the basis, how then is urban quality in terms of building heights determined by the economic and socio-political balance? Which are then the salient forces that can be grouped amongst these economic, socio-political, or power factors? What are the respective effect that each group of factors has in affecting building heights, and how to these effects influence density clustering tendencies?

CHAPTER FOUR

FACTORS AFFECTING BUILDING HEIGHTS

Because the social realm often includes politics and economics as its branches, it is first necesary to separate[120] them to clarify what each of these terms are meant here. Infact the *identity of any city form is but a reflection of the particular permutation of these aspects which a particular society as a whole chooses to emphasise* as opposed to less identifiable cities where their relative influences of those factors would not be so easily distinguishable. The dictionary meanings for them are (i) Economic: "maintained for profit" or "frugality," (ii) Social: "community (organization and gathering)" and "social order (human relationships in society)," and (iii) Political: "of human relationship to one another and with the state," and (iv) Power: "relating to influence (personal capacity) or status (official authority)."[121]

The purely social factor is somewhat not as clear because of its considerable overlap with the others. What is clear is that the political and the economic factors are the more conspicuous, with the social factor often incorporated under either one of the two or embedded somewhere in between them. Frequently, the social factor, and less so the economic factor, have been subsumed as the alibi to be used as bargaining chips for certain political motives. If the economic factors are those that would produce investment yields benefitting only individuals or small private groups of building owners directly, and the socio-political factors relating to those who indirectly suffer the adverse impact of those investments and thereby provoked to react politically to counter height increase as rival interest or the public at large, then the factor which has the capacity to favour either of two competing groups of interests through superior status or access to influence, or to advance its own interests irrespective of all considerations by virtue of having enough authority, must be power. If the interest of the many is pitted against the few who profit,

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[120] The only purpose for their segregation is to facilitate analysis, but their innate inter-relatedness is actually too close to be separable.

[121] The Concise Oxford Dictionary. 7th edn, 1982. (also, Identity : "individuality.")

the interest of the few would be termed economic, and the rest would be the social and or political forces combined, and thus termed socio-political.

The impact of each force will be discussed separately at first to highlight their specific effects on building heights. The forces have been organised into three groups of factors in increasing order of importance (i) economic, (ii) social-political and (iii) power factors, in the way they affect building heights to help argue why all those grouped as either economic or socio-political factors by themselves are not as influential as those grouped as power factors. Then, how is power the predominat factor in affecting building heights? Since the theme of this study is the overall cityform instead of the heights of individual buildings, it is pertinent also to look at some basic government policies which determine where any development is allowed as to their spread or cluster, or disallowed as preserved open spaces which in fact have been assigned no density or zero building height.

If not for economic factors, it would be possible to erect a building more than 2000ft in height, the only factors limiting the possibility even heigher than this height is (i) the enormous weight of the lift cables required and (ii) the capacity of the human ear drum to withstand the vibration in an elevator travelling faster than 1500ft per minute. Messurier confirmed that the tallest economic height is much below the maximun physical or engineering height.

> "The least factor against intuitive expectation is not structure or technolgy. Far from having more clout than anyone else, the engineers have the least say about how a building is designed and how it will behave because for the most part they are brought in at the end of the line. The combination of economics and egos will keep monstrous towers getting built, and of the pair, *ego* is perhaps the stronger force. In any case, the impact of of these buildings on society, is primarily political; not of any architectural or engineering issues."[122]

4.1 FACTORS THAT INCREASE BUILDING HEIGHTS

4.11 ECONOMIC FACTORS

As height increase, the net investment return on a building gradually rises to an *optimum* of x storys, after which it declines. A projected income curve indicates that the

[122] Messurier, p55. Messurier recalled that his client only wanted to beat the Sears Tower record just "long enough to hold the record at least for a few years."

net income will vanish entirely at a specific number of storys, y. This height of x storys is the point of maximum economic return so that the high land value makes lower buildings unprofitable. The dominating influence of the high land value is apparent. It is only in the x-story structure that the total cost of the land is for the first time equalled and exceeded by the total cost of the building. In structures taller than x-storys, the total building cost of constructing the additional storys and loss in rentable space are so great that the average return upon the total investment is less than the x-story building.[123] Due to the association of tall buildings with expensive land, high rents and land values seem to force developers to intensify their land use. The demand for the services of the land will not be released until the proper building height is placed on the site. To this extent the operator is forced to intensify his land use because any other combination of building with land would yield a lower income than the optimum.

The net return received from a building investment depends on factors which increase or diminish returns as height increases, and those which are either irregular or constant in their effect. Based on the net rentable area per square foot cost ('cost') the combination of these conflicting factors results in a *definite tendency to increasing returns until a considerable height* is reached, after which point of maximum economic return, the percentage of the net income from the required investment steadily decreases. The major factors in order of importance are (i) land value, (ii) size and shape of plot, (iii) legal restrictions, (iv) design/layout efficiency, (v) cost-increasing factors[124] (vi) cost-decreasing

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[123] Clark, p21-25.

[124] Ibid. Items of increasing cost are: structural steel, elevators, brickwork, plumbing and water supply, heating and ventilating, electric light and power wirting, mechanical equipment, permanent interior partitions, windows and glazing. The 'cost'of *structural steel* rises steadily with building height. Its cost components in floor steel, column steel (in footings and lower members), erection (plant and working at higher levels), and wind bracing all increase with building height. In addition to increasing capital outlay, especially with each additional lift shaft, lift services demand an increasing wastage of net rentable area as height increases. The ratio of brickwork to rentable area only rises for schemes above eight storys due to the low proportion of brickwork in the basement and first few floors and perimeter walls normally increase only after the fourth story. This rise shows the largest ratio-increase with height relative to the rise for steel and lifts because of the time and cost incurred in raising workmen and heavy materials to higher levels. The 'cost' for plumbing and water supply also rises with height because the number of sanitary fittings, piping and water tanks are proportional to the rentable area. However there is no uniform cost increase with height for heating and ventilation for buildings below 22storys where most of the rentable space requiring ventilation and the heating plant are usually in the basement. Since more of the electrical work is in the horizontal than in the vertical distribution, the rise in electrical cost in the

factors[125] (vii) constant-cost building factors[126] (viii) absorption of rentable area by elevators and services, (ix) level of construction costs, (x) rental value variations of floors at different heights, (xi) operating costs variations at different heights.

4.11.1 Land Value

This is the most important single factor bearing upon the problem of economic height.[127] An important element in the cost of the land and the whole property is the *cost of carrying* the land as an unproductuive asset during the construction period, including taxes paid and interest foregone during this period which should be added to the original purchase land price. Because taller buildings require a *longer time to erect*, any underestimate of land cost would be more disadvantageous to higher compared to lower strucutres.[128] In city centers where land values are high, the owner of an office building site must build a skyscraper so as to develop his land to its maximum economic intensity if he is to have a profitable investment. The higher the value of the land, the higher he must go.

Land varies in quality and the *uses* to which it may be put. When there are closely competing uses there is the tendency to develop the efficiency of say an hotel site by using

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tower work is relatively low in view of the large ratio of rentable area to the total area at higher floors, though the cost of power wiring, lighting, ductwork and fixtures is proportional to the gross area. However as a percentage of the total cost of a tall office building, their rise in cost is high; 20% for 8storys but 30% for 75 storys. The cost of most permanent internal partitions is constant irregardless of height as they remain in constant ratio with the floors served. However the walls for the lift and mechanical equipment increase faster in the taller building than its rentable area since the M&E shaft diminishes rentable area on every floor and also adds to partition work. In buildings over 15 storys, increasing perimeter and decreasing ratio of net rentable area to building volume or wall area cause the cost of glazing to rise with height.

[125] Clark, 1930. Items of decreasing costs include roofing, excavations and foundations. The *roof area* is constant for buildings of any height for a given lot area. Though higher buildings require more work on its many setbacks, roofing 'cost' steadily decreases with height even with variations in the quality of materials. The 'cost' of *excavations and foundations* is very high for buildings lower than 8storys but decreases until 22storys and thereafter almost flattens.

[126] Ibid. The 'costs' for concrete floors, interior and exterior finish show constant trends with height increase.

[127] Ibid. p31.

[128] In lower buildings, the relation between land and building cost is too unbalanced to make possible a profitable investment. The overhead of land cost is too great for the small volume of business which the net rentable area produced by fewer floors makes possible. The addition of more storys serves to spread this land overhead progressively thinner over each unit of business done, until this gain is wholly neutralized by other factors which increase the cost of doing the larger volume of business.

the first floors for shops and the remainder for hotel use. The capital expenditure for second and third stories of business blocks brings very much less than the expenditures for the first. In apartment house utilization, there is not this sharp falling off in the net return over the cost of the second or third floors. The office building sells space and to get the maximum of space economically, a towering structure is necessary. The department store sells merchandise and space is subordinate to that function; the result is a building of moderate height. Sites which support multi-families need to be builtup higher being more valuable than sites for only single-family dwellings. Views can increase the aesthetic attributes of residential land. In coastal areas, there is great economic pressure to convert to highrise dwellings.

The location of land is changeable when viewed economically, where distance is a matter of time and cost, not of miles. Improvements in the mode and cost of transportation have brought worthless land close to market and thus changed its quality.[129]. Land next to major roads is most expensive because of highest return on the usually allowed mix-use. Adjacency to main roads is desirable because of the amenities that come with it including the social and cultural quality of the neighborhood, lower crime rates and accessibility to economic activity. Utilities provided by governments are normally along major roads. Proximity to employment, work and entertainment are measured in travel time and distance. The longer the travel time, the lower the land value.

Though it is difficult to dissociate *traffic congestion* between sheer population and business growth from *increased building height*, the latter can actually beckon the trends of population and traffic and compel the **shifting of economic centers** of gravity.[130] Congestion has more to do with population density than mere building height because cities with stricter height limits also have congestion. In cities of the same density, the degree of congestion may not be the same. It is easier to blame tall buildings for peak time congestion by their poring out of crowds of people into the streets at about the same time, the same effect which also notoriously desolate CBDs during the off-peak hours. But it

[129] Dorau and Hinman, p471. "The Nature of Urban Land Income."
[130] Ibid, p472.

has been shown that the effect of increasing building height does vary over a range from zero to less than the square root of the increased height.[131] Because building heights are unlimited but yet they front streets whose capacites are limited, there might be a more direct relationship between the street width and building height. Decentralisation of CBDs may not necessarily alleviate traffic congestion.[132]

If transportation demands are not met, congestion may propel business to shift to new and less congested areas. To spread vertical concentrations of high intensity is tantamount to increasing distance to increase the travel time as many fold as the flattening. Transportation ensures that people doing business and employed in the district must be able to come to it and depart from it in reasonable comfort and time. Poor transportation facilities lead to **decentralization** of the central commercial districts and a resulting depression of its land values. Conversely the urban **concentration** of transportation facilities, expansion potential of existing commercial and financial institutions which attract additional business and industry, and the extent and variety of business and cultural opportunities to attract increased in-migration from smaller areas to city centers will lead to core formation as had occurred in New York City. Okamoto said,

> "Manhattan's tower clusters resulted from the high degree of transit access on their confined sites and the requirement of frequent face-to-face communication in daily financial transactions. Though usually unplanned, the concentration of office activities in major centers fulfils a function since the need to be close to related activities and near points of high accessibility.[133]

Business District *specialization* resulting from the voluntary grouping of allied businesses most significantly affects commercial land values.[134] Where municipal services are provided only within the political boundaries[135] of a city, sites outside of the

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[131] Simpson, 1928. Institute of Research, Land and Public Utility Economics, Northwestern University.

[132] Los Angeles used to have a 150ft building height limit. Inspite of few skyscrapers and its many wide streets, congestion could be serious in some parts. Congestion may have been increased by the sprawl which causes longer street journeys

[133] Rai Okamoto, 1969. p51.

[134] There are economies when many related service firms like to occupy even the same tall building to save communication time. The initial rise in its land values is augmented by the increase in prestige of the district for a specialized type of business; its reputation aids in maintaining land values.

[135] The supply of urban sites is increased by extending a city's boundaries to open up the way for the extension of municipal services. However if realty taxes within a city could be so high as to offset its advantages over sites outside the city limits subject to lower taxes, urban sites would be less competitive.

boundaries cannot compete for urban use with those within. The levels of service in the city center, especially in transportation, is initially the highest which is then upgraded to attract more development and increase concentration to eventually form cores. Moreover if transit nodes are planned within the city center, central site values will soar by enhanced demand. Since building heights are directly proportional to land values, causes of high land values are indirectly also factors tending to increase building heights. Because these factors simultaneously lead to concentration, building height increase will accompany core formation.

4.11.2 Size And Shape Of Lot

Particularly under set back provisions, a small lot[136] would reach its point of maximum economic development at a much lower level than a larger plot. As height increases, lifts and services call for more space and cost. Towers restricted to low site coverage are more likely to be uneconomic if the lot is smaller. Irregular or too narrow lots give rise to design difficulties[137] which usually increases with height. The effect of the setback laws is to steadily decrease the increases due to height in the ratios of rentable area and volume. A lot size and shape of 400ft x 200ft ($\underline{134 \times 67 yd^2}$) generally represent an ideal site for intensive development for achieving the simplicity and efficiency of the ideal office plan throughout most of the building which insures permanent light and air for most of the space and the relative economy of construction.[138] The higher probability to secure the

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[136] The unit area operating cost rises with height due to the declining ratio of rentable to gross area and the time lost to reach the higher floors. The smaller the lot, the sooner does this demand reach a prohibitive ratio to the the net amount of rentable area, and the sooner do the setback requirements constricts the net amount of rentable area to unprofitable dimensions. If a smaller plot and one of lower value had been selected, the tendency of diminishing returns would have been more rapid and the point of maximum economic return would have been reached much earlier. Whatever the size, value or location of the plot or the character of the building, the law of diminishing returns will serve in at some story height and sooner or later a point will be reached beyond which it will not pay the owner to build under the existing conditions. This point of maximum economic return in the case of high value, strategic locations is considerably higher.

[137] A tower's central location in the plot in making its mass pyramidal is most stable against lateral thrust which gives savings in windbracing. Smaller column spacings permits the use of lighter beams, thereby reducing the weight on the columns which in turn substantially decreases the total weight on the footings, whose thickness therefore diminishes with lighter overall load of the building. Because heavier girders are required where setbacks tend to be in between rather than coinciding with column lines for smaller lots, the larger lot and larger building decreases the amount of steel per unit volume of space.

[138] Clark, p33.

larger corporations as tenants or owners and their superior rental appeal enable tall buildings to be leased out sooner and more completely. For rapid and complete absorption of new space, superiority in layout and design becomes determinate.

The cost of a building does not go up exponentially with height. If the ratio of height to width of a tall building's footprint is constant, costs do not go up linearly on the structural frame[139] alone. One can therefore *neither conclude* that the rate of return decreases steadily nor their cost increases with increasing height. In fact there is no single cost component which definitely shows any constant upward or downward trend. Instead of varying constantly with each floor added, those trends are quite irregular depending on certain series of story height levels. Except on very small plots, only when a great height is reached before the factors of increasing returns is equalized by increasing cost. However the tower space in the taller buildings fetches the highest rental rates. Besides being above the noise and dust line, this space has near ideal layout, light and air and the best outlook. Many tenants are willing to pay more for space in conspicuously large and tall buildings than in ordinary low buildings, and the most for the topmost space. Tall buildings also have high unit area rental value for the basement and the first four floors, particularly the ground floor. As a result of the large populations in the tall building, its business potential is enhanced by the increased traffic fronting the sidewalks outside and inside the buildings' lifts and corridors.

4.11.3 Building Economics/ Design Efficiency

In "Predicting Building Costs," Reynolds stressed that there are optimal sizes (floor area) and floor plans favouring certain specific dimensions to be more efficient than others. This implies that given the same volume of space, all other building heights which do not correspond to these most efficient typical floor plate areas must be less efficient (fig13).

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[139] Berger, 1968. p17. For instance, savings on foundations and roof could be substantial enough on a single 38-story building, in comparison with two 19story ones. Experience showed that there are a series of breaking points in each highrise at which construction costs jumped. Of those factors which tended to increase costs with increasing building height, Clark found the cost of structural frame and mechanical equipment to be the most significant. In terms of specific components and at certain heightson the other hand, the diminishing costs of excavation and foundations more than offset the increasing square-foot cost of components which increase with building height.

McLaughlan wrote that the "single most important and strategic decision made at the early stages in the design process" is building form. While the morphology and geometry of a building is determined by topography, plot shape, accommodation and circulation space provision, the building envelope[140] is affected by plan shape, number of stories and story height.[34] For typical central core office towers, tower size is determined based on the established 25-35ft distance from a window to a wall (fig 14). [141]

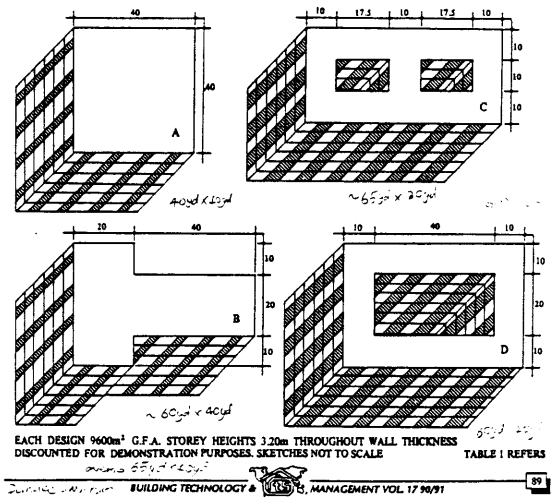

fig 13 Desirable Plan Shape dimensions.

Mostly of 40yd x 65yd (for identical GFA and story heights) based on acceptable performance variables such as daylight, sound levels, temperature, cost, weight etc. As quoted by McLaughlan. (Source: Research at Dundee Institute of Technology, Department of Civil Engineering, Surveying & Building)

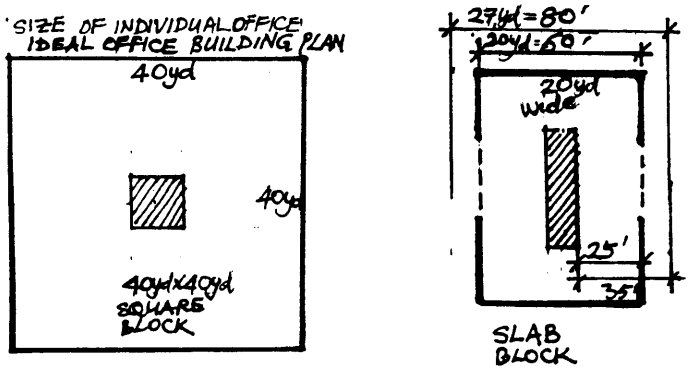

fig 14
Davison's Estimates

For 82% efficiency, the building ends up being a 60ft (20yd) wide slab block or 120x120ft^2 (40yd^2) square block, and as the core drops in size as the number of lifts drops off, the building rises for higher efficiency).

[140] The building envelope is an important factor in maintenance and running costs since it helps to determine fabric heat gain or loss.

[141] Inefficiency as wasteful floor layouts will become increasingly burdensome as height increases. Lacking a precise measure of architectural efficiency, the three ratios used are net rentable to gross floor area, net rentable area to gross lot area, and volume to unit area of net rentable space. These ratios could be enhanced, for instance, by deeper office space to increase net rentable area, or lower ceiling heights to reduce volume. Since the space taken up for lifts and services is increasingly larger part of the total space, the increase in volume for taller buildings is lower than the increase in net rentable area.

4.11.4 Real Estate

Jacobs reported that developers were most eager to participate in the formulation of San Francisco's Height Ordinance because they want to know clearly what they could and could not do. There is the possibility of reacting to increased land values by modestly increasing building heights. This is because building heights effectively limit the volume of buildable space permissible by the city.[22] The fact that permissible buildable heights directly affects its value can be observed in cities which have a historical maximum height restriction to say 10 stories, the lowest ten floors of tall buildings are worth no more than the first 10 floors of any other building.[142] Excepting the first two floors, the lower floors of highrise real estate fetch the cheapest rental.[143] Therefore where it is not feasible to construct podia with internal atria, builders would keep building higher than surrounding buildings. If the price paid for the land reflects its actual earning power, economic height calculations indicate that if x-storys is the most profitable height on land of a given price, a building taller than x storys is more profitable on higher priced land.[144]

4.111 INFERENCE FROM ECONOMIC FACTORS

From the owners' point of view and the usual CBD conditions, the economic desirability of the tall building is definite, in terms of providing him a fair profit. But the low areas have functional and visual importance, where a wide range of essential and specialized human-scale activities locate, though a few are often within highrise buildings. [145] These ancillary services should not continually be displaced to inconvenient locations as they are

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[142] John Davidson. 1986, p43. "Planning Highrise Buildings" in AKA Seminar proceedings. Hugh Stubbins probably realized when hollowing out Citicorp's base that the bottom ten floors of any highrise building are pretty dull because people do not like looking acrooss the road at the adjoining buildings.

[143] These are the most difficult to rent since people who rent space in highrise do not like working below the plateau of the surrounding buildings. So the lower floors are often turned into a podium with an atrium to provide light and interest to the lower floors. Only in this way could the lower floor space charge the highest rental because the inward view is far more interesting than looking out across the street.

[144] However these calculations assumed a given level of office rents without considering the effect of the addition of so many square feet of office space on the rental market of the city. In a depressed market, only a building lower than x-story will become economical for the site.

[145] For instance, the dining experience will be sterile where upper floor company canteens replaced street restaurants and lunch-time activities will be discouraged not to mention night-time activity.

vital to support office workers. In advocating for a few high clusters separated by low areas and some open space, Okamoto pleaded,

> "The need to improve visual coherence and 'grasp'of the area, to increase the sense of **identity** of individual parts of the CBD, to provide visual variety, to create new urban open spaces and views - all these problems of form call for a few large clusters of buildings and related facilities within the CBD rather than for an even spread over a large area. This physical form counterpart of the functional principle which makes the tendency to **cluster more efficient** and workable."[146]

Clark said, as "the most econmic tool ever devised" tall buildings spur core formation, in making possible the provision of quality service not affordable by low buildings: quality spaces at the upper stories with superior conditions of light, air and views, economical supply of utilities through large scale economies and centralization, utmost efficiency essential to modern commerce through high concentration and specialisation, and of huge savings in land, shorter streets and sidewalks within the city, or outside the city from land spared development for recreational uses, particularly where land is scarce. Tall buildings are not the cause but the symptom of high land values, because they do not create high land values but high land values necessitate tall buildings. The name *Golden Triangle* was coined in terms of high cost to justify tall buildings on the artificially escalated cost of land in Kuala Lumpur to attract investments since 1969. But skyscrapers are simultaneously **private space** for making money and **public space** by dint of their visibility.[147] Any such increase in prices that can only be supported by intensities detrimental to public welfare should not be considered as benevolent values.

4.2 FACTORS WHICH DECREASE HEIGHTS

4.21 SOCIO-POLITICAL FACTORS

4.21.1 Government Policies

Given the general availability of land in Malaysia where there is little tendency for compact developments, higher intensities must manifest as greater building heights. It is necessary to view two groups of influences:(a) indirectly affecting building height through

[146] Rai Okamoto, 1969. p35. The small-scale activities include eating places, theatres, small hotels, and specialty stores and street vendors.

[147] William Curtis, 1986. p82

built ***intensity***, and (b) directly affecting building ***height***. Further it is useful to separate those factors which refers more to (i) *equity*[148] and (ii) *community.*[149] Beyond the traditional general *welfare* and *safety* concerns like adequate light, air and views, height limits have been used for social purposes such as, control of residential density, preservation of area or historical character, stimulation of social housing and their mix, and managing city growth. Recent effects in both building height and intensity in Malaysia have been deliberately created by some of the following government *policies.* Growth stratagies responding to natural population growth or income levels are tied to overt programs for adjusting *socio-economic inequities.*

(i) Equity

A ***decentralisation*** strategy[150] was formulated primarily to secure the uniform spread of resources throughout the state in line with the federal government's NEP. The NEP sought to improve rural economic conditions and quality of life through improving *access to opportunities* and public facilities by reducing commuting between places of employment and residence to permit more equitable sharing of the benefits from economic growth. To restructure the imbalance in the distribution of income, health and recreational facilities as well as socio-economic advancement of the population amongst the regions, the overall strategy adopted was to spread developments from the more developed areas to the less developed regions. This had somewhat curbed urbanisation of some parts of cities until the 90s resulting in extensive low intensity, lowrise sprawl fringing the cities.

The distribution of allowable building heights is also affected by the intention to build according to ***development priorities*** favouring a "Corridor"[151] over a "Consolidated"

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[148] Concerned with social justice, and general welfare (public versus private interests).

[149] Concerned with spaciousness and privacy.

[150] Draft Structure Plan, 1985, p14. The State's Urban Development Pattern: "During the 80s, rapid growth in the city center had created negative growth impact in the outer regions. This trend need to be checked by stimulating growth in the other regions as well."

[151]The Structure Plan, p30-33. "Growth within the Johor Bahru-Pasir Gudang, Kulai-Senai, and Ulu Tiram-Kota Tinggi Corridors should be given priority. The existing towns and committed housing projects located along these corridors will be developed in proper hierarchy where Johor Bahru is to function as the regional center and Pasir Gudang as the major subregional center. The Corridor Strategy provides a better guide to long term development by building on the existing structure of utilitities and

development strategy, which can be guided by a "long term urban structure needed to shape the future city in a desired form," (fig 15) in view of the existing urban structure and

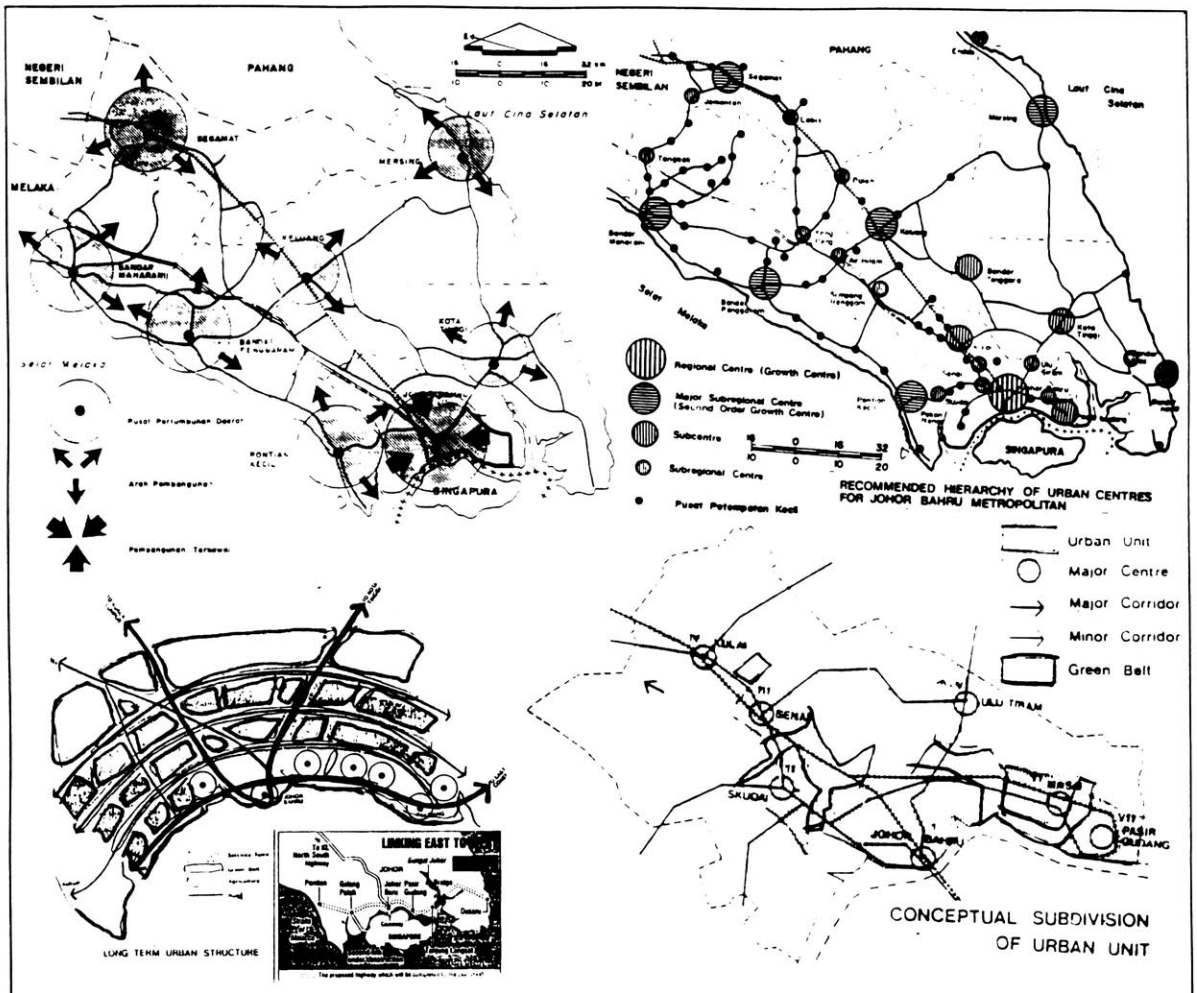

fig 15 The Decentralisation Policy. The preferrence is not for uniform intensities but to direct development along belts of established urban centers linked by main transportation routes serving to concentrate development and thereby create highest intensities in linear forms, rather than at fixed points.

the need to accommodate further development while maintaining large areas between the corridors for non-urban uses.[152] In view of the greater emphasis on more *open space*,

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services in an economic and rational way, enabling urban growth to be developed in units which can acquire individual identities and yet linked by communications without significantly affecting further developments yet achieve a balance between built and natural environments.

[152]The Structure Plan, p47. Land steeper than 1:5 and height exceeding 122m (400ft) above mean sea level is considered unsuitable for development. Very low-density residential and outdoor recreation may be considered in appropriate locations to avoid excessive earthwork which destroy special features and cause flooding due to soil erosion. Agriculture land in between committed development shall be protected to be used for future recreational and green belt purposes.

the buildable coverage of any site would generally be reduced with parallel increases in building heights.[153] Even within the metropolitan district, the policy is also in favour of spreading development intensities.

The present ***housing*** policy directly influences density, it encourages high density housing in urban centers and specifically requires developers' "social contribution" to construct at least 40% low cost, 40% medium cost and 20% high cost for all housing schemes.[154] In Malaysia, invaribly the price governs the housing type: lowcost housing is predominanly single story detached houses in the outer suburbs,[155] medium cost housing ranges from single story terrraces to four story apartments, and highcost housing are either double story bungalows close to city centers or highrise luxury condominiums. Johor insisted on the allocation of 60% lowcost and 40% of medium and high cost housing to Malays.[156] This burden falls on the middle earner who are displaced from their market sector. [157] This policy has a definite effect on the resultant heights of buildings since developers would be forced to either squeeze more but smaller units onto the same land area or build multistory apartments since most of the land would be occupied by the required lowest-cost units. Thus the government's 40:40:20 policy coupled with the socio-economic affordability has created an extensive suburban lowrise housing sprawl in

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[153]Structure Plan. To conserve the natural character of an area and existing traditional rural settlements and areas which have potential for recreation would be preserved. Relative to the federal ***open space*** standard of 2.66ac to 1000 population Johore's present ratio of 2.2ac is inadequate. In most residential areas, public recreational opens spaces are poorly equipped, too small or badly located. A new minimum of 2.69ac and the minimum open space for children play areas of 0.25ac shall be adopted.

[154]Incentives to build more low cost housing include allowing increased densities, exemption from certain building by-laws or shorter approval times.

[155] Highrise public flats within urban centers are no longer encouraged as being visually "incompatible."

[156] Guiness, 1992. p180. "The ideology of the competing and antagonistic races was intended to provoke the support of the subordinate class for the ruling class in the latter's consolidation of political and economic power."

[157]The socio-economic profile of the population demands mainly low cost and medium cost type housing. For monthly incomes of less than $750, affordable houses need to be priced below $2500. Private developers are thus required to build lowcost flats, sell 40% of the units at the fixed price of RM25,000 and are expected to recover their losses by inflating the prices of more upmarket units by an extra RM30,000 per unit. [Brennan (as quoted by Guiness, 1985. p93, p205): The legitimacy of the Malay ruling elite was based on its claim of standing for all Malays against the economic priviledges enjoyed by the non-Malays to consolidate their political position. The ruling class was an uneasy alliance of its various factions, in which the Malay faction held political hegemony, but was economically dependent on international capital. Both Malay and non-Malay bourgeoisie manipulated racial sentiments to mobilize support among the dominated class.]

contrast to the substantial medium and highrise residential developments in the cities. In terms of building heights, the suburbs are made up of a montony of rigidly laid-out one-two story housing estates, while many tall residential towers are begining to emerge close to or within city centers.

The NEP accorded Bumiputra participation in the commercial sector at least 30% of all ***commercial*** development in terms of equity share and operation approvals, and they must only be sold to or operated by Bumiputra entrepreneurs,[158] the allocation being endorsed as a condition for planning. In place of the mostly stilted single story half-timber houses in the rural areas, the modern commercial structures replacing them are usually at least two to four storys high. However this is negligible compared to the most drastic change in Johor's skyline and the increase in building heights mainly from mix-use ***shopping complexs*** instead of pure offices. In view of Johor's proximity to Singapore as an international tourist center for the region and the habit of local residents to shop extensively in Singapore, one deliberate policy was to promote tourism through increasing the quantity and quality of local shopping facilities[159] (fig 16). The current policy also encourage mix landuse in the central area[160] to juxtaposed the retail area around the

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[158] Structure Plan. The distribution of such establishments will show priority to Malay reserves or areas where there is a concentration of Malay population. The priority to locate development in Malay reserves had been constrainted by land legalities related to suitability, size and location.

[159] Ibid. Other than stricter enforcement of taxation measures at the causeway and strengthening the local commerce and service sectors, measures to reduce the substantial (30% of the total) leakage of shopping expenditure to Singapore include the development of large centralized shopping centers through (i) releasing more land for such commercial development, (ii) increasing the intensity in the central area in terms of plot ratio, and (iii) encouraging commercial development in the subcenters to be developed in a comprehensive manner by increasing the plot ratio to 2.5.

[160] Ibid, p71. *Residential* development is encouraged to maximize utilization of facilitates, diversify activities, and make the place safer and efficient since public services would be serving the residential population other than the commercial sectors by making the streets active at all hours. (For high density mixeduse, of the total floor space 70% must be for commercial use and 30% for residential at 200 person/ac. For high density residential, the minimum site area for apartments should be 1ac inside the central area 2ac outside. For apartment or flat developments outside the central area, the plinth area must not be more than 50% and 30% of the land should be landscaped.) Meanwhile, to inject more *office* space into the central area, existing plot ratios of 3.5 for commercial use would be reviewed to 4-5.5 and incentives include increased plot ratio, bonus plot ratio, generous building height limits (see appendix). Interrelation between government and private agencies is encouraged by ensuring close proximity of govern agencies to private office complexes and shopping facilities to ensure mutual convenience and benefit quasi-government agencies which caters for commercial activities. Flatted type *industrial* buildings are designated to accommodate labor intensive industries to be located in high population

pedestrian movement system complete with its own parking facilities and linked to the public transport system. To achieve the desired mix-use urban form the heights allowable are in the belief that the central area built form may be shaped by the control of plot ratio as it "allows the gradation of building densities further controlled by building heights."[161]

fig 16 Mismatch of Highrise Mixed-use and Lowrise Residential.
This recent development type is not only limited to the CBD but they seem to be thriving even within the predominantly lowrise residential suburbs such as Holiday Plaza. Thus the ubiquitous two-story landscape of shophouses and housing estates is rapidly being transformed into one where occasional 15-20 story office towers on four-six story shopping podia abruptly project above the vast monotonous sprawl.

Uncommon to the Southeast Asian region in terms of scale and frequency, Malaysia's new avowed pro-privatisation policies has given the private sector considerable

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density areas or near to neighborhood commercial centers or for storage, warehousing and showroom for industrial products. Their maximum allowed height is five stories at the highest plot ratio of 2.5.

[161]The Structure Plan, p138. "Height control is intended to (i) relate building height and bulk to the scale of the controlling landforms and the existing structures; (ii) minimize loss of sunlight and acceleration of wind; the most intensive and bulky developments should be along a north-south axis to reduce shade and present the least obstacle to winds; (iii) allow views over or from development; the taller buildings located and spaced so that significant views over the town and sea-fronts are not interrupted; (iv)relate new developments to the existing development; (v) provide an orderly roofscape, all rooflines will be required to have simple, clear and ordered forms; and (vi) reduce site coverage where significant landscape needs to be preserved." The authority is also begining to consider regulating development to achieve a desirable urban form. *Bonus* plot ratio could be awarded for the provision of plazas, landscaped pedestrian footpath, overpass, underpath, escalators in public areas, parking space, preservation of historical structures and comprehensive developments on sites larger than 2,129.6m^2 (23,000 ft^2). The bonus is designed to encourage private entrepreneurs to carry out urban block redevelopment of the existing dilapidated adjoining shoplots where their plot ratio would be raised by 1 above the basic. Commercial premises could built to the lot line with a minimum 7ft verandah for pedestrian movement.

responsibility to build infrastructure.[162] This will have a definite effect in terms of the volume of the overall built-up space, which will be manifested in increased densities in cores within cities; either their extensive provision (in line with the belief in the greater efficiency that privatisation would produce) will tremendously quicken more urbanisation leading to new or more urban problems, or their shortfall might stifle development.[163] "If you increase supply of physical infrastructure hoping that you could build your way out of the problem, demand will just increase to match it," warns Peter Hills.[164]

If no traffic restraint measures are implemented 12,600 ***parking*** lots in the year 2000 would be required.[165] The zoning system requires multi-story garages sited at the periphery of the CBD and linked to the commercial core via a system of pedestrian linkages. On expensive CBD land, basement carparks could be the most economical. Otherwise, elevated garages are often sandwiched in between the podium and the tower above it. For large projects, the large floor area would require so many carparking lots to be provided to require several more floors just for parking cars. This would raise the overall building height by at least an average of five storys. On the other hand on less central urban land, where the land is less expensive so that surface carparking is feasible, the building coverage would be squeezed to a portion of the site to result in even taller buildings.

4.21.2 Public Safety

Building height may not increase the risk of ***fire*** hazard but occupants of the upper floors of tall buildings constantly face the risk of being trapped in the incidence of a severe fire at the floors below cutting off quick escape to the ground. Certainly the use of conventional fire hoses cannot fight fires beyond 10 storys. However we can assume a

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[162] In 1995 alone, private investors will put US$10.2 billion into infrastructure projects. The national bank's guesstimate for this figure over the nest 25 years is US$2.8 trillion. In contrast, Malaysia's sixth plan (1991-1996) allocates only US$4.2 billion of government money to infrastructure. ["Malaysian infrastructure: Private Money, Public Friends." The Economist, Oct 22, 1994, Vol 333, No.7886. p82]

[163] Repeatedly, we have already seen that real estate interests often demand high densities (as in New York) in contrast to tendency towards low densities preffered by symbolic priorities (as in Washington).

[164] The Director of the Urban Planning Center, Hong Kong University. ["Mega Cities, Mega Solutions." Asian Business. Feb 1994, vol.30, No.2, p35.]

[165] The Structure Plan. 1 carpark space per 95.6m^2 (1000ft^2) net commercial floor area

reasonably high degree of reliability of current standards of fire protection provided by (i) advances in fire fighting equipment and technique, (ii) widespread adoption of fireproofing requirements in buildings, (iii) the common practice of periodic fire inspection before and after completion of buildings, and (iv) the levying by fire underwriters of higher premiums on buildings with lower fireproofing standards. It may be impossible to justify a maximum height in view of fire hazards but it is obvious that tall buildings could be very huge and complex due to their sheer size and height which certainly prolong the time and complicate the efforts of rescuers to enter and escapees to exit in relation to the great distance from the ground level.

There has never been any report of tall buildings being blown over by strong ***winds***. While the highest recorded wind velocity is 74 mph, the design standard for windbracing is normally for 120mph, which is also considered adequate to withstand earthquake shocks. Moreover the use of the steel frame in modern construction affords great elasticity to the building to absorb rather than resist wind forces. The world's tallest building is achievable by starting with the correct structural form; a squarish plan form is ideal.[166] However the great concentration of occupants in tall buildings may drastically multiply the extent of injury to more people in the event of disasters at any one time in structural collapse or soil failures. With regard to noise, air and light around tall buildings, it is still not known what is the minimum amount of, say daylight, is enough for the health of a place in which to live and work. Because these are concerned with psychological more than solely physiological needs, it can never be considered in any simplistic manner, so that environmental amenity can only be satisfied with reasonableness using common sense.

4.21.3 Public Health

From the belief that traffic ***noise*** gets amplified by their mutilple reflections from the large areas of hard surfaces of tall buildings, limiting building height might reduce noise. The wider the street due to the street width itself or setbacks, the lower this reveberaration

[166] For a mile high tower, its plan shape need to be about 65m square. Messurier cautioned that the cylinder is the worst because of its uniform geometry, vortices will form at lower velocity on a circle than other forms.

of noise. In view of the very large populations ejected from tall buildings, it is more likely that the noise originating from passing vehicular traffic is aggravated by their conflicts with pedestrian traffic at the street level due to increased congestion. Relative to sunlight and air, the harmful effects of excessive noise had been more easy to calibrate because of the more well known limitations on people's eardrums to the volume and types of noises.

