RETHINKING **Palava**

Study of Urban Grain models

July 2016

Preface:

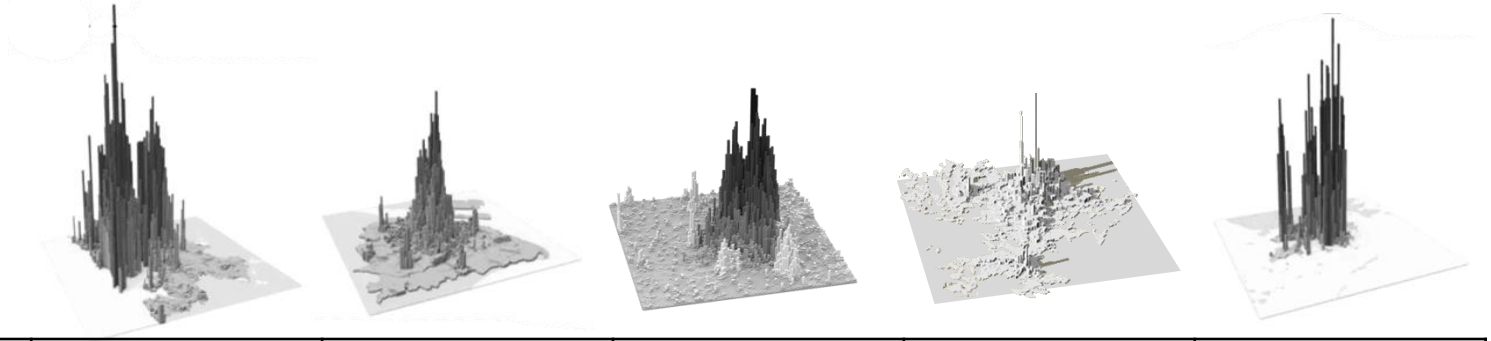
The study tries to evaluate examples of cities across the world that set livable standards as a result of its ***Urban Form.***

Key factors that affects urban form :

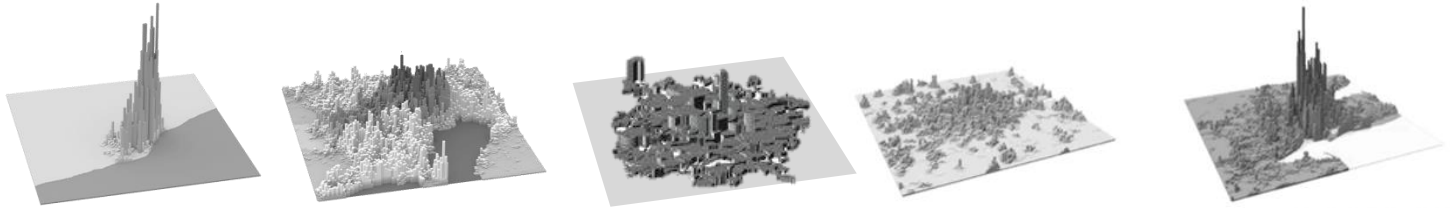
- ***Residential Density***
- ***Ratio - Building height : Street width***
- ***City Block***
- ***Structure of open space***

An Overview - Population densities of major cities

Density *is a fundamental measure of urban structure and determines the* ***efficiency*** *of its* ***urban footprint.***



	Mumbai, India	Shanghai, China	Delhi , India	Jakarta, Indonesia	Hong Kong , China
Land area (ha)	60,300	74,600	1,48,400	1,36,000	1,09,800
Population	1,43,50,000	1,00,00,000	1,10,07,835	1,42,50,000	68,26,500
Density (people / ha)	**238**	**134**	**112**	**105**	**62.17**