The British Law of Ancient Lights dating to 1189 is the earliest attempt to assure a minimum standard of light to the ground story windows of all buildings. Tall buildings cut off ***sunlight*** to the street level and the lower floors of adjoining buildings and interfere with the free circulation of fresh ***air***. Sunlight and drying are needed to sterilize the air, if not the people in the streetes will suffer infections of the respiratory tract. A law that existed in Paris called the Law of Servitudes allowed a building to go up as high as the width of the street it faces, plus a stated additional height of from five to twenty feet. A building can go still higher within the one to three Mansard stories so that the average maximum height is six to seven stories to a maximum of nine storys. The height districts in New York City's zoning regulations were inspired by the need to increase sun and air access by tapering the building upwards.[167] Obviously, deep plots would allow tall buildings with terraced tops, but those where the streets are narrow and the plots are shallow, the buildings are forced to be very stumpy.

Because of the flood of sunshine, fresh air and magnificent views on the upper floors the problems apply to only the few lowest floors. The lack of sunlight and the continuous use of artificial light mainly in offices was believed to be injurious to the eyes and nerves and detrimental to physical and mental deficiency. However it is becoming increasingly common to provide artificial illumination, ventilation and atmospheric control which are comparable to the effects of natural light and air. Modern forms of illumination can be made more even than natural light and may not cause more unnecessary strain on the eyes.

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[167] New York City Zoning Handbook: The typical restriction is in the form - "No building shall be erected to a height in excess of twice the width of the street, but for every one foot that a portion of the building is set back from the street line, the height limit for that portion can be raised four feet"

By obscuring sunlight the cost of artificial lighting is raised, so it is for air. The surface of the pavement and the street atmosphere are being continuously polluted. Crowding speeds up and increases the transmission of contagious diseases. So the air at the lowest levels is considered bad because gases and smoke do not get into the open to diffuse. But if the air does not get much purer above the 10th floor, it is baseless to claim that tall buildings provide much fresher air at its upper storys. Moreover, health problems associated with unhygienic ventilation systems have been serious enough to become a whole new field of study in "sick buildings."

Modern air systems to purify and humidify the air could provide a more steady and purer air circulation. However tall buildings do actually reduce the amount of sunshine and fresh air available at the lower floors and the street level. To date, there has been no unequivocal evidence of damage to life and health due solely to light and air movements the limitations by tall buildings. But the cost to ameliorate a deep plan is *wasteful* when air and sunshine are free in the first place. So artificial means are merely remedies but cannot be considered effective solutions to remove the need for set back regulations. It is true that congestion increase close personal contact in streets and in public transportation which actually become uncomfortable due to the human expectation of certain levels of territoriality related to a community's psychological need for spaciousness.

(ii) Community (Spaciousness)

Low buildings along a street are in harmony with the way people move about and the way human sensory perception functions. Tall buildings are not. Meaningful contact with the ground level events is only possible from the first few floors in a multi-story building.[168] Although transparent materials that permit glimpses of activity within and uses

[168] Gehl, 1987, p180. Activities located 170-330ft from one another horizontally along a street inter-relate more readily than functions placed vertically just 10ft over or under one another. Between the third and fourth floors, at 22-33ft there is a marked decrease in the ability to have contact. Another threshold

such as services and retail activites at the ground floor level might help create pedestrian interest, this is only applicable to the first three floors. Thus the height of buildings are very limited for particular uses such as institutional and retail. Doxiadis called modern man's allowance of tall buildings to disrupt the innate social and community tendencies in the traditional human habitat due to the isolating effect of highrise buildings one of the greatest crimes, when our 3-dimensional urban space problems began during the birth of the skyscraper, turning 2-dimensional urban land surface to 3-dimensional space created by the heights of buildings.[169]

It is established practice to preserve or set the social character and property value by setting allowable building heights within a range from the lowest for single-family housing areas to the highest for multifamily housing areas. Despite the practice of spacing tall apartments well apart based on the belief that this would alleviate overlooking concerns, the free standing highrise flat created problems regarding separation of the building from the pavement, elimination of the pedestrian, lack of communication and movement into and around the building from traffic and access points. But being *unconnected* buildings on isolated plots, tower flats and offices destroyed the street wall that defined the hard edge of the street with the sudden loss in neighborhood character and scale. By setting back the tower, the podium seemed to have saved the street line.

The impact of density on neighborhood quality depends on (i) a sense of crowdedness,[170] and (ii) the adequacy and convenience of access to amenities.[171] Although this ground floor space is often the most prime space, the social aspects are sometimes more important than economic criteria. If any particular residential area or project in general does not meet social needs and demands, its economic efficiency is of little avail.

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exists between the fifth and sixth floors. Functions above the fifth floor at 44ft are definitely out of touch with ground level events.

[169] Instead of the old concept of landownership which could extend underground and to the air space above the property, Doxiadis proposed a more equitable land policy where there should be a hierarchical distribution of vertical space in the form of partitioned equal-increases in heights corresponding to a specific historically derived basic unit of 10m, to 22m, 36.4m and so on.

[170] Depending on the the degree of privacy at each story level and the amounts of open space especially at ground level.

[171] Such as parks, schools, recreation, neighborhood playgrounds and outdoor parking.

Those areas which cannot compete in meeting human needs will also not be able, in the long run to compete economically.[172]

4.21.41 Civic Symbol

In ancient Rome, it was a maxim that a city should preserve the visible symbols of its identity to give its citizens a sense of security in a changing world. An increasing number of people recognizing that ***vistas*** add to the community's sense of place and image, which in turn have been shown to be important in contributing to the overall quality of life and attracting new businesses.[173] For Boston, the brilliant golden dome on State House is a fitting crown for Beacon Hill despite the office towers looming behind it. In Philadelphia, two office tower proposals that would dwarf the William Penn statue atop City Hall which has long set an unofficial height limit for the community has kicked off a bitter struggle and led to the Mayor calling for a complete revamping of the city's downtown plan.

Denver's mountain view ordinance is designed to protect panoramic mountain views from parks and public places.[174] Austin's Capitol-Civic Center District View Ordinance creates five zones, each with its own specific height limit, designed to protect the view of the Rocky Mountains from the state capitol and the view of the capitol itself. The restrictions are also designed to create a symbolic pattern of height limitations in the form

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[172] Woodbury, 1953. p113. This principle is illustrated by families moving out from from high density areas due to their association with noise and dust and the lack of open space to green suburbs which though generally more expensive, afford better living environments.

[173]Duerksen,1986. Seattle required limiting building heights downtown to retain views of Elliot Bay. Pittsburg restricted the heights of new buildings in two areas that flank the Monongahela River. The restrictions geared to *protect views* of the city's riverfront, require the staggering the heights of buildings according to their distance from the river. Boston, in particular, was a leader to protect its beloved Copley Square from being overshadowed by surrounding buildings. Similar disputes are being played out in Austin and Denver to protect views of important public buildings such as their Washington look-alike state Capitols.

[174]Ibid. The purpose of the view ordinance was to (i) protect and perpetuate certain panoramic mountain views from various parks and public places within the city which is required in the "interest of the prosperity, civic pride and general welfare of the people," (ii) strengthen and preserve the municipality's unique environmental heritage and attributes as a city of the plains at the foot of the Rocky Mountains; and (iii) protect and enhance the city's attraction to tourists and visitors. With respect to Cranmer Park, no structure can be higher than 5,434ft above mean sea level plus one foot for each 100ft feet the structure lies from a reference point within the park. In practice, apartment buildings 300ft from the reference point and at the same base elevation could be a maximum 30ft high.

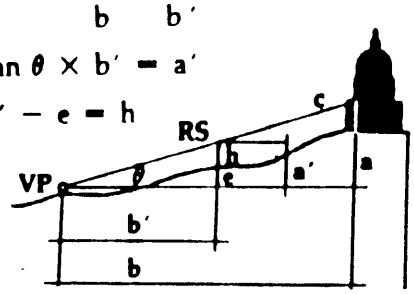
of three stepped planes allowing greater height with increased distance from the civic center (5,451, 5523, 5391 ft amsl). Views also serve political purposes for cultivating civic symbolism such as "national recognition to the government complex"(fig17).[175]

HEIGHT CALCULATION FORMULA

$\tan\theta = \frac{a}{b} = \frac{a'}{b'}$

$\tan\theta \times b' = a'$

$a' - e = h$



VP = Viewpoint
RS = Review Site
a = 653′ − VP elevation
b = Distance, VP to capitol
c = Sightline to capitol
e = RS elevation − VP elevation
a′ = VP elevation to sightline at RS
b′ = Distance, VP to RS
h = Allowable height

fig17 View Protection To Austin's Capitol.

Height allowances in each corridor was defined by sightline elevation from the viewpoint to the base of the capitol dome to protect and reserve public views of the state capitol building from selected points in the city such as parks, bridges and major roads.

Begining as John Raskob's dream to build a monument to the great state of New York, the Empire State Building became a monument to its development conception, planning and coordination. With the crash of 1929, in throwing up 2,249,000ft^2 of space the project became a symbol of hope and achievement for a public despondent in the depths of economic depression. Long after losing its record for being the highest building in the world, it remains a symbol of the astonishing degree of organisation and teamwork as the tallest building ever constructed within a year of January 22, 1930. As a source of identity at a distance Bentley said, "When you drive into a city for the first time - the fleeting glimpses of individual buildings, the shapes of the skyline and the ever moving composition of space and form make a lasting impression."

On the question of the protection of *symbolic skylines* facing social, economic, technological and political changes, Attoe used the diminished authority of Saint Paul's presence due to its outsizing by new highrise structures such as the Barbican and the

[175] Duerksen,1986. Restrictions on structures in the civic center area protect the (i) governmental complex, as the civic center shared by the state and the city; (ii) integrity of the civic center and openness as a relief from its intensely developed surroundings; (iii) stature of its public buildings as the symbols of the city and the state and as important points of orientation for permanent residents and visitors; (iv) substantial public investment made in the public improvements such as civic center park and capitol building, and (v) emphasizes the national recognition of its governmental complex.

National Westminster Bank. If London is now no longer a "Cathedral on a Hill" but a modern commercial center, why should not its skyline reflect that fact? Attoe argued that it should not unless the newer buildings are more noteworthy forms.[3] The London problem arose from the piecemeal way of approving highrise buildings which lacks the benefit from long term considerations. In the case of KT city, a building density or height plan is essential, to provide the *initial image* as a *basis of continuing strategies to provide direction in the face of changes*, to remain an up-to-date substitute symbol of the times.

The invention of the electric elevator, the steel frame and climatic control further propelled tall boxy buildings to rise even higher. The pre-airconditioned structures such as the Empire State and RCA in midtown New York City reflected a concern for light and air. However Lower Manhattan is a jumble allowing the most banal form in the world to succeed in taking over New York City's skyline merely by doubling its sheer height. In San Francisco, public opposition to high-rise construction in the 60s-70s led the city to reduce height and bulk limits and to issue an urban design plan, but the visual results in terms of overviewing were disappointing.[176] Not impressed by tall buildings, San Francisco passed a law in 1986 to limit the amount of office space that can be built in the city center to only 90,000m^2 per year as a growth management measure.

4.22 INFERENCES FROM SOCIO-POLITICAL FACTORS

Opponents claim that tall buildings are an effect not a cause of high land values. They destroy as much land value as they create, by robbing adjacent buildings of light and air, by depressing values of more distant property and by overburdening the social services and utilities at public expense. As economic factors keep pumping up building heights to optimise private profits, public interest persistently resist by demanding for no or minimal height increases. The resultant building heights are lowered or their spacings increased

[176] After much debate and politicking, the city council enacted a series of design related ordinances which in addition to air and sunlight needs, require the upper portion of any tall building be tapered or visually distinctive to avoid the benching effect, consideration of aesthetic and historical area characteristics and impact on tourism when issuing a permit and reducing building heights downtown from 700ft to 550ft (56 to 44 stories).

through more open space or skyexposure. ***Where economic factors propel increasing densities to coagulate into central cores, socio-political factors would conspire to scatter or deflate potential cores.***

4.3 FACTORS WHICH EITHER INCREASE OR DECREASE HEIGHTS

4.31 POWER FACTORS

4.31.1 Corporate Power

The "greatest city in America is Chicago" in terms of its organization of the skyline around the lake. Its silhouette does represent some great technological innovations like in the John Hancock and Sears. Sears is best seen from afar from the airport, but it gets worse when one gets closer, walking around it show nothing of interest at all even after appendages had been added to its bottom to provide human scale. Does this not say where the concerns of large corporate interests lie? Because their visual domination is directly related to their *bulk*, arguably the usual dimension used to accentuate a building's physical presence must be building height, given that a certain volume of space is a function of ground plan and its inversely related dimension of height. Halprin directly equated the hierarchy of importance in buildings to building height whether in the Duomo of the Florentine city or the modern office block.[177]

"A city's skyline is a veritable vertical graph showing by its silhouette the ranges and the locations of high values and choice desirable sites."[178] Power play in the skys had eclipsed economic considerations between two of Singapore's largest banks situated across the same street, the UOB and the OUB,[179] to produce Singapore's equivalent of New York City's twin World Trade Center towers. The UOB building is reputed to be the tenth tallest in the world, just three meters taller than the second tallest building, the OUB, yet the UOB has 10 storeys less. The object was clearly not a requirement of additional space and being completed six years later than the OUB during the peak of a construction

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[177] Halprin, 1972. p132.

[178] Ford, 1931. p162

[179] United Overseas Bank (UOB), Overseas Union Bank (OUB), the former is taller. Construction of the UOB was delayed for a couple of years purportedly negotiating developing charge for the height record.

boom cycle, there was no apparent advantage in cost to go taller. For some unpublicised reason, it was also known that no third building could be allowed to be taller for some time.

When asked why Boston's International Place, a tall complex designed by Phillip Johnson, had to be higher by twelve floors, the developer aknowledged that he would have made a reasonable enough profit at that height but claimed that by building it higher he had also provided benefits to the city.[180] The city recognized that the market then was so intense that it can milk developers for certain public advantages. Though the damage from these tower to the central area is not in dispute, the city backed the project to distribute wealth from the center to the poorer areas of the city by claiming that before this, it was never able to provide public housing elsewhere in the city through linkage taxation. Unless the linkage payments are exactly at par to the city center's loss in amenity, it would be a case of extortion. But even if it is possible to demonstrate conclusively a net gain from the compensation what justifies injury to the city center but not elsewhere? Apparently the question is an economic one, since the developer would not proceed with the project unless he derives a net return after deducting the linkage payments. If the returns are just being redistributed by the city, there is then no net economic gain to the city as a whole.[181] The issue seemed to be one more so of political patronage where corporate power procured extra height for its building by coopting the city's interests in another case of the failure of public pressure.

Governmental Power

As a political symbol, the structure and appearance of a capital city are the products of the balance of power within that society. The leadership expects the other's regard for its control through the spatial relationships amongst public buildings to communicate their exclusivity or accessibility and the building's dominance or subservience using building *scale* and manipulation of their architectural *proportions.*[182] Vale observed that the

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[180] As related by Julian Beinart during the Golden Triangle Study in 1986, p89.

[181] Brugmann, 1971 : Highrise cost the city more in services than they actually pay in taxes, probably because new construction is often underassessed..

[182] Vale, 1991. p3.

modern capital make up for its lack in size and diversity of economic base through sheer density of symbolism tied to the practice of ancient empires by which a capital's splendour served to legitimize the power of the ruling individual or group.[183] To legitimize exclusion of the masses from the leadership, monumentality and hierarchy is promoted through architectural manipulations[184]of its scale, *proportions* and materials. In a Lutyen's sectional sketch for New Delhi's government complex, the relative importance amongst the respective buildings clearly reflects their hierarchy in their placement (fig18) down the slope. Recognising the paradoxical domination of the hierarchically more significant assembly buildings in Chandigarh by the skyscraper Secretariat slab block housing bureaucracies, Corbusier placed the latter parallel to the approach direction (fig19) to minimize its visual *bulk*, and more *off-center* than the Assembly to reduce its symbolic importance.[185]

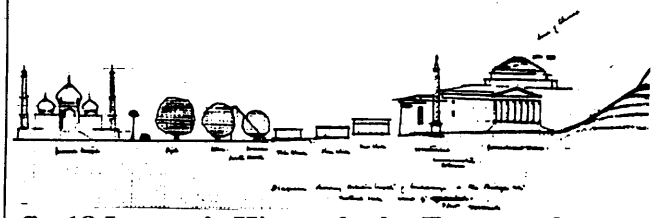

fig 18 Lutyen's Hierarchy by Topography.
Heights of proposed buildings relative to the Ridge sketched for New Delhi on September 1912

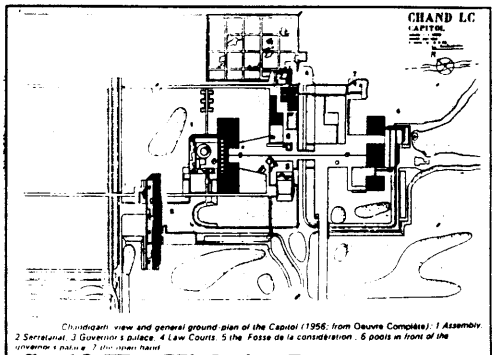

fig 19 The Highrise Paradox.
The placement of the skyscraper Secretariat in deference to the lowrise but more important Assembly in Chandigargh

In the *cultural balance of power* within a pluralist state, the elite's choice of national symbolism could be divisive. A decade ago, plans to construct a twenty storys high standing Buddha as part of the extension of a hill temple complex in Malaysia's northern State of Penang were shelved due to religious sensitivities of opponents who noticed that the statue would be taller than the tallest minaret in the State. As if to reflect the present

[183] Ibid, p15.

[184] Mumford, 1961. p65 Capitals were cities where change in scale was meant to dominate by creating palaces whose sheer *bulk* and *upward thrust* would awe the beholder to give "assurances of stability and security, unrelenting power and unshakeable authority."

[185] Ibid, p114, p123. Again in Brasilia, the Secretariat slab blocks show their shorter sides to the axis so *that their height* do not over-dominate the complex

state policy that emphasize wealth generation than its distribution, the recent completion of this statue testifies that the economic value of such structures in tourism had become the new priority. Any alternative iconography especially involving relative heights is subject to the current official interpretation of the national identity.

4.32 Inference On Power Factors

Hitherto I have argued that, among the general factors, economics and power are more important than the rest. I will now show that not only are the economic and political factors the more influential than the rest, the power factor appears to be the most powerful factor. New York's and Chicago's skylines may produce the most powerful impacts but the quality of their streetscape with respect to human scale is something else. While economics is about maximising value for money, power is about maximizing both the amount of money to be spent, and on the kind of values to be politicized. Economics is about minimum outlay for maximum return, Power is about maximum outlay for maximum return!

4.4 THE FACTOR WHICH DECIDES FEASIBLE BUILDING HEIGHT

4.41 The Balance Of Power Between The Economic And Power Factors.

The crux of the question in *which factor (or who) decides whether a building should be as tall as it should* rather than *how economic it is to put up the tallest building.* In its influence on the heights of buildings, especially in the case of commercial office buildings located in the CBD, economics may well be the major consideration. But in reality even with commercial buildings, economics is only remotely influential when compared to political power as the predominant factor. In what way then is economics less important as a factor that affects building heights? The answer will lie in the fact that power but not economics can get to erect buildings which are taller than those consistent with optimal economic heights, and that even under uneconomic conditions, it is specifically due to power motivations that the tallest buildings can ever become feasible.

Building height per se is not a prime consideration in most cases in the conception of highrise buildings; it is generally a secondary decision after the gross building space as

permitted by regulations been determined.[186] In practice, decisions on the overall height of buildings are seldom made based on the marginal returns from incremental stories which actually gives a higher profitability, albeit lowered efficiency (eg. construction time, lower net rentable to gross area), than that by the criteria based on maximum rate of return. As yet there may be no concensus on the absolute economic height since the question of 'how tall' is a value judgement which is not entirely guided by costs-and-benefit considerations alone.[187] Generally there could be a lower building height which is more economic than the tallest affordable. In other words, there is only an optimum economic height but not a maximum economic height. To a large extent this illustrates how the human mind does not think in purely linear rational terms so that economic criteria is not always the primary factor in decision-making. Highrise office building returns were frequently sought in the form of advertising returns, which are due to the association of prominence by height with corporate identity. Monuments do justify excessive or even unprofitable construction costs.[188]

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[186] Berger, 1968, p26. Highrise construction managers when interviewed indicated that the increase in rentals with height is fundamentally based on the prestige associated woth higher locations rather then the factors of light, air, views or quietness.

[187] Ibid. There is actually a negative correlation between a building's efficiency and excessive increasing height. The optimum height is at which the net investor's profits is maximised, which is achieved when the revenue generated by the last story just exceeds the extra cost of that additional story. It is that particular number of stories giving the highest rate of return as a ratio of net revenue to gross investment. Buildings which exceed this economic height appropriate resources better used elsewhere while those which are lower underutilise the resources.

In view of the positive correlation of building height with the completion period, the determinants of profitability of a highrise building is such that the longer the construction time, the higher the contruction costs, the higher the cost of financing and the cost of property taxes on the land and the building during construction and the longer the period of deferred productivity before completion. In terms of the effect of building heights on rental rates, there is a postive correlation between increasing heights with the rental rates at specific story levels and the average rental rates in highrise buildings. However per floor rental rate differentials based on vertical location is not evidence for the observation that average rentals are higher in taller buildings by virtue of their sheer height. The reason is the arbitrary practice of setting the middle floor at the average price and thereafter adjusting this price upwards or downwards for higher or lower floors leaving the average rental rate for the building as a whole the same.

[188] Ibid, p21. Though this advertising potential is a valid economic motive, the unusual production costs may appear to be unjustifed in terms of projected rentals.There is little incentive for such advertising value in highrise apartments since there is little benefit that can be associated with corporate identity. Hence building type can also make a difference in terms of its height. Where there is absence of the advertising motive, the increase in square-foot construction costs with increasing building height, is even clearer.

4.42.1 The Effect of the Factors Combined On Density Distribution

The Regional Survey of NewYork and Its Environs affirmmed that the therapeutic effects of light and air are essential to good health but their adequacy remains unmeasurable. In practice, the regulation of building heights is founded on spacing buildings as far apart as they are high. Fundamentally this involves the psychological perception of spaciousness in terms of claustrophia. Because this openness is a relative concept and an intangible quality, the basis for ensuring openesses must then be found in something at least more tangible, and their necessity must be founded on basic physiological needs - the universal concerns of public health and safety. Only in this way can one continue to justify height restrictions even when contemporary technology could offer controllable environments closely approximating natural atmospheres. Similarly the definite connection between the traffic factor and building height as such is impossible to be absolutely ascertained.

The predominant factor of power is just the innate desire of man simply to dominate, which in practice is through political power, and maximum building height is one of its expressions. Studies done (often sponsored by proponents) on the economics of building height have been motivated by the desire to justify the existence of a certain optimal economic height to support the claim that height controls always restricts the height of buildings to levels that are below the optimal. This "proof" of an optimal height ironically also weakens the claim that economics is the predominant factor that affects building height; that height regulations as imposed by local development authorities, is the more powerful factor than economic considerations. Moreover there are actual buildings where the feasible height in practice could either be much higher or lower than the optimum economic height, so that any desire to be taller or lower than the economic height must necessarily be uneconomic and therefore would show that the economic factor is not the most dominant factor. The economic consideration is a major factor but only in so far as budgetary viability is concerned. Because power considerations could override economic considerations but seldom the reverse, political power in terms of its authority in decision-making based on the balance of all considerations must be the most influential factor.

4.42.1 Instances when the economic factor trails behind the power factor

The following instances will substantiate how building height is used for power objectives which therefore determine how tall buildings should rather than can be.

> "At independence, the rights of the individual Malays and the immigrant non-Malays were bargained into a political-economic construct - Malays continue to dominate politics, while the non-Malays keep control of the economy."[189]

The change in a city's skyline parallels any changes in this socio-economic contract. In times of robust economic growth, tall buildings is one way to show that social disparity is now finally achieved, or even exceeded. It is true that without a robust economy, there is no money to build much, let alone expensive tall buildings. But economic means could only gurantee the most affordable building height not the highest allowable. Even in dire economic times, the tallest buildings do get built if there is enough political authority. However only a combination of funds and authority could any project ever get to be realised and on schedule. The new skyline reflects this - the tallest buildings are all not just government sponsored, they are mostly sponsored by the dominant political party in the muti-racial ruling coalition.[190]

In the Capital of Penang State, Georgetown, the 60 storeys Komtar Tower shot above the cityscape at a time when the tallest building was much lower than fifteen storys. A decade since its completion it continues to dominate the city skyline, "sticking out like a sore thumb."(fig 20). The architect was none other than the brother of the then Chinese

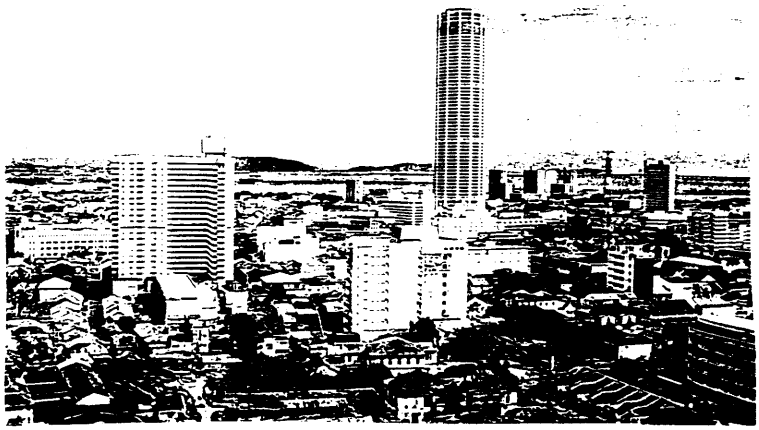

fig 20 Spot Height Zoning in Penang?
The lone 60 story Komtar continues to tower over a predominantly low skyline in Penang.

[189] Tun Daim Zainnuddin, "Sharing a Big Cake is Easy." Asian Business, Mar 1993 vol 29, No. 3, p48.
[190] All its component parties have declared that it is each's purpose to champion the interest of the ethnic group they each represent.

State Chief Minister. Soon after that Penang also boasted the world's third longest bridge connecting it to Peninsula Malaysia. As milestones of the country's economic success these civil projects were proclaimed as the consequence of effective political leadership. Recently, the Prime Minister announced that, since 1987, Malaysia has been experiencing the longest and strongest expansion of its economy in 35 years.[191] Malaysia's leaders are convinced that with discipline, there is pride in the institution one belong and along with that pride goes the the wish to excel which encourages competitiveness, leads to higher productivity and better services and products (fig 21).

The relocation of the Selangor Turf Club's racing facilities from its central Jalan Ampang site to a new location in Sungei Besi left a major piece of real estate empty in the middle of Kuala Lumpur. The announcement of the completion of plans for a gigantic highrise commercial development on this site, the Kuala Lumpur City Center (KLCC) by Kumpulan Senireka with Ceasar Pelli led many people to conclude that,

> " In many urban areas in the country, the building of highrise is encouraged. It is the highrise genre that require the greatest research and experimentation as it is the building typology that shall more than likely feature significantly in Malaysia's future cityscape."[192]

To celebrate 37 years of Merdeka on 31st August 1994, "100,000 people of all races gathered at *Dataran Merdeka* (Independence Square) to raise the giant Malaysian flag" atop the world's tallest flag pole[193] to usher in National Day and to acclaim the official declaration that racial unity had been achieved by political stability. It is ironic that this Dataran is in fact the same Municipal Field[194] used by the departed British administration as the colonial government center from whom independence was won in 1957. After

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[191] Straits Times Weekly Edition, Sept 10, 1994.

[192] Yeang, 1992.

[193] New Straits Times. Sept 2, 1994 : "100,000 people of all races ushered in the National Day. At midnight three thunderous shouts of 'Merdeka' were heard from the crowd followed by the playing of the national anthem."

[194] This is one of the typical municipal fields in Malsysian cities where each is still edged by period architecture of former colonial instituions, such as the mock Tudor style clubhouse for the city elites and Moghul style government buildings, and especially where cricket matches are still being enjoyed by both the local and the expatriate communities. From the earlier unusually grand celebration of the recent twentieth anniversary of the founding of the ruling coalition Barisan Nasional (National Front) and its choice of this very venue for the occasion, many commentators were prompted to wrongly speculate on the announcement of the date of the next general elections which is due latest before the end of next year.

having the tallest flag pole in the world, Malaysia will soon also have the tallest buildings in the world within the KLCC [195] project. Just 23ft higher than Chicago's Sears at 1,463m,

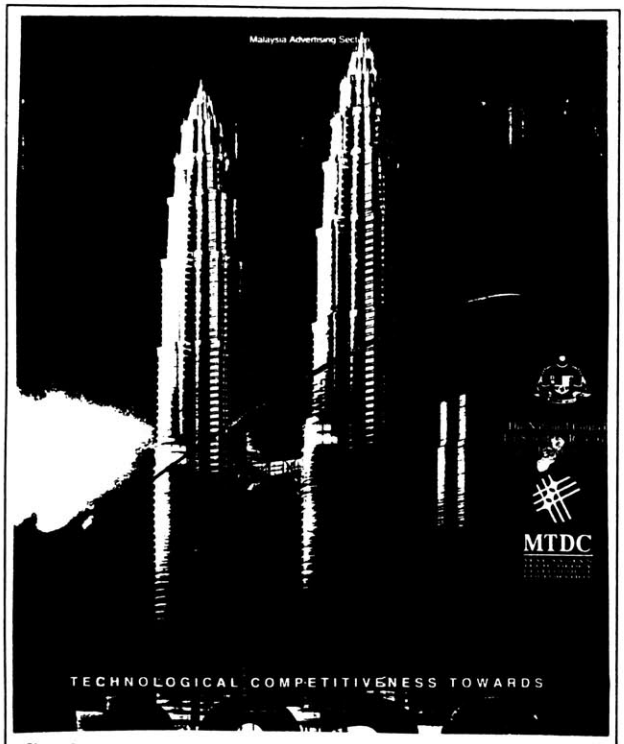

fig 21 The 100 Storys Billboard.

Material evidence doubled in a twin 100-storys tall marketing tool was needed to visibly demonstrate the imminent success of the 2020 Vision! (Scientific American, March 1994, Advertising Supplement)

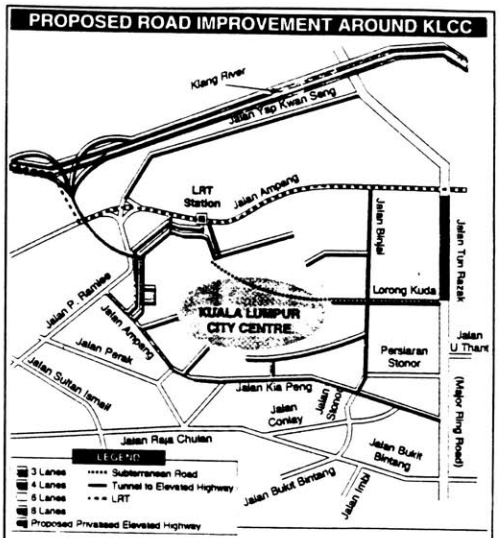

fig22 Road Improvement Around KLCC. NEW STRAITS TIMES, WEDNESDAY, AUGUST 24, 1994

In foreseeing the tremendous congestion that this project would introduce to the development area, it "voluntarily contributed RM100 million" (US$40 million) to improve and widen more than a dozen roads in the vicinity when the construction of the superstructure had already progressed well beyond the fifth story.

this "City within a City" will have not one but two of the world's tallest buildings when completed by mid 1997. Touted as the single largest real estate development in the world, the property consultant, Chris Boyd of Knight Frank Berhard said, "The sheer size of the project will ensure its success." Sid Astbury commented, "A host of problems stem

[195] KLCC has a total floor area of 216,901m2, on a site area of 40.5ha, a large part of which will be retained as a public park for the meantime.KLCC comprises two 88 storys towers (Petronas Towers) linked by a 57m long skybridge at the 41st story, a 6 story podium, two 45 story towers (Ampang Tower, and Esso Tower) and a 15 story hotel.

It is 51% owned by Petronas (the government-owned national petroleum company) and 48% by the proponent, Malaysian-Indian financier Ananda Khrisnan. This implies that the former land owner is now left with the remaining last 1%. Himself a former director of Petronas, Khrisnan has alledgedly cajoled Petronas into being the chief investor and anchor tenant to boost his chances of realising the one-off high plot ratio. However Petronas's president said, "Mainly we are motivated by a desire to have our own building," when Petronas already owned the prestigious 34 story Daya Bumi Complex which was the dominant political party's showcase and tallest project in the 1980's.

directly from Malaysia's high rate of growth over the past six years, chief of which is the inadequate infrastructure.[196] Since usually the infrasturucture comes after the completion of the buildings, infrastructure is seldom a factor to be reckoned with for determining building height. If a project is seen to produce problems, it is not the practice for the project to wait for the infrastructure to be first improved. To show that the reverse might be the rule rather than the exception KLCC may just be one example (fig 22).[197]

Another tallest structure in the 1,381ft[198] Kuala Lumpur Telecommunications Tower has already long taken over the Kuala Lumpur skyline though only 70% completed.[199] In its eagerness to project its fast economic growth, tall buildings have been used as convenient symbols of material progress. This project was awarded to Binariang, a company also controlled by Ananda Krishnan.[200] However the fact that when these mega-projects are being sponsored by a government that is led by a dominant governing political party, the symbolism is fraught with political overtones. Ostensibly to mark the country's achievement and progress these could also be read as fitting trophys the government awards to itself for being competent even though in fact the country's achievement has been largely and justifiably attributable to the government's performance. The advertisement for the earth-breaking ceremony for Malaysia's controversial Bakun hydroelectric project, emphasised that it has many firsts describable only by superlatives. From the apparent assertion that equates magnitude with merit,[201] the tallest must be the

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[196] Asian Business, Mar 1993, vol 29, No. 3, p38: Akio Morita complained that he lost RM2.2 million when a massive power failure plunged peninsula Malaysia in darkness stopping all work in Sony's electronic plant in Kuala Lumpur.

[197] New Straits Times, Aug 24, 1994.

[198] With an 86m antenna atop a 335m platform, it is the world's third tallest free-standing structure.

[199] Sitting on the city's Bukit Nanas (Pineapple Hill), such one-off megastructures are presumed to create visual coherence by organising lower structures around it (eg. Paris Eiffel, Toronto's CN tower, Seattle's Space Needle, etc) depends very much on its own superior design quality to work. Though very powerful and yet not absolutely reliable, their scale is hardly conducive to the continuity of a city's identity.

[200] Asian Business. Aug 1994, vol 30, No.8, p9

[201] For example, the advertisement for the earth-breaking ceremony of Malaysia's Bakun hydroelectric project emphasized: "has the *longest* submarine power cables ever installed in the world, *longest* total HVDC transmission system in the world, *biggest* privatisation of a hydroelectric project *in the world*, and the *largest* hydropower plant (2000MW) in Southeast Asia," but without explaining which item, if any, or why that measns also the best in the world. (New Straits Times, Sept 19, 1994)

most effective symbolism in itself probably because of the belief in the parallel between structural audacity and technological prowess.

As an example of another colossal building which is clearly not motivated by economic returns, albeit to express religious fervour, is the Sultan Salahuddin Abdul Aziz Shah Mosque[202] (fig 6) in Shah Alam ("King of the World"), the new capital of the Malaysian State of Selangor. As a religious building which has no direct economic value whatsoever, it is a most powerful political landmark that proclaims the faith of the dominant ethnic group who has political supremacy. The much older Johor State Secretariat is also sited on the highest hilltop to dominate the Johor Bahru CBD (fig3). *The aspiration to dominate by height is not unique to any particular race, country nor period of time.*

The prelude to Hong Kong's impending return in 1997 to China (PRC) had also played out in its skyline. Hong Kong Bank had long being a symbol of British Imperial sovereignty. The Bank's Chairman, Sir Purvis was reported to have only briefed Norman Foster, the architect of the Hong Kong Bank, "to give me the most expensive building." So the Bank emerged as the tallest until superseded by Pei's China Bank Building. Just as Hong Kong Bank represents Britian's last hold on her richest colony, the China Bank symbolise the PRC prestaking her presence. The PRC's responded in sheer height as if structural exhibitionism was not enough in a show of one-upmanship. The intended message was that the PRC will henceforth continue to thwart the departing regime's reluctance to relinguish dominance by persisting "to stand up."

If there is still lingering doubts as to whether political power instead of economics is the predominant factor that affects building heights, North Korea's hotels are the archetypal examples. In the deliberately prominent conical form 105storys high, the

[202] It is the region's most magificent mosque with the world's largest dome (302ft high and 167ft diameter), set in 37ac of landscaped parkland. It could accomodate 17,500 worshippers and has four of the world's tallest minarets each 450ft high. Besides monumental buildings like the Museum, Archives, sports complex and Southeast Aisa's largest Library, no less imposing is the Selangor State Government and Secretariat Complex (fig 6) with its bold architectural forms and megastructure resembling an ocean-liner, "its hill top location adding to its dramatic appearance."

Ryugyong Hotel is the tallest hotel in the world. Notwithstanding the recurrent delays due to the hugh construction costs involved, there is the external debt amounting to US$6.7 billion. North Korea's second tallest 45 story hotel is only 7% occupied while the Hyangsan Hotel, which has no overnight guests houses Kim Il Sung's favourite ego trip - the International Friendship Exhibition Hall - the six story palace for displaying 70,000 gifts from admirers from around the world. Tass's Oleg Polensko explained, "North Korea does not want tourists, this government is still scared of cultural infection."[203]

The **tower** has been a symbol of **dominance** throughout history, and cityscapes of towers have registered the spirit of competition between powers since time immemorial.[204] Many kinds of ambitions come together in tall buildings.[205] Le Corbusier made the tall building the central emblem of his Ville Contemporarines, placing it right at the heart of the city - saying "the brains of the city is there." To desire identity is to be averse to conformity. If power is the means to excercise individuality to accentuate physical control, then height is the expression of psychological subjugation. Subjugate the land if it is economically viable. If topography is not available, then through psychological means subjugate other people, by overlooking them from the highest possible vantage or making them look up from the lowest station. [206] If hierarchy by vertical distance is the established indicator of visual significance, then differentiation by height is but the manifestation of political importance. *Especially with building height, what is at stake is not just who would get the largest share of any resource (the most floor space), <u>but who would be allowed to stake his ego over the heads of the others</u>.*

Generally, gubernatorial power creates the <u>valley effect</u>, through *supression* of individual rights in the heights of surrounding private buildings, in contrast to corporate

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[203] Ron Gluckman, "North Korea: Profit versus Paranoia." Asian Business, Nov 1991, vol.27, No.11

[204] Julian Beinart, AKA Seminar proceedings, 1986. p16.

[205] Harman, 1968. p29. "Planning is the process by which groups exert political influence over the physical development of the city. Because many of the groups involved in this process have conflicting goals, conflict is an important element in planning."

[206] Bentley, p78. "More effort is required to raise the eyes, or point of sight, through a certain vertical distance than through an equal horizontal distance." The vertical line appears longer than the horizontal line of the same length. A pole is appraised as of greater length when it is standing than when it lies down the ground.

power which produces the *hill* effect, where building heights are closely proportionate to the strength of the largest banks in every financial district. Despite L'Enfant's firm Republican convictions, the design he set forth for the new capital of Washingtion was in every respect what the servants of despotism[207] had originally conceived dictated by centralized coercion and control. Irrespective of the degree of democratisation, it seems inherent in the psche of those who govern to distinguish themselves by being different, usually through magnifying scale by distance, juxtaposing a "head" if adjacent, positioning on high ground, exaggerating physical height, deliberate supression of the heights of non-governmental buildings in the vicinity or all of the above combined!

4.5 INFERENCE ON THE SUM OF FACTORS OF HEIGHT DISTRIBUTION

Just as increase in building heights results from the intensification in scarce land of high value on choice locations to optimize economic gain, decrease in height stems from socio-political concerns to disperse this valuable land to spread its harm or distribute economic benefits. While the economic factor increase concentration and thereby height, the socio-political factor decrease height and thereby promotes dispersion. Thus the **economic** versus the socio-political balance encourage **core formation** or diffusion. Power determines the pace, location and intensity of this concentration or deconcentration.

If the economic factors inevitably increase building heights to allow neccessary growth on limited urban land, the socio-political factors persistently resist that by decreasing their heights, and the power factor consistently violate these agreed heights, whatever the resultant height shall be termed the feasible height. A feasible height plan is useful at least as a basis to evaluate the extent of any violation and establish the ground rules to direct meaningful negotiations. Barring that blatant violation by absolute power cannot be averted, this violation could be minimized to sustain at least a minimal coherence promoted by a logical *direction of predictable growth* guided by these feasible heights.

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[207] Mumford, p403. Apart from lacking fortifications, the DC plan was an exemplary adaptation of the standard baroque principles to a new situation.

P A R T I I I

CHAPTER 5

THE NEED FOR A NEW CAPITAL CITY

CHAPTER 6

STREET PATTERN AS THE BASE PLAN

CHAPTER FIVE

THE NEED FOR A NEW CAPITAL CITY

Having ascertained the nature of KT's identity, what is the nature and character of the land, the nature of the accumulation and required size of the total volume of floor space anticipated for KT city? If there is a particular way of distributing this space, what was the primary motivation behind the proponent's preferred vision that would discriminate against other permutations?

5.1 THE SITE

5.11 Location

The area of the site is generally known as Mount Austin, in Malaysia's most southern State of Johore. It is located 10miles (mi) directly (12.4 mi by road) north of Johor Bahru City within a triangular region bounded by the North-South Highway to its southwest (Federal Route 1), the Ulu Tiram - Kota Tinggi Highway to its southeast, and the Senai - Ulu Tiram Highway forming the third side of the triangle to the north (fig 23).

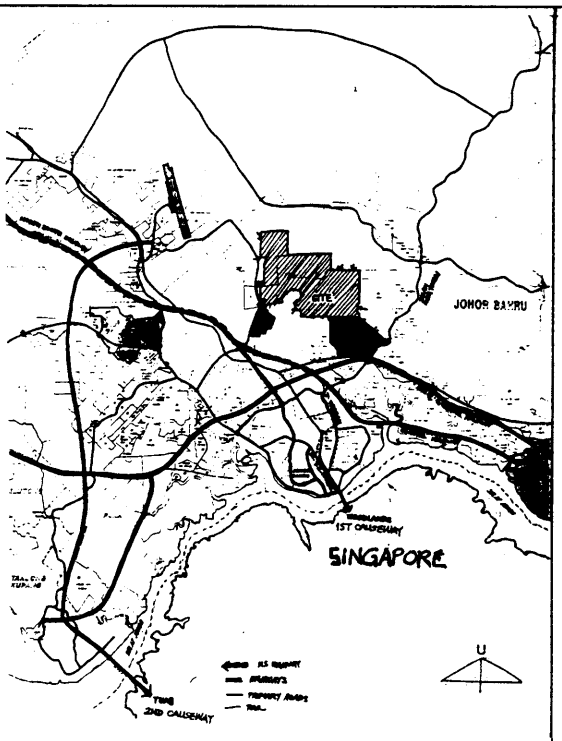

fig 23 Location Plan of the Site at Mount Austin.

It is surrounded by the Sultan Ibrahim Airport (to the northwest at Senai) and the southern branch of the UTM (Technological University of Malaysia) to the west, a ring of golf courses, industrial estates, and housing estates to the south and the rich agri-based Kota Tinggi - Ulu Tiram Development Corridor to the east.

5.12 Physical Constraints

Being close to the Senai Airport, the northwestern portion of the site may be subject to aircraft noise although it is advantageous in terms of accessibility by air. The undulating landform and its many intervening streams are expected to impose considerable constraints in terms of costs required for bridges and earthworks if the conventional construction method of level platforms is used. A gas and a water supply reserve runs across the site from east to west. The site as shaped by its boundary edges which are relatively straight and roughly in three steps except for a recess to the south east, can be read as consisting of three sectors in view of the terrain which are roughly north or south running except for the central third which comprises several diagonal ridges running northeast to southwest alternating between the main tributaries of the Tebrau River. The "recess" within the boundary which is otherwise relatively regular is a source of concern to the proponent.

5.13 Topography

Northeast of the site is the remnant of the Main Range that runs along the middle three -quarters the length of the Malayan Peninsula (West Malaysia) (fig 24). Southwest of the site the main valley of the Tebrau River runs downstream from the north-west to the south east. The landform within the site consists of undulating terrain generally between 50 - 350ft above mean sea level (amsl) with the lowest land at about below 50ft along the Tebrau River basin to the south-west, so that by and large the main slope rises diagonally towards the highest elevations to about 350ft to form a distinct ridge to the north-east. The higher land to the north-east is divided by the subtributaries of the Tebrau River into four or five ridges of average elevations at about 200ft. There is an existing reservoir sited at the highest point (visible from most parts of the site) at about 93.6m (307ft) north east of the site. Within the site the two highest spots are almost along the central diagonal length of the site at 204ft and 249ft) almost at the centers of respectively the northwestern and southeastern sectors of the site. The highest land forms only about 10% of the total site area. The main views are (i) down and south towards Johor Bahru City and the sweep of the more than mile wide of the Straits of Johor, the main peak of the southern region to the east at 2154ft and now enclosing the water reservoir supplying Singapore, and (iii)

a line of three hills above 350ft northeast of the site but roughly in line with a lone hill at 185ft southwest of the site, and (iv) the Tebrau River southwest of the site.

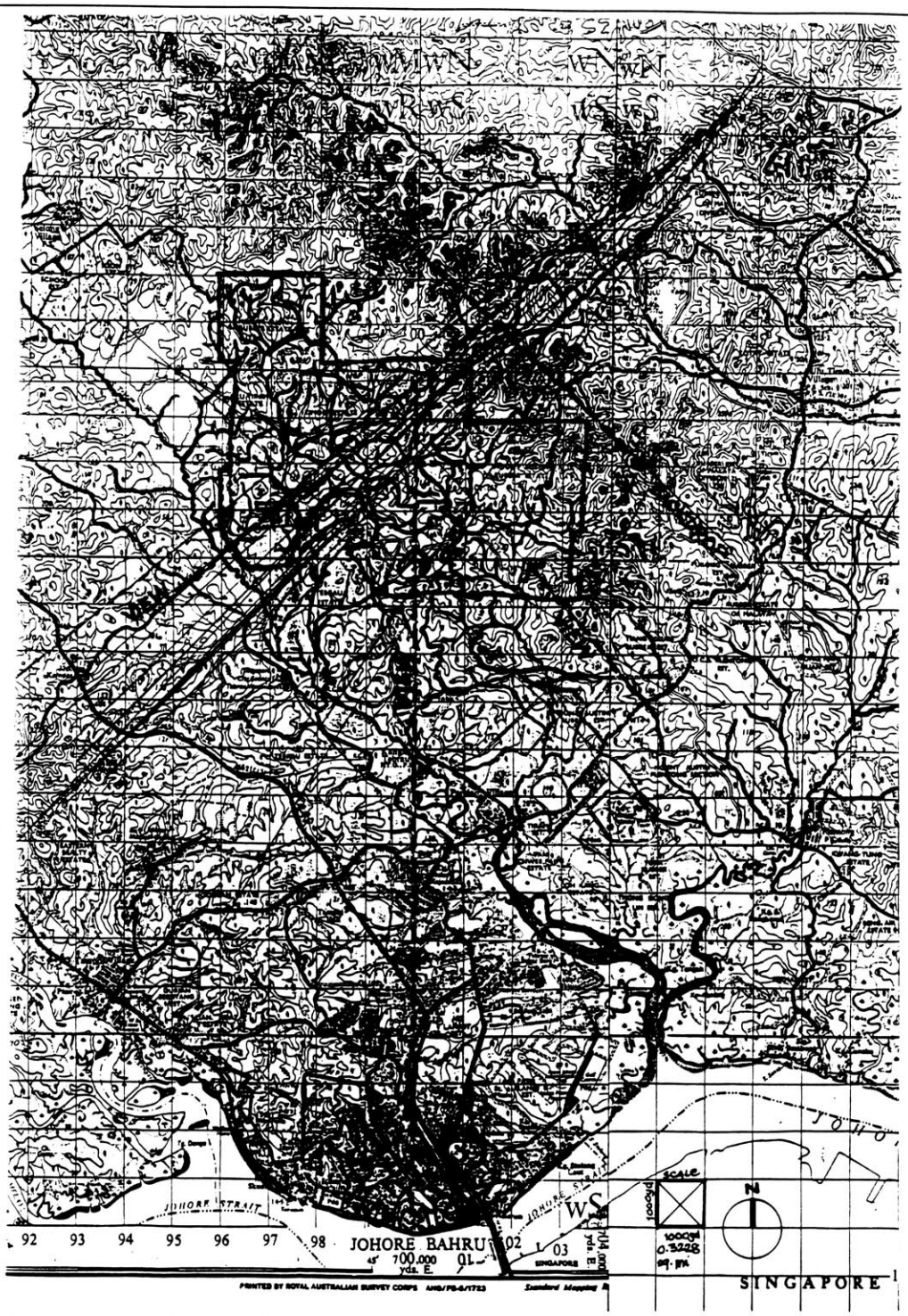

fig 24 Topography Plan of Southern Johore. The "recess" is at the southwestern corner of the site. The closest point of access at this corner abutts the Federal Route 1, that is parallel to the Malayan Railway Line and the Tebrau River that drains diagonally southeast-wards to the Johor Striats. The lie of the land is baiscally sloping down from the ridge in the northeast to the Tebrau River to the southwest.

5.14 Existing Transportation Infrastructure

Mount Austin is located at the cross-roads between the Federal Route 1 (almost parallel to the North-South Malayan Railway Line) serving the West Coast, and the Ulu Tiram - Kota Tinggi - Mersing trunk road serving the East Coast. These two coastal highway systems and the southern terminus of the Malayan Railway meet in the Johor Bahru City Center. The Structure Plan envisioned a half concentric ring urban structure radiating from the Gelang Patah - Johor Bahru - Pasir Gudang Corridor ringing the Straits of Johor (fig 15, p87). Interconnecting these coastal highways systems, the Senai - Ulu Tiram Highway north of the site forms the third side of a triangular region within the inner ring of this half concentric structure. A half-hour's drive away to the southeast is the Senai and the Kempas Freight Terminals on the way to the Port of Pasir Gudang. Pasir Gudang is also linked by rail to the Malayan Railway system serving the West Coast via Johor Bahru and has facilities for handling bulk cargo and heavy industries. The Sultan Ibrahim Airport (at Senai) is 3mi northwest of the site but it is currently only capable of handling Boeing 737s on domestic flights (fig 25) .

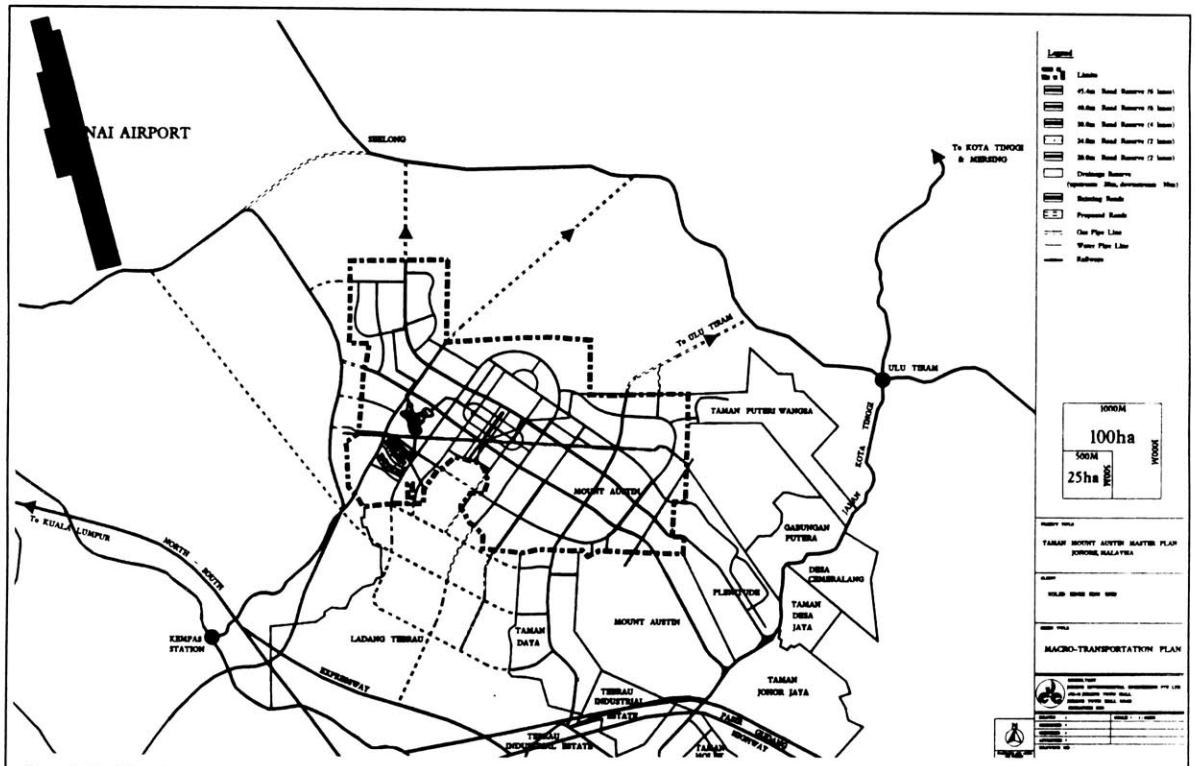

fig 25 KT's Transportation Plan.

Note the diagonal relationship between the Senai Airport to the Northwest and the Pasir Gudang Seaport to the Southeast. This has inspired the concept of the diagonal spine across the site.

5.15 Socio-Economic Condition and Surrounding Land Uses

The land had been used previously as an extensive rubber estate and currently as an oil palm estate. This has so far precluded the site from encroaching development in the forms of the suburban housing and industrial estates notably from the southeastern corner of the site. The Structure Plan projected that the population of the region would grow from 0.75 million in 1984 to 1.8 million by the year 2000. The major ethnic distribution for 1980-2000 was 56.2% Malay, 32.7% Chinese, and 10.5% Indian.[208] The population is very young; 40% of its population is in the 0-14 years age group and 60% of its population is in the economically active group. The potential workforce is projected to reach 400,000 by year 2000. The prime mover will still be the private sector of commerce and services.[209] However the Rahim Report warned: "The major obstacles to dampen influx of investment include, an overburdened infrastructure and utilities systems, shortage of suitable land and skilled and unskilled labor, and rising cost."

5.2 RATIONALE FOR THE NEW STATE CAPITAL CITY

5.21 The Proponent's Brief

As the private landowner, the proponent commissioned the CMP that would organise the basic land uses and supporting infrastructure. Its purpose of the CMP is to recommend the utilization of the Mount Austin land to integrate with the existing developments south of the site, of which the proponent also owns a golf course, an industrial estate and two housing estates. The original intention was to develop some of the land on the site as an industrial park as part of a comprehensive master plan incorporating a self contained township complete with urban amenities including utilities, social amenities and infrastructural facilities. This industrial park would attract high-tech investors to quality ready-built factories within landscaped environments although only "site and services" would be provided initially. Subsequently, the proponent forsaw the worsening of the existing congestion within the present Johor Bahru City Center unless an alternative

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[208] Structure Plan, p15.

[209] These sectors will expand faster than the average rate in generating 138,000 jobs by year 2000 to account for 53% of total employment. Manufacturing will be the largest employment sector at 27%.

"growth center" is created to cope with Johor Bahru's expansion needs and her current traffic problems. They envisaged that traffic problems in Johor Bahru could be alleviated by expunging certain administrative and institutional functions which need not be within the CBD.

The northwards expansion of Johor Bahru into the Tebrau region is seen as the logical direction in view of the tension between the capital cities of Kuala Lumpur in the north and Singapore in the south. The Structure Plan had adopted a decentralization strategy to spread out development with Johor Bahru retained as the Regional Center for southern Malaysia. With Mount Austin's more central position relative to Johor State as a whole, the proposed city is capable of complimenting Johor Bahru as a self-sustaining commercial, civic and cultural center for the Middle Johor Region. In view of the large size of the project and the potential for integrated development to include the state owned land (mentioned above as the 'recess') adjoining the site to the south jointly with the Johor State Government, the proponent also wished to identify the siting of 120ha (297ac) of land within the site to be reserved and surrendered for an envisioned State Administrative and Civic complex to take some pressure from Johor Bahru's urban problems (fig 26).

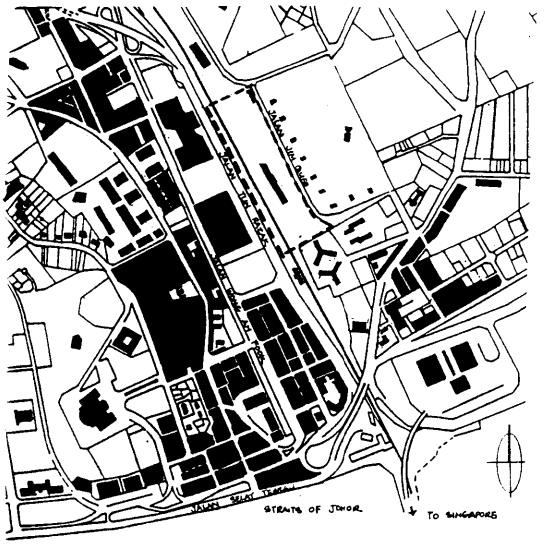

fig 26a
Constraints In Johor Bahru City Center.
The predominance of figure over ground west of the railway track indicates that steep slopes had hampered eastward expansion of the city center.

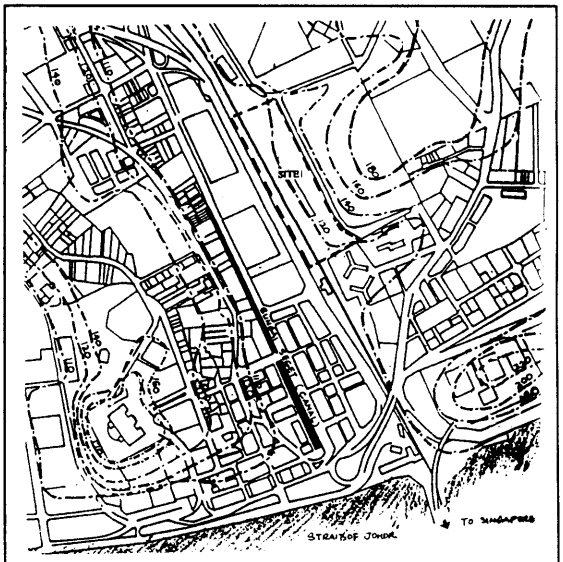

fig 26b The city center was built in a valley between 2 hills to the east and the west. The city has developed linearly northwards along the Seget Canal away from the coast on a gridiron pattern superimposed on the topography.

5.22 The Existing Capital City Of Johor State And Its Urban Problems

The proponent's intentions for an alternative capital city was inspired by some of the following urban problems[210] in Johor Bahru which were highlighted by the Structure Plan.

> "The current road system will not be able to cope with traffic volume generated along the Johor Bahru Pasir Gudang and Johor Bahru-Kulai corridor by the year 2000. Part of the disorderly traffic is attributed to mixed traffic including rampant jaywalking. Loading and unloading activities in front of shophouses along busy streets and parking along primary distributors. Separation of lanes by vehicle types is needed and the main roads should be reconstructed and installed with pedestrian side walks and malls."[211]

- The grouping *of institutional uses* such as major educational institutions in certain areas is not an efficient arrangement in the future when the population increases. Due to piecemeal planning of large housing projects lacking hierarchical provision of distributed facilities, the centralization of social facilities and employment centers generates traffic of tremendous magnitude daily at peak hours along certain major routes.

- The city center's organic growth from a small commercial-cum-institutional core since the earlier days resulted in congestion and environmental deterioration of the city center as traffic pollution and natural aging set in.

- The close location of the City Center to the the international *causeway* to Singapore and its related immigration and customs checkpoint, the southern terminus of the Malayan Railway, the passing of Singapore-bound traffic from West Malaysia and the lack of *traffic flow* management have aggravated the congestion. A considerable number of Malaysian workers also commute daily to work in Singapore. Moreover there is an increasing counter flow of Singaporeans who cross over to Malaysia almost on a regular basis for recreation and food to take advantage of their stronger dollar.

- Replacement sites had been identified for large city amenities inappropriately located in the CBD such as the Central Market, bus terminal, taxi terminal, wholesale market,and the mental hospital.

- Commercial developments predominantly in the form of *shophouses* along the main roads had created traffic hazards and environmental problems.

- In the city center, there are many *incompatible land uses* along major roads like workshops, backyard and polluting industries such as sawmills in the residential areas.

- Public *open spaces* for recreation and playing fields for organized sports are lacking.

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[210]Johor Bahru District Council, *Draft Structure Plan,* p38-39.
[211] Ibid, p169.

- The Planning Authorities are handicapped by lack of phasing information caused by the piece-meal approval of large scattered housing estates in the 70s boom without planned employment facilities, infrastructure and social services.

- Existing problems will be aggravated due to *persistent pressures* to convert agricultural land into more poorly serviced housing estates.

To gauge the extent to which these problems would be aggravated it would be pertinent to next look at the economic conditions, to be informed of the prospects for physical development which is but the pace, staging and size of the eventual space requirements.

5.23 Development Potential

Except for the hilly land to the north, this site is ripe for development because it is surrounded on three sides which are already experiencing brisk development. The site has key strengths in its sheer size under single ownership, unsquattered land, sizable local labor pool[212] from the adjacent housing estates, availability of existing water and power supplies and its location west of a university and bounded on all sides by major transportation infrastructure including an airport. Only 45 minutes drive from the established centers in Johor Bahru and the Port of Pasir Gudang, it could provide considerable potential for development in terms of low-priced land suitable for start-up businesses which otherwise could not afford expensive urban land in Johor Bahru. Proximity to Singapore has resulted in Johor Bahru's economy growing at a faster pace than the rest of the country.[213]

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[212] Rahim Report: Wage levels are 15% lower than in other established cities.

[213] JEE. This had been partly due to the increasing relocation to Johor of Singaporean industries in search of cheaper labor and relatively inexpensive land. While Pasir Gudang is intended for medium and heavy industries, the Mount Austin development could be suitable for accomodating business parks and science parks along with supporting educational and institutional infrastructure, all of which depend on the availability of sizable tracts of well serviced but low-priced land. In view of the high cost of residential property in land scarce Singapore, the Johor Bahru housing market had been very buoyant thanks to their tremendous popularity with Singaporeans in general and foreign executives of investor companies from Japan, Taiwan and Hong Kong. High tourist spending, particularly by Singaporean day-trippers who possess high spending power and a high advantage in their superior currency exchange rates, had also triggerred of a recent surge in the development of several large surburban shopping centers (eg. Holiday Plaza) residential projects and recreational facilities such as golf courses and country clubs.

Johor Bahru developed from the commercial hub centered around the causeway to Singapore in a fan shaped movement towards the north of the State with residential and industrial developments. While this movement in development continues, the acute shortage of commercial land is most evident in Johor Bahru's latest thrust to extend the commercial hub southwest-wards from Jalan Ibrahim by building a Waterfront City (fig 27) over the sea at Lido Beach fronting the Straits of Johor. Though the State Government has a proposal to ameliorate its worsening traffic congestion problem by implementing its RM1.7[214] billion infrastructure improvement scheme for the construction of various intersections in the city, implementation will spread over the next twelve years[215] not to mention the general observation that transportation improvements often unwittingly encourage increasing cycles of traffic demands matching road improvements.

fig 27 Waterfront City.
It is already under constuction in Johor Bahru since August 1994 and cost US$3.2 billion. Its development at the Tebrau Straits would rujuvenate the old CBD over the next 15 years and provide a basis for the growth of Johor Bahru into one of the leading economic centers in Southeast Asia. Sitting on a US$5 million concrete platform will be a commercial center, a 650room hotel, 1500-unit condominiums and shopping complexs.

5.3 FLOOR SPACE PROJECTIONS

5.3.1 General Economic Prospects

> "Malaysia is one of the most obvious candidates to join the newly industrialized countries (NICs). Over the past 20 years, Malaysia has consistently been among the five fastest growing countries in the world. It has an economy in which industry has surpassed agriculture as a proportion of GDP. Its share of world trade and foreign investment continues to grow."[216]

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[214] Value in 1985, Ringgit Malaysia (RM)= Malaysian Dollar. (Current exchange: US$1= RM2.25).
[215] Rahim & Co., Johor Bahru Property Market. 1993. p50.
[216] The Economist, Aug 13, 1994. Vol.332, Number 7876. "Who's NICst?" p31.

Malaysia shifted from an agro-based economy to an industrial-based economy in the 1980's in keeping with the Government's policy to achieve and sustain economic growth[217] by endeavoring to become a Newly Industrialized Country (NIC). In place of the NEP, this enlargement of the economic pie made possible the New Development Policy (NDP) which stressed economic development over affirmative policies though the latter is now being pursued simultaneously. The aggressively pro-development NDP is a product of the painful experience from the combined effects of the worst economic recession in the 1980s and some of the restrictive policies of the NEP. Some pentup demands will be released to directly cause the overall projected volume of space requirements to be exceeded and thus give rise to a drastic increase in building heights.

In 1990, Johor's 2.2million population constituted 12.3% of Malaysia's total population of 17 million, making Johor one of the more densely populated and urban states in Malaysia. In terms of Johor's role in the overall Malaysian economy however, its contribution outsize its physical land area. Occupying an area of 18,914km^2, the State of Johor amounts to 5.7% of Malaysia's total area. It contributes 10% to Malaysia's GDP and its per capita income at RM3,594 is close to the Malaysian per capita income of RM4,432 making it one of the more well-off states. In 1990, GDP growth has been high at 9.5%, close to the Malaysian GDP growth of 10%.[218] Johor aims to be the most industrialized state in Malaysia by overtaking Penang and Selangor in the next ten years. Johor Bahru plans to be the second largest city (after Kuala Lumpur) in Malaysia.[219]

5.3.2 Space Demand Forecast And Real Estate Market Prospects

5.3.21 **Offices Sector.** There exist a total supply of about 2,026,653 ft^2 of net lettable space in existing office buildings located in Johor Bahru. The future supply needed would total 2,490,800 ft^2. [220]

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[217] Though an annual growth rate of 7.5% is the aim of the plans, the actual growth rate for 1993 was: GDP 8.6%, GNP 8.0%, inflation 4% and unemployment 4%. The per capita income for Malaysia based on the household size of 5 persons, was projected to increase by and average of 7.0% per annum over the period 1991-2008 and the annual household income for the period 1991-2008 would increase by 6.0%.

[218] Kamil, 1991. p50.

[219] Ibid, p63.

[220] Rahim Report. p69-70. The demand for highrise office space is expected to be strong based on the economic growth experienced by the country. The escalation of rentals for office space as well as capital

5.3.22 **Retail Sector.** Shortage situations will occur in 2000 by 325,489ft^2 and 2008 by 2,572,989ft^2. Projected Retail space requirements for shopping complexs will increase from 4,629,500ft2 in 1995 to 6,877,000 ft^2 in 2008.[221] By 2000, 18 million ft^2 of shophouse commercial floor space would be added to the market.[222]

5.3.23 **Hotel Sector.** There are now 50 hotels in Johor Bahru with a total of 3,382 rooms. By end of 1996 seven 4-star and 5-star hotels with 2547 rooms are expected to add to the existing supply. A total future supply of 4553 rooms will be added to the market between the years 1994-2000. [223]

5.3.24 **Residential Sector.** The projected increase is from 9000 units in 1995 to 211,000 units in 2008. There is an undersupply with a difference of 67,890 units by 2008.[224] The state has the advantage of being within the "Southern Growth Triangle" with Indonesia's Batam and Singapore[225]. Foreigners especially Singaporeans are more inclined towards purchasing houses in Johor Bahru.[226]

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appreciation of office buildings shows the trend of improving net investment yields for offices which is expected to be maintained and will remain fairly constant during the years 1992-2008.

[221] Rahim Report, p80-82. (i) *Shopping Complexes Sector*: Retailers believe that consumer spending is growing in the country to stimulate future supply. Local corporate companies are purchasing existing major shopping complexes or embarking on joint ventures with foreign parties to build new ones besides the influx of Japanese and Singaporean supermarkets and departmental stores and fast food outlets which are fast mushrooming in the city center and established housing estates outside the traditional capital area. Though outside the CBD they still have very good business turnover and almost 100% occupancy rates (p76-78) This is attributed to their close proximity to residential estates, like Taman Pelangi, Taman Sentosa, Century Garden, and Melodies Garden, and more importantly because of their size, unique design, retail variety and support from reputable anchor tenants. Demand for retailing has gained from the weakening of the Malaysian Ringgit vis-a-vis the Singaporean Dollar because most of the consumer spending in Johor Bahru is heavily supported by Singaporeans who realize that they can buy a whole list of goods in Johor Bahru cheaper than in Singapore.(p90). Moreover, the State Government had plans to turn Johor Bahru into a shopping paradise by improving the city's infrastructure and transportation needs to cater for the influx of tourists (p81).

[222] Ibid, The market for terraced shophouses continues to be popular despite the presence of shopping complexes because of the uptrend in the the retail business from local consumers possessing more purchasing power and the influx of foreign tourists shopping in the area. Three to four story shophouses will continue to complement shopping complexes and office tower blocks since their main demand is for convenience shops which cater for the needs of residents in housing states and for office workers in business areas. Unlike shop lots in purpose built complexes, shophouses have much cheaper rental rates, enable each occupant to have individual corporate image, are very adaptable to various uses and there are no complications from strata titles, management corporations, or service and promotional charges. The State government's plan to transform the city into a shopping paradise and the discerning tastes and high consumption rates of the enlarging the middle class market base will boost the retail sector.

[223] Ibid, p106. Occupancy rates since 1990 improved principally due to the government's efforts in emphasizing tourism through highly successful annual Visit Malaysia Years as a foreign exchange earner prompted by a period of weak commodity prices in the world market. The Johor Bahru Municipality has set a target of 5000 rooms by year 2000. The finding of the Malaysian Hotel Industry's Survey by Arthur Young that business travelers prefer to stay at both the high class and cheaper hotels while tourist prefer the medium cost hotels indicated a potential niche in medium cost hotels.

[224] Ibid, p136.

[225] Kamil, 1991. p39. The idea mooted in 1989 aimed to combine the various comparative advantages of each member: Johor's availability of land, skilled and unskilled labor and infrastructure, Singapore's

5.3.25 **Condominium Sector.** The supply-demand shortfall would increase from 1,272 units in 1995 to 11,740 units in 2008. Of the existing supply, only 30% of the condominiums are on the eastern and western part of the CBD compared to 65.4% in the fringes of Johor Bahru.[227]

5.3.26 **Industrial Sector.** The projected land requirements for industrial purposes will rise from 1,057ha in 1995 to 1,200ha in 2008 to a total of 17,086ha. The total supply-demand shortfall of 2035.1ha shows an undersupply of available land for industry.[228] The improved accessibility[229] from neighboring states ironically encourage industries to decentralise to other areas, instead of the established areas, because of even lower land prices and the greater availability of labor.[230]

KT's identity in its three-dimensional form will be achieved by the deployment of these floor space requirements over the site. Prior to the determination of its two-dimensional cityform based on the street pattern, the broad organisation of the city's intended attributes has to be adequately clarified. What were the previous considerations that would continue to influence the moulding of the eventual pattern?

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sophisticated financial, marketing, and services industries, and excellent infrastructure, and Batam's low-cost land and labor.

[226] Rahim Report. p147. On purchase by foreigners, the Foreign Investment Committee has a blanket ban on land not for industrial and commercial use while the State Government imposed a 10% ceiling for two story link houses, medium cost flats and bungalows, and a ban on buying single-story link houses, low cost houses and those reserved for Bumiputras. The State government will construct low-cost houses below RM22,000 per unit by providing the private sector with state land to build them.

[227] Ibid. p156. Due to the rapid rate of industrialization around Johor Bahru developers are fast cashing in on the sudden increase in demand by locals for condominiums and the demand created by the influx of expatriate tenants of upmarket condominiums from Japan, Singapore, and Taiwan[227] who came with the foreign investments in the manufacturing sector and other foreign property investors. More expatriates would be staying in Johor Bahru as the task of commuting between Singapore and Johor Bahru becomes unbearable. With the extension of the Mass Rapid Transit (MRT) system from Singapore to Johor Bahru, more Singaporeans could stay in Johor Bahru and commute to work in Singapore.

[228]Structure Plan, p176. Flatted factories are unpopular compared to terraced and semi-detached factories due to higher cost to smaller operators, inconvenience in moving goods to the upper floors and weak individual corporate image. The growth of the industrial property market in Johor Bahru will be limited by scarcity of suitable land and their poor accessiblity. Demand in the industrial market will definitely increase if the city enforces its policy of relocating the illegal factories.

[229] The proposed second causeway with Singapore which will create a new growth center in South-west Johor, recent completion of the North-South Highway, increased number of lanes in the Customs and Immigration complex at the causeway, and the proposed inner ring road will reduce traffic jams at the causeway and the city center.

[230] Kamil, p47. Factors favoring industrial relocation to Johor are: depreciation of the Malaysian Ringgit, cheaper cost of local materials, availability of raw materials and labor, lower initial capital investment in land, rent and construction costs.

5.4 The Previous Proposed Conceptual Master Plan For Mount Austin.

5.4.1 The Concept

In line with its purpose to take over the political and administrative role currently played by Johor Bahru, KT's administrative complex will adjoin the commercial center. It would be modelled along the Petaling Jaya - Kuala Lumpur example where Johor Bahru City Center will be retained but with its growth needs absorbed by KT as the new growth center completely free of any contraints instead of the redevelopment alternative involving intricately encumbered urban land, with its associated tremendous cost and time for clearance, in the existing Johor Bahru City Center.

The design concept sought to concentrate an intense belt of prime activities along a diagonal main circulation spine comprising a dual (the one north of the commercial center partly as a tunnel and the other south of it partly depressed to avoid dissection of the city center by arterials) arterial system to connect Senai Airport to the northwest with Pasir Gudang Port to the southeast to complement the excellent surrounding transportational network surrounding the site for the purpose of constructing a strong urban identity since this belt is expected to locate the highest development intensities (fig 28).

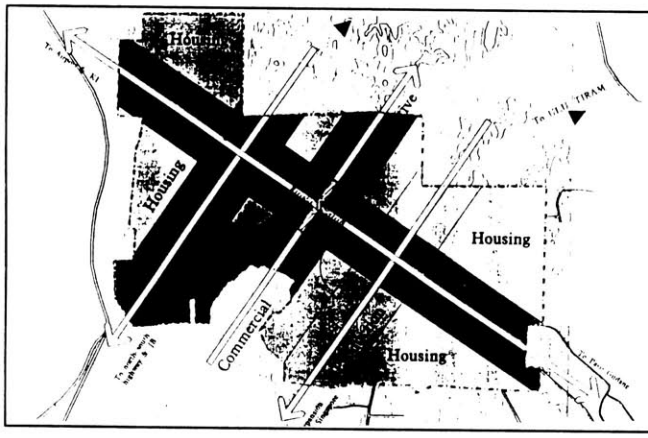

fig 28 KT's Secondary Spines.
Secondary activities will project perpendicularly off the main spine in line with the site's topographical configuration of diagonally alternating ridges and valleys orthogonal to this spine. Placing the Government - Civic Center on the higher land north of this spine allows the corresponding Commercial Center to be positioned in the lower land to the south to allow its future growth to respond to the pull of the established Johor Bahru City Center from the south.

KT will provide supporting facilities and a comprehensive range of amenities to cater for the needs of modern business, high technology industries and research institutions There will be four residential New Towns (each providing an average of 13,550 dwelling units (du.) over an average area of about 271ha (670ac)) at the four quadrants around the City Center to cater to a projected total residential population of 271,000 (fig 29).

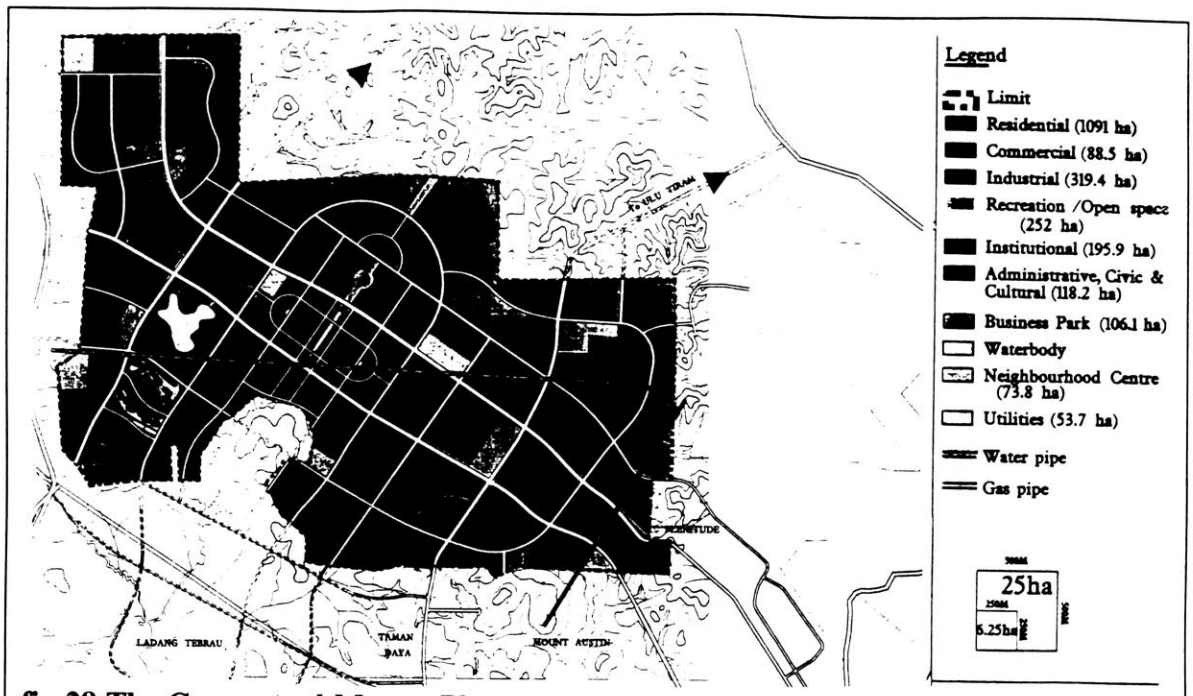

fig 29 The Conceptual Master Plan. To maximise the propinquity to the Airport and the Seaport, two major industrial zones are located at each end of the spine; the Science Park catering to serving time-sensitive and aviation industries nearer the airport end and UTM, and the other, closer to the Commercial Center, a Business Park serving more conventional industries nearer the country clubs to the south, and beyond that, the seaport. There are local pockets of light industries intended to provide employment to support the local population. All major activity nodes within the site will be interlinked by traffic-free green connectors. Generous greenery embracing the spinal arterials and the industrial belt will effectively buffer the four residential zones; two on the higher land to the north for high-end housing and the other two for lower-end housing types that require flatter land for more uniform layouts. The major recreational facility is a Regional Marsh Park proposed on the lowest land over the river basin at the southwestern corner as a water theme park as one of the main views created to set off the city's placid ambience.

5.4.2 Land Allocation

The net site area of the land parcels will vary from 100% in very compact urban sites to a maximum site coverage of 60% in the suburban areas, the latter depending on the amount of land for internal roads, surface car parking requirements and green buffers from the roads and other set backs. The assumptions influencing the apportionment of land and land use distribution is shown in tables 5A, 5B and 5C. Development will be in 8 stages each of about 338ha (835ac) as shown in table 5D (appendix II). How could KT's identity, the character of the site and the anticipated space requirements be integrated on the site? Given the volume of space requirements, what are the considerations in generating the street system as a two-dimensional broad framework to organise the way in which the density is distributed to create a specific three-dimensional identity?

CHAPTER SIX

THE STREET CONFIGURATION AS BASE PLAN

How essential is a street pattern to the role of building height in achieving identity? Is building height alone not enough? Good streets locate building masses in such a way to enhance ability of the general public to find their way into and around the buildings and open spaces, and integrates the gradients of the architectural forms and open spaces around them in order to enhance the degree to which the pedestrian experience can be vividly remembered. The street width provide the third dimension to allow perception of depth which cannot be gauged by solely perceiving the two-dimensional quality of building height alone. In fact, KT's street system has dimensional characteristics[231] whose intellectual synthesis in the mind's picture becomes KT's identity.

For sites with featureless topography, their street pattern will not have enough character due to its lack of vertical variation along the street level.[232] Therefore these streets only have the heights of buildings to rely on for the required vertical variation. For sites with unique topographic features, topography must be a component of identity evident by their street patterns' response to landform which then intensify the variation of building height. For sites which do not respect topography though the site has it, the consequent form of such a city will be diluted in its identity for lack of an expected systemic sense of harmony with the ground plane, whose identity can only be weak even with the effect of sensitive building height placement alone.

The significance of using topography to guide building height limits could be illustrated by the observation that tall buildings on the tops of hills allow clear views down streets but when sited on slopes of hills they severely restrict views from above the slope. Because

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[231]Based lengths, widths, depths, gradients, direction and curvature, district streetwall height uniformity on variations of the widest basic 120ft width and a typical 12ft story height in order to interrrelate all parts. This higher than normal 10ft story height is necessary to cater for modern building services which require deeper false ceiling and raised floor spaces.

[232] Notably, a height district zoned on a two-dimensional plan does not inform the actual elevation of the variegated facade planes of buildings lined along those inclined streets.

siting and massing with respect to street pattern influence the quality of views from street space, the case of San Francisco had affirmed the crucial relationship of building height to street pattern over hilly land.

6.1 THE CHARACTER OF KT's STREET PATTERN.

6.11 Overall Street Pattern.

Conceptually, the dual arterial system[233] diagonally across the entire city as a whole links the central belt of the site to afford reasonable accessibility to areas north and south of it. Differentials in land levels in KT have been taken advantage of by using strategic crossings between different traffic carriers to avoid disruption to essential circulation and also provide opportunities to design these crossings as gateways in between different height districts.[234] In between is a central green pathway system connecting to water features and open space or greenery as landscaped pedestrian routes to minimize conflict with vehicular traffic. Buffering the residential new towns, this linear belt consisting of double institutional strips sharing a central commercial strip has a total width of 3000yd based on a walking radius of 1000yd for each strip.[235] (fig 30) This makes possible individual expression on a smaller scale within a total context; smaller systems, such as PUDs,[236] could "plug-into" the greater system preferably at points of scenic quality around the many river valleys.[237] While the city center will be urbane due to rectilinearity,[238] the

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[233] Incorporating a light mass transit reserve and a continuous park spine actting as the main connector to link all spaces and activities. Transit nodes in KT city center will locate high density cores.

[234] For instance, the two arterials are split into smaller roads as they enter the city center and into more and narrower branches towards the city center. While the northern arterial tunnels below the city hall precinct to coordinate with the light mass transit - park and ride system beneath the park, the southern arterial splits on traversing the city center either as a smaller or depressed roads through the fringe of the businness center or bypasses around it further south.

[235] Tay suggested a depth of 3000ft per strip.

[236] Planned Unit Developments are encouraged to ensure more sensitive response to the hilly KT site and avoid the usual montonous grid housing estates layouts.

[237] Otherwise since the parts take their identity from the system "there can be no identity but only chaos of disparate entities engaged in pointless competition." [Shadrach Woods, p152. "System for an Urban Environment."]