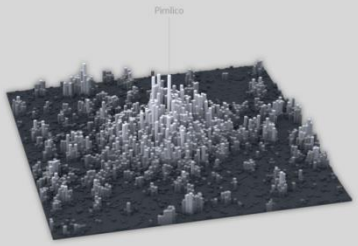


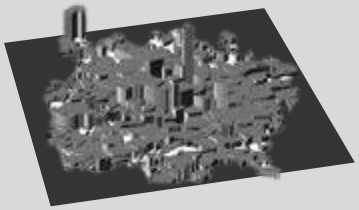
	Barcelona, Spain	Tokyo , Japan	Paris ,France	London , UK	New York, USA
Land area (ha)	80,300	6,99,300	2,72,400	4,14,700	7,69,000
Population	39,00,000	3,32,00,000	96,45,000	1,22,32,000	1,60,44,000
Density (people / ha)	**48.5**	**47.5**	**35.40**	**29.49**	**20.86**

Note : The density reflected in the chart is for entire Metropolitan region
Source : http://www.citymayors.com/statistics/largest-cities-density-125.html

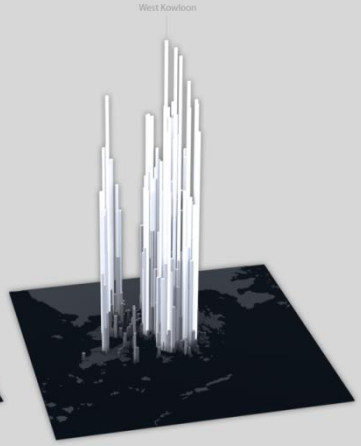
Population densities of major cities in the world

RESIDENTIAL DENSITY







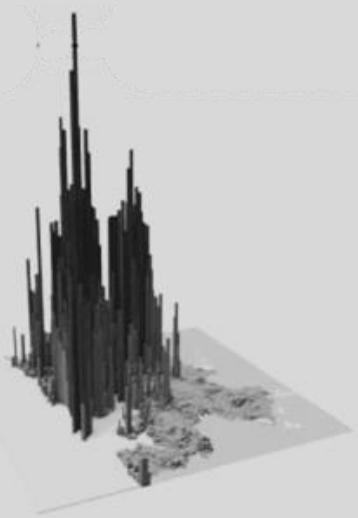


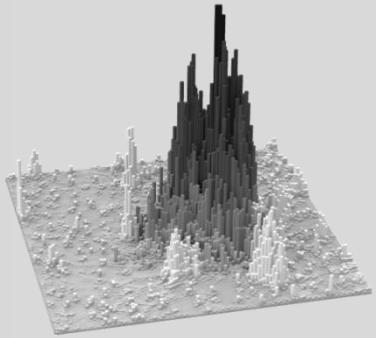
	LONDON	PARIS	NEW YORK	HONG KONG
Urbanized area (ha)	4,14,700	2,72,400	7,69,000	1,09,800
Population	1,22,32,000	96,45,000	1,60,44,000	68,26,500
Density (pp ha)	29.49	35.40	20.86	62.17
Core	Greater London Authority	Ville de Paris, Hauts-de-Seine, Siene-St.-Denis, Val-de-Marne	Greater New York	Hong Kong Island
Core area (ha)	1,58,100	74,900	78,300	8,030
Population	71,88,000	61,64,000	73,23,000	14,07,600
Density (pp ha)	**45.46**	**82.29**	**93.55**	**175.29**

http://www.demographia.com/

Population densities of major cities in India

RESIDENTIAL DENSITY





	MUMBAI	DELHI
Urbanized area (ha)	60,300	1,48,400
Population	1,43,50,000	1,10,07,835
Density (pp ha)	238	112

http://www.demographia.com/

Urban grain of major cities in the World

URBAN GRAIN









	LONDON	PARIS	NEW YORK	HONG KONG
Building Height (Avg)	G + 3	G + 4	G + 6	G + 16
Open space (sq m / person)	**31.68**	**11.50**	**26.40**	**2.5**

Source : http://www.citylab com/

URBAN GRAIN





	MUMBAI	DELHI
Building Height (Avg)	G + 5	G + 3
Open space (sq m / person)	1.1	12

Source : http://www.citylab com/

Density range of major cities ***29 – 238 ppha***
(calculated on the gross metropolitan region)

As per UDPFI guidelines *for cities up to a population of 8 lakhs ,* ***Ideal habitable density*** ***495 – 740 ppha***