[238] For the more intensive central district the street grid organize the distribution of urban land and rationalize the transportation network. The gridiron synthesizes the demands of an orthogonal geometry with ideals of lot and street size. Hierarchy is embedded in the geometry of the network those connecting urban centers are wider and more traffic oriented than the streets that serve private parcels. Since traffic volume through a street is proportionate, though not directly, to the spatial volume of the abutting

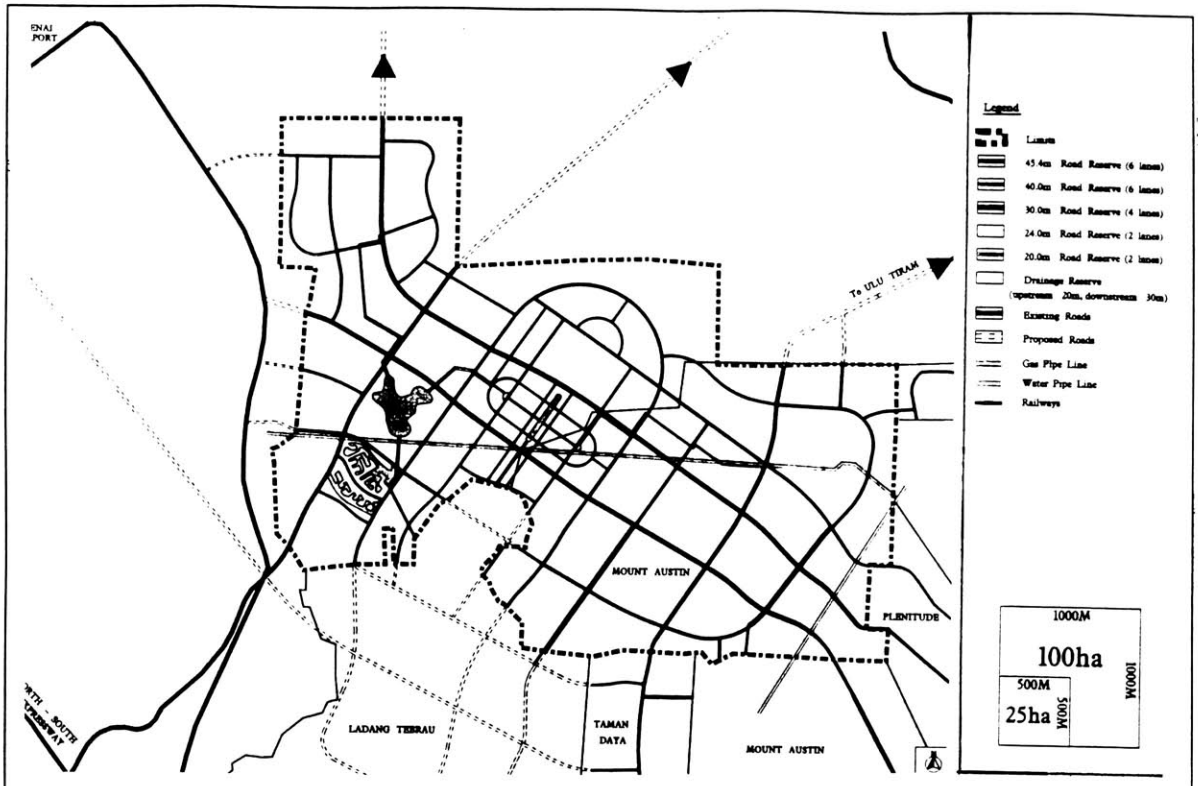

fig 30 KT's Circulation System.

From the site configuration as dictated by the shape of its boundaries, the site can be considered to be divisible into three sectors, the central, the western and the eastern sectors, each defined around its respective northeast to southwest running axis. The grid is only applied to the city center and a few subcenters in the eastern and western sectors. In the outer areas a 1000yd^2 open-ended web system for uniform low densities is suggested to establish a large scale order since it is not as crucial as for the central district to predetermine activity centers that are only more suited to grid systems.

New Towns will be bucolic with only a few large circulation loops. KT's street pattern will reflect changes in topography where land forms are allowed to determine the street and block layout. If topography is disregarded in the layout there would be points too steep even for motorized vehicles or too many bridgings over rivers to continue the grid so that development abruptly cease. Not forgetting that the grid will shape both plots and buildings, a rigid grid system is only applied to the KT's city center to provide coherence by defining the intended ideals of lot and street size, and a couple of smaller central areas in the subcenters of the western and eastern thirds of the site (fig 31). This is intended to create an extreme contrast between downtown and uptown district character.

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building, the street's dimensions must commensurate with their expected functions in relation to (i) transportation, and (ii) building height.

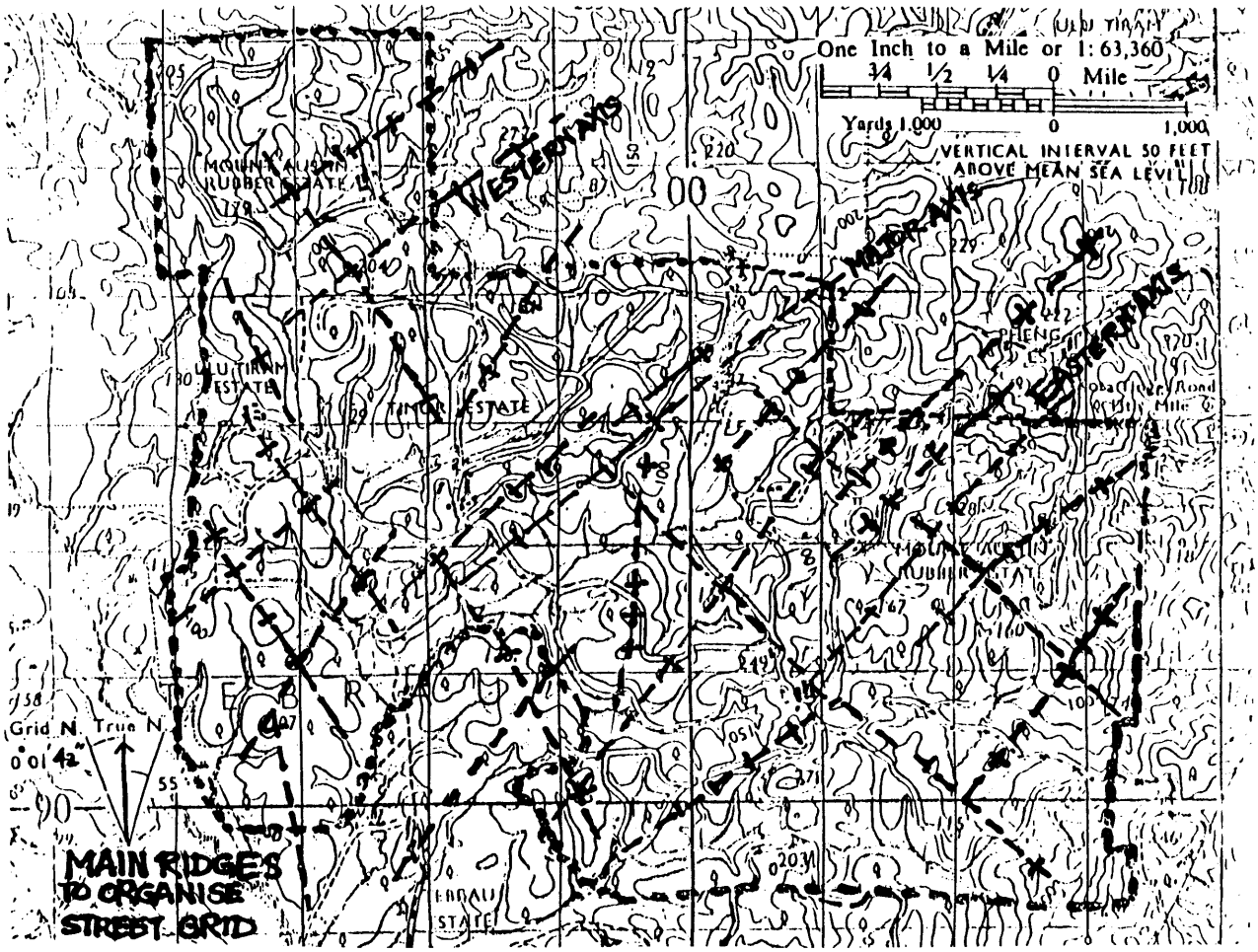

fig 31 Main Ridges To Organise Street Grids.

Main ridges are aligned by and large with the diagonal lie of the land down towards the Tebrau River in the south west. The main grid in the city center is guided by running the setting out lines along the top of the most defined ridges so that the grids are draped to fall symmetrically over each ridge to simulate its contours. As a result each promontory is covered by the local grid like a piece of checkered cloth with its main fold along a ridge and each river valley is the seam where each grid stop and another begin.

Where there are larger rivers bridgings may be necessary though expensive. Along medium size rivers, the grid may just stop so that they form logical breaks for adjusting angling of the local area grids. Especially in the areas outside the central districts, the smallest river valleys shall be harnessed as idyllic focal points around which to organize the cluster of "PUDs," in the manner of traditional Malay villages stepping down slope around the water feature. This is where the traditional Kampung layout is most appropriate as their fine grain organic pattern can sensitively adjust to all the irregularities of the terrain, especially in the hillier areas of the site, and even water courses.

It is important to bear in mind how the original climatic conditions of development which had provoked the concerns about building heights in temperate[239] regions differ from the tropics where KT is situated.[240] At lower temperatures and humidity, *sunlight* is needed to maintain comfort. At higher temperatures and humidities, cooling wind produce the lower humidity needed to maintain comfort. Especially in the tropics. Walkers rather than seated persons generate more body heat and therefore desire lower levels of sunshine and temperature. Where both temperature and humidity are high, shade and ventilation are

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[239] Slab highrise intercept large volumes of moving air to generate strong winds at their base. The greater the exposure to the prevailing wind due to greater volume and momentum of the wind intercepted or the greater width and uniformity of a facade, the greater the wind accelerations at ground level. In temperate climates, the warmth provided by direct sunlight make a difference in the physical comfort. Buildings to the south, east and west of parks and plazas should be limited in height, oriented or shaped to allow penetration of sunlight and minimize shadows they cast on the public space. The plane described by the sun access angle also establishes a maximum street wall height for the buildings. Varying access angles and street wall heights could result from varying street to sun orientations and different street widths. Since it is not possible to ensure direct sun access at all times, it is necessary only during critical times of use of the public space around noon.

[240] Their rationale is the same in principle, though in detail they may not be given the same weight or require reinterpretation when applied to hot and wet climates. For example setbacks for buildings in the tropics are less feasible because they secure no additional rental on account of the dust and reflected heat from concrete roof terraces and more significantly reduce the downward outlook. Moreover, shadows and cold winds affecting human comfort which have to be avoided at all cost in the colder climates are most desirable in the tropics. Rather than the formulaic north-south orientation in the tropics to minmize heat gain, in cold northern climates, the ideal exposure to ensure adequate sunlight is the southern exposure while the east-west orientation is much better than the northern. Therefore the north-south streets most desirable in cold climates are infact most undesirable compaired to the standard east-west streets for the tropics. While it is important to avoid cold winds channeled by tall buildings in cold climates, it is vastly desirable to be able to catch the prevailing winds using the most appropriate orientations in the tropics. The eastwest street is the most desirable type of street, but if they are varied more than 10° from north-south, one side of the street would gain noticeably at the expense of the other.

most vital for comfort. So it is critical to achieve shade and wind in the tropics probably by using shadows from tall buildings and preferred orientations, which are basically determined by the proportion, size and angling of the city's *street pattern* to channel prevailing breeze which blows across the Malayan Peninsula from southwest in April to September and from the northeast from October to March. Hence the street grid respond by having the side streets running parallel to the prevailing wind direction and the main streets against, in the southeast-northwest direction, where the overall rise in elevation of the land is consistent with the prevailing wind direction. Where the slopes are less clear, the reverse may be preferred. In the case where the main streets are against the wind, the building heights must certainly also rise with the land or else the building blocks will attenuate the wind too early. Essential shade from the intense tropical heat can be procured in between suitably spaced[241] and oriented tall buildings from their shadows. A northsouth grid will only provide least sun exposure, but does not utilize the building height for shade let alone oriented to the diagonal prevailing wind flow.

The usual northsouth orientation is only meaningful for slab blocks with their shortest sides facing eastwest. This is not ideal as it will be unsympathetic to the down-slope terrain and the prevailing wind direction which are almost diagonal to northsouth. The longest sides of slab blocks constitute the greatest obstruction to views and bulk impact as compared to the here-proposed regular building block forms. Moreover, on land sloping down west-east-wards, perfectly east-west streets constitute dangerous glare hazard to motorists. Inspired by the landform and the local climate, the predominant angle of inclination of the grid orientations is 36.5°.[242] This inclination of the main axis locates and interconnect the civic, administrative and commercial precincts diagonally down slope along the major ridge in the central district (fig 32), and through vistas to high points, the land north and south of the site beyond (fig 24).[243]

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[241] When buildings are spaced so far apart that "the shadow of one does not even reach the other," the spaces in between them are unimpressionable, because everyone would be an outsider.

[242] For avoiding excessive sun exposure in the tropics, the accepted standard orientation is maximum 45°, being midway between the obligatory northsouth and the most adverse eastwest orientations.

[243] "Because most views in a grid plan city have no terminations, those which do become extremely important; the vistas in grid cities are among the most important urban symbols and are central to the

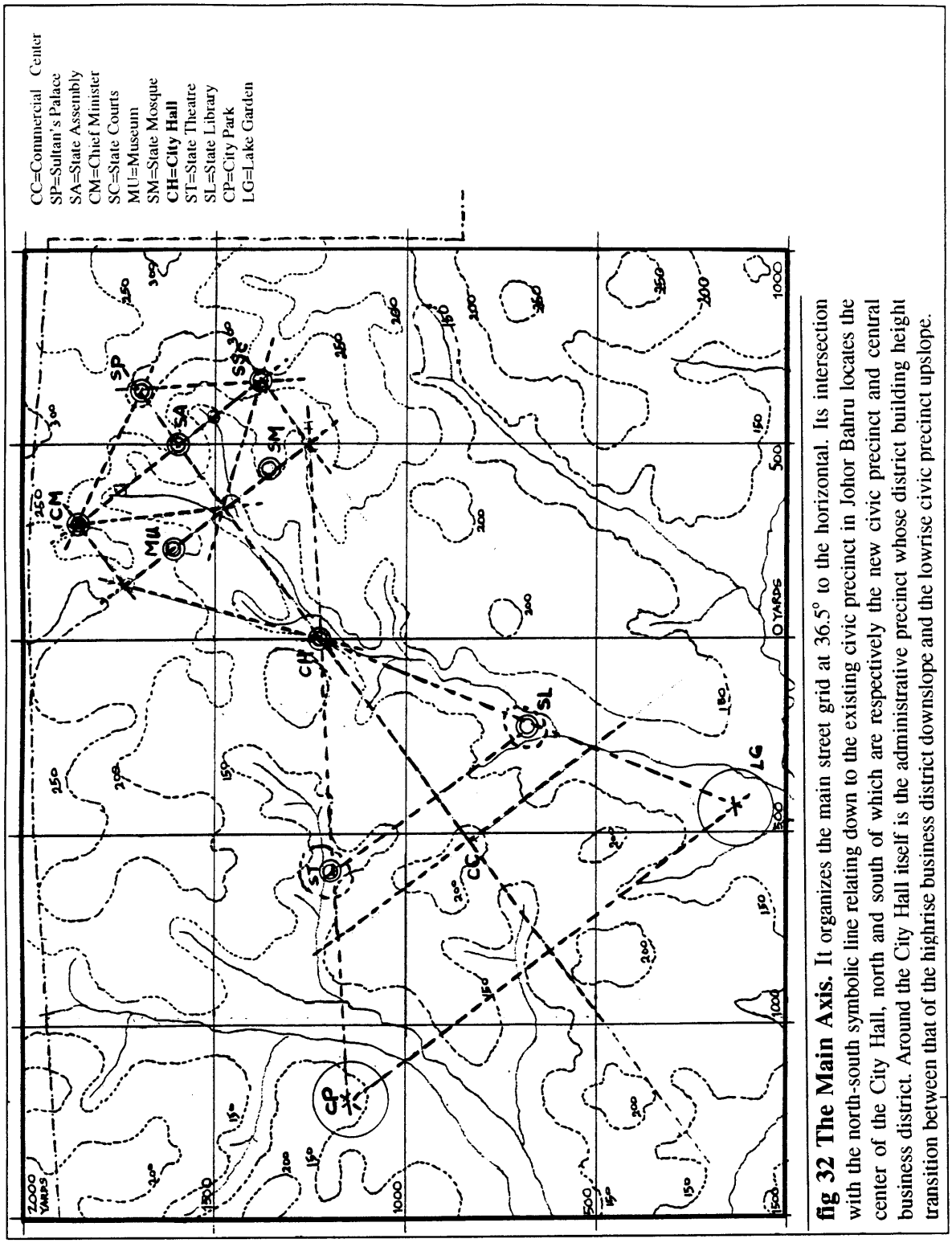

fig 32 The Main Axis. It organizes the main street grid at 36.5° to the horizontal. Its intersection with the north-south symbolic line relating down to the existing civic precinct in Johor Bahru locates the center of the City Hall, north and south of which are respectively the new civic precinct and central business district. Around the City Hall itself is the administrative precinct whose district building height transition between that of the highrise business district downslope and the lowrise civic precinct upslope.

identity of their downtowns." [Dennis Scott Brown, *"Visions of the Future Based on The Lessons of the Past," in ARCHITECTURE FOR THE EMERGING AMERICAN CITY*, School of Architecture, University of Texas at Austin, Journal for Architecture in America, Rizzoli, Vol 1, New York 1985.]

6.12 KT's Street Pattern in the City Center

Jacobs' criteria for great streets are (i) make *community* to facilitate interacting by making it easy to *find* and *access*, (ii) *comfortable* and *safe* and not feel *confinement*, (iii) encourage *participation* regardless of status, (iv) *memorable* from strong continuing impressions, and (v) *representative* as best of its type.[244] Excessive height of buildings along a street in relation to its width, can be oppressive; dark, heavy, and tall buildings seem to weigh on the street when there is no sun or reflected light. The *heights of buildings* along the streets that are remembered best have to do with *pedestrians*, because it is on foot that one can see peoples' faces and statures to be most intimately involved with people and the urban environment to facilitate public socializing and community enjoyment in daily life. It is not a matter of proportions, it is of *actual dimensions.*[245] Street and block patterns are points for giving an initial order to which individual streets can play their roles;[246] by their juxtaposition to one another, individual streets being wider or straighter, longer or more focused than others, help give a sense of orientation to users by giving focus to an area of a city.[247] The amount in a limited area that can be experienced *intimately on foot* could be used to compare cities of different scales with one another by, streets per square mile, different places for people to be, but not necessarily a greater surface area taken up by streets. This permit quantifiable comparisons of some two-dimensional aspects of urban scale, such as the number of blocks and intersections[248]

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[244] Jacobs, 1993. p8.

[245] Ibid, p83. Many fine streets are proportioned (width to height) varing from 1:1.66 to 1:2. London's curved Regent Street gives enclosure with a section of 15 to 18ft walks on either side of a 50ft driveway. Buildings have unified block fronts, 6-7 floors high. Edinburgh's one-sided Princess Street is 96 ft wide with a promenade flanked by a park. Though its built side was originally of four story townhouses, taller buildings of 60ft suit it better.

[246] Jacobs. Ordering streets orientate by bringing comprehension to a district by forming a boundary like Vienna's Ringstrasse, or an attractive spine like Zurich's Bahnhofstrasse and Berlin's Kurfurstendam. San Francisco's Market street is wider, longer than other streets and is the joining street of two different grids. Venice's wider, longer and gentler Grand Canal is the city's orientating structuring spine. Just as the wide boulevards structure Paris, the three wide streets that focus on Piazza del Popolo order central Rome. Amsterdam's horseshoe-shaped canal system which focuses on a central core and the railroad station at the water's edge informs where one is.

[247] Jacobs. The third-dimension of topography and building height and a fourth-dimension of land uses and density can give order and structure by reinforcing or countering the two-dimensional patterns to result in identity.

[248] Ibid. Vast differences in the physical nature of cities are from their visual and spatial complexity in one area versus another in the amount and sizes of spaces, number of available choices of different paths and points. Older cities such as Boston have a finer scale than newer cities measured in the number of

in the same area. Cities designed at very large scale such as Brasilia have very little to be discerned in a given square mile. Thus to create a walkable size city, assumed to be half to one square mile,[249] the eventual height variations on the KT's city center will show the plausible building heights attainable from the distribution of 60% of the total space requirements. The 200yd width (200 x 300yd^2)[250] allows for an economic plan width dimension of at least 70yd for 10-story or taller blocks and provision of a coverage of 60%[251] with a shared half-street-width back to back service alley,[252] and block front continuity. This grid size enables KT to have 69 to 103 ten story blocks and 412 four to six story blocks per square mile, bearing in mind the greater the number of blocks,[253] the closer the street intersections[254] to achieve compact pedestrian scale. Though the 120ft

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terms of the number of intersections and blocks within a square mile, Venice has 1,500 intersections and 900 blocks, Brasilia only 100 intersections and 50 blocks (Lower Manhattan has only 220 intersections, and in Irvine's business district just 15!).

[249]Ibid. In terms of compactness, intensity and density differences in scale of street and block patterns, between older and newer cities stand out. The scale of the older cities are generally smaller and finer than that of newer cities. Over time the patterns become less complicated, the scale of blocks and of street patterns have become larger with their distance from the community's center. The newer is always simpler, more regular and larger scaled as the gigantism in Brasilia or Irvine. The recent jumps in scale may be due to the automobile whose faster speeds make greater distances possible and desirable. As the numbers of intersections and blocks per square mile decrease, the distance between intersections increase.

[250] The 200yd x 300yd street grid size had been generated from factors including Clark's economic lot size (134yd x 67yd), Dundee's typologies (40-65yd widths, fig13), Davidson's estimate (40-60yd widths, fig14). [Clark. New York City's street grid has 100ft wide northsouth streets spaced at 610-920ft, and 60ft wide eastwest streets spaced at 200ft, such that the eastwest rather than the northsouth spacings are closer.]

[251] In distributing the space requirements over KT's city center area in chapter 8, the coverage studied was 40% and 60%. For the desired density in urban conditions in KT's city center to achieve a predominant streetwall height of at least 4 storys, further height studies were done only for 60% coverage.

[252] Shared parking and ramps instead of individual access ramps might prevent the cutting up of the sidewalks by access and egress roads into each site which is harmful to a meaningful pedestrain system. Rear service roads parallel to the main streets like the traditional shophouse arrangement, or a series of transverse roads that formed a fairly tight grid for circulation throughout the area are used in KT.

[253] The block size is an issue because it is related to land parcel size. Without a reasonable plot size control, building heights can be unmanageable, as we shall see in FAR's weakness in the next chapter. (Jacobs, 1993. p304-308. More buildings along a given length of street mean more contributors and different participants; owners with an different economic interests, architects who will not design alike. Community is fostered when things are done differently initially, maintained or modified gradually to add visual interest and continuity, socio-economic diversity, formal variety, more mix of uses and destinations that attract mixes of people from all over the city or neighborhood. Streets with nearby density are more likely to have people on them than those which do not. At least 50 dwellings per acre are possible without requiring 5 storys or too wide streets.)

[254] Ibid. Vast differences in the physical nature of cities are from their visual and spatial complexity in one area versus another in the amount and sizes of spaces, number of available choices of different paths and points. Older cities such as Boston have a finer scale than newer cities measured in the number of terms of the number of intersections and blocks within a square mile, Venice has 1,500 intersections and

wide streets are intended for typical 10 story blocks for the city center eventually, KT's grid size (fig 33) is intended to be wider than adequate for four story blocks to provide

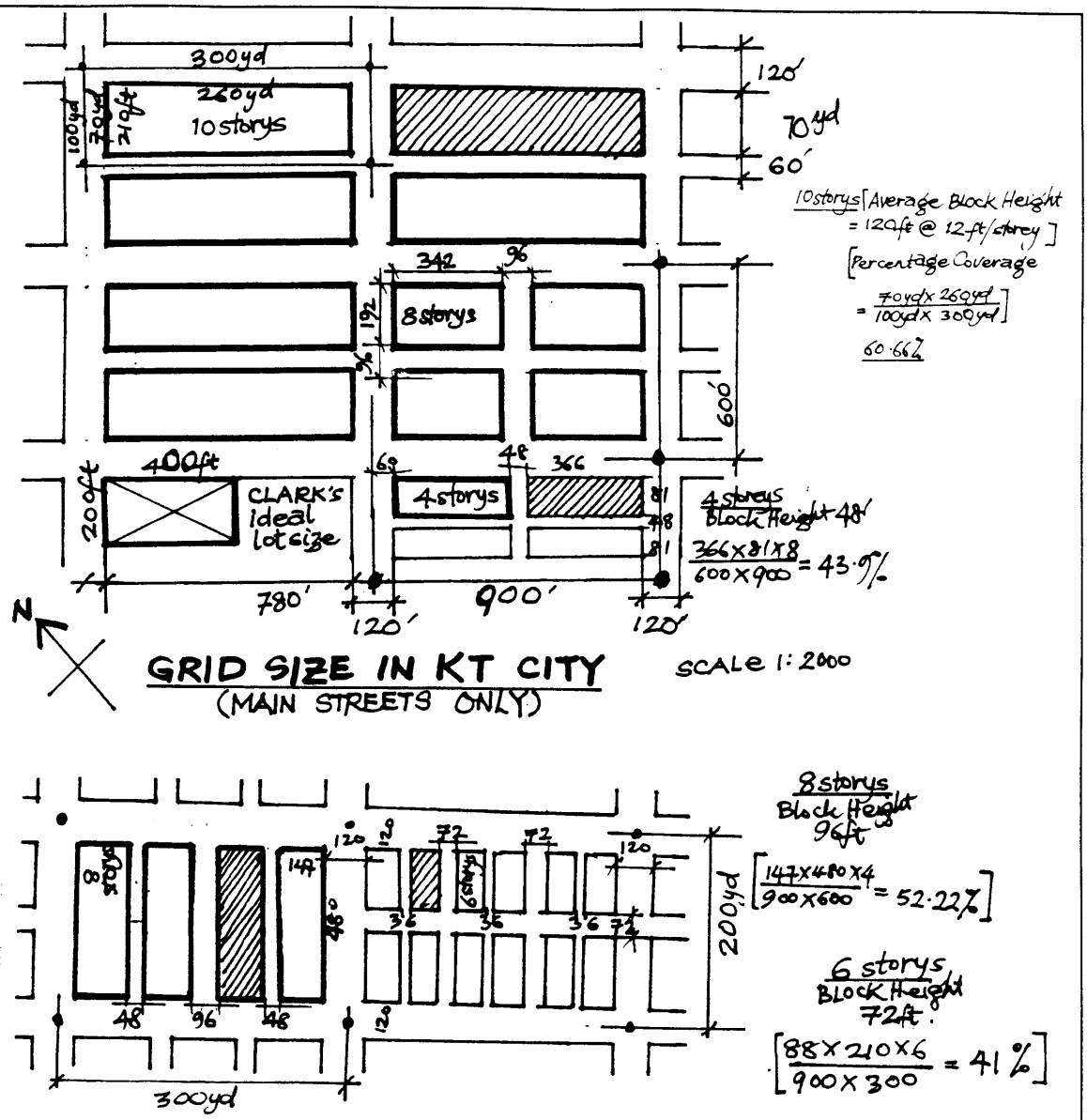

fig 33 Block Building Height to Street Widths and their Coverage in KT City.

Coverage in KT varies from 43.9% (4 storys), 41% (6 storys), 52.22% (8 storys) and 60.66% (10 storys) where the service back alley is at 1:2 ratio (assumed to be half the width of the front street). The front street width to building height ratio in KT is generally 1:1 so that the widest 120ft street widths can accommodate blocks of uniform heights of up to 10 storys without setbacks. However the blocks of uniform heights lower than 10 storys will have their streets within the same 600ft x 900ft grid but their front street and alley widths adjusted accordingly (e.g. six- story blocks face 72ft front streets and 36 ft alleys, etc.) . Compare Manhattan's 610-920ft x 200ft street grid, with coverage ranging from 58.5% to 62.4% (fig 12).

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900 blocks, Brasilia only 100 intersections and 50 blocks (Lower Manhattan has only 220 intersections, and in Irvine's business district just 15!).

for a coordinated covered arcade[255] and open sidewalk system with planting reserves. KT's city center will be confined within a straight rectilinear 200yd x 300 yd (600ft x 900ft) grid for intense urbanity, produced by its deliberate compaction, [256] where 120ft boundary streets (enclosing four and six story districts) will be the widest, lined with uniform six-ten story blocks, and specific pocket parks locate two transit nodes where the tallest buildings (above 10 to 50 storys) may edge, in contrast to outer free-form two-story residential districts which more closely fit the local terrain and drainage patterns. The 200 x 300 grid is extensible to 200 x 600 and 200 x 900 or 400 x 600 and 400 x 900 always to achieve closer spacing with the longer side parallel to the main flow of traffic over the site.[257]Not only do the widest streets directed being in the main flow of traffic for orientation they are joined by equally wide transverse streets around some height districts where they form boundary streets to designate district character in addition to that afforded by flat block height limits.

KT's highest density Central District has two wide diagonal boulevards[258] to define the funnel-shaped district confining the area for tall buildings from encroaching sideways but open for expansion southwards. These diagonals are inspired by the topography since they link the central civic district placed high on the central ridge with a pair of open spaces (a

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[255] Fine streets invite walking, safe from vehicles, and have walkways that permit people to walk at varying leisurely paces with neither a sense of crowding, are comfortable, and offer *protection from the elements without negating the natural environment.* Compared to the arcaded streets of Bologna, Vienna and Berne which offer winter protection from rain and cold as well as shade in the summer, New York City has no such covered arcades because rain is usually very slight.

[256] Ibid. Vast differences in the physical nature of cities are from their visual and spatial complexity in one area versus another in the amount and sizes of spaces, number of available choices of different paths and points. Older cities such as Boston have a finer scale than newer cities measured in the number of terms of the number of intersections and blocks within a square mile, Venice has 1,500 intersections and 900 blocks, Brasilia only 100 intersections and 50 blocks (Lower Manhattan has only 220 intersections, and in Irvine's business district just 15!).

[257] Ibid. Vast differences in the physical nature of cities are from their visual and spatial complexity in one area versus another in the amount and sizes of spaces, number of available choices of different paths and points. Older cities such as Boston have a finer scale than newer cities measured in the number of terms of the number of intersections and blocks within a square mile, Venice has 1,500 intersections and 900 blocks, Brasilia only 100 intersections and 50 blocks (Lower Manhattan has only 220 intersections, and in Irvine's business district just 15!).

[258] Longer, wider, more regular streets such as the Champs Elysees stand out from their surroundings more than shorter, narrower and less regular ones. Broadway in new York , however is irregular in a very regular pattern.

botanical garden to the west and a green to the east, created at confluences of streams and so are conducive for recreational but not construction use) along two naturally diagonal river valleys which as esplanades then form part of the triangular ceremonial route for the city along with the cross plaza originating from the centered City Hall (CH in fig 32).[259] The ceremonial route (fig 42), made up of the two diagonal streets and the transverse green, and linking KT's three main open spaces (municipal field fronting City Hall, City Park and Lake Gardens), is set apart from other streets by its greater width and lining with four straight rows of tall royal palm trees, being the symbolic street system reserved for the city's pageantry of ethnic, religious, national and royal celebrations. By its placement, City Hall transitions the symbolic street system from the triangular loop south around the business center to another formally rectilinear but softer park-like loop north around the civic precinct (fig 34). A continuous 300ft axial promenade extending right from the government precinct on high ground down through the elevated city hall and finally to literally split the lower business district into two eccentric cores which address the main approach from Federal Route 1. An intersecting linear plaza connects to two other major pocket parks around two mass transit nodes within the heart of the business cores. These strategic open spaces are also meant to locate the taller building clusters as focal interest within predominantly lower height districts which need more than the widest 120ft street widths to be comfortably spaced. Similarly, wider spaces permit higher blocks by splayed intersections at strategic locations forming part of a chain of connected public spaces.[260] With respect to this street pattern how could the space requirements be allocated as building heights to further enhance this two dimensional identity?

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[259] The City Hall locates the point of intersection of the vista to the existing capital city down south in Johor Bahru, with the major axis passing from the three peaks northeast of the site to the hill down southwest of the site to terminate the axis. Transitioning between the legislative center positioned on natural promontories on the higher land to the north and the commercial district to the south, the City Hall symbolises the freely accessible civic heart of the city by fronting it to the south with the municipal field for formal functions and north of it, it shares a park with the legislative precinct set within water features adapted from the existing drainage. The highest level legislative precinct has aa additional fourth pole in the Sultan's Palace heading the "three powers" in normal tripartite system of modern democratic systems.

[260] Barcelona's memorable patterns of streets and blocks achieved by having diagonal corners of every block over a large area probably through mandatory setbacks may be accounted for by the city's many fine streets, where buildings are built to their streetlines. The scale of its blocks seem small, because one may experience the blocks ending at the start and finish of the diagonals which become the intersections.

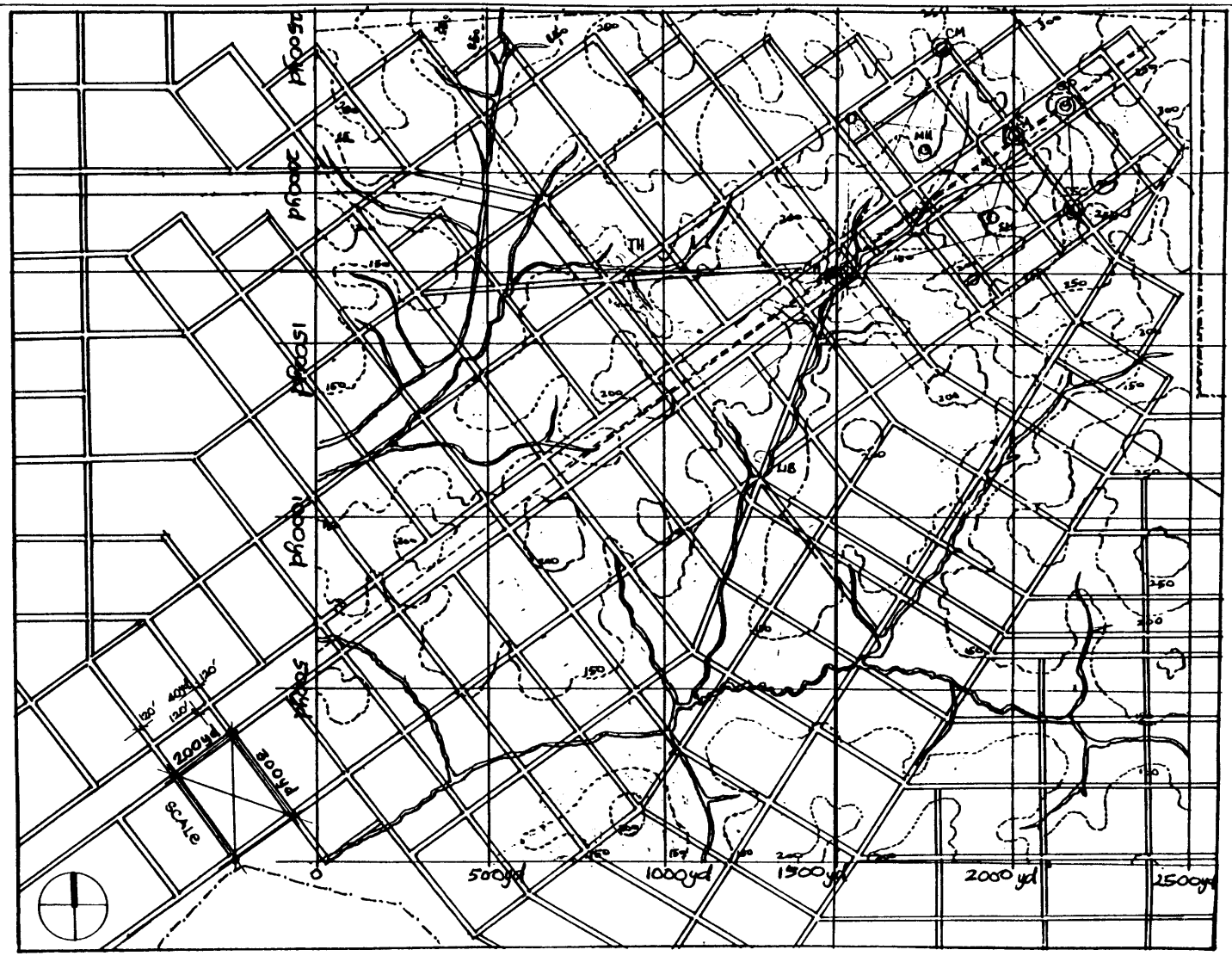

fig 34 Relationship of Grid Module and Topography. This is a preliminary uniform-size grid as the basic module which will be further subdivided as necessary to give the proposed street pattern.

P A R T I V

CHAPTER 7
HEIGHT VARIATIONS ON THE STREET PATTERN

CHAPTER 8
CONCLUSION

CHAPTER SEVEN

HEIGHT VARIATIONS ON THE STREET PATTERN

In some countries, non-physical planners are primarily concerned with the allocation of resources through parcellation and use of land according to projections of future need rather than the three-dimensional effect of their decisions in terms of what may be placed on it in the future. In terms of decision-making, this land use approach is a significant function because it is necessary to allocate, in view of their limited amount of and the competitive nature of the various demands on resources which are basic to the operation of ordered societies. Unless it satisfies a similar basic human need there is no need to be concerned with whether the impact of the three-dimensional form is even important. Because of the intrinsic inequalities created by these decisions to distribute resources, the nature, organization and physical structure reflecting their values and rationale would create inevitable differentials, which is nothing but the very image of the city identified with that particular permutation of priorities according to the relative emphasis amongst the socio-political, economic and power aspects. Therefore, whatever the values concerned, there will be a corresponding image or identity. If that is so, the kind of identity cannot be left to chance, for to do so is tantamount to lacking a sense of purpose. More significantly, it is the very continuous urge to transcend the mere satisfaction of basic needs that enhances the quality of life which gives meaning to securing of the basics in the first place. The body has its needs so has the spirit.

7.1 ALLOCATION OF TOTAL SPACE REQUIREMENTS ON THE SITE.

The tallest building heights will come from offices, hotels and residential condominiums, the lowest from conventional housing and detached industrial properties towards the fringe areas and the mid-range from shophouses, shopping centers, flatted factories or other mixed use types. However, this study will only look at the extent of spread over the KT site as a total volume of space since for a successful downtown, mixed-use is strongly recommended so that strict separation of uses in KT will be rare. But the space requirements for conventional housing and industrial uses will be located outside the

central areas and therefore will not be considered. The central area is intended to be at least above two storys and predominantly four, six or ten storys districts to deliberately create high compactness and sharp spatial edges for the urbanity distinct from the rest of the mostly single and two story sprawl. Taking into account that some fraction of the total 100% anticipated volume of space has to be allocated to subcenters and neighborhood centers, 100% (fig35a, 35b), 60% (fig35c, 35d) and 40% (fig35e, 35f) of the total space is allocated for the core area of KT's city center depending on the specific land use type and their relationships to one another on the site supposedly according to assumed standards for landscaping and open space. Each of this fractions of the total amount of space is then spread over the land at 60% and 40% site coverage. Fig 35c for instance show the extent of the land and topography covered of 0.55625 square miles by 60% of total space absorption in KT city at 60% site coverage, if all buildings are four storys high, or cover one-fourth of 0.55625 square miles if only one-quarter of all the buildings are 4 storys high. This helps to assess the combinations of blocks of flat-height-types to have a grasp of the kinds of height variations as the number of storys of the tallest block height type is reduced[261](fig36A, 36B). In fig 36B for example, permutation B would cover a total land area of 0.224 square miles if the mix of building heights consists of one-quarter each of 4, 10, 30 and 50-story domains. Each domain is a subdistrict of several blocks of the same number of storys in height. A 60% fraction of the total space at 60%[262] site coverage (fig36B) is then adopted for further exploration in the process of apportioning the domains

[261] For instance, what is the spread of the total space and the combination of say 4, 10, 20, 50 story heights when the tallest height is say 50storys, and so on? (This allow some adjustment using the residual 60% or 40% space to be apportioned to fill-out the areas further out from the core area. The footprints of the blocks of the total space could then be ascertained to obtain a grasp of the highest number of stories and their coverage, thereby informing the order of the building heights possible. By projecting these footprints vertically for each block representing all the allocated space of a flat height-type, the size of the city center of a flat height block can be determined guided by the consideration to create a walkable city to estimate the extent to which such blocks of space will cover the site. This assist in sizing the extent of the spatial distribution in relation to the topographical features when superimposed on the land. Intuitively, the 40% result is not consistent with the idea of a central core of reasonable mass and density. Again the 40% coverage is thought to be too sparse for urban density, but it was done to allow some comparative idea of the difference in resulting maximum heights that could be achieved between at least two different coverage standards.)

[262] From fig 33, the adopted 200yd x300yd grid module corresponds to more than 40% coverage for 4story or higher block heights. In fact the blocks taller than 10storys cover more than 60% of the land.

the domains of graduated building heights according to numbers of storys on the half square mile and one square mile extent of the site (fig37A, 37B).