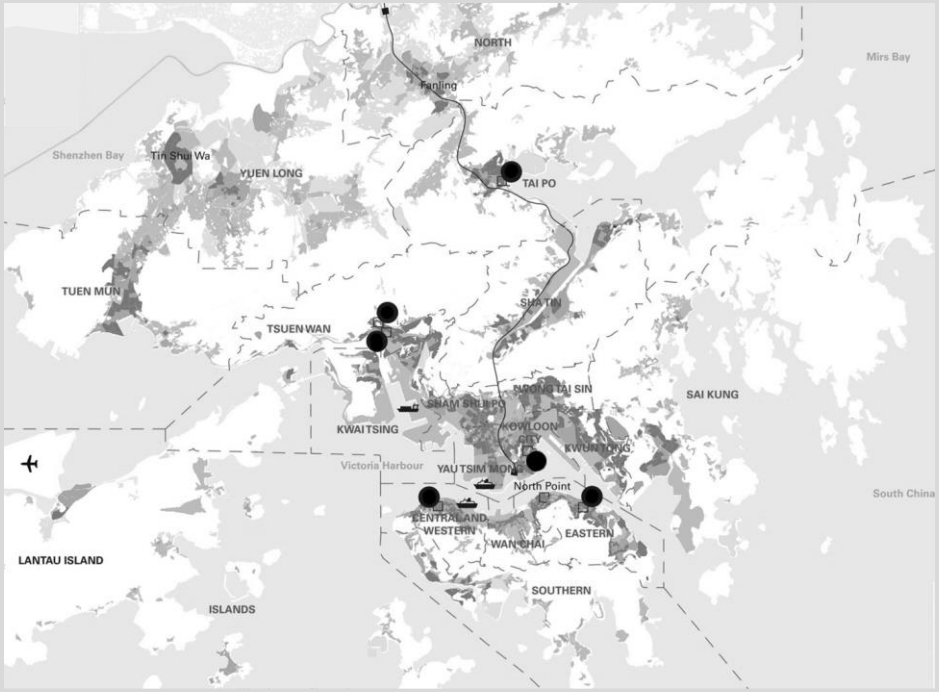
Estimated Palava Density (Phase II) ***1090 ppha***
(Master Plan April 2016)

Smaller pockets within certain cities like ***Hong Kong*** *will have higher densities ,which is comparable to the estimated* ***Palava*** *density.*

Analysis of the Six pockets/areas in Hong Kong with High habitable densities.

Selected Areas:

1. *Tai Koo,*
2. *Tsuen King,*
3. *Chi Kiang Street,*
4. *Sai Yin Pun,*
5. *Tai Po,*
6. *Fuk Loi*



Map -Hong Kong, Marking the Six selected areas

Source : https://lsecities.net

Hong Kong consists high rise urban form and extreme populated densities mark the cities landscape



HONG KONG – TAI KOO
211,457 pp/km2 (star-shaped towers)



HONG KONG – SAI YIN PUN
151,501 pp/km 2 (mixed high – rise block)



HONG KONG – CHI KIANG STREET
206,888 pp/km2 (perimeter blocks)



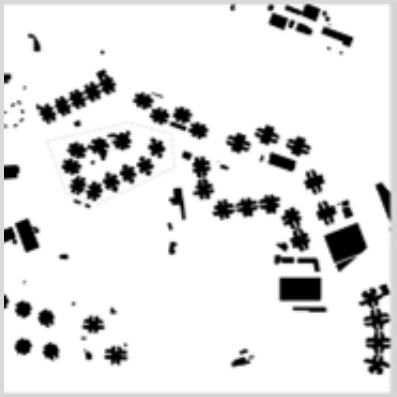




Building Height 40 Lvls

*Marked In **RED** are densities comparable to Palava*

Source : http://www.citylab com/



HONG KONG – TSUEN KING
261,407 pp/km2 (star-shaped towers)



HONG KONG - TAI PO
83,992 pp/km 2 (Double tube towers)



HONG KONG – FUK LOI
64,600 pp/km 2 (Slab block)



Building Height 40 Lvls



Building Height 25 Lvls



Building Height 12 Lvls

*Marked In **RED** are densities comparable to Palava*

Source : http://www.citylab com/

Urban grain and Densities Comparable to Palava



PALAVA I - CASA RIO
69,000 pp/km 2 (Slab block)



HONG KONG – FUK LOI
64,600 pp/km 2 (Slab block)



Avg. Building Ht 8 Lvls.