SUMMARY OF SPATIAL REQUIREMENTS USED FOR THE BUILDING HEIGHT VARIATIONS ON THE SITE

Table 7A Fractions of Space Absorption (from section 5.3.2)

Total Space To Be Absorbed By KT City/million ft^2			
Landuse Type	**100%**	**60%**	**40%**
Offices	5.74	3.34	2.23
Retail	6.87	4.12	2.75
Shophouses	18,000	10,800	7,.200
Condominiums	27.15	16.29	10.86
Hotels	4.45	2.67	1.78
TOTAL / million ft^2	62.04	37.22	24.82

Table 7B 100% Space Absorption

	Total Land Coverage in square miles (mi^2)	
62.04 million square feet	Core Size/coverage 2.22537 mi^2	
Site Coverage	**60%** (fig 35a)	**40%** (fig 35b)
Total Land Area Required (mi^2)	3.70880	5.56325
Building height/number of storys		
100	0..37080	0.05563
75	0.04945	0.07417
50	0.07417	0.11126
30	0.12362	0.18544
20	0.18544	0.27816
10	0.37088	0.55632
4	0.92720	1.39081

Table 7C 60% Space Absorption

	Total Land Coverage in square miles (mi^2)	
37.22 million ft^2	1.3352 mi^2	
Site Coverage	**60%** (fig 35c)	**40%** (fig 35d)
Total Land Area Required (mi^2)	2.22530	3.33800
Building height/number of storys		
100	0.02225	0.03337
75	0.02966	0.04450
50	0.04450	0.06675
30	0.07416	0.11125
20	0.11125	0.16688
10	0.22250	0.33377
4	0.55625	0.83442

Table 7D 40% Space Absorption

	Total Land Coverage in square miles (mi^2)	
24.82 million ft^2	Core Size/coverage 0.8902 mi^2	
Site Coverage	**60%** (fig 35e)	**40%** (fig 35f)
Total Land Area Required (mi^2)	1.48382	2.22573
Building height/number of storys		
100	0.01483	0.02225
75	0.09784	0.02967
50	0.02967	0.04451
30	0.04946	0.07419
20	0.07419	0.11128
10	0.14838	0.22257
4	0.37095	0.55643

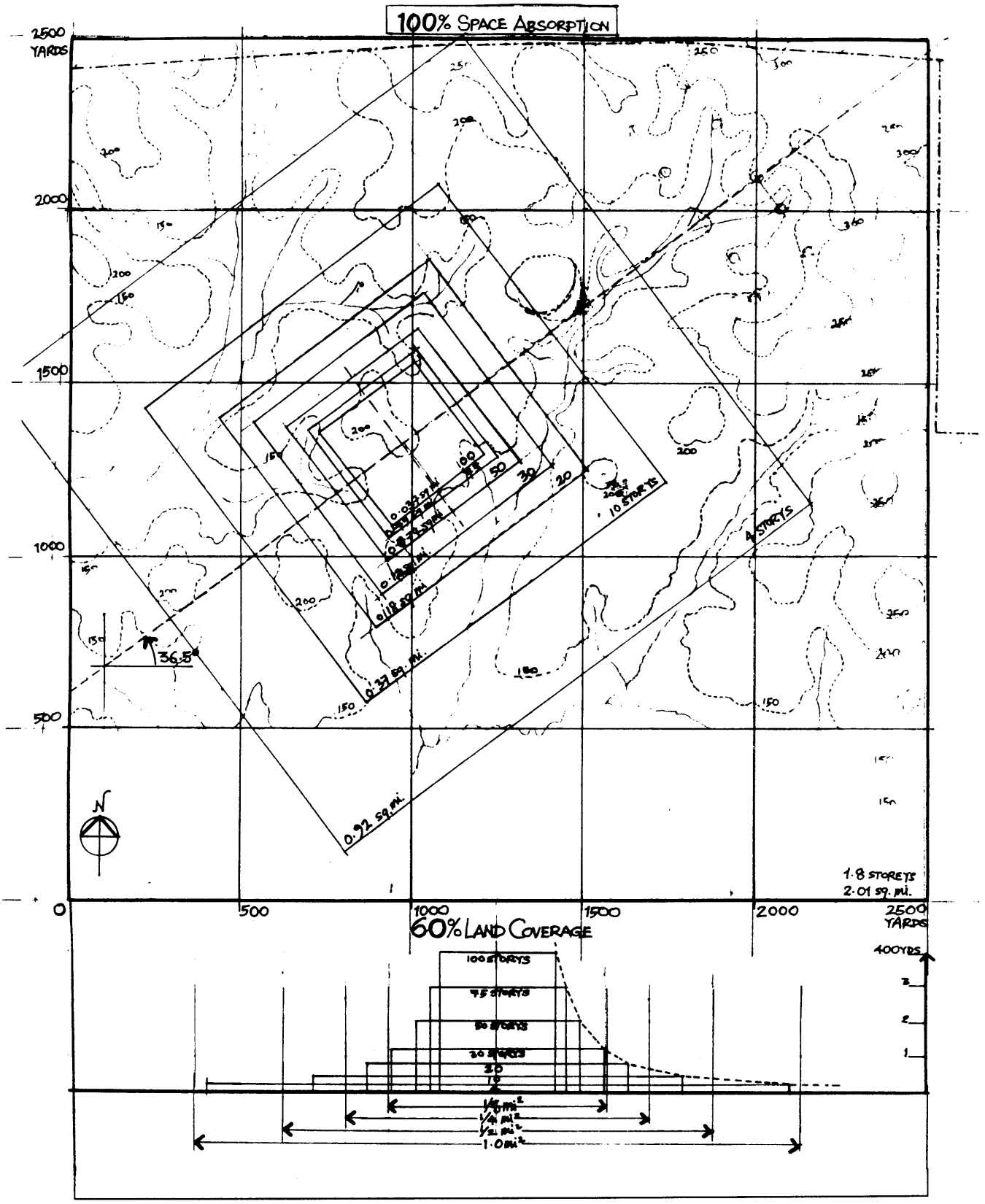

fig 35a Assessing Domain-Types For 100% Space Absorption. At 60% Land Coverage.

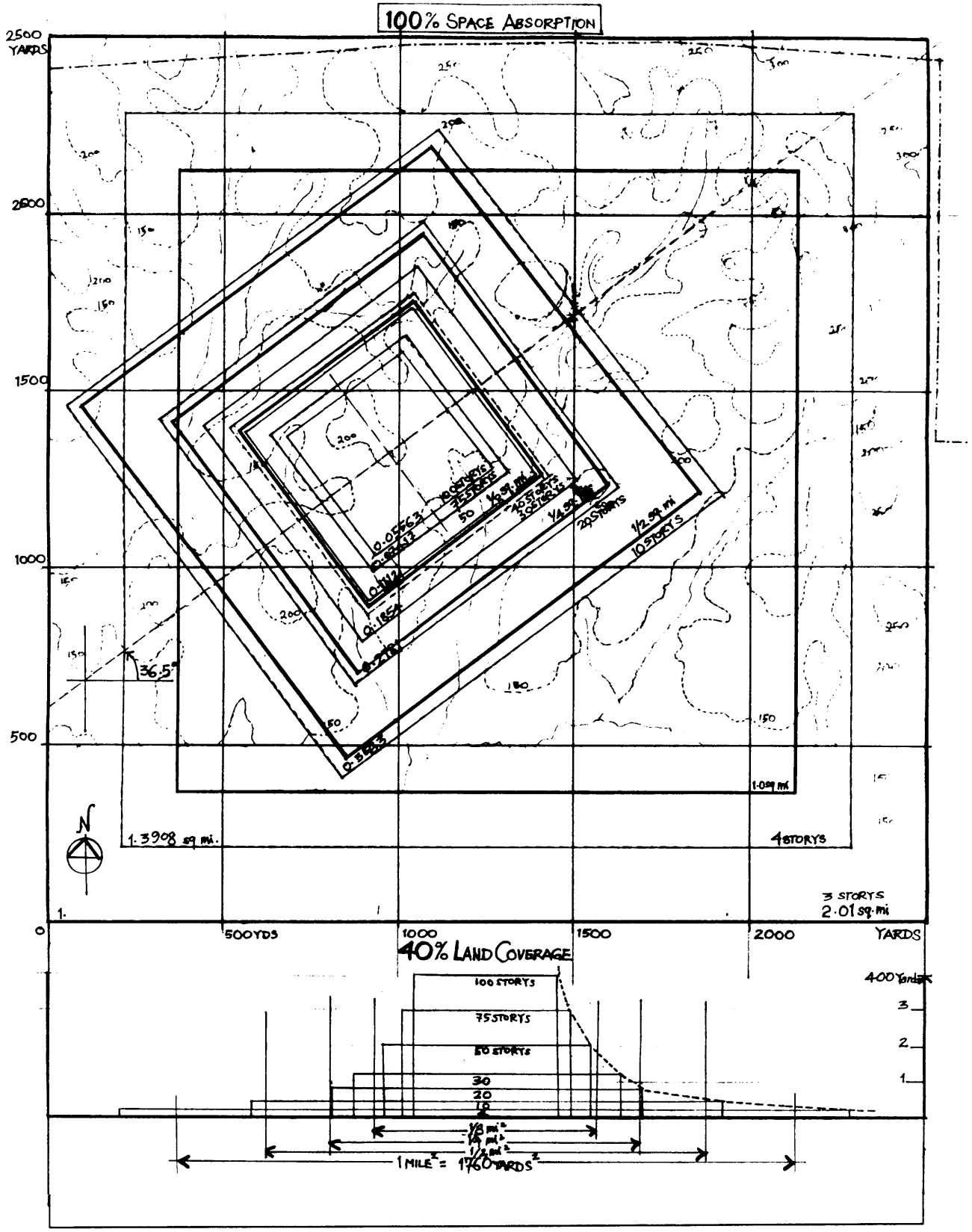

fig 35b Assessing Domain-Types For 100% Space Absorption. At 40% Land Coverage.

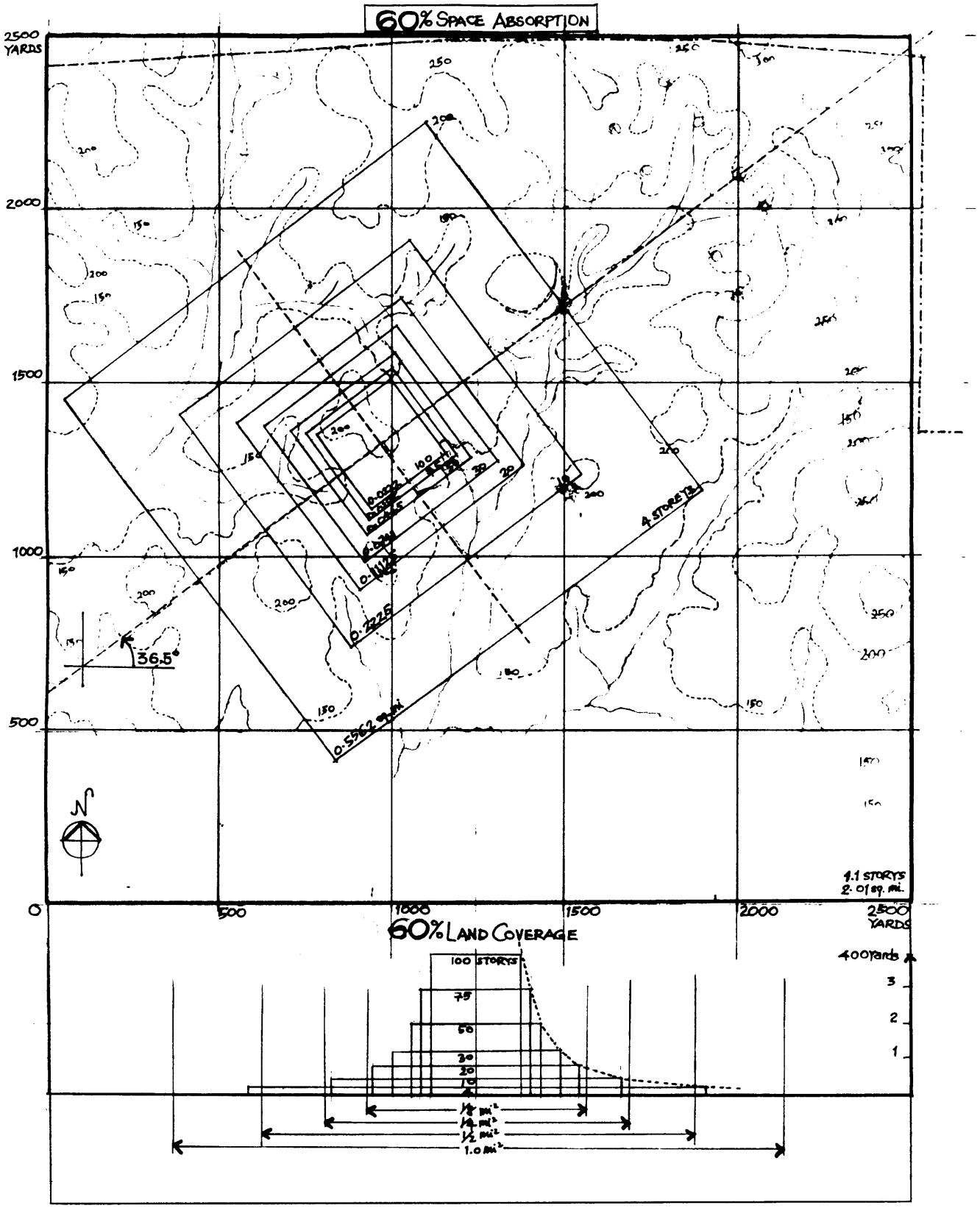

fig 35c Assessing Domain-Types For 60% Space Absorption. At 60% Land Coverage

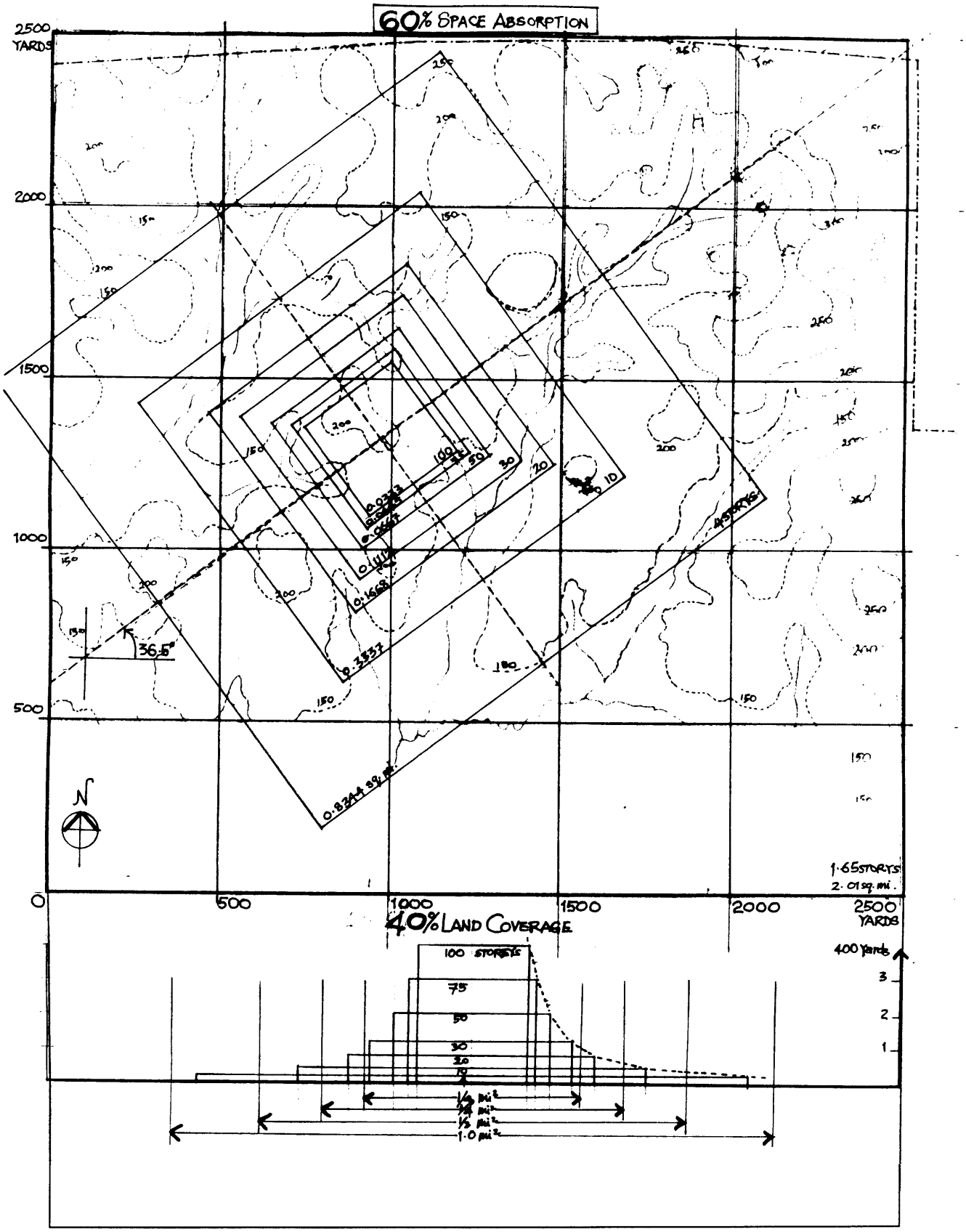

fig 35d Assessing Domain-Types For 60% Space Absorption. At 40% Land Coverage

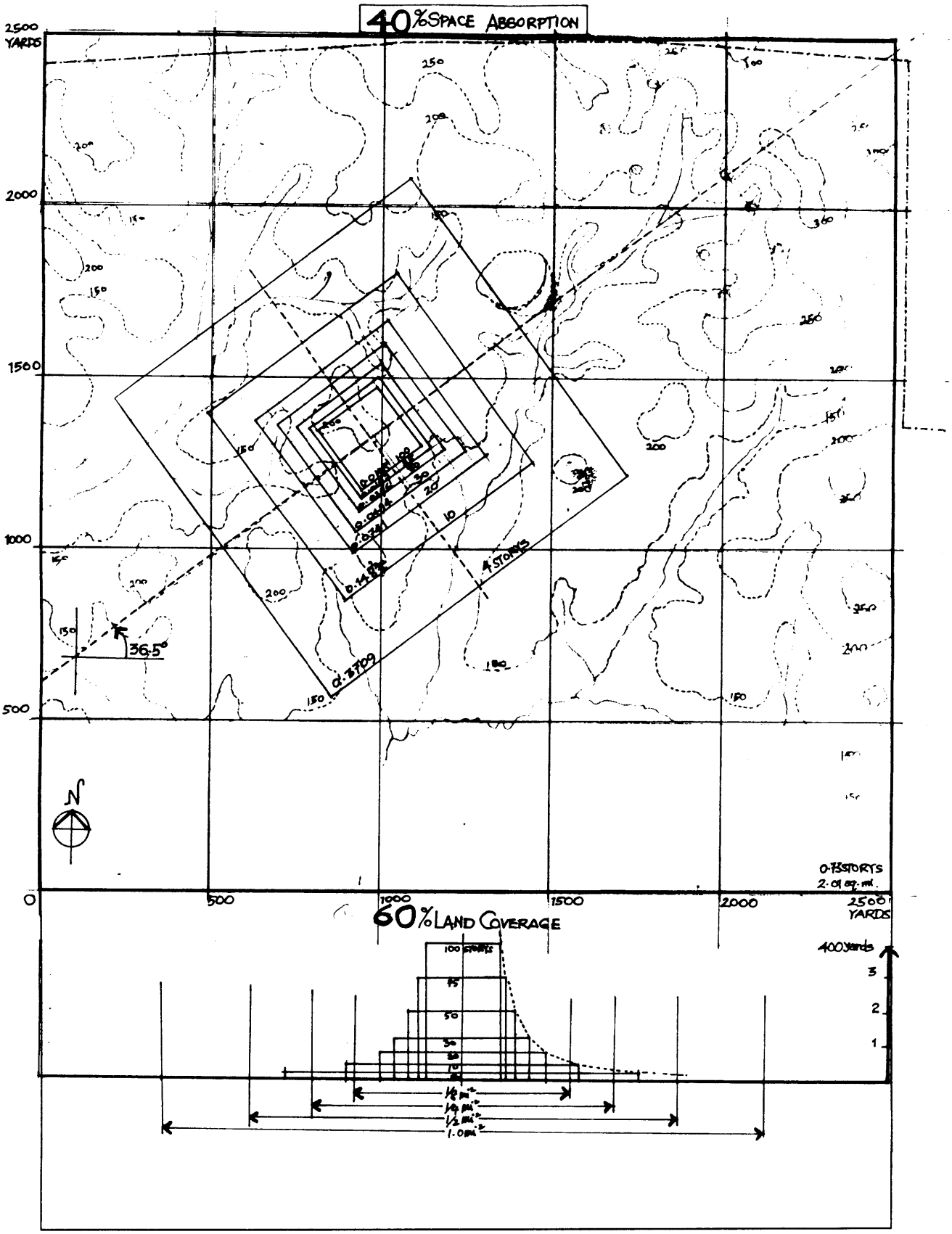

fig 35e Assessing Domain-Types for 40% Space Absorption. At 60% Land Coverage

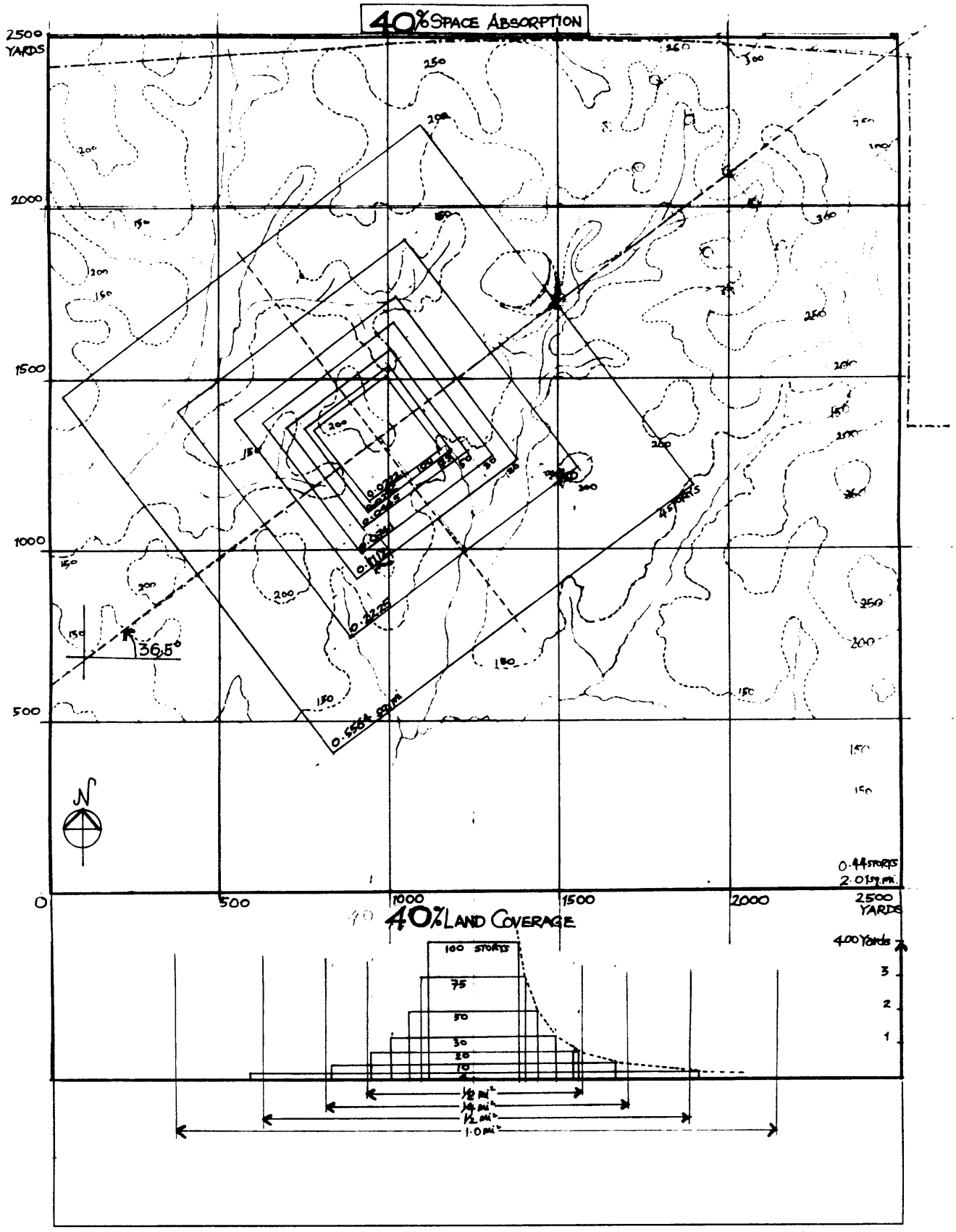

fig 35f Assessing Domain-Types for 40% Space Absorption. At 40% Land Coverage

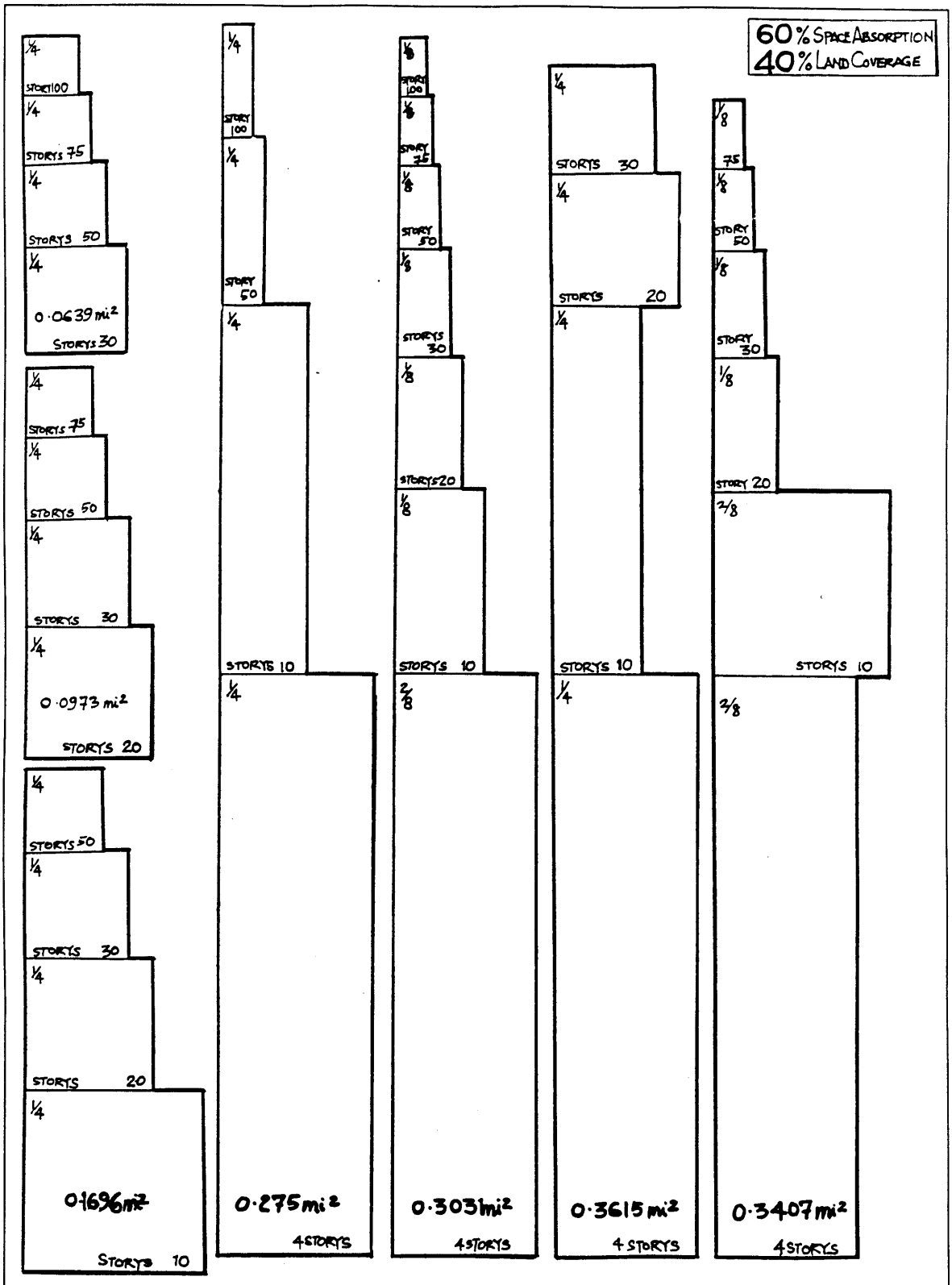

fig 36A KT's Total Land Coverage At City Center At 40% Land Coverage.
Probable Permutations of Uniform Height Domains At 60% Of Total Space Absorption.

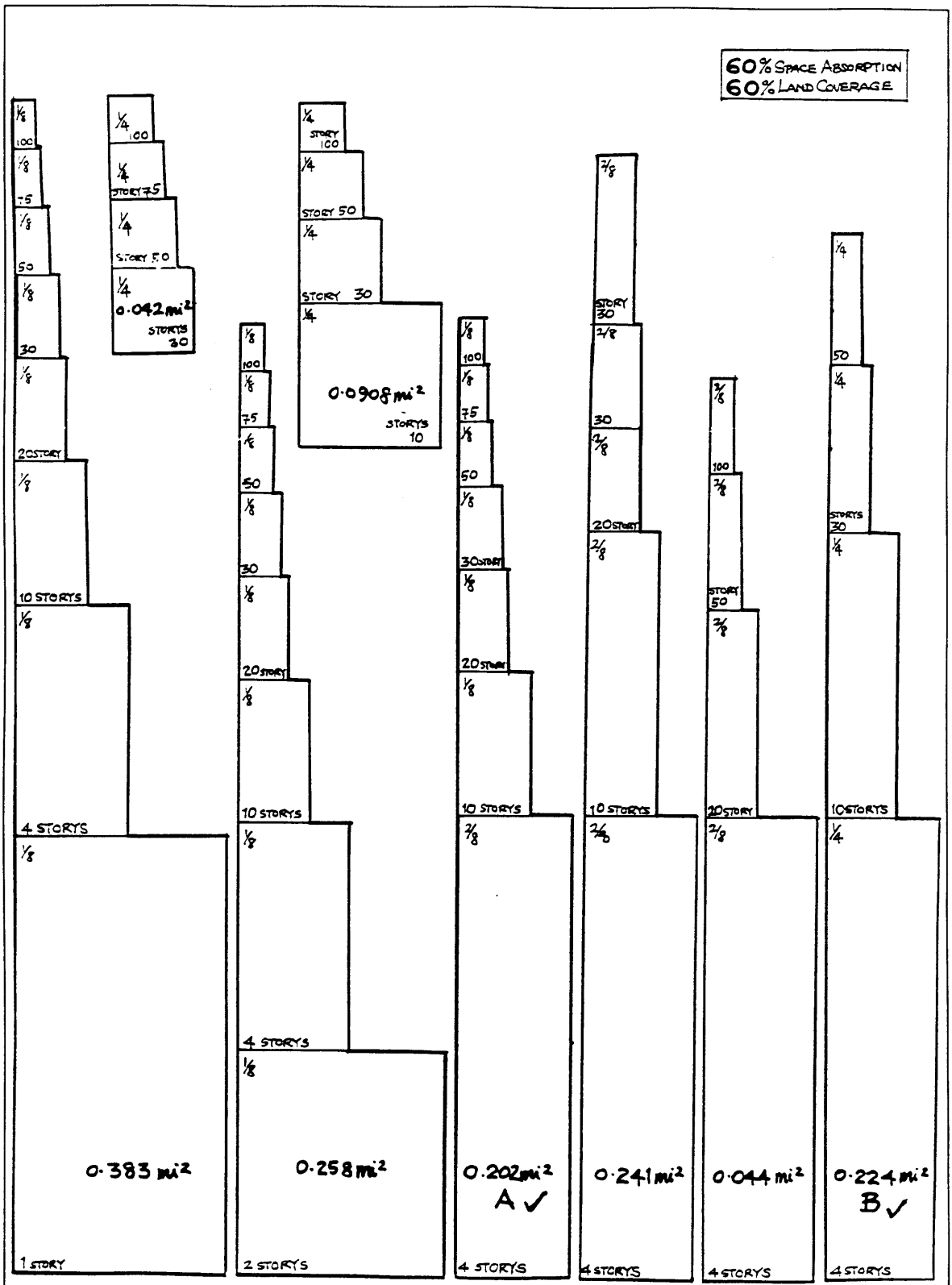

fig 36B KT's Total Land Coverage At City Center At 60% Land Coverage.
Probable Permutations of Domains of Uniform Heights At 60% Of Total Space Absorption.

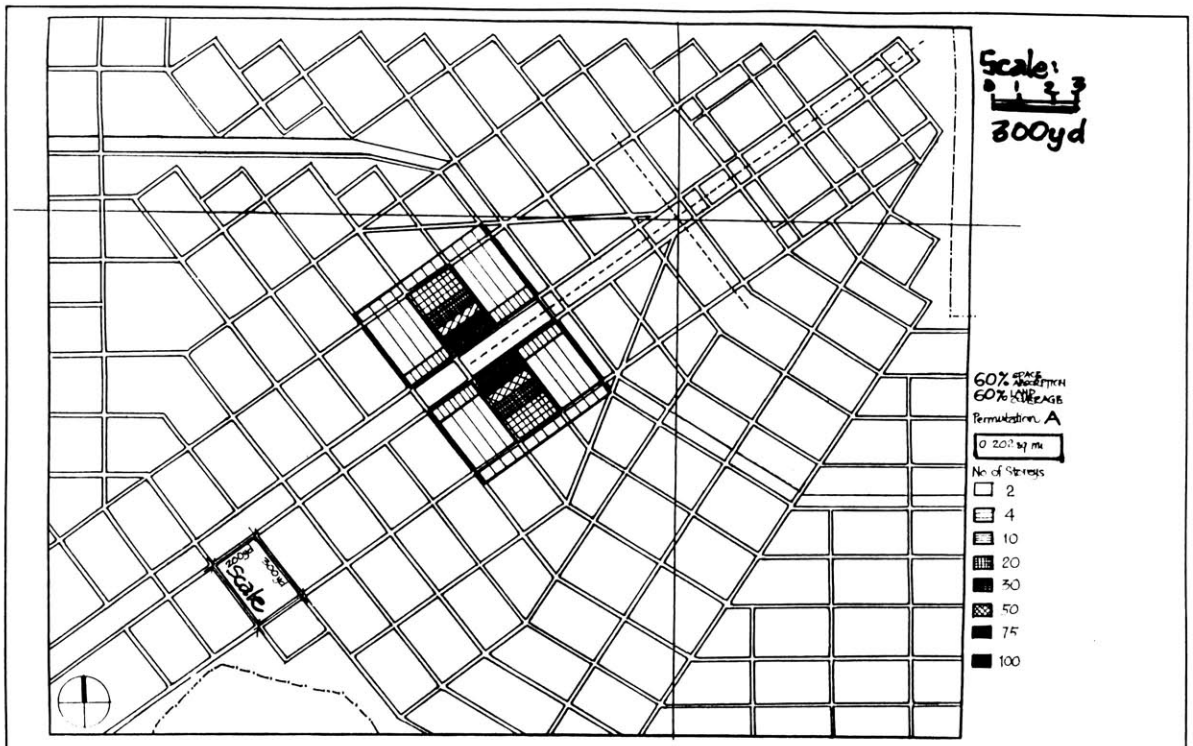

Fig37A Domain Height (Number of Storys) Permutationfor Alternative A of fig36B

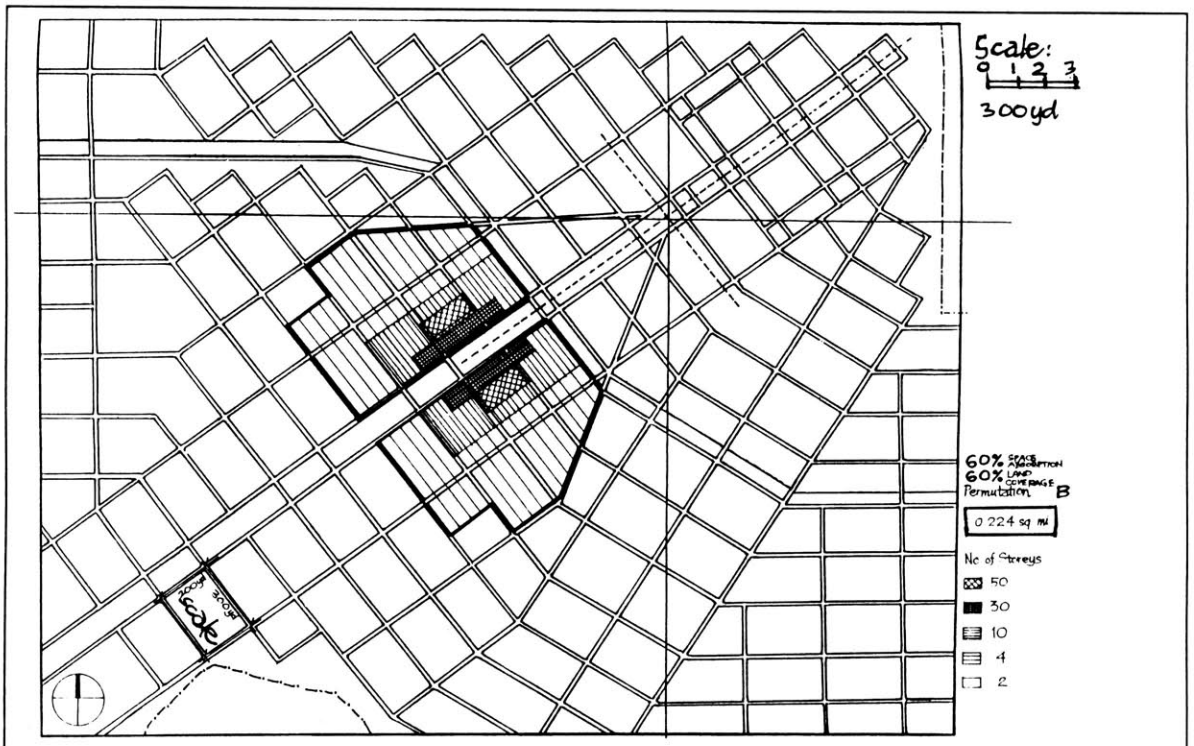

Fig37B Domain Height (Number of Storys) Permutation for Alternative B of fig36B

7.2 THE HYPOTHESIS ON CONDITIONS FOR ACHIEVING IDENTITY

Jonathan Barnett singled out the three "vices" of design plans that "do not take into account (i) economic, (ii) political, and (iii) social feasibility."[263] Assuming that these are the major aspects which are often ignored by designers, it would be desirable and essential to incorporate their influences into every design plan. For testing the reliability of the design, the criteria will test their cogency that reflects their priority in either economic, political or social feasibility. This then will become the test of the basic reliability of the design. The additional test of aesthetic validity would be visual excellence of the cityform at both the human scale and at a distance. The best identity is the one most feasible that simultaneously satisfies both sets of criteria, reliable by being well balanced in the non-physical priorities and also valid in response to the physical characteristics of the site.

Attoe summarized the measure of a skyline's effectiveness as a vital "icon of urbanized culture," reflective of the city's political rituals, economic behaviors and social values in four ways: (a) an expression of political and social behaviors related to the conquest of heights, (b) an index of cultural processes, social values, and dominant life-forces, (c) sheer visual pleasure from a harmonious composition of building shapes and (d) as a symbol for collective identity. Coincidentally, (a) and (b) are similar to those concerns here called "non-physical priorities," while (c) and (d) those physical aspects recommended here especially topography. Hence the qualities in (a) and (b) are evaluated under Reliability, (c) and (d) are under "Validity." When as many of these aspects are present, the city identity has "Feasibility."

7.21 THE HYPOTHESIS:

"Good Identity occurs when non-physical and physical aspects are complementary."

When one of the three non-physical aspects of socio-political, economic and power factors in a city is emphasized over the other two factors, say power is the priority over the socio-political and economic factors, then the identity of this city is one which reflects this overriding emphasis on power. If this emphasis on power could also be reflected in

[263]Barnett, 1982. p239.

close fit to the physical aspects in this city, such as its landscape, then the formal expression of this power emphasis is highlighted further by the form of the landscape. The landscape itself is also enhanced by the way the built- forms that emphasize power is laid on the landscape. For example where the precinct of power, say a government center, requires more space around it with taller buildings further away from it, the impact of the presence of this power in the vicinity of the government center will be intensified if this government center is laid over that part of the landform which is a valley rather than a ridge. On the other hand, if the emphasis is on economics, where intensive the use of land to maximize investment yield is called for with higher intensity nearer the center, the increasing heights of buildings towards the center is increased if the group of buildings sit over a mound rather than flat land.

7.21.1 PREMISE A: Response To Non-Physical Priorities

Society operates on decisions based on the rational balancing of cost and benefit, which is broadly, an economic attitude. Because cost and benefit are relative to competing interests, settlement would be by political manipulation of influence. If there is no cut and dry answer, when resolution depends on imposing a point of view, then such conflict is a matter of decision, by whoever is in command or has higher authority. Chapter 2 inferred that the question of identity is a conjectural one whose resolution is decided by the aspirations and interpretations of the ascendant privileged group or elite.

As concluded in Chapter 4, building height is a function of many factors,[264] but they basically fall into one of three categories of the socio-political[265], economic and power factors. The power and economic factors are more potent than the rest; the economics

[264] The non-physical priorities concern the relative emphasis on either power, economics and socio-political factors as already discussed in chapter 4. Physical priorities here refer to the visual aspects of the man-made environment including topograpahy and its response, the presence of landmarks and urbanism.