Avg. Building Ht 12 Lvls

Inference :
Density for Palava II in the range that is between Casa Rio and Fuk Loi i.e ***665 ppHa – 740ppHa*** *will give a desirable Urban Grain with* ***Building height max 12 Lvls.***

Source : http://www.citylab com/

Height to Width Proportion (HWP)

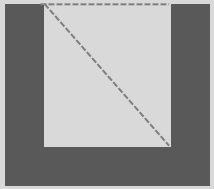
Different ***Height of the Street wall to Width of the street*** *ratios invoke different feelings and a different sense of place .*
For eg 3:1 ratio in major urban downtown and 1:4 ratio in suburban retail strip.
The HWP ratio of any space generates spatial enclosure that is related to the physiology of the human eye. If the width of a public space is such that the cone of vision encompasses less street wall than sky opening, the degree of spatial enclosure is slight. ***The ratio of 1:6 is the absolute minimum if a sense of spatial enclosure is to result.***

As a general rule, the smaller the ratio is the stronger the sense of place and, oftentimes, the higher the real estate value.

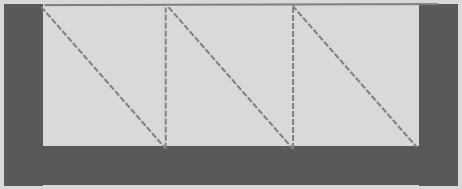
Height to width Ratio_ Street Enclosure

Urban Planners / Experts

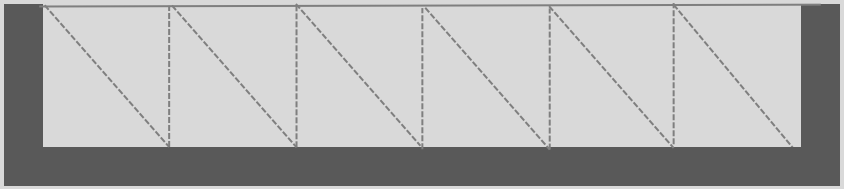
Alexander	**1:1**	**(ideal)**
Hedman	**1:1 – 1:2**	**(Ideal)**
K. Lynch		
Hack	**1:4**	**(Min)**
	1:2- 1:3	**(Ideal)**
Duany		
Plater-Zybek	**1:6**	**(Min)**
A Jacobs	**1:2**	**(Min)**
	1:1	**(Ideal)**