[265] The socio-political factor seems to be a moderating factor in two ways (i) as when couched as public rights are perceived to being transggresed by private interests, and (ii) utilised as tools in various forms of political patronage. However, the impacts from of the social factor is clearer at the level of the streetscape than in the skyline, probably because all fair-minded people are similarly endowed in terms of sensory perception to permit greater agreement on what is the right human scale which tends to favour lower building heights more compatible with human dimensions.

factor is not as influential as power. Power is the predominant factor in affecting building height. If power is the capacity to sway the favorable outcome of influence, and identity is expression in building height, then power is the determinant of the identity based on building height. Further, unmanaged change in building heights in themselves may easily diminish the identity of a city unless they are initially clearly and consciously composed. Clear and consistent strategies are necessary to maintain the identity, particularly its skyline image needs to be constantly monitored and updated, given inevitable change over time. Because priorities change over time, the maintenance of that particular identity depends on continued support from an authority whose power endures and maintains its preference for that priority. For example, an identity that reflects emphasis on the economic aspect will be more enduring if the same government that emphasize economics continue to stay in power for a long time or successive governments too maintain economics as their priority.

7.21.2 PREMISE B: Response To Physical Priorities

The natural environment refers to such natural endowments as water and land resources. These natural features may be present in interesting configurations to give the most attractive natural environments. The more responsive a city is to its natural environment, especially topography, the better its identity by simply working along with it. The good *man-made environment* refers to the high proportion of excellent architecture such as the presence of many individual landmark buildings, and the combined effect from their placement with respect to each other at the human scale at the ground level of these buildings. Landmark buildings are those that contribute significantly towards a quality skyline and can stand on their own almost anywhere. Lesser buildings need to enhance each other when there can relate in such a way as to bring out the best qualities in each other as a group which they individually are unable to manifest. Where there are landmark buildings and other lesser buildings are sensitively grouped to effect overall urbanistic compositions the resultant man-made environment is excellent. Even poor man-made environments but well sited on quality natural environments could give good identities. When sited on featureless land, cities with both landmark buildings and effective urbanistic

groups give great identities. If these great cities are also founded on quality natural environments, their combination create wonderful identities. The better the quality of a city's man-made environment, the better its identity. Then if a quality man-made environment sensitively complements its attractive natural environment, they would reinforce one another to manifest the ideal identity by being in perfect harmony with each other. Therefore one could assess the quality of a city's identity based on the combined contributions from its natural and man-made environments.

7.21.3 COROLLARY:

Response To The Sum Of Non-physical and Physical Priorities

From premises A and B, the corollary is:

"Good Identity is achieved when the Physical complements the Non-Physical priorities."

In terms of the natural contribution, San Francisco is less sensitive than Boston in relation to their respective topographies. In terms of urbanistic order in the man-made contribution, Washington is stronger than New York City. Just as Washington and Boston could be grouped as having the advantage of their attractive topographies, New York City and San Francisco could be paired as disadvantaged in their topographies. From this I would hypothesize that the identities of Washington and Boston are superior to the identities of New York City and San Francisco. Confining the discussion to the civic precincts, I would say that because the overall architectural quality of central Washington is superior to that of Boston's, and the urban quality from intense intensity in New York is superior to San Francisco's, the identities of these four cities could be ranked accordingly.

Civic action by business groups (which may have obvious economic motives) and citizen groups also make a major difference, and as local government is so important to identity, the unwavering support from Provincial Chief Ministers and City Mayors is essential. In the context of Malaysia (i) the general population is not used to civic action, while in Johor State (ii) the local government has relatively more political autonomy than other states. At both levels, the Federal and Johor State governments are pro-development. In

terms of civic action, the social aspect will unlikely be given any great emphasis. In terms of economics, it is of great priority. Power however is of top priority because of (i) its dominance over economics for the reasons already discussed above, (ii) the rationale of this city being a capital city, where the power identity must be emphasized be it favoring the expression of the power of governmental authority (a dominant party in an ethnic coalition), religious symbolism (Islam being the majority faith and official religion), or Malay dominance (structure of cultural-political representation), and (iii) the presence of royalty in the country's rotational system of Constitutional Monarchy at the national level and the Sultanate at the State level. The adopted criteria is **Permutation I** as the one closest to representing the current[266] condition in Malaysia, as in tables 7E and 7F. Permutations V and VI may be unlikely; and in table 7F, permutations II and IV may be negligible.

Table 7E. The criteria for reliability (based on non-physical concerns)

	Permutations					
	Power		**Economic**		**Socio-political**	
Non-physical Priorities	I	II	III	IV	V	VI
1	power	power	economic	economic	socio-political	socio-political
2	economic	socio-political	power	socio-political	power	economic
3	socio-political	economic	socio-political	power	economic	power
CASE STUDIES	KT[267]	Washington DC	New York City	San Francisco		Boston
Topography	3	4	1	3		2
Topo-response	2	1	4	2		3
Landmarks	4	1	2	4		3
Urbanism	2	1	4	4		3
IDENTITY	2	1	3	4		2
RANK	**?**	**1**	**3**	**4**		**2**

[266] The order of these priorities are not static, as Robert Cambell observed, "If the skyline is a graph of power worship, then we are in an age where the towers of finance have replaced the church spires and state domes as the symbols of transcendence." ("Welcome to the future," Letter from Hong Kong, Boston Sunday Globe, May 1, 1994.)

[267] KT's topography is not that distinctive except that it is rather evenly undulating and therefore relatively much more interesting than sites which are completely flat. New York's location on a long narrow island is dramatic compared to Washington's meek undulations. San Francisco has the Bay and a low hill, but Boston is exquisite as a thin peninsula with water on three sides though little of its original three hills remain.

Table 7F. The Criteria[268] for Validity (based on physical concerns)

Permutation		I	II	III	IV
Emphasis	Ideal	**Power**		**Economic**	
		Economic	Socio-political	Power	Socio-political
		Socio-political	Economic	Socio-political	Power
Skyline	Jagged	c	b	b	a
	Flat	b	a	c	b
Streetscape	Highrise	2	3	1	2
	Lowrise	2	1	3	2
Desired Identity	Yes/No	**Yes**	No	No	No

7.21.4 The level of fit between the hypothesized identity and reality is high.

Table 7E showed that the degree of fit between the ranking of the case study cities is quite consistent with the premises that harmonious response in terms of both man-made and natural environments is essential to good identity. The case of Washington and Boston stand out. Generally, the observation is that where the political factors are most important, greater control is expected and thereby more tolerated. The capital cities of the three most powerful countries all have relatively low buildings in their political core. Imagine the damage to the respective identities of Washington DC, Moscow or Beijing when tall buildings are permitted say in just outside not to mention within the Forbidden City! While the relatively low building heights of Beijing and Moscow are inherited from historical technologies, the building heights in Washington which had been deliberately kept low would most unlikely be raised even if the most futuristic construction techniques of the technologically most advanced country is available. Especially in Paris, tall buildings are fortunately relegated to the La Defense area where their functions are purely economic,

[268] **Evaluation criteria:** In order of desirability, the choice of skyline quality from the flattest to the most jagged is indicated by a>b>c, while the choice of streetscape in terms of building height is indicated by 1>2>3. Where the power factor is predominant, flatter skylines are preferred (a for flat, b for intermediate, c for jagged) and lower building heights are required (1 for low, 2 for medium, and 3 for high). Where the economic factor is predominant, the preferrence is for the most jagged skylines (a for jagged, b for intermediate and c for flat) and the tallest building heights are most desirable (1 for high, 2 for medium, 3 for low). Because the social factor is often not as clear cut as the power or economic factors, it is of intermediate importance. For instance, public housing could either be the lowest lowcost terrraced houses or the tallest blocks of flats. When the social factor is more important than either the economic or the power factors, its intermediate effect it would rank be ranked 2, and both the remaining power or economic factors will be ranked 3.

away from the medieval low rise center. The CBDs' main function appear to be for the tallest buildings to maximize profits by squeezing the greatest amount of leasable floor areas from their land.

The tables above do not serve the purpose of ranking the case study cities in any conclusive way for direct comparison, because the sources of their respective identities are very different nor is there much similarity in any particular aspect. What it serves is that even based on the main issue of topographic response, it demonstrates the very different degree of their responses though it is clear that all of them have their identities attributable to large extents to their topographic characteristics. However the table sets out the range of contrasts that is possible, each a direct result of a their respective combinations of the same priorities but in varying importance. KT shall then be guided in its search for identity by deciding which permutation is more akin to its own situation as regards its site and its location within the conditions in Malaysia.

From table 7F, (Permutation I: "cb22") the nature of KT's identity could be captured, that is one in which *its skyline is least jagged but not completely flat, and its streetscape has no predominance of either very high or very low buildings. This plausible permutation will be the one to guide the exercise for height variations on KT's city center street pattern.* The twin cores express the presence of a corridor of power between them (fig38A). Addressing the entry to KT city from the closest point of approach from the West Coast Highway, the twin cores act as the gateway in between which the central axial promenade commence to introduce the vista inexorably uphill towards City Hall and thence symbolically all the way up to the administrative precinct. Economic forces would dictate the business district concentration into the minimum number of centers or cores, where ultimate concentration would reduce that to one single dominant core. The greater the number of cores the more uneconomic; more than two cores are even more uneconomic than the twin cores. The force that can split this intense affinity for a single business core must be that much stronger in the power of the civic precinct located higher uphill and behind it. This intended symbolism is to reflect the relative priorities as in

"Permutation I" in decreasing order, among the power, economic and socio-political factors, presumed to operate in this location. Relative to the three possible directions to which they may visually relate from a distance, from the west and east trunk roads and the existing capital Johor Bahru city to the south, the twin cores have been placed to be seen as two cores from all these three main points rather than symmetrical about the main civic axis within KT City (fig38B). Moreover such eccentric placement of the cores allow their masses to provide sun-shading for each other which can not be possible if placed otherwise symmetrically to the civic axis.

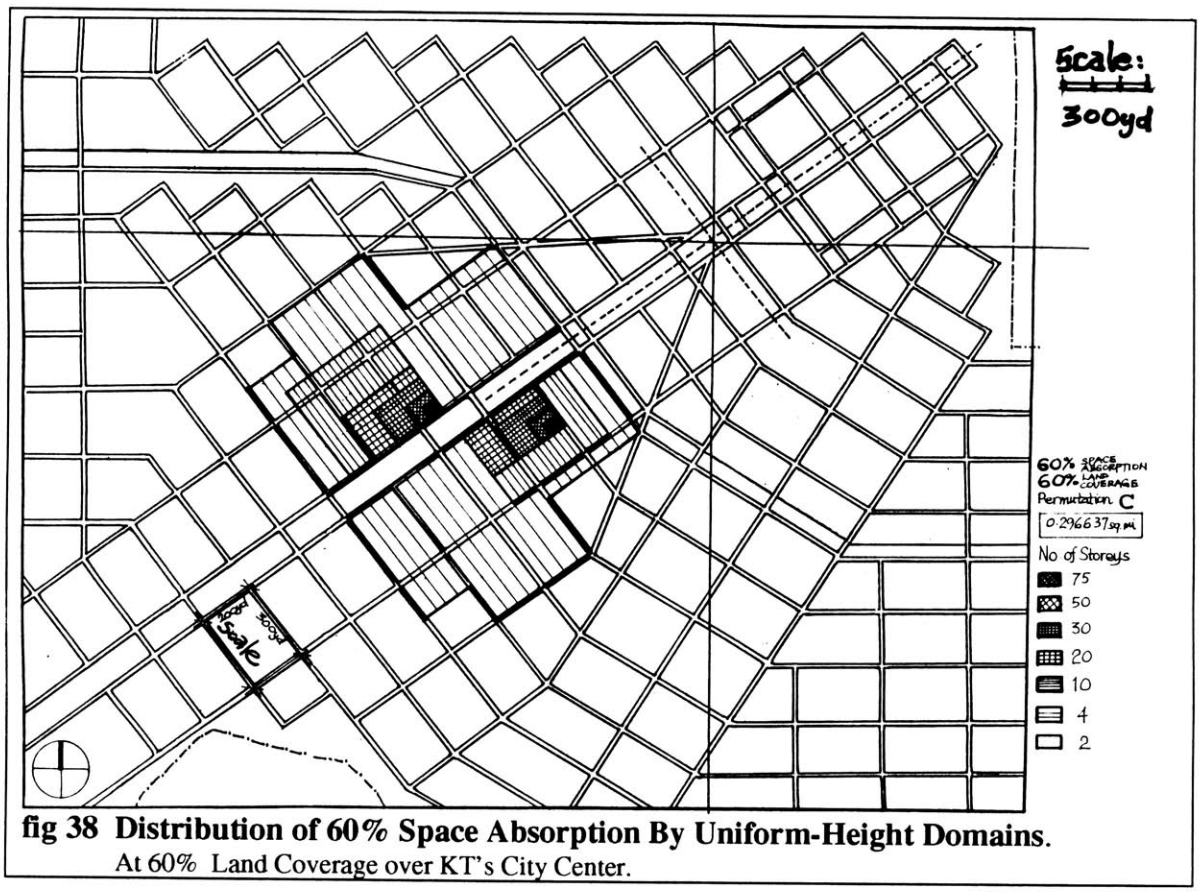

fig 38 Distribution of 60% Space Absorption By Uniform-Height Domains.
At 60% Land Coverage over KT's City Center.

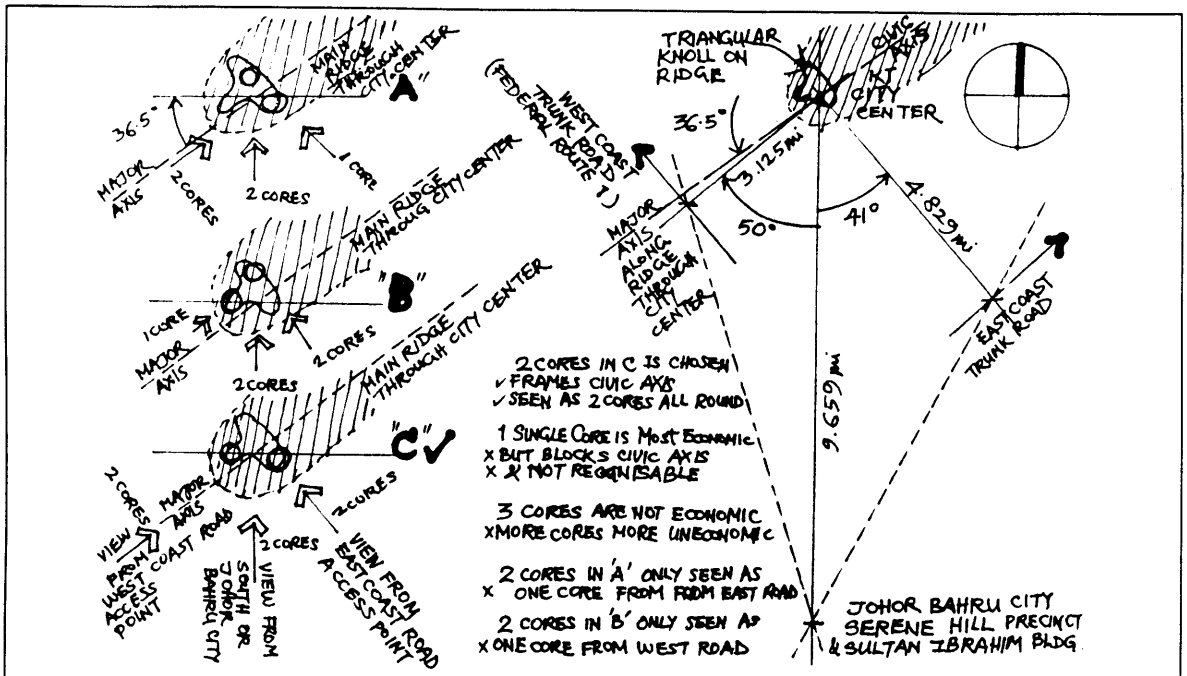

fig 39 Location of The Twin Business Cores In Relation to KT's Topography and For Visibility From External Points of Approach.

The proportion and the selected height mix of Johor Bahru's developmental pressures that is within KT's capacity to absorb based on an appropriate *pattern* of density distribution has to be decided now. This would enable the range of possible building heights to be determined so that height control principles can be applied on them to guide their purposeful distribution in order to achieve KT's identity. *It will be seen that despite the fact that KT's site lack dramatic topography, what it has can substantially be intensified by the complementary effect of deliberate building height distribution (fig 40).*

7.3 THE APPLICATION OF BUILDING HEIGHT CONTROLS

7.31 Some Aspects Of Identity Which Can Be Achieved By Height Control.

7.31.1 The relation of building heights to street widths

Streets are defined vertically, involving building height or street walls, and horizontally, along a street involving the length of and spacing between street edges. Vertical definition seem to be a matter of proportion and of absolute numbers; the wider a street, the more mass or height it takes to define it, until the point where the width is too great that real

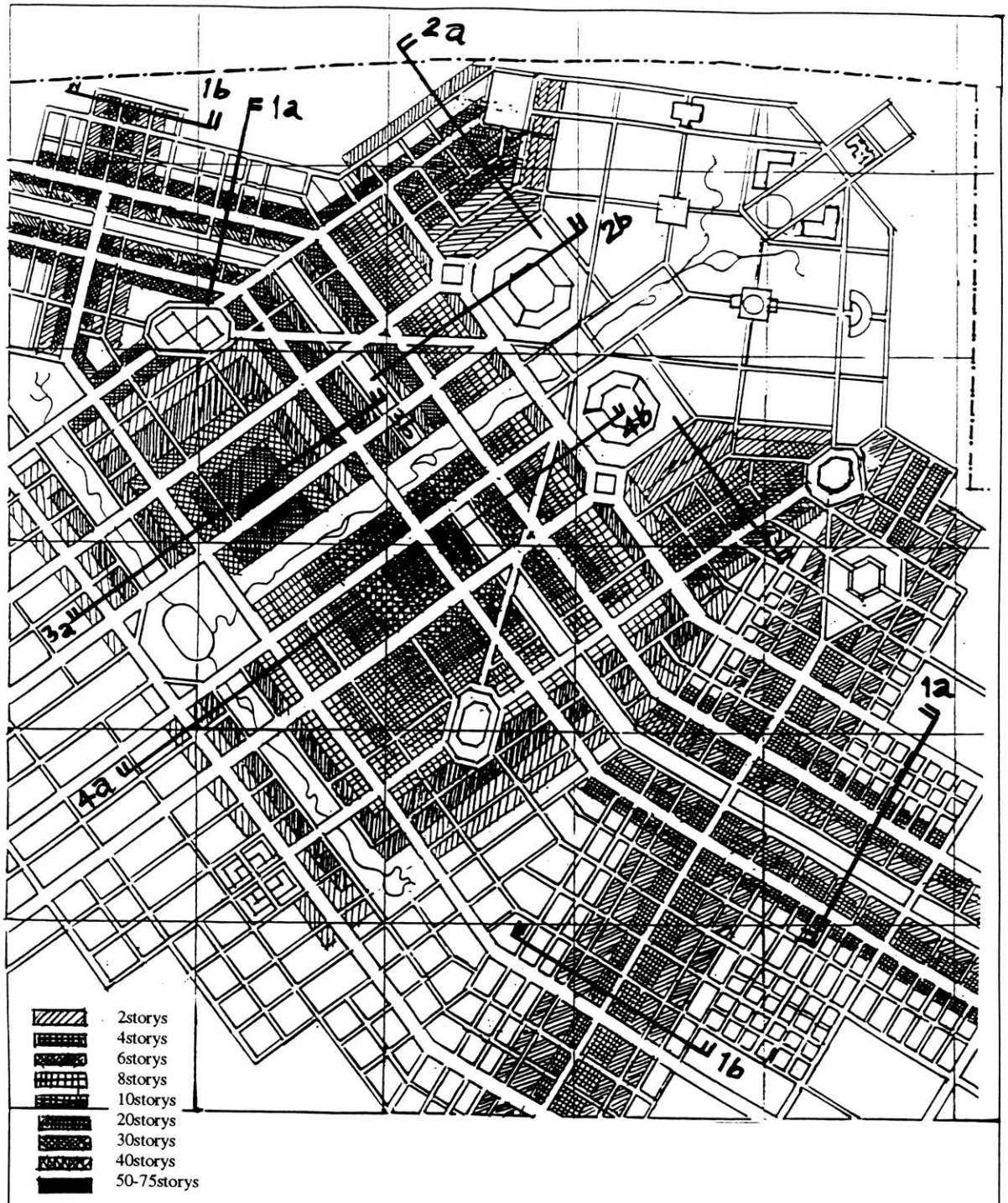

fig 40 Modelling The Building Height Domains To Achieve Identity.

The Height zones shown are deliberately varied over the topography and the use districts in the city center area to illustrate the **sculptural** possibilites for KT's cityform. In line with the reverse building height symbolism with the tallest buildings of the business center lowest downslope and the shortest buildings in the legislative precinct highest upslope, the lower of the twin cores has a smaller land coverage but a higher vertical profile than the other core higher upslope.

Residential Precincts: Sections 1a (2-4 Storys concave along green link); Section 1b (2-6 storys convex along ridge). Civic Precinct: Section 2a (concave 2-6 storys); Section 2b (concave 10-2 storys). Business Core 1: Section 3a,3b (4-75 storys convex) but gradient of 3a gentler than gradient of 3b. Business Core 2: Section 4a, 4b (4-50 storys) but gradient of 4a gentler than gradient of 4b.

street definition stops, regardless of height.[269] Too wide street widths may not a street make, because they lack definition. Streetscape composition depends on building width (W) and the ratio of street width (D) to building height (H). Based on D/H=1 as a median when balance is achieved, space opens or closes as when D/H is greater or less than 1.[270] Ratios of W/D<1 are characteristic of an 'Asiatic bustle' where narrow streets are crowded along both sides with small stores and where there is variety and rhythm to produce a bustling atmosphere which are however limited only to streets which are less than 75ft wide, coinciding with the distance to readily identify a human face.

Concerned with urban scale and basing on psychological optics and experience, Blumenfeld[271] used distances at which it is possible to recongnize people (human scale) and distance at which facial expressions can be perceived (intimate human scale), together with angles at which objects can be perceived clearly, to judge the scale of buildings.[272] Generally, buildings are likely to provide a sense of definition when height to horizontal distance ratios are at least 1:4 where the viewer is looking at a 30° angle to the street

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[269] Jacobs, 1993. p277. It has been observed that when the small dimensions of places exceed 450ft spatial definition is weak and becomes more than a field than of a place despite the greater height of the structures. In Paris, the two-dimensional (street width) to three-dimensional (height to cornice line) proportion of streets had existed traditionally and was then formalized since 1847. Haussman would later change to a square section for streets but without changing cornice height, although height above the cornice lines became greater for a city as a whole. Sunlight could be have been a factor in these height limits, but seems more for achieving street definition.

[270] Ashihara, 1983. The ratio of historical cities varied from 0.5 (medieval Italian), 1.0 (Renaissance) to 2.0 (Baroque) though for actual purposes, ratios of 1-3 are feasible. Ratios of D/H=1.3 and W/D=0.6 had been observed to give comfortable space at a human scale.

[271] Hans Blumenfeld, *The Modern Metropolis: Its Origin, Growth Characteristics, and Planning*. (ed. Paul Spreiregen), Cambridge, MIT Press, 1967. p216-234. He concluded that a building height of three stories (about 30ft) with a building width of 36ft, and a street width of 72ft are the maximum dimensions for a building of human scale. The smaller intimate scale requires a building height of two storys (21ft) with a building width of 24ft, and a street width of 48ft. At an angle of 27° (height:distance=1:2) an object could only be dimly perceived as the background; at 18° (1:3) it still dominates the picture, but becomes as important as its surroundings; at 12° (1:4) or less, the object becomes part of it surrroundings and appears mainly as its silhouette. These *dimensions and ratios* seem more appropriate to the *dynamic* nature of street experience, which takes place while one is moving and generally in perspective views. Sizes between those where the building or wall for defining the street still dominate and permit a silhouette may be those most important in street design, that is at angles larger than 18° (less than 1:3). In sections their vertical and horizontal ratios range from 1:0.4 to 1:4 (for residential steet; most streets fall within a range of vertical to horizontal of from 1:1.1 to 1:1.25).

[272] For the widest streets, where width is significantly greater than height, such as the ChampElysee, it is the intervening trees as much as the buildings that provide definition.

direction.[273] The 1:4 ratio at the 30° angle translates into a street cross section design ratio of 1:2 height:width *(i.e. street definition is weak if buildings are less than 0.5 or half the street width).*[274] Jacobs said there may not be an upper or lower limit to street definition in relation to street width at which the buildings are so high to become oppressive. The upper limits are probably determined by height impact on comfort and livability of the street, as measured by sunlight, temperature and wind, than by absolute or proportional height, though none of the best streets can be characterized as having tall buildings.[275]

For KT's street pattern (fig 41), the 60% coverage on the basic 200yd x 300yd grid would allow the widest street widths to be 120ft and 60ft alleys. The 120ft width would accommodate district building heights predominantly in steps of six and ten storys at 12ft story heights, corresponding to H/D ratios of 0.6 and 1.0. For embedded subgrids, building heights will be four and six storys in the areas further from the center of the CBD, where the H/D ratios would be of similar proportions since the street widths would be proportionately less than 120ft. Thus the street widths or building spacings should decrease the further from the CBD for the hill effect and response to the ridge profile (fig 40). Conversely this is the case where street widths would decrease the closer to the civic precinct to create the valley effect and to reinforce the precinct's river basin landform. If the street is less than 120ft wide, the maximum height of the building can only be twice this width at 240ft or 20 storeys. To assure adequate light and air and separation between towers, mandatory side setbacks are required from the property line above a certain

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[273] If the building height across the street where one's vision intersects with it is one-fourth the horizontal distance to that point, then it is likely that one sensed that the street is defined. At hight distances ratios of 1:3.3 there always seems to be definition, and at 1:2 definition is strong. At and beyond 1:5, the street is undefined, unless the street actually end in some way, such as a crossing street. This account for why focal points, such as obelisks, fountains and statues, or crossing streets which provide street endings are important for creating a sense of place and explains the why streets that rise and fall with the terrain are more exciting.

[274] Jacobs. None the less, at this angle, most of the best streets have height to horizontal distance ratios of 1:4 or often less. Streets of Bath with low height to distance ratios, are made up of both narrow streets and low buildings and fall within or near dimensions characteristics Blumenfeld say create human scale.

[275] Jacobs, 1993. p281. In Litchfield, Connecticut, homes at the historic main street are as far as 200 ft apart and, as pleasant as the street may be as a planted way, there is little street definition as a pedestrian pace. For spacings of smaller streets which have buildings typically spaced 10-20ft apart, tighter spacing is more effective than looser in achieving street definition.

height. To avoide abrupt jumps before the next higher height terrace, above 1.66 the width of the principal street the building faces, the tower should be setback from property lines and from the center line of streets narrower than 72ft.

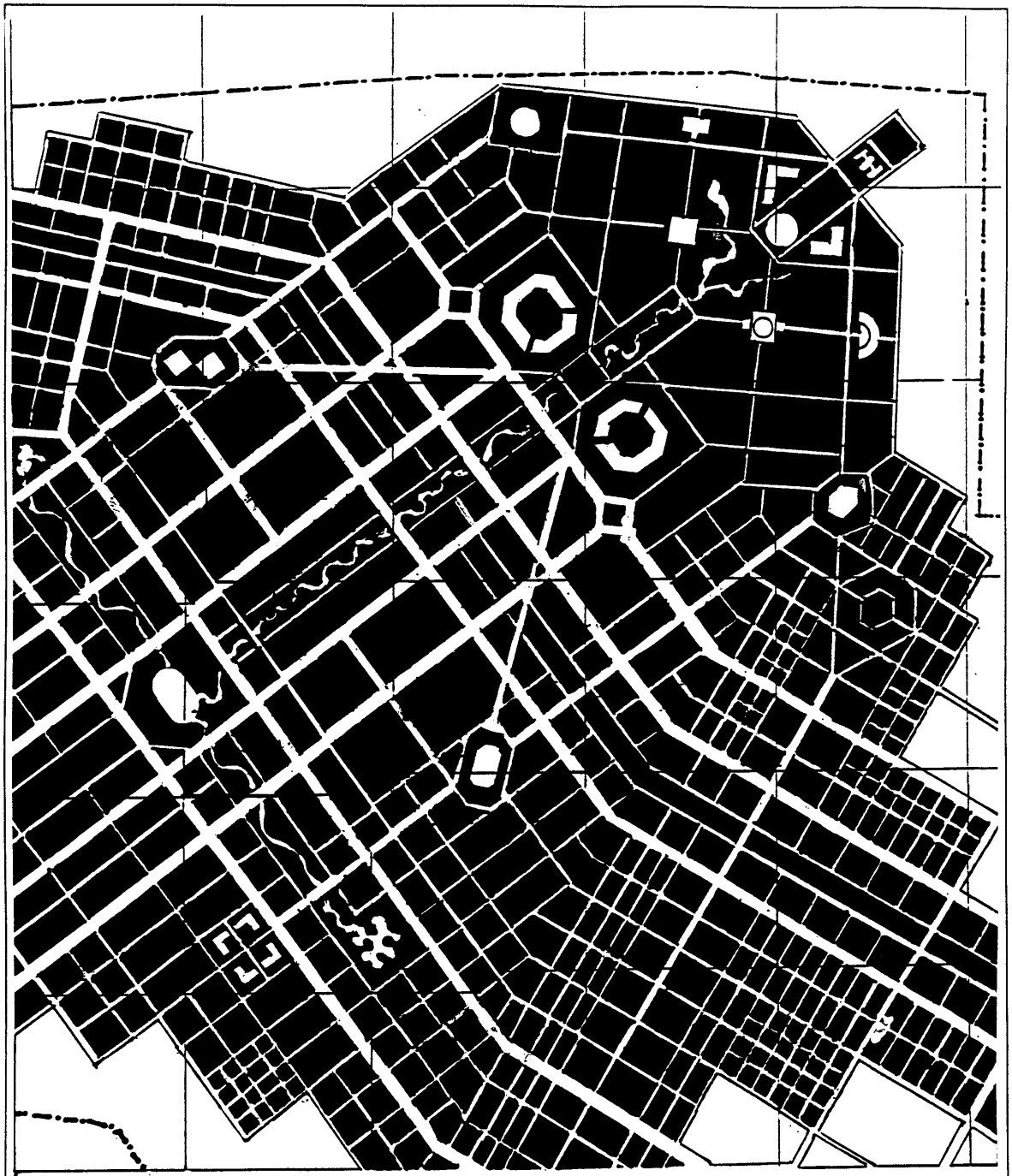


fig 41 KT's Street Pattern.

The street spacings and widths are proportional to the main traffic flow direction parallel to the southeast to northwest Main Diagonal Activity Spine. The grid scale and street widths diminish with the block heights and lot sizes as one moves away from the commercial center. The complexity in number of blocks and intersections also decrease towards the commercial center.

7.31.2 Relationship of building shape to views

The intrusion of large, flat modern buildings among small-scaled decorated older buildings can disrupt the continuity and unity of the street facade created by older buildings. View corridors as volumes of unobstructed space could be established where the perception of the city's structure of streets - the rhythm of open space and built up blocks - is endangered by the size of multiblock developments, view corridors. They can also preserve visual access to natural features, monuments or landmark buildings.

7.31.3 Open space provision

The parts of the tallest buildings fronting the axial view corridor would be reduced so as to properly frame the civic buildings. The most effective framing of the civic precinct is provided by the sheer contrast of the tallest facades of the office blocks against open space. Spaces wider than normal street widths could also locate the taller buildings. Open or circulation space should not be created too frequently to undermine the continuity of the streetwall (fig 42).

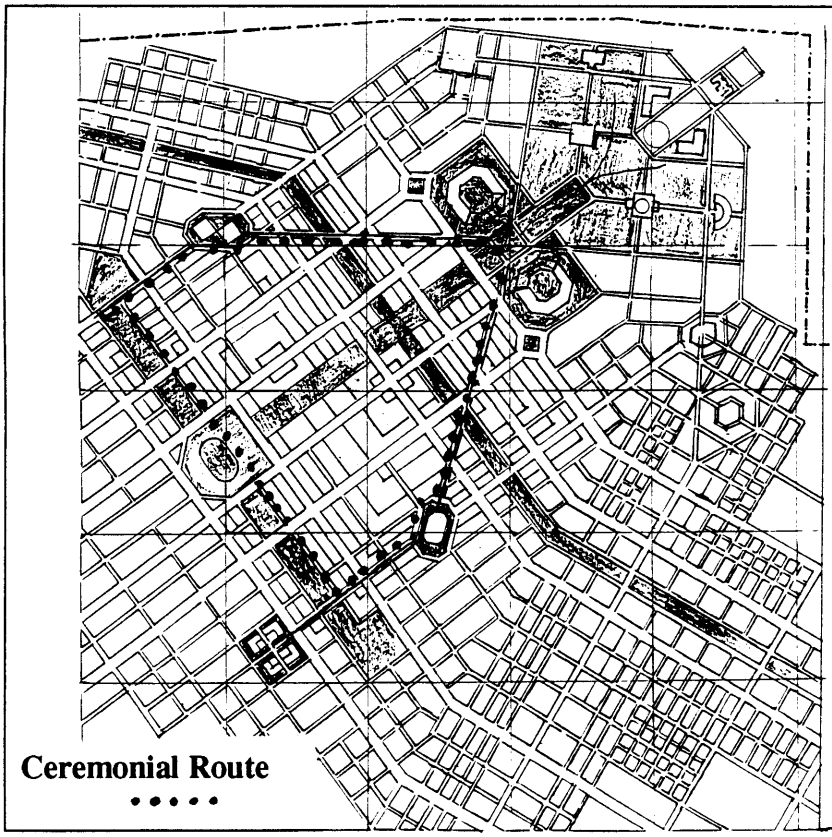


fig 42 Open Space For Accomodating Taller Building Heights

The tallest buildings in KT are generally placed on both sides of the two intersecting "T"green promenades which together split the tall building business center zone, of predominantly 10 storys, into three parts. The main promenade along the main civic axis further splits the tallest parts higher than 10storys portion into two cores which are recognisable from afar. In the southwest corner is shown an urban courtyard (see 8.4.3) which locates larger plots than can the normal street width provide for clusters of taller buildings.

7.31.4 Streetwall definition

The sharp definition by buildings placed at the property line with little or no space between them would create an intense urban quality. Structures should be built to the street property line along the entire frontage to a sufficient height for proper definition of street space. When the new taller building is set back above the predominant streetwall height, the upper portion of the building will not be perceived as part of the streetwall.

7.31.5 Tower setbacks

Setbacks above the minimum height could become a visual theme to minimize the appearance of the bulk of a building and to increase light reaching the street. The depth of the setback required would depend on the street width and the height of the existing streetwall. The appropriate building base should be located at 1:0.5, 1:1, 1:1.25 x street width. Disruption would be minimized if the lower portion were given similar texture and a projecting cornice. The appropriate streetwall height is the height consistent with the general scale of buildings on the block face that are likely to remain. Where there is no worthy street wall and, except for sunlight access and windbreaks, setbacks may not be needed if a strong pedestrian scaled building base is created and the building tower is well separated from other towers.

7.31.6 Building lines

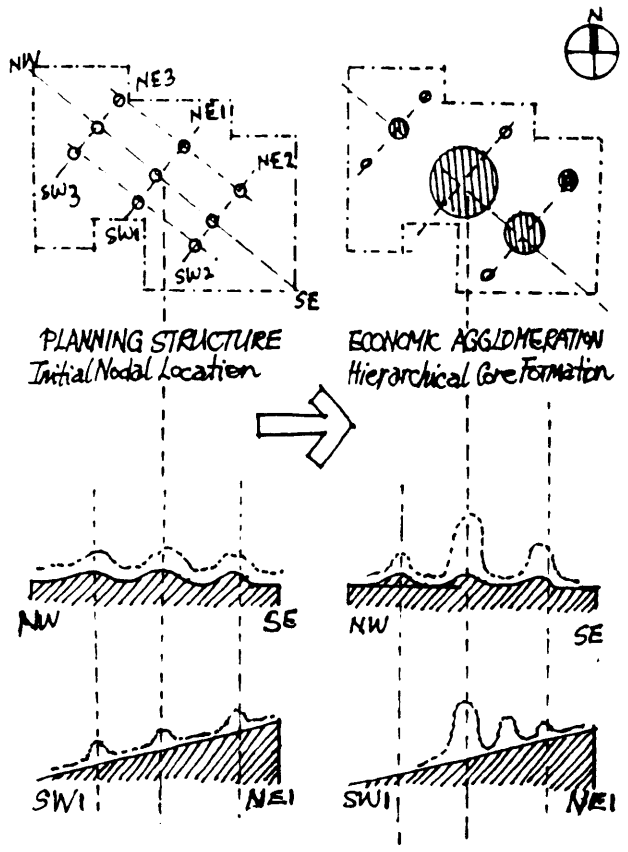
Mandatory heights along a street increase the sense of street continuity while build to lines and minimum height requirements generate low, street defining elements. Building lines can fix the height elevation of street facades to achieve the desired sense of spaciousness or enclosure as well as continuity of street form. KT's mandatory citywide verandahway system self-imposes contiguous building lines to ensure facade continuity.

7.4 HEIGHT CONTROL PRINCIPLES FOR KT'S DESIRED IDENTITY

I now illustrate the following variations in building heights which can be shown on the street pattern to help create effects contributing to KT's identity in its

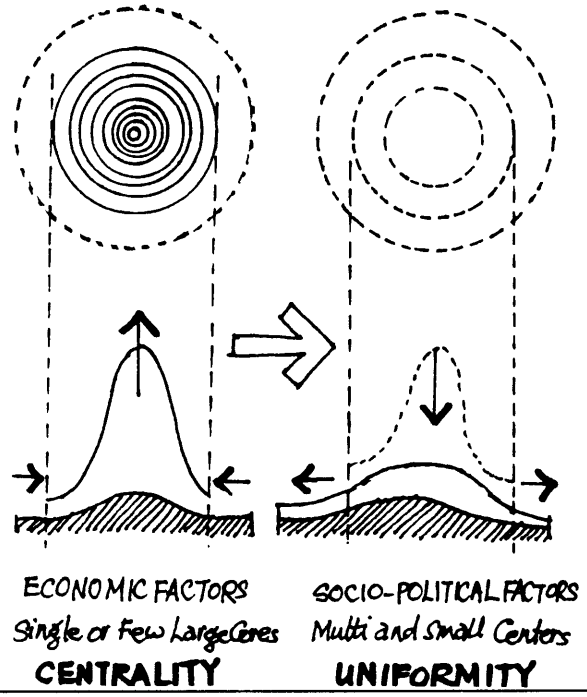
7.41 Skyline:

fig 43 **7.41.1 Concentration to optimise economic priority**



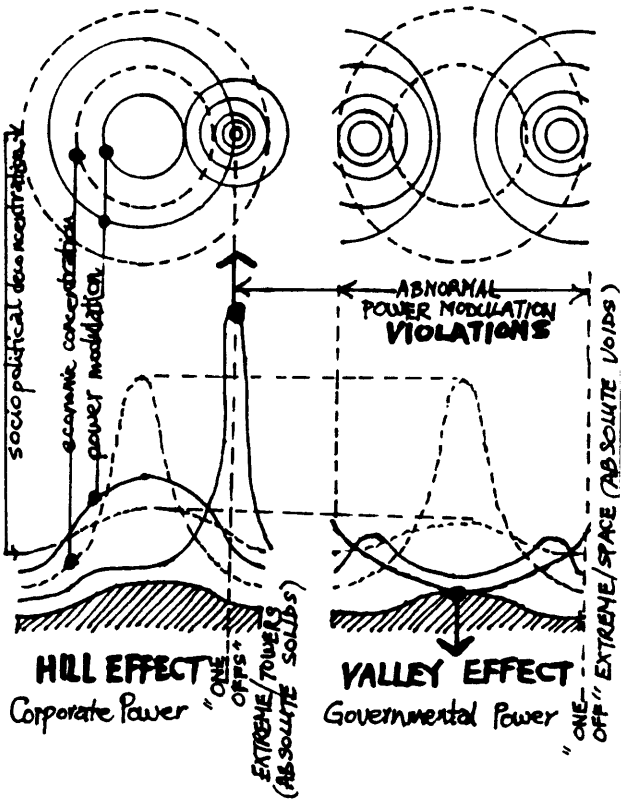
The Structure of KT's planned locational relationships of the quantity, proximity and variety of facilites and mix uses including resident density establish an initial hierarchy of intensities due to minimal cost and time for travel. Agglomeration economies, transportational accesibility to work and social opportunites, geographic centrality and convenience to clustered social and cultural amenities acquire initial prestige from specialisation which further attracts in-migration from and deconcentrate surrounding areas to foster point clusters of activity. Maximum acitivity along KT's diagonal spine but of uneven increase in intensity promote maximum cluster heights around minimum number of nodes. The central core is the node of highest specialisation which then form the the single point of maximum concentration. Highest land values thus created will motivative their optimisation for highest yield by maximising the capacity of finite parcel size, stretching its space utility by multiplying the number of floors as the total building height.

fig 44 7.41.2 Deconcentration to counter heights through socio-political uniformity



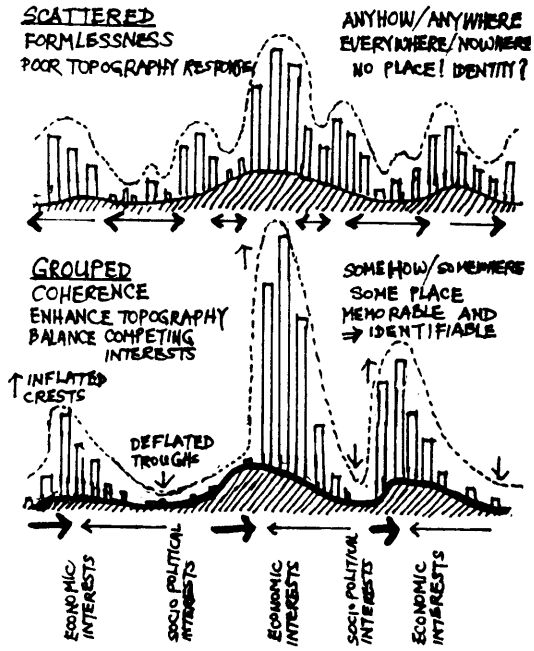
Locational prestige and heiracrchies resulting from economic disparity are countered by the equalizing forces of social competition and political conflict to redistribute economic opportunites. This equalizes coverage and deflate the intensity of cores to effect building heights lower than their optimal values. Especially, not all the total space requirements could be confined to a single point so that minor cores away from the central district could form to serve area needs. Subcenters emerge to complement or in competition with the central or established cores.

fig 45 7.41.3 Modulating effect of power between maximum and minimum heights



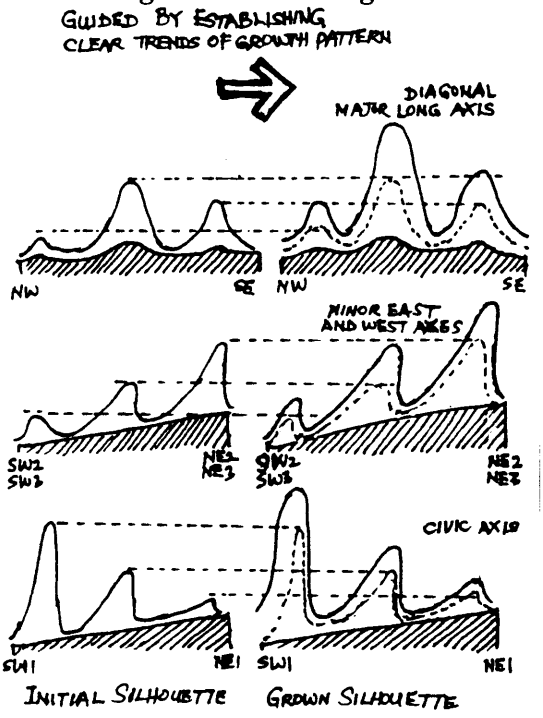
To exaggerate the valley effect locations of power distance densities and selectively influence resultant density from socio-economic equilibrium levels. So maximum economic building heights could be lowered or socially acceptable building heights could be raised. Dramatizing the hill effect influential corporations could realise much taller towers in odd locations. Civic precincts demand more space and separation from other community or business use or even diffusion of whole cores. In KT the axial promenade to bisect the commercial concentration at one point is a symbolic extension of civic presence downslope and its park setting signifies spatial priviledge on upslope high value urban land.

fig 46 7.41.4 Clustering to accentuate city structure and visual prominence



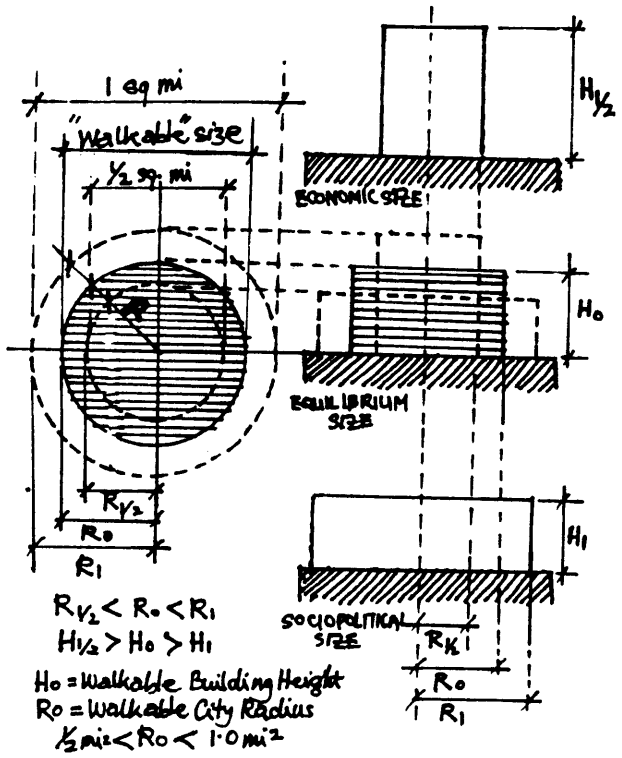
Spontaneous clustering is further compacted by intense packing and tighter spacing to create adequate density, mass and bulk to make major cores stand out from the rest. The central core in KT dominates all others for directional focus for residents within the city and for visible prominence for visitors from distant points of approach.

fig 47 7.41.5 Strategic location of highest clusters for reproduceable silhouette



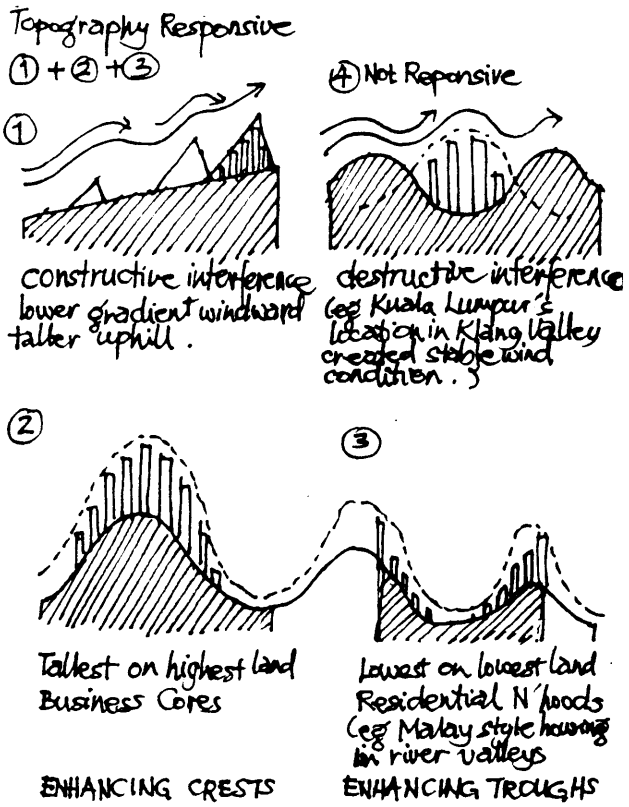
Clear initial pattern affords nuclei for subsequent coagulation to produce enlarged but similar pattern of expansion. Deliberate locations of KT's first nodes increase potential to realise eventual expectable silhouette.

fig 48 7.41.6 Heights attainable by confining their spread for walkable city size



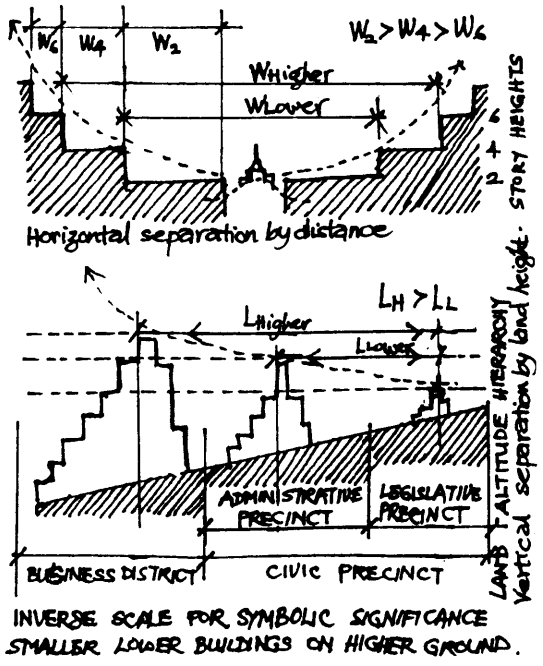
The walkable size is used to guide moulding of the given volume of space required to achieve the plausible extent of spread and the intensity of rise in height as the transitional envelope size between that desired by economic and social-political factors. The size of a walkable city is assumed to be half to one square mile (Jacobs, eg. Boston, Tay (3000ft)). When KT has more tall buildings, the city is less sprawling and more walkable.

fig 49 **7.41.7 Heights of buildings should simulate the landform**



Building heights are generally taller on higher land, building more on ridges than in valleys. Height increases are greater on crests and smaller in troughs. Size of height districts need to be smaller and have more steps to recreate softer hill profile. Exceptions are the central cores and civic precincts which exaggerate the effects of economic power and political power respectively. Even the business cores (located on ridges), rise more gradually on the side facing lower slopes, and the civic precinct (focussed onto a valley) allows greater albeit lower height with distance. In contrast to tall buildings in urban centers on higher land, Malay style lowrise residential neighborhoods are focussed around river valleys for picturesqueness.

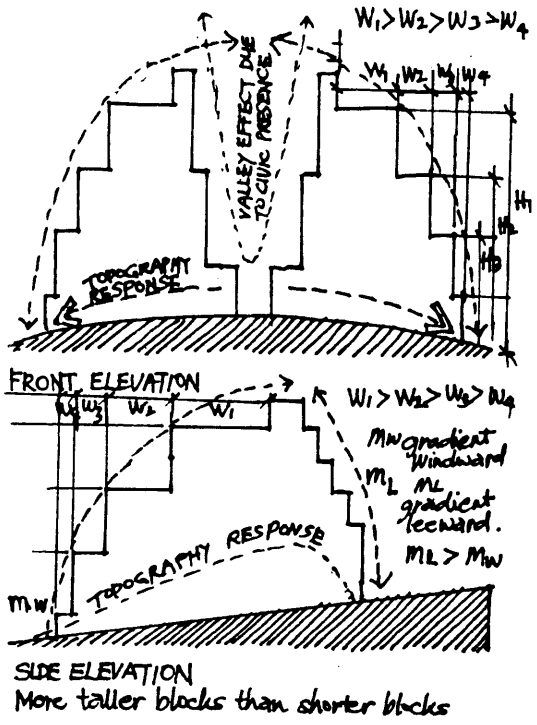
fig 50 **7.41.8 Concave height diminution to signifiy civic importance**



Around the civic precinct, the heights rise from two to six storys but the widths of height zones on both sides decrease with distance from the center. That is the two-story zones are closest to the center but widest, and vice versa for the six-story zones. Along the axial promenade, the administrative precinct at mid-slope comprises most of the medium rise office space for the bureaucracy transitioning from the lowrise legislative precinct to the highrise business district.

fig 51

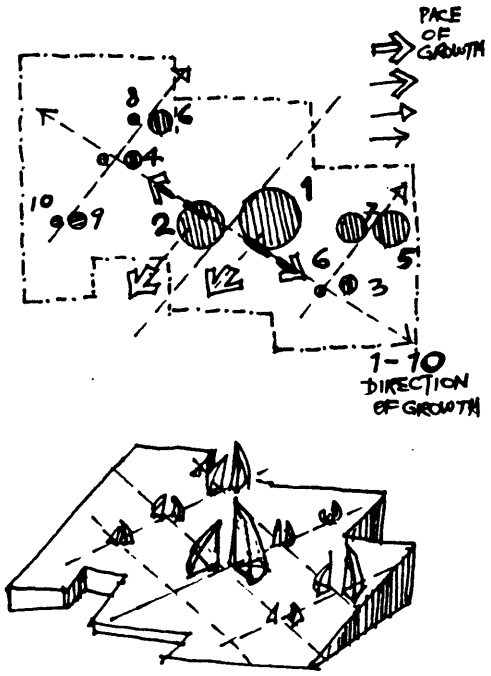
7.41.9 Convex height increments to signify commercial image



The prominence of the business center is projected by a deliberate convex profile by having closer transitions the further from the tallest part of the core. Greater convexity on the uphill slope is achieved by more abrupt height changes in response to the terrain.

fig 52

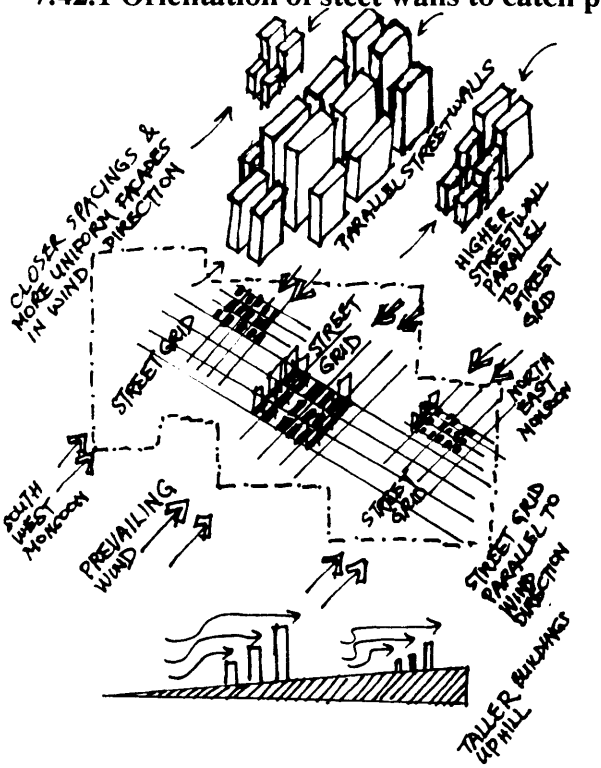
7.41.10 Prediction of new locations to direct future high density growth



The planning structure deduced from the landform and surrounding development forces promote density distribution along the diagonal spine and cross corridors. Thus major nodes locate where primary corridors intersect the spine and minor nodes situate at junctions with secondary corridors, and so on. Excepting extenuating political and economic upsets, normal incremental development will be expected to begin in the order of first the central district, the eastern subcenter, the western subcenter, thence to neighborhood centers in the uplands, then those in the lower land and so on, though all anticipated centers shall be guided but not rigidly restrainted from spontaneous growth since these centers can be expected to grow proportionately relative to one another due to the planning and systematic phasing of facilities and services.

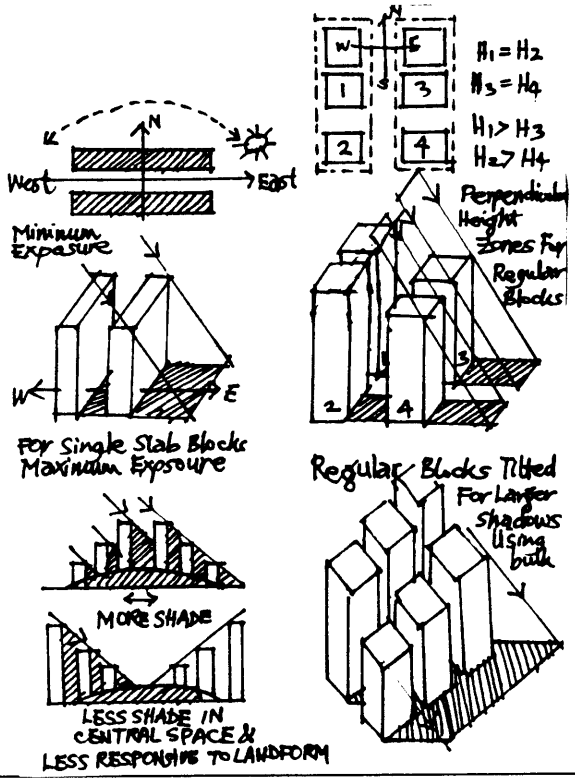
7.42 Streetscape:

fig 53 **7.42.1 Orientation of steet walls to catch prevailing wind.**



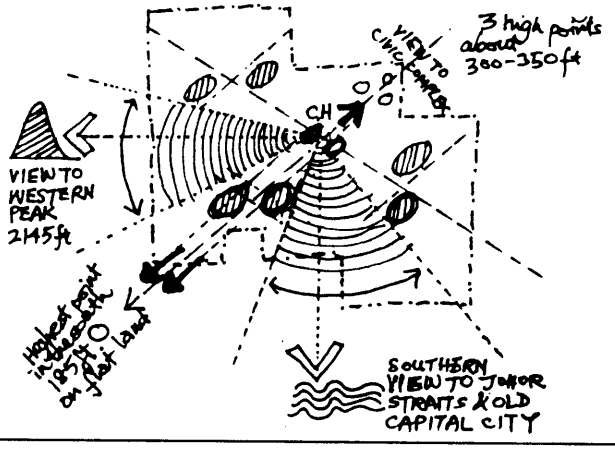
Higher and more continuous facades along northeast-southwest streets channel wind uphill, assisted by building heights that rise with the landform northeast-wards.

fig 54 **7.42.2 Orientation of building height to promote shade**



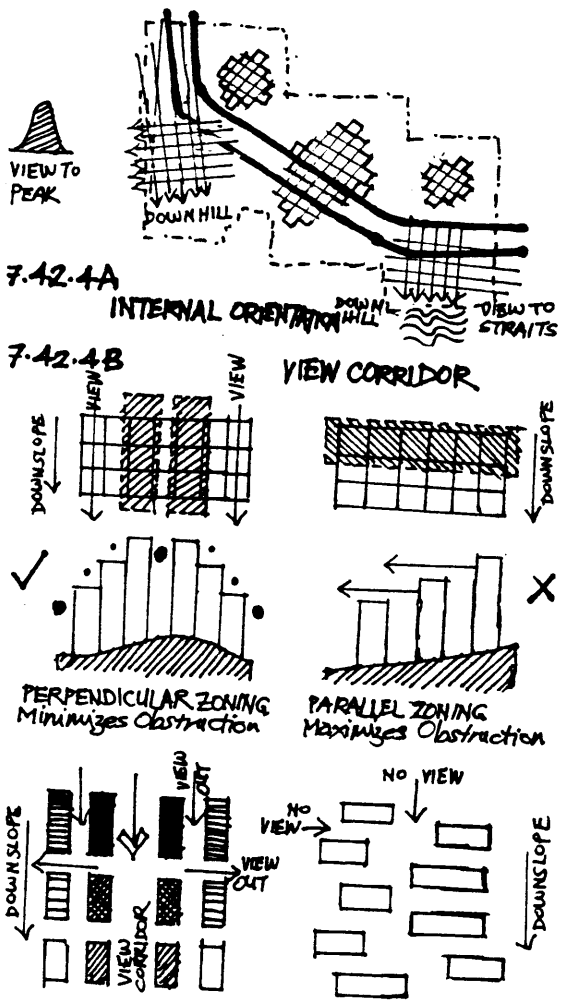
Since visually most bulky slab tower blocks are discouraged in KT, the tallest buildings are of regular shapes. Their shadows could be harnessed for sunshading, where angled building bulk could promote larger shadows without unreasonably increasing their sun exposure. Further, by placing the tallest blocks centrally and spaced close enough across the axial promenade adjacent tallest buildings and this central space is shaded more of the time than if the lowest blocks are in the center yet respecting the higher profile of the ridge in the center.

fig 55 **7.42.3 Placement of height clusters to frame specific views**



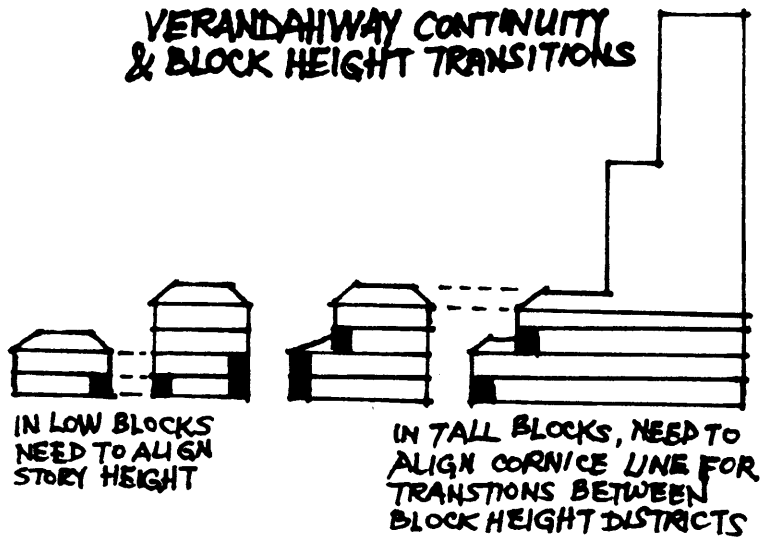
The tallest towers are separated by the axial promenade to provide the greater spacing required for larger building bulk. Besides, this allows the strong framing of the adminstrative precinct and the legislative precinct higher uphill or the view form the civic precinct downhill. Similarly the central cores and the western subcenter core frame the view to the highest peak west of the site. The central core and the eastern subcenter core frame the view to the Johor Straits.

fig 56 **7.42.4 View corridors by streetwall and grid pattern for internal orientation**



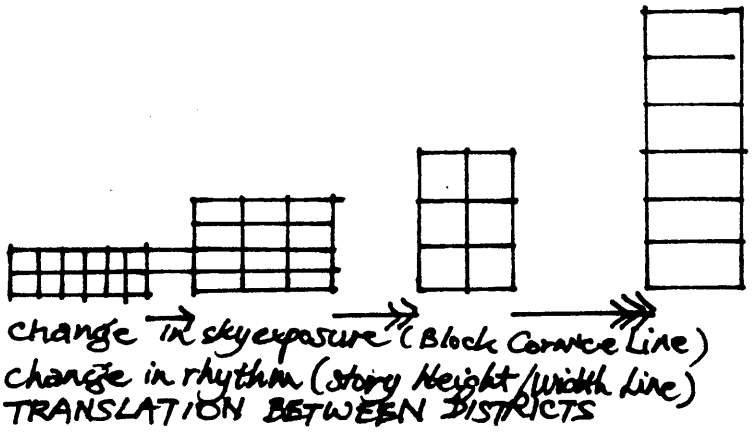
In the central district taller height districts are delineated as thin strips perpendicular to views, or sun exposure but aligned with winds. Apart from the symbolic views framed by the cores along the major open spaces, the ordering common streets in the eastern sector of the site have views directed predominantly down south to the view of the Johore Straits and the ones in the western sector have views predominantly, but not perfectly west, downhill to the western peak. This is facilitated by the more defined street walls and orientation of the local street girds in these two sectors which may depart suitably from the predominant orientation of the central district street grid. The major core orientation is more significant in view of the concentration of the tallest buildings in this central business district as compared to the less dense and much lower medium-rise buildings in the subcenters. In fact in the outer areas of even the central district, the local grids are more sensitive to the local terrain than in the inner central areas.

fig 57 **7.42.5 Stepping of street wall height/continuity using covered walkway**



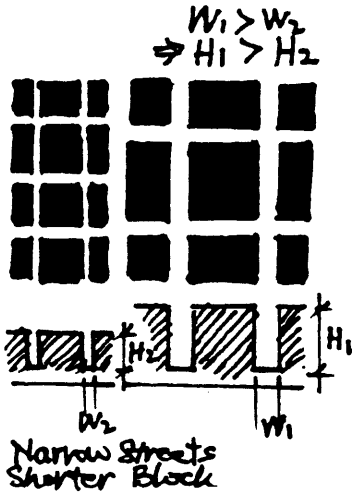
Since the covered walkways are seldom more than two storys high, its mandatory adoption would recess the ground story but project the higher floors of of all buildings which thereby are brought to edge the building lines which are predetermined to ensure continuity of the walkway system and so also achieve streetwall definition and continuity. In areas where the upper floors of taller buildings are setback, the verandahway transition the building bulk to pedestrian scale. Also, the walkway system acting as the lowest terrace would inspire a coordinated, less abrupt and graduated stepping of facade height from the street in between different height districts.

fig 58 **7.42.6 Internal place orientation by relative location of height zones**



From the consistent position of the cornice line within each flat height district, any variation in its vertical level with respect to the sky exposure in that district signals translational change across districts. The bulk and use of buildings of different heights would also inform the character of and one's position in the district. Moreover, since the district heights are stepped up towards the city center, higher cornice lines automatically inform people they are heading towards the city center and vice versa.

fig 59

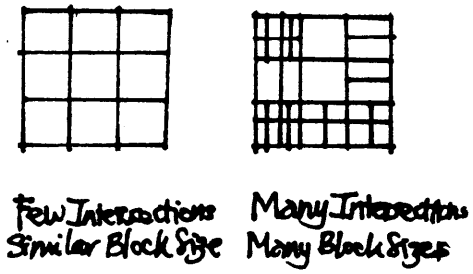


7.42.7

Street widths in proportion to heights of buildings placed along them.

As taller buildings call for wider spacings, taller height districts correspond to districts with proportionately wider streets. Thus the grain of the street pattern should be coarser towards the city center where taller buildings sit on bigger parcels. Larger street widths correspond to greater capacity to accomodate more traffic from taller buildings.

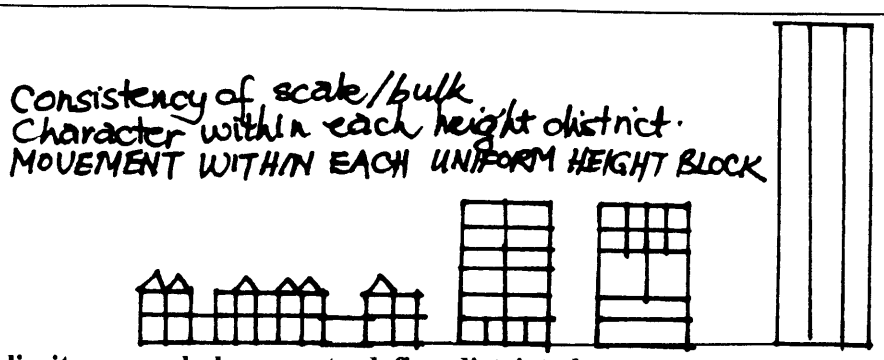
fig 60



7.42.8 Complexity of block sizes in relation to number of street intersections.

There are many more blocks and intersections in districts of finer grain where smaller blocks of two-four storys are placed around narrower streets and intimate public spaces, as compared to much taller blocks around large civic places in the central business district. As large plot shapes also have to be more regular to be more economic for tall business buildings, streets they front have to be more regular as they are wide. Conversely, the narrower streets can be less formal, bent or even curved to suit the topography.

fig 61



7.42.9 Flat height limits over whole areas to define district character. Buildings on the best streets are complementary by respecting one another, often similar in heights; rarely differing by more than three storys.[275] In KT distinct district height limits are proposed in relation to the topography and distance from the business center, the higher closer to the business center and on higher land and the further from the civic precinct. Heights would be lowered to secure a transition to the Civic Center. Visual benching of buildings would be reduced through increased complexity of height districts in smaller steps. The height plan has at least 3 height limit terraces stepping upward either concavely or convexly to smooth awkward looking stairsteps unsympathtic to the soft profile of the ridges if the height districts are too large. For the height districts lower than six storys, drastic variation is not encouraged since violations would tend to cancel out or even upset the smaller height differences due to the topography itself.

7.5 A proper plan for building height should weigh all the height concerns at each location in the city taking into account appropriate, established patterns of building height and scale, seeking for the most part to follow and reinforce those patterns and also recognize the functional and economic needs for space in major forms of high density developments. *KT's texture when viewed from close-up or from afar, is one of small-scale buildings covering the hills on loose curvilinear patterns in contrast to the urban grid patterns so that the collective mass of office buildings in the Central District stand out as the most prominent man-made part of the skyline.* The application of techniques which limit building heights such as height restriction, lot size, lot coverage, FAR, open space ratios, building setbacks, and boundary setbacks, will next be analyzed with respect to the quality of the pedestrian experience in relation to the street pattern and their connections to the skyline to achieve cityform identity. The operation of the more revalent FAR will be compared and contrasted with building height control to discern the more potent role played by height control.

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[275] Ibid, p289. Regular order is essential. Great streets are not characterized by individual architectural wonders that stand out. Even then, building heights may be similar; a tall three-storey building can look like a four-story one in height. Storey height is probably not as important as overall building height. But a church or corner tower that is significantly different from the norm, but are buildings of special symbolic importance, or whose height is purpose ful on the street, making a turn or a corner.

CHAPTER 8

EVALUATION AND CONCLUSIONS ON HEIGHT CONTROL

I began with asking these major questions: Why should tall buildings be tolerable in the downtown but less elsewhere, and is it only because of economic reasons.? How relevant are the conclusions from the case studies all of much larger scale than KT and which have "matured" existing development, while KT is completely undeveloped yet? I arrived at the same single answer. Firstly, if tall buildings have adverse impacts yet essential for growth, it is logical to contain them to where they should be, and in the least harmful locations in the city to provide functional and aesthetic benefits and yet furnish the most coherent image anchors to the city as a whole. Secondly, KT just like any other city may one day develop some portion of those high densities along with similar attendant problems in the case study cities where any remedies could only be piecemeal in places which are already fully developed. Since KT can start anew, a purposeful direction is necessary to anticipate its process of maturity with a known framework for development that has been informed and forewarned by the good and bad experiences of its forbears.

In previous eras of city building, the height of new development within an area might not be expected to vary considerably. The economic pressure to maximize development on a site was not as significant a factor then. Under such conditions, extended areas with the same height limit did not pose any cityform problems; a natural variety of heights resulted in a complex, interesting city. There is now however an increasing tendency to build to the height limit in unlikely locations without concern for the *existing or future* environment.

8.1 THE NEED FOR BUILDING HEIGHT CONTROL

Reacting to the completion of a huge tower in the Petaling Jaya town center once destined for lowrise low density shophouses, Mohamad[277] summarized the typical impression,

[277] Mohamad, 1981, p81.

"Decision making in the cities of this country has been in the hands, not of designers, architects nor planners, but of politicians and government bureaucrats. The government has no framework for highrise development; wheeling and dealing determines the form it takes!

Among the many problems identified by the Kuala Lumpur Golden Triangle Study, those which stand out are (i) discontinuity at ground level, (ii) inadequate relationship to natural systems (green and climatic), (iii) poor inter-building relationships, and the (iv) unplanned rate and pattern of growth. Most of the prime sites have been densely built-up as island developments without regard for neighboring buildings nor any design control Kasi cautioned on the exercise of careful control especially in view of the pressing demands totaling 100 million ft^2 as zoned by FARs even though only 53.8 million ft^2 was projected for year 2000. [278]

8.2 THE MITIGATION OF BUILDING BULK

8.21 The Impact of Bulk

8.21.1 Bulk refers to the apparent massiveness of a building compared to its surroundings whether or not it is of extraordinary height, blocking near and distant views and create a disconcerting dominance on the skyline and neighborhood. Combining several uses in a single development may be more efficient or logical, but its external bulk affects the city. The apparent bulk of a building depends primarily upon (i) the amount of wall surface visible, and (ii) how far the structure extends above its surroundings. Bulkiness then should be avoided through considering the existing scale of development in each part of the city and how *topography* expose building sites to widespread view.

8.21.2 At the closest view - at the street level - building mass directly affects the light and air on the street and on adjacent buildings. The mass of an individual building dominates the scene from a pedestrian's view. At a distance of a mile or more, relationships among buildings form a skyline image - a combined mass and shape. The bulk and form of the individual structures - most particularly the taller, larger structures and those at the edge of downtown - affect the skyline image most. Bulk controls should address the impact of a building at the streetscape view, its relationship to neighboring buildings, and its

[278] Kasi, 1985. p4.

cumulative impact on the skyline as a whole. An adequate assessment of the impact of height should at least cover the smaller shorter buildings at the streetscape to the largest buildings at the skyline level if not the whole range of building heights. The height controls should provide a building envelope that offers a latitude for individual building design, but in harmony with the whole.

8.22 Aspects Affecting Density Or Bulk Increases

8.22.1 Large lots.

This development trend increases the economic returns to individual owners but also delays adjustments of supply and demand in the real estate market, depending on the net rentable space supply relative to the market's vacancy situation and its rate of absorption. Real estate cycles of boom and bust create chunks of pent-up development in spurts in between periods of inactivity. If this absorption time is substantial, this must be considered as the cost of carrying the unproductive space to be absorbed as capital cost, necessitating larger parcels to build even taller, the moment there is impending short supply. Moreover the consequent practice of assembling smaller existing lots in established city centers may contribute the least in terms of a more harmonious and socially efficient grouping of buildings.

8.22.2 Over spacing.

KT will not mandate formulaic provisions like the Open Space Ratio (OSR) requiring each property to have its own open space on its own property. That would result in surrounding each building with space, making it impossible to pool these spaces either vertically or horizontally for joint public development. For large sites, this mean smaller coverage and taller towers.[279] For KT most lots need to be near 100% coverage to create sharp streetwalls for intense urbanity, though open spaces are deliberately reserved in

[279] When multiplied parcel by parcel over broad areas and particularly along avenues, the bonus provisions for plazas and open space regulations have destroyed the visual order of the city. Set back regulations effectively force wider visual street effects than are desirable, since the open space contained within street lines include the sidewalks ad the setbacks establishes spaces along sidewalks and between buildings which stays wind, and often create maintenance problems.

specific locations for taller clusters in strategic locations which allow the larger spacings for higher densities (see recommendations on "urban courtyards").

8.22.3 Land coverage restrictions

This discount the first few storys for commercial and garage spaces; the tower restrictions and roof open space requirements tend to establish building forms consisting of a tower with an inaccessible low plinth. These forms disrupt street continuity because the plinths are too low to visually effect a quality of streetwall. The burden of defining the street form then falls on the towers which are however too diversely designed and too widely spaced to create either a wall or a series of related rhythmic elements.

8.22.4 Flat building tops

Skyline effects of boxy buildings exacerbate benching effects which are more evident when height control is used. The tops of new buildings similar in height to nearby towers should be shaped and detailed to disguise their similarity. All buildings should be massed or otherwise articulated to create a visually distinctive termination of the building facade. (see recommendations under "slenderness ratio.")

8.22.5 Abrupt changes in building heights

These cause significant impact on wind velocities in adjacent parks and streets, particularly important along the edge of the city exposed to prevailing southwest and northeast winds. Zoning height changes should therefore be done gradually, in increments of less than 100% of the adjacent height zones (for a convex cluster silhouette). Similarly, height zone changes should not be drawn along streets, but in the middle of blocks. There should be appropriate transition to adjacent higher/lower buildings and additional height set back from the street frontage to maintain continuity of the predominant streetwall and verandahway.

8.22.6 Benching

This important defect of height restriction which creates large flat steps in the skyline due to too many adjacent buildings with exactly the same height all having their flat tops

lined up, over a substantial area. This can be avoided by adopting graduated height limits over a sizable area or flat height limits over much smaller areas. The latter approach require more careful thought in terms of sculpturing adjacent height zones at a more detail sub-district level.

8.23 Techniques Commonly Supplementing FAR Use

8.23.1 Story height and number of storys

On KT's sloping land, it is not easy to determine the ground floor height to impose the number of storys control. For story height control, each half-meter difference in the floor-to-floor height could mean an extra 8 storys on top of say a 50 story building. Whether it is more correct to control based on *story height* or overall building height can be highly debatable. The bulk of two buildings can be similar where one of them has fewer storys but with taller story heights.[280] Since floor heights should likely differ particularly on slopping land in KT, control by the total number of storys is not supported since variable floor heights would drastically disrupt the cornice line to produce erratic results, especially for the lower height districts. The uniform block height assure that there will be almost the same number of storys and story heights in buildings for similar uses; any cornice height variation would then be more likely to be consistent with the land form.

8.23.2 Building setback and Boundary setbacks

The greater the height of the facade, the wider the range of differences in height that will be invisible to the pedestrian.[281] If a significantly taller building is built in the context of six-story facades, the building base ought to be visually separated from its upper stories.

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[280] Story height controls may assure the lining up of adjacent floor or overall block cornice lines, but number of storys control is not effective to guarantee uniform block heights. Probably the abhorrence of adopting height control in some localities stem from the suspicion that story heights greater than the nominal may be prone to illegal additions of mezzanine floors.

[281] Blumenfeld showed that in the streets between 60-80ft in width, a pedestrian most clearly perceives up to the first six stories from 200 ft away. The difference of 1-2 storys will not unduly disrupt the visual continuity of the street facade if most buildings maintain a height of 6 stories along the street. Where the prevailing height of surroundings buildings is 10 storys, the acceptable range of additional facade heights is 2-4 storys. The principles of setbacks are (i) the street wall of a building should not exceed a stipulated number of times the street widths (0.25-2.5times), (ii) for each foot increase in a portion of the building, that portion should be set back say, at least 2 feet, but a tower may be erected up to a maximum of say, 25 % of the of the lot area.

This can be achieved by setting the upper storys in a tower, setback 14-20 ft from the base facade. Arguably, limitations of the street wall could be reduced so that taller towers which need only to setback less behind a lower street wall can be allowed.[282] The surrender of a proportion of the lot area on the floors above specified story levels offsets the sacrifices essential to achieve a ideal office depth of 25 ft for assuring adequate light and air.[283] The aspect affecting *psychological cheerfulness* from adequate light and air is more important than the controversial claims in their therapeutic effects.[284] But setbacks is the only means to ensure openness to avoid *overlooking* in terms of privacy aside from providing adequate natural light and air. Outlook and light at the upper storys command a marked premium, so it has been practical to sacrifice building bulk in the lower storys to bring more of the upper openness and brightness to the lower storys provided a sufficient proportion is replaced in the tower.

8.3 EVALUATION OF BUILDING HEIGHT CONTROL AS A TOOL

I will now assess the building height tool in relation to other density control techniques including by observing how and the conditions in which they operate best or poorly, alone or in combination, and analyze their inherent limitations to support some recommendations

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[282] Lowering the street wall would reduce the net rentable area at the lowest floors which are more than offset by the prime values of the rental areas in the tower. The upper storys gain also increase the amount of sunlight and air to the street and lower floors of adjoining buildings. Depending on the building's use; setbacks may be more suitable for apartments or hotels but not for offices.

[283] As separate plots of land, each individual parcel is required to comply with its share of plot coverage and setbacks from their respective boundaries. Given a required plot coverage, it is usually more efficient for a larger plot comprising especially of smaller component plots of irregular shapes. The sum of all the residual or net buildable areas within each plot is always smaller than the net area of the combined plot as a large single parcel. Though this sacrifice of individual income caused by setback laws is far greater when considering the effect relative to the unrestricted development of all properties, it is acceptable in the "greatest good of the greatest number." It is in whose and how much to be sacrificed as adequate that the issue ceased to be about economics but begin to be politicised

[284] The setback principle accepts the therapeutic effect of light and air, and is a reasonable compromise to observe tthe rights of the individual owner, owners of adjacent buildings and the community. Diffused skylight is only a third as strong in the therapeutic ultra-violet component as direct natural sunlight. To assure that buildings are no higher than the width of the street, the traditional guide is to observe a 45° light angle. With the rampant use of modern artificial indoor environments, upper windows remain preferably closed due to the strong winds at the higher levels. So claims that smoke, dust and carbon monoxide which is heavier than fresh air, sink and are therefore prevalent at street level cannot anymore be arguments in favour of tall buildings

for prescribing building height control to achieve identity and to improve its effectiveness in doing so.

8.31 COMPARISON BETWEEN HEIGHT CONTROL AND FAR

8.31.11 The advantage of FAR

The use of FAR is prevalent because it is supposedly most flexible as regards total freedom of geometrical control. Rather than encouraging design creativity, it more readily facilitate optimization of development and amendment to mapped values to abet circumventions especially during boom times. Local authorities desirous of city taxes often resort to all sorts of inducements to sell extra development bonus points and create additional development rights leaving no visible consequences that can be easily detectable by nor need much justification to the public.

8.31.12 The disadvantages of FAR

The FAR ostensibly grants flexibility to the design of overall form to envelope the permissible volume of space by neither fixing its horizontal ground plan dimension nor its vertical dimension. Since the ground plan is determined more often by the buildings' function than by plot coverage and because of the myriad possibilities of the ground plan coverage, the resultant building height as a reciprocal of the footprint area can be very unpredictable. For any given FAR, the height aspect is too erratic to be a reliable parameter in its contribution towards the desired overall cityform. The irregular New York-style skyline is a direct consequence of the application of FARs. Its usual assumption of auxiliary restrictions testifies its impotence in affecting form.

8.31.12.1 FARs are abstract arrangements translated into formless volumes.

The major difficulty with FARs is that they are only the starting point for determining maximum but amorphous building envelopes. Even when FAR is enforced in combination with specific plot coverage, number of storys or floor height requirements, both the final building height and bulk can go awry. Such ambiguity attract violations. Whenever the greatest development potential is achieved through bonuses, transfers of development

rights, fees, contributions and linkage agreements to exceed the prescribed FAR limits, their results are even more unpredictable.

Though building height limits are also subjected to such enticements, the extent of this distortion can be accounted for exactly in precise height changes thereby rendering their geometrical impacts on their surroundings precisely measurable. Any opposition can then be framed in certain terms to make objections more formidable to dissuade departures. For instance, TDR[285] may not be workable in some places if transferred to another site since density is increased or decreased in particular localities involved. It is not easy to find someone to take over the old site in practice because the value transferred is no longer the same due to the change in location! Why is it justified to transfer bulk that is apparently harmful in one location to someone else's? If the adverse impact of height from say 10 storys is transferred, opponents can marshall exact quantitative arguments in relation to the physical dimensions of adjacent buildings to oppose the physical impact of an additional 10 storys in the new location . Whereas if an equivalent volume of space is transferred as an amorphous FAR, the new volume could be anything other than 10 storys so that the exact impact from this additional bulk cannot be precisely ascertained. One now see the greater political feasibility to transfer bulk as FAR rights than transfer by height.

8.31.12.2 FARs ignore placement of buildings on any site.

As a function of the plot area[286] but not its shape, the ambiguity of the FAR defined envelope is further impotent as regards delineating a building's footprint size or shape. It

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[285] The FAR for a given lot is computed on all property included as part of the development site. For sites containing an existing building, the floor area of the existing building would reduce the amount of floor space allowed in the new building. The unused development rights from architecturally important building designated could be transferred to a new development on a non-adjacent parcel since the square footage is simply transferred from one lot to another, the total allowable density downtown would not be increased. The purpose of the TDR is to obtain more useful open space downtown and to preserve significant existing buildings.