1:1 ideal for streets



1:3 ideal for squares



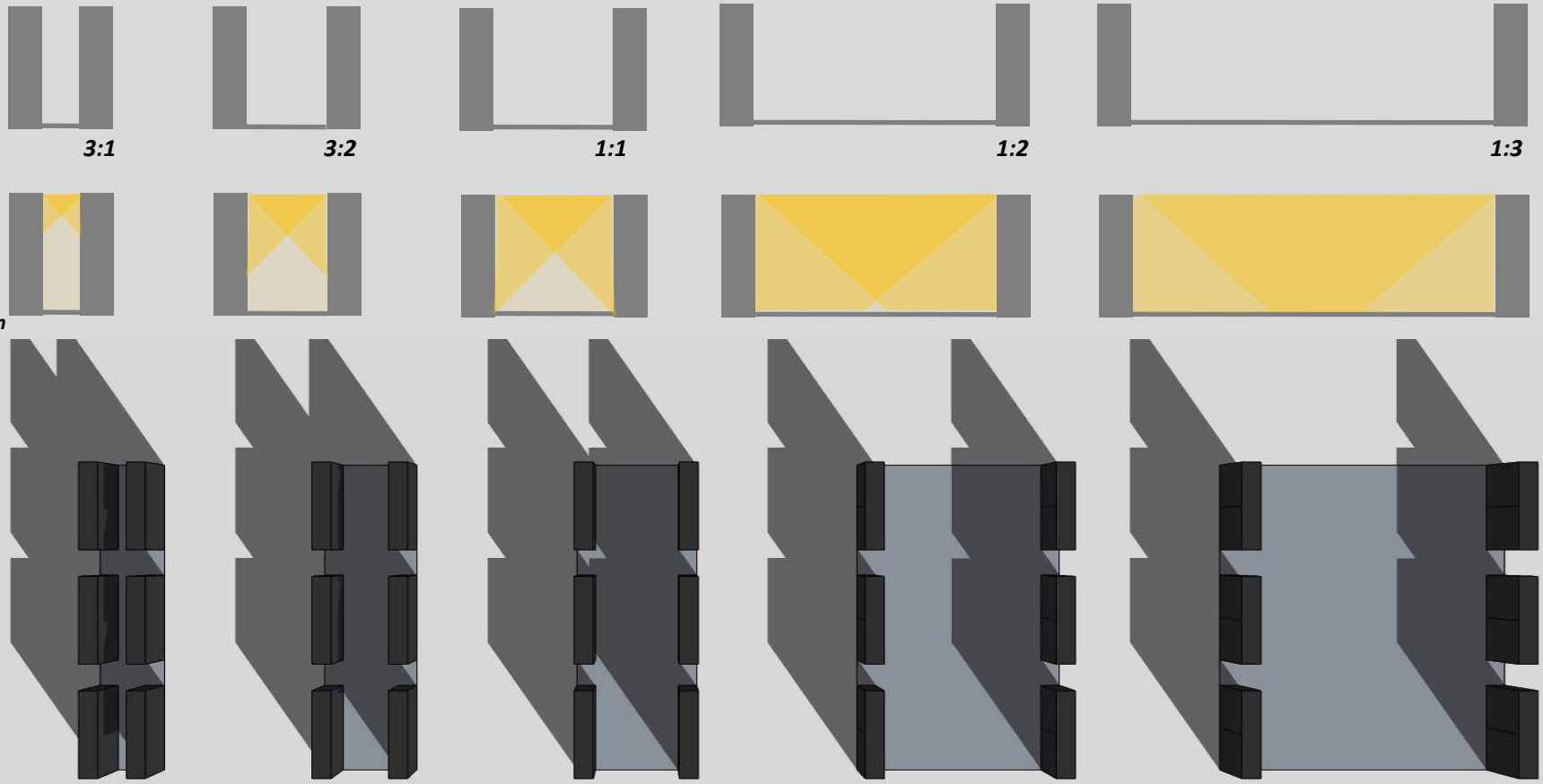
1:6 The perceivable maximum

Source : https://archive.epa.gov/greenbuilding/web/pdf/ptfd_primer.pdf

Building height : Street width ratio

HWP Ratio and Place making

(Block Considered 20m x 100m)

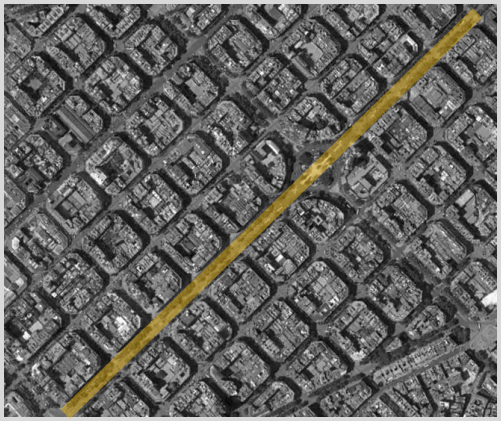


	3:1	3:2	1:1	1:2	1:3
Ratio					
Light penetration					
Shade					
Sense of spatial definition	*Strong , directional ; feel like a "concrete canyon"*	*Strong ; clear sense of enclosure*	*Excellent, Strong place making potential. Strongest ratio for good place making.*	*Good, for place making*	*Weak, Place making potential is low. No sense of place to the street*
Occurrence	*Larger downtown*	*medium size urban area*	*all urban areas (residential)*	*Ideal urban street/ squares (place making)*	*suburban areas where wide streets are lined with 1-2 storied residential /retail*

http://sdgreatstreets.org/wp-content/uploads/2011/07/Changing-the-Conversation-Building-Height.pdf