[286] Because FAR is based on the lot size as the flat ground base for mutiplication to obtain the allowed floor area, FAR is less tangible than height control which is based on a direct attribute of 3-dimensional form. When one says doubling the height, dimensional impact can be clearly visualized because the same cross-sectional size is assumable so that a given volume of space would exactly be twice as tall based on the same footprint size. When FAR is doubled, the change in height is nor apparent at all since its lot

is helpless in influencing the positioning of the tower on any site as usually, the tower and podium base are inextricably lumped as a GFA[287] based solely on the single prescribed ratio figure. Excessive bulk in the lower storys could actually reduce the overall return for the whole building. The nature of retail function require maximizing the lowest levels of space nearest the street level so as to command attention of passing shopping traffic. If not for locations conducive for retail and service business which require larger lower floors, it may be better to have the fewest number, at most five levels of floors near street level since the lower floors except for the lowest five levels are most affected by the cutting off of light and air by adjacent buildings, or lower the tower by building a larger portion of the total bulk as a "taller" tower to reduce the bulk of the podium.

In comprehensive developments involving several individual building blocks on the same large parcel, FAR cannot contribute to the number of blocks suitable to the site, the relationship between the blocks in terms of spacing or siting with respect to the overall site even if there are subsidiary 'FARs' for subdivided plots within the larger parcel, unlike height control. Their shortcomings became evident in the 60s when municipalities began to use FARs to encourage inclusion of public amenities like plazas for increases in height or FARs which yielded buildings that rose right from the property line.

8.31.12.3 FARs encourage land amalgamation.

As an abstract ratio, FAR mechanically multiplies whatever plot size to give the permissible floor area; the bigger the plot size, the larger the allowable GFA. The economic basis of tall buildings due to high land price must inevitably produce the tallest buildings by assembling and building on the largest plots. Larger land parcels for fewer wider streets with less inhibiting intersections, are believed to improve efficiency for development.[288] At the same time, it is uneconomic to have streets (which brings no

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shape as the footprint can be any size or shape. The image of the number of times the lot area is stacked up to simulate the number of floors is not useful because site coverage is rarely 100% .

[287] Gross Floor Area.

[288] Jacobs. The larger newer street patterns brought about by public policy favours the large scale developers and financiers at the expense of more smaller participants in city development. The total amount of land of streets which have become part of the larger blocks and parcels is a considerable percentage of all land before redevelopment, thus ceding large areas of the public domain to large wealthy

revenue) which are too wide on expensive central urban land. Based primarily on the net area of any site, FAR encourages the amalgamation of originally small plots of land to maximize the effect of the largest combined site area as the base to be multiplied by the designated ratio to obtain the largest total amount of leasable floor space. Not only does this destroy the traditional massing of more intimate scale, the use of FARs effectively increase the combined bulk of the new buildings on amalgamated sites over and above the combined bulk of the displaced masses.

8.31.12.4 FARs trade amenities by conducing bulk.

Unlike height control which is founded on scale relative to human size or among adjacent buildings so as to promote compatibility of adjoining scales, FAR is oblivious to visual magnitudes. FAR is conceived as a neutral economic commodity exchangeable for equivalent economic compensation. While height consideration tends to restraint building bulk and respecting existing or surrounding attributes by height decrease, incentives bonused by FARs had been mainly in the form of more floor area thereby instigating bulk increase. Beyond its utilitarian function of shelter, KT's arcade system shall be a citywide mandatory[289] feature which must be accommodated by all developments to provide a coherent consistent human scale device for transitioning to the towers above each development.

8.31.12.5 FAR is silent on environmental and aesthetic concerns[290]

This refers particularly to the determination of quantities of air, light and wind. A building's blockage of light to the street is a function of the placement of the building bulk in relation to the street, not of its FAR. Light and air are vital to the pedestrian's

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private interests. Having many streets and intersections, does not necessarily mean having a large percentage of land in the public domain and less development, though with narrower streets.

[289] While the FAR approach tends to discourage the provision of arcades unless in exchange as a bonus incentive which would increase additional bulk in the form of a taller building, height control can require arcade provision by moulding the desirable variations in the scale and enhance the street wall without any need to compensate with bonuses.

[290] Harvey Bryan, "Natural Light and Urban Environment," (ed. Moudon 1991) p299. (see Appendix V)

enjoyment since they not only influence the quality of the street life, but reflect the ambiance and livability[291] of the city as a whole.

8.31.12.6 FAR destroys streetwall continuity

Especially when there is no clear policy on the plot coverage, the tendency to achieve maximum building height squeezes the footprint at the ground level too unpredictably into unnecessary and uncoordinable setbacks leading to unmanageable jogs in the streetscape. The increase in bulk it abets also require large irregular setbacks above the streetwall which are difficult to coordinate. The main problem is on the sides and the rear of the lot as current practice provide a fraction of the setback afforded on front streets, or worse where there are blind walls without windows and where there are no rear service alleys.

Since FAR is conceived on economic but not social-humanitarian grounds, it is not surprising that FAR is indifferent to the significance of every physical attribute comprising aspects of identity which are circumstanced on human perception of visible form. And economics often contradict formal intentions for identity. If FAR disregard formal values, FAR is powerless for purposes of identity.

8.3.2 Disadvantages Of Height Control

An attractive streetscape require street life which can only be assured by the introduction of activities at ground floor level to create pedestrian interest and housing rather than height control alone to achieve the physical scale. This could be achieved by establishing a corridor for mixed use high density with housing above commercial space zoning the outer central district as a high density residential area and permitting housing to be built to the limits of the height and bulk regulations without counting the housing in the project floor area ratio limits.

Though height control may be better in addresses building form directly, it results in compressed bulky forms unless the footprints are also clearly implicit without being rigidly

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[291] Ashihara, 1981, p10. "External space is basically formed by the relationship between an object and a human being perceiving it. This relationship is primarily determined by sight, but often the same space gives entirely different impressions according to the way rain, wind and sunshine affect it.." (For example, sunlight depends on seasonal angles of sun rays. But daylight is diffused light from the entire sky, so orientation is not as important a consideration as it is for sunlight.)

specified. A perfectly flat roof provides most useable floor space at the top levels of a building if the absolute permissible height limit were to be optimized from a functionalist attitude. When this effect is multiplied over whole districts or even clusters of buildings, the result is awkward *benching* which is less acceptable in tall buildings than in buildings lower than 10 storys where it defines the skyspace for a pleasant human scale open ceiling to "outdoor rooms."

Attempts to restrict buildings arbitrarily to lower heights would result in severe deflation of land values in the CBDs, which would have two drastic effects, in (i) the earning power of city property as security for bank credit in which is largely tied up industry, commerce and business investments, and in (ii) deflation and dislocation of the whole tax structure of our cities which derive a large proportion of their total revenue by taxes upon real estate. The deflation of land values in the CBDs would not be offset by corresponding appreciation elsewhere because the ***decentralized*** city will be found to be both a ***less efficient*** *and more expensive* mechanism for carrying on most commercial activities.[292]

Height restrictions are often attacked in reining growth by for holding back development. This would explain my eventual proposal on why it is important to persuade that for height control to be acceptable, not only does it not constraint growth if conscientiously updated with realistic growth demand, it in fact molds clear patterns for orderly development rather than leaving it to the unfettered operation of the property market for which purpose the FAR suits well. Though it may be too wilful to prescribe drastically different height limits for adjacent plots in order to shape the skyline, discriminate height limits applied to groups of significant buildings or over districts of related character can be successful as has been demonstrated in Boston.

8.32 THE INFERENCE: FAR OR HEIGHT CONTROL?

The impact of building mass is controlled by limiting its overall volume, where FAR is popularly used. It is used in combination with height control, story height, number of

[292] Clark, p57.

storys, various setbacks and site coverage, but too many controls would be restrictive to its professed flexibility to designers. FAR therefore cannot control bulk nor form except with the aid of supplementary techniques[293] which rigidly freeze the building form such as story height which ignores the diversity in building functions, or setbacks based on daylight grounds. In practice, none of the techniques can be used by themselves. Height control is capable of achieving almost all the aspects that can be achieved by FAR but FAR completely breaks down concerning dimensional formal aspects which height control is particularly suited for, there is no need to use both FAR and height control. In fact FAR needs to be supplemented by height control but height control can stand on its own.

However in terms of molding a definite desired skyline, height control is the most direct attack. But in order not to appear arbitrary to the extent of being accused of anti-growth, the set of height limits have to be continuously monitored and frequently revised over time periods according to demand at the time. Since FAR fixes the total permissible space and plot coverage that can be justified based on objective views concerning the efficiency of the ground floors but not necessarily relative to lot size and shape or street width-height proportions, FAR and plot coverage are imposed on rational economic grounds. If purely economic factors are allowed to govern, true economic height will be found at levels higher than the usually moderate heights permitted. Zoning Codes are founded on the need to restraint the heights of buildings but not to shape urban architecture.

Height restriction is probably the most open to charges of arbitrariness due to the human tendency to continuously exceed whatever the current height 'record.' Their imposition is often excused by some technical constraints such as flight paths in the way. Generally, when the priority is either symbolism or economics, the criteria is respectively building height, or leasable gross floor area in the form of bulk. Despite a tendency towards the lowest end of the spectrum of symbolism associated with economic priority, FAR is the

[293] Although New York's Zoning Code is renown for having shaped its stepped buildings, that was the work of its intricate setback rules rather than due directly to the effect of FAR alone.

most conducive tool to foster economic growth. For identity purposes, height restriction is the most affective and effective tool. It has been repeatedly shown that, economics often contradict the attainment of identity. If the efficacy of FAR lies in expediting economic growth, the relative weakness of height control is its strength in its competence in creating identity. And economic growth is not the first priority for a capital city with identity. [294]

8.4 RECOMMENDATIONS ON THE USE OF HEIGHT CONTROLS

8.4.1 JUNCTION CONTROL

Barnett pointed out how rampantly the building height to street width relationship had been violated in New York City by supposedly capable designers including Franzen, Barnes, Pei, and Johnson. This call attention to the practice of designers who design their buildings to stand out by deliberately placing towers right at the corners of major street intersections. Certain strategic street junctions need to be more stringently managed not just for height control but to motivate the creation of special public spaces as urban connectors within KT's open space system by using inverted conical or even hemispherical volumes of space to sculpture these public spaces. They are unlike those building splays delineated by the turning radii of vehicular traffic but are to be projected according to established optical principles sympathetic to pedestrian perception (fig 62).

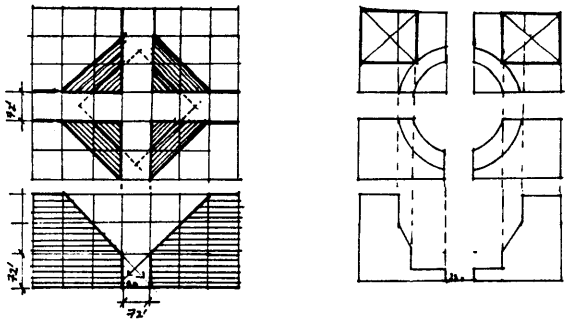


fig62 Junction Control
Street intersections need not only meet at 90° but may be shaped to accommodate building heights taller than that fronting on the widest streets, and also create a chain of such public spaces.

[294] Vale, 1992 : Designed capital cities are "diagrams of poltical power," for control and continuity, to display political institutions through invented symbolism.

8.4.2 VERTICAL ZONING

In dense urban areas, there is a need to assess the lower part of buildings separately because other portions of a tall building are not visible except the first three floors. It is also necessary to assess the upper parts by themselves because the most visible are the top two-thirds of tall buildings when viewed from afar. To regulate the forces which act upon a city's public open space it is economically and aesthetically desirable to control the spatial quality by more direct means.[295] Planners began to rebuild Rotterdam by first laying out plans for the entire city with its streets, parks and building masses on a scale model to study the spatial quality created by the planned buildings to determine the heights and setbacks of all structures from the standpoint of the volume of the **external space** created before actual construction commenced. Fitting new development into KT's environment is a matter of scale requiring careful assessment of each building site and relating a potential new structure to the size and texture of its surroundings. Good scale depends upon a height that is consistent with the *total* pattern of the land and of the skyline, a non-overwhelming bulk, and complements the building forms and elements of the city.

Vertical zoning envisions roof decks as layers of "new ground planes" defining vertical height zones in between them. Thus the footprints of upper parts of a tower are defined on upper height zones thereby ensuring spatial relationships between upper masses to be coordinated across large districts of the city just like it is now done for the ground level but from the standpoint of the building as an undifferentiated whole. Each new building needed to be related to its neighbors at both the upper and lower levels. Lower levels of lower buildings are controlled by uniform height limits. The upper level need to avoid jarring contrasts that would upset the city pattern. This could be adopted at three levels: (i) the shape given to the top portion (of every large structure should consider the building's position in city views. Prominent buildings should be consciously designed to

[295] The homogeneity of the streetscape that may be achieved is dependent on city step-back ordinances designed to protect air rights by recreating the original sharp streetwall line through surrendering volume at the base as in the entirely stepped back Seagram Building or by an unbroken sloping line in the San Francisco's pyramidal TransAmerica Building.

contribute to a graceful skyline in harmony with the texture of development on surrounding hills); (ii) buildings below the silhouette (but still prominent in views, should contribute to an overall sculptural form - avoiding awkward or overscaled blunt forms); and (iii) the tops of all buildings (interesting to look at from nearby towers).

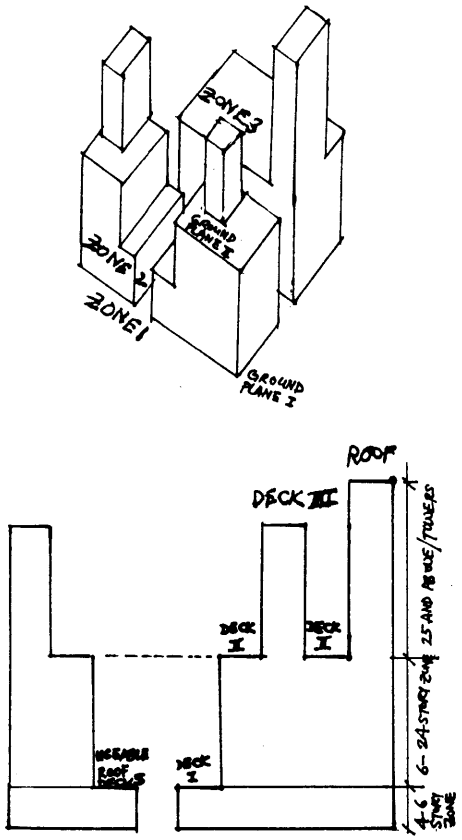


fig 63 Vertical Zoning
Controls should be separate for different levels of tall buildings since their relationship at higher levels are not the same as the ground level. (e.g. street widths is important, but at higher levels it could be tower separation, and still higher could be oblique sky view. Where the podia roofs are useable for recreation ,they become the new street level which call for different standards of spacing. Similarly for the higher levels such as roof tops of flat topped towers and so on.

8.4.3 URBAN COURTYARDS

Higher height and density transfer to a part of the same block to create a private urban park is allowed. Pockets wider than the widest streets will allow taller buildings to cluster and edged around courtyard-like civic spaces, especially around transit nodes. Without the need to assemble as large a lot area as possible, sizable office towers could be constructed on adjacent lots otherwise not suited to the narrower streets. The controls would be applicable to four vertical zones on a building: base, lower tower, upper tower and tower extension based on the principle that as building increases in height, it should decrease in bulk. In bringing light and air to the lower floors like in the traditional shophouses, outer courts, preferably facing onto streets like one-sided streets are recommended. Internal

courts must be large enough to be effective particularly for greater heights. Outer courts can be more effective than considerably larger inner courts (fig 64).

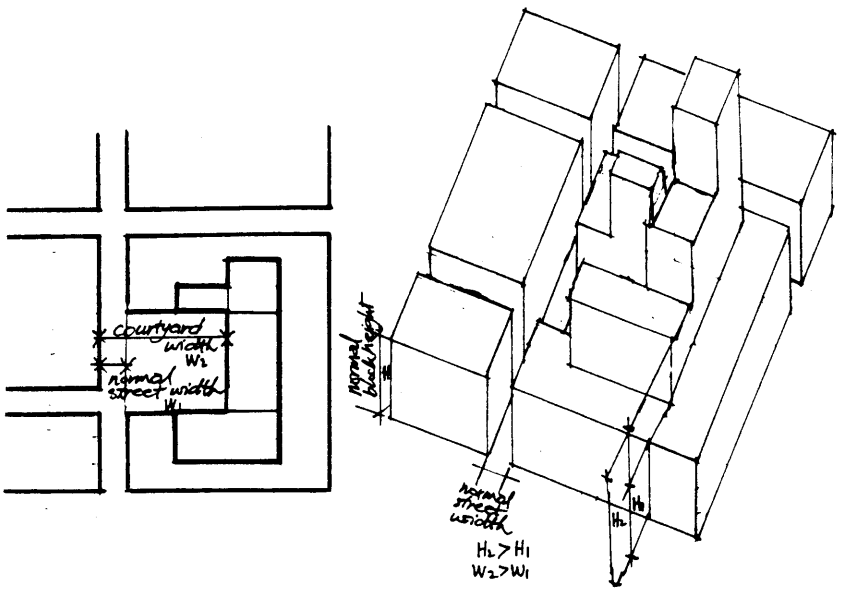


fig64 Urban Courtyards
Pockets of space around critical places especially at transit nodes where the street width could be widened considerably to take on spots of high density development.

8.4.4 SLENDERNESS RATIO (SR)

On sloping land where views around building bulk is important, the slenderness of buildings can modulate height districts of height h through regulating the footprint size r but not plot size[296] to discourage bulky buildings. The h/r ratio restricts the site coverage for individual buildings by controlling r as a radial dimension to promote regular plan shapes At the height cap for that district, r has to be small yet h is within the h limit; otherwise, buildings would be compressed by the height cap to become bulky indeed. To be less restrictive, the ratio can be graduated accordingly when applied to different vertical sections of a building. Simultaneously the ratios are set at optically elegant proportions.[297] Since it is based on volume, the ratio can handle the function of space specification too, just like FAR.[298] To avoid the awkward benching effect caused by the visible lining up of

[296] This avoids restricting the development size. It is enough to control building bulk by controlling the base of individual buildings on the same plot to a reasonable size yet allow topping up to the height limit.

[297] This ratio parallels the civil engineering criteria which evaluates the tendency of buckling of a structural column based on geometrical dimensions. This has an affinity to the "visual correctness" of constuction materials as a guide to the right sizes of building parts.

[298] Given any volume V of space specified, both h and k can be plotted to facilitate reading off the appropriate pair of values for h and k. [If k=h/r, r=h/k. Space specified $V= \Pi r^2 h$, $V=\Pi(h/k)^2 h=\Pi/k^2 h^3$.

building tops when many buildings are built to their height limits, the narrower height districts depend on the slenderness of the whole height cluster, not just individual buildings. The ratio allows greater height for more slender buildings up to the height limit. Height limits should be structured so as to allow the presence of new buildings for improvement and growth to affect the existing skyline in a positive way softening existing "benching," and providing more variety and interest in the skyline and a general view of the city. As a method of measuring bulk as the greatest horizontal radial dimension of a cylindrical volume measured at a height corresponding to the prevailing height of adjacent development, r gives some allowance above the nominal height h, limit the leeway[299] for creating interesting building terminations embraced within a hemispherical volume atop the tower. An apparent predominance of hemispherical building tops will not emerge since generally any odd intrusions into KT's skyline shall be subject to design review (fig 65).

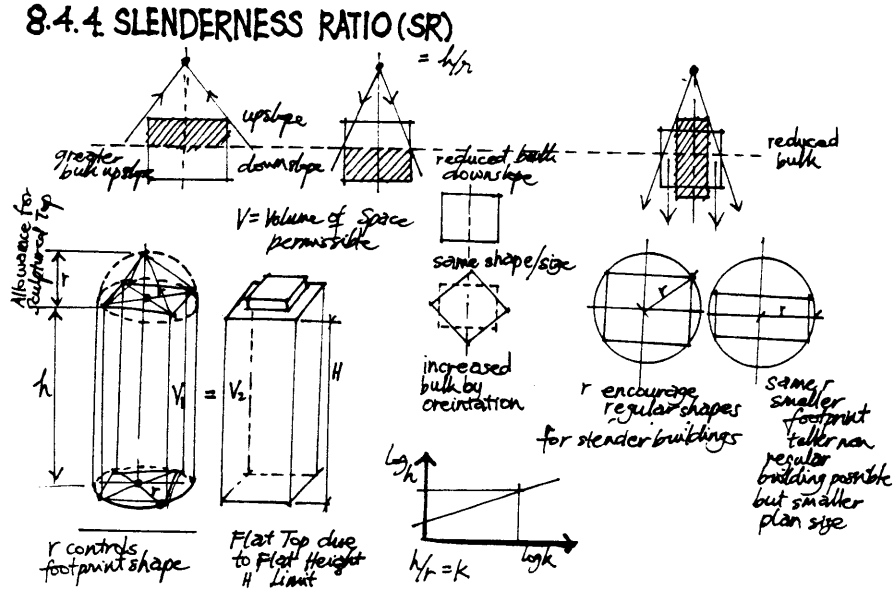


fig 65
Slenderness Ratio

Unlike FAR which is aimed at facilitating economic growth while oblivious to concerns on parcel amalgamation and building bulk, SR regulates form directly without restricting growth yet controls building bulk in such a way to encourage interesting building tops and elegant overall building proportions by taking into account a sense of the footprint.

Then $h^3 = k^2V/\Pi$, $h = (k^2V/\Pi)^{1/3} = k^{2/3}(V/\Pi)^{1/3}$ $\therefore \text{Log}h = (2/3)\text{Log}k + (1/3)\text{Log}(V/\Pi)$].

[299] To avoid absolutely flat rooflines for interesting variations and yet maintain district height character, slight variations will be allowed. There is incentive for an optional upper tower extension for flexibility to encourage slenderer buildings and skyline appearance by permitting an exception to height limit Up to 10% or 3 storys, whichever the lower, of the mapped height if there is further bulk reduction which will create slenderer overall profile. Unroofed recreational facilities are exempted from area calculations to encourage recreation use of building tops and screening of equipment. Unoccupied enclosed space allows up to 24ft (two storys) above the building height limit while the requirement for integrating rooftop mechanical functions to be incorporated into the architecture as integral building form allow an additional 12ft (one story) above the limit for mechanical equipment.

8.4.5 MUTABLE CITYFORM FOR GROWTH.

8.4.51 Greater use of height, set back and coverage regulation is preferred since the latter are less volatile with respect to market demands than FAR. The permissive use of incentives had enhanced the potential of the FAR approach to flout mapped height intentions to encourage building the tallest buildings. Instead of encouraging over building, bulk controls should be used to moderate increases in the supply of office space through timing and monitoring. To ameliorate the disastrous effects of the cycles of boom and bust, a *dimensionable volume* of space to set a desirable pace of growth should be established by current market surveys (fig 66). However it may sometimes be advantageous to increase height limits in less sensitive areas by deliberately making some clusters more compact or relegating taller buildings to the edge of the larger plots to release some land for open space rather than applying uniformly low FARs over all adjacent sites. Taller buildings should be clustered to promote the efficiency of commerce and avoid needless encroachment upon other areas. The higher height area could be confined besides retaining the basic concept of a small compact highrise financial core, surrounded by accessible, spacious lowrise or open areas.

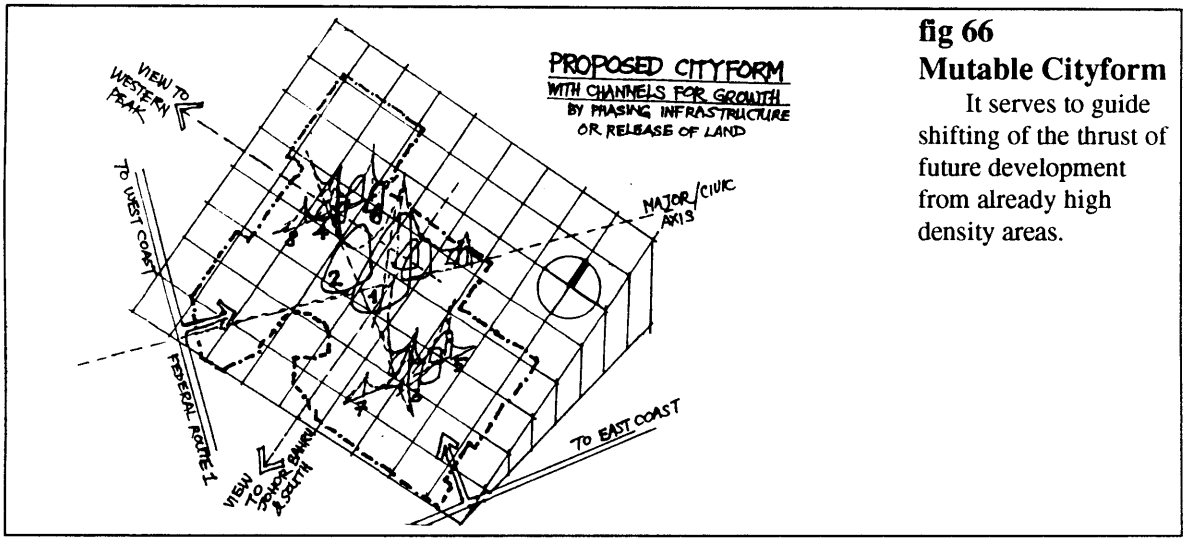


fig 66
Mutable Cityform
It serves to guide shifting of the thrust of future development from already high density areas.

8.4.52 THE ROLE OF HEIGHT CLUSTERING

Sufficient mass and compactness are essential for well formed silhouettes. New York City's sheer density crowds out its landmark buildings. For sharp silhouettes in man-made

environments, there must be all three components (i) compactness, (ii) extreme density, and (iii) individual landmarks. New York City has not retained its faintest original topographic features. But for those which have it and not to use it, is to be perverse. A ready made element that can be put to good use is therefore topography: it is unique, lends instant height, gives the play between the ups and downs, conserves by sensitively utilizing the valleys and hilltops and is most permanent over time.

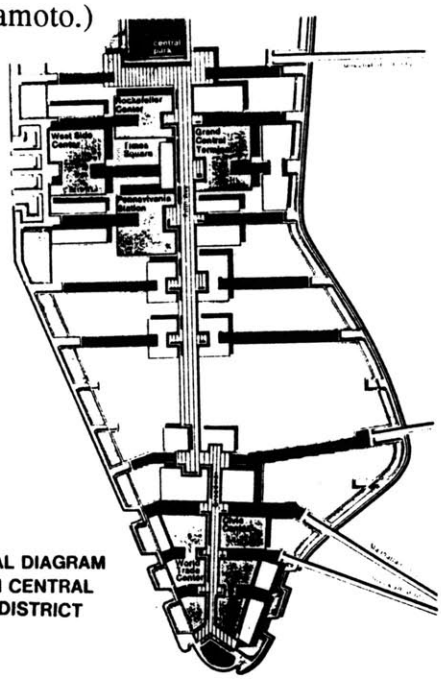
Hong Kong's skyline is highly recognizable because it unconsciously followed the steep sides of the hill. With its recent stock of new architecture. Hong Kong's topography is dramatized by its recent crop of adventurous contemporary architecture which are far less boxy than say Singapore's or Sydney's Skyline. Because only New York has the first two features to an extreme degree, most other cities cannot be compared on those bases. Most international style skylines are indistinguishable from one another if not for their landmarks which typically break out of the "box". That is why landmarks are so desirable in many cities, but not all landmarks are reliable, unless the design is absolutely unique without being kitsch. Because of these are so conspicuous, poorly designed ones do more harm to the skyline than not having them. The easiest way was to resort to mere height with structures called spikes, pricks, towers and needles. The Statue of Liberty and the Eiffel Tower are the few that stand out as unique structures which made the best of their height though they cannot be considered as normal buildings. But the colossal Eiffel Tower would not be as effective if it cannot visually anchor itself but for Paris' uniformly extensive six-story base. The continuous displacement of small scale services from New York's CBD alarmed Okamoto,

"Manhattan's clustered peaks are losing their distinct shapes as they coalesce visually into an undifferentiated mass. The powerful clarity and identity of its CBD clusters are disappearing and losing supporting service facilities within walking distance..."

New York's opportunity to sculpture the volumetric city form relied on occasional individual landmarks by chance, buildings which must be distinctively designed or simply allowed to be much taller than the rest like the Twin Towers of its World Trade Center. Despite their lack of much architectural interest, they probably reestablish Lower Manhattan's emblematic tallest cluster (fig 67) at the tip of the Manhattan Island by

restoring coherence to an otherwise uniform mass. *But prominent individual buildings do not make a good whole city, at most they only make good parts of a city.* Whereas San Francisco is relatively respectful of its original topography, Boston flattened whole hills to use the earth therefrom for reclamation purposes thus ending up with less character than it should. Because Boston retains the character of its various distinctly uniform height areas such as Beacon Hill and Back Bay, San Francisco's skyline is not more prominent than Boston's even with its gimmicky TransAmerica Pyramid.

(Source: Okamoto.)



CONCEPTUAL DIAGRAM
MANHATTAN CENTRAL
BUSINESS DISTRICT

fig 67 The Highs and Lows of Manhattan's Cityform. Note the twin cores at Lower Manhattan and Mid-Manhattan. The latter core has two distinguishable peaks..

To sculpture overall cityform the height of individual major buildings deserve careful individual control. Uniform height in tall districts is not the same thing as in low districts. The uniformly high densities as products of FAR as against height control in New York City are not comparable to the elegant lowrise order in say Boston. *Boston's unique heritage in its urban order, particularly in height control, has successfully guided Kevin Lynch to envision Boston's highrise spine* (fig 68). Thus conscientiously grouped building mass is the discerning way to project the timelessness of the land from which it grows to create a total identity.

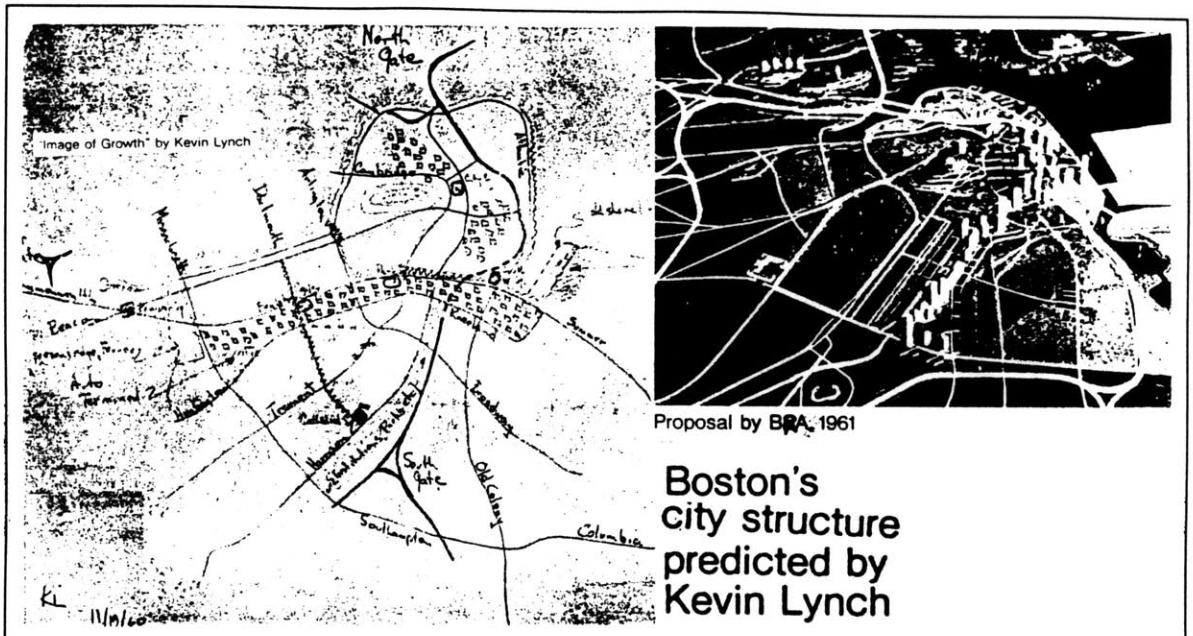


fig 68 Boston's High Spine. BRA's Proposal for Boston was closely adopted on the ground. This presents unusual coincidence with Lynch's earlier Image of Growth.

8.5 CONCLUSION

Although overt architectural identity is more intimate to the human scale which lends itself better to finer expression at the decorative and community levels, sympathetic consideration at the cityscale level is crucial since policies at the broad level often prevent the achievement of those detail level characteristics unless there is a clear awareness of the planning conditions conducive for nurturing the finer ingredients of the cityform. It is equally important that the designer need to understand the non-visual priorities of the planner, just as it is for the latter to provide for a desirable aesthetic environment as his broad contribution to facilitate rather than hinder the realization of an inspiring cityscape with identity.

While economics can determine the most optimal height, power detemines the maximum permissible tallness. Optimal height is a measurable vertical dimension, whereas tallness is perceived height relative to the scale of adjacent structures and subject to interpretation as influenced by the visual signals given by the tall structure itself. This explains why social-

political and power opinions about building height differ tremendously from optimal height. The feasible height is therefore always subject to socio-political evaluation but ultimately decided by power. If height is an important aspect of identity, then power as its predominant factor, must be used in discerning ways. Otherwise, the possible identity is one of anyhow, everywhere but nowhere; any identity is fortuitous at best. At worst, height becomes a tool of powerful megalomaniacs for self-aggrandizement to cause more harm than good for the identity of any cityform.

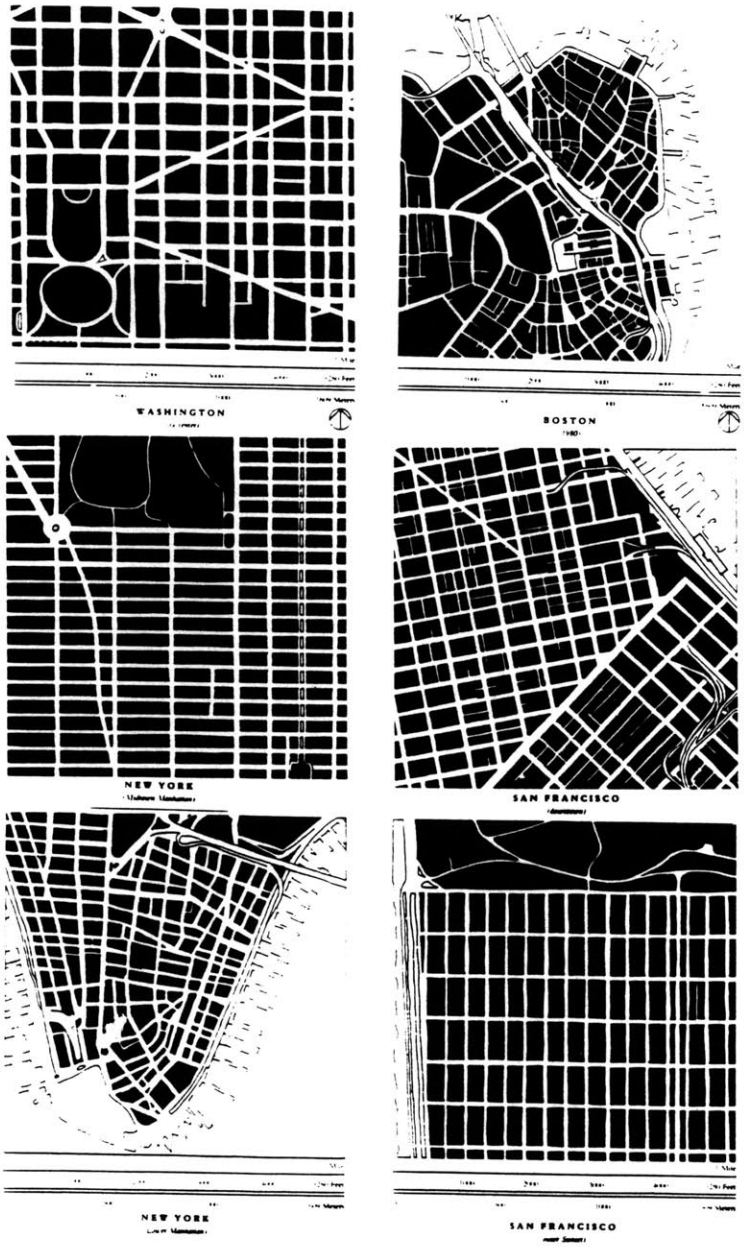
It was seen (chapter 4) that official policies motivated by political exigencies and ostensibly intended for equalising socio-economic advancement are closely related to and have direct consequences on the distribution[300] of development intensities albeit indirectly effecting the heights of buildings. Given the capacity of the power factor, especially cogent for a capital city, rather than a commercial city, for collating the socio-political and economic factors that affect building heights, its authoritative potential for such cityscale organisation of built densities could be implemented on the basis of a preplanned street pattern in coordination with specific height controls to direct purposefully the anticipated growth of a city and in so doing create and sustain the continuity of its identity.

[300] Lam, "The NEP has its overiding objective in the promotion of national unity by restructuring of society through correcting economic imbalance to eliminate the identification of race with economic function. The UDA (Urban Development Authority) was vested the power to translate into action-programs Government Policy to restructure society through urban development to achieve distribution of opportunities."

APPENDIX I

Street Patterns of Case Study Cities

Ideally the identities of these cities should be a direct result of their distinctive street configurations. Notably, Boston's unique street pattern as a narrow and crooked radial system is even more "medieval" than that of Lower Manhattan's. These stand out from the usual gridirons of the other American Studies. The transitions in the street pattern of San Francisco is representative of a major topographical feature. The layering of the diagonal system over the normal grid in Washington gives it its strong identity while the "one-off" Broaway of Mid-Manhattan gives its overall gridiron even more character like a signature stroke of a confident personality.



APPENDIX II

Previous Conceptual Master Plan

Table 5A. Planning Standards Assumed

1 **Population** (total estimated) +	Needs for Johor Bahru catered by year 2000	271,000
2 **Worker Population+**	40% economically active	108,400
3 **Industrial Workforce+***	28% industrial	30,352
	24 % from surroundings	7,300
	Total industrial worksforce	37,600
	Industrial land provision	319.4 ha
	Assumed worker density	85 p/ ha
	Business Park land provision	106.1 ha
4 **Open Space**	Open space land provision/ 1000 population.	0.8 ha
5 **Residential***	Assumed residential density	250 p/ ha
(Low/medium/high density mix)	Residential land provision	1084ha
	Assumed household size	5 persons/du
	Each New Town 67750 population (271ha)	13,550du
6 **Commercial***	Office space GFA provision	520,000m2
(Catering to regional needs)	Retail space GFA	500,000m2
	Hotels (number of)	10
	Assumed plot ratio	2.0 - 3.0

Sources: * Structure Plan; + Rahim & Co. Research Sdn. Bhd.

Table 5B. Proposed Overall Land Use Distribution

LAND USE	AREA/Ha	PERCENTAGE	ADOPTED STANDARDS
1 **Residential**	1084	40.1 %	Assumed density 250 p/ha (h'hold size 5)
2 **Industrial**	418	15.5 %	High-tech industry and Business Park Plot ratio 1: 0.4 - 1.2 Industrial Worker density: 120 p/ha Industrial land: 314 ha Business Park worker density: 60 p/ha Business Park land: 103.8 ha
3 **Commercial** 60% at year 2000	138	5.1 %	Office space: 330,000m2 Retail space: 370,000m2 Hotels/service apartments: 10
4 **Recreation/ Open Space**	260	9.6 %	0.8 ha per 1000 population.
5 **Administrative /Civic/Cultural**	68	2.5 %	Administration: 40 ha Civic /Cultural: 28 ha
6 **Infrastructure/ Water Bodies**	372	13.7 %	Roads, utilities and artificial lakes.
7 **Institutional**	291	10.8 %	Social welfare, educational, medical.
8 **Neighborhood**	72	2.7 %	Daily/convenience amenities.
TOTAL	2704	100 %	

Table 5C. Land Use Distribution of New Towns (average 13,550 du)

LAND USE	LAND AREA (ha)	PERCENTAGE
1. Commercial (Neighborhood)	35.23	13.0
2. Residential	108.40	40.0
3. Schools	29.81	11.0
4. Open Space	9.48	3.5
5. Sports Complex	1.08	2.0
6. Institutions	9.48	3.5
7. Industry	32.52	12.0
8. Roads	37.94	14.0
9. Religious	1.35	0.5
10 Utilities/Others	1.35	0.5
Total	271.00	100.00

Table 5D. Development Phasing

Stage	Description	Area/ha
1	Nearest the existing developments outside the southeastern corner of the site to gain initial access via the two existing main roads off Jalan Kota Tinggi Highway. Provides a balanced mix of working and living spaces with light industries and a starter residential neighborhood developed first to minimize infrastructure costs.	338
2	Continue phase 1, mostly residential, more industrial use and a business park.	388
3	Resident population sufficient by now to justify the commencement of the city center. To finance the construction of a part of the Government Center one half of the adjoining commercial center will first commence.	341
4	Development to concentrate along the spinal belt northwards whilst the residential neighborhoods north of the city center will also proceed.	414
5	Growth of the city center will generate sufficient pull to induce north-western end of the spinal belt to grow southwards to eventually merge with the city center.	378
6	Spinal developments and the city center completed, perpendicular fingers of development begin northwards.	374
7	Commercial center and more residential developments completed.	228
8	The rest of the site will be developed especially on the hilliest portions.	243
	TOTAL	2704

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