Case Reference_ Streets with HWP ratio of 1:1

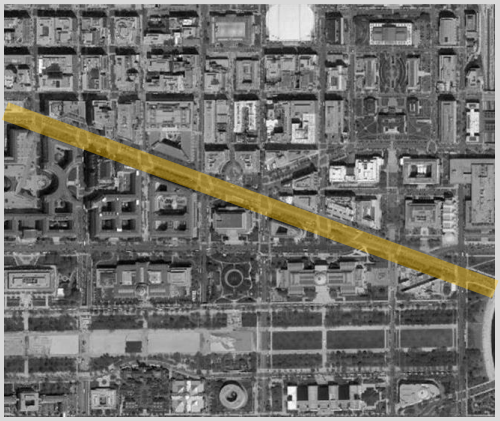
1:1
Barcelona Street , Spain





Building Height 4 levels (20m)
Street Width 20 m

1:1
Massachusetts Avenue,Washington ,D.C. U.S.





Building Height 12 levels (48m)
Street Width 49m

1:1
Eleventh Avenue / West end Avenue , Manhattan

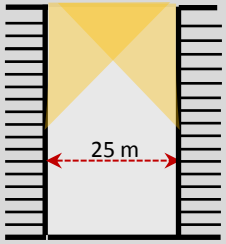




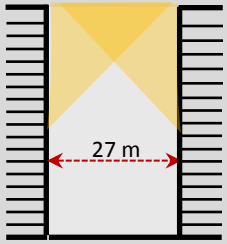
Building Height 14 – 15 levels (42-45m)
Street Width 45 m

At Palava

2:1

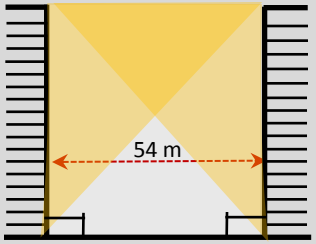


Courtyard



Lateral Road

1:1

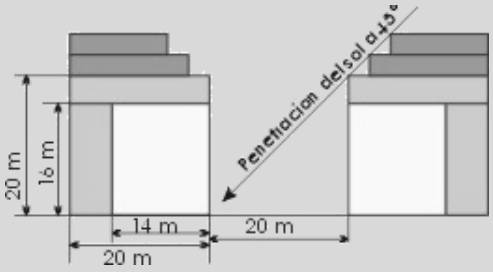


Spine Road

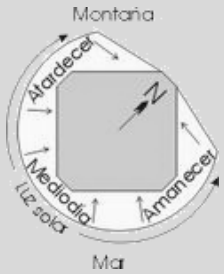
Relation of built form and street _Case Barcelona



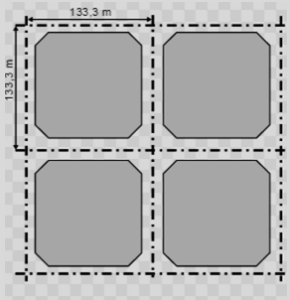
Land Area	: 7.46 sq.km
Street width	: 20m / few boulevards 50 m
Building height	: 20m
HWP ratio	: 1:1

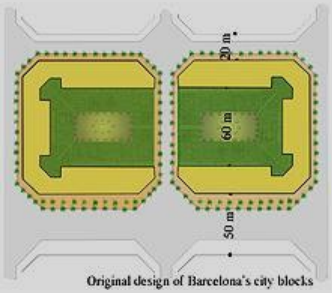


Solar access was retained on all floors of the buildings on the other side of the street by placing the top floors somewhat further back, producing a terraced building. In this way, developers looking for financial profit actually improved housing density without negatively impacting solar access.



Orientation of the block as per sun path movement.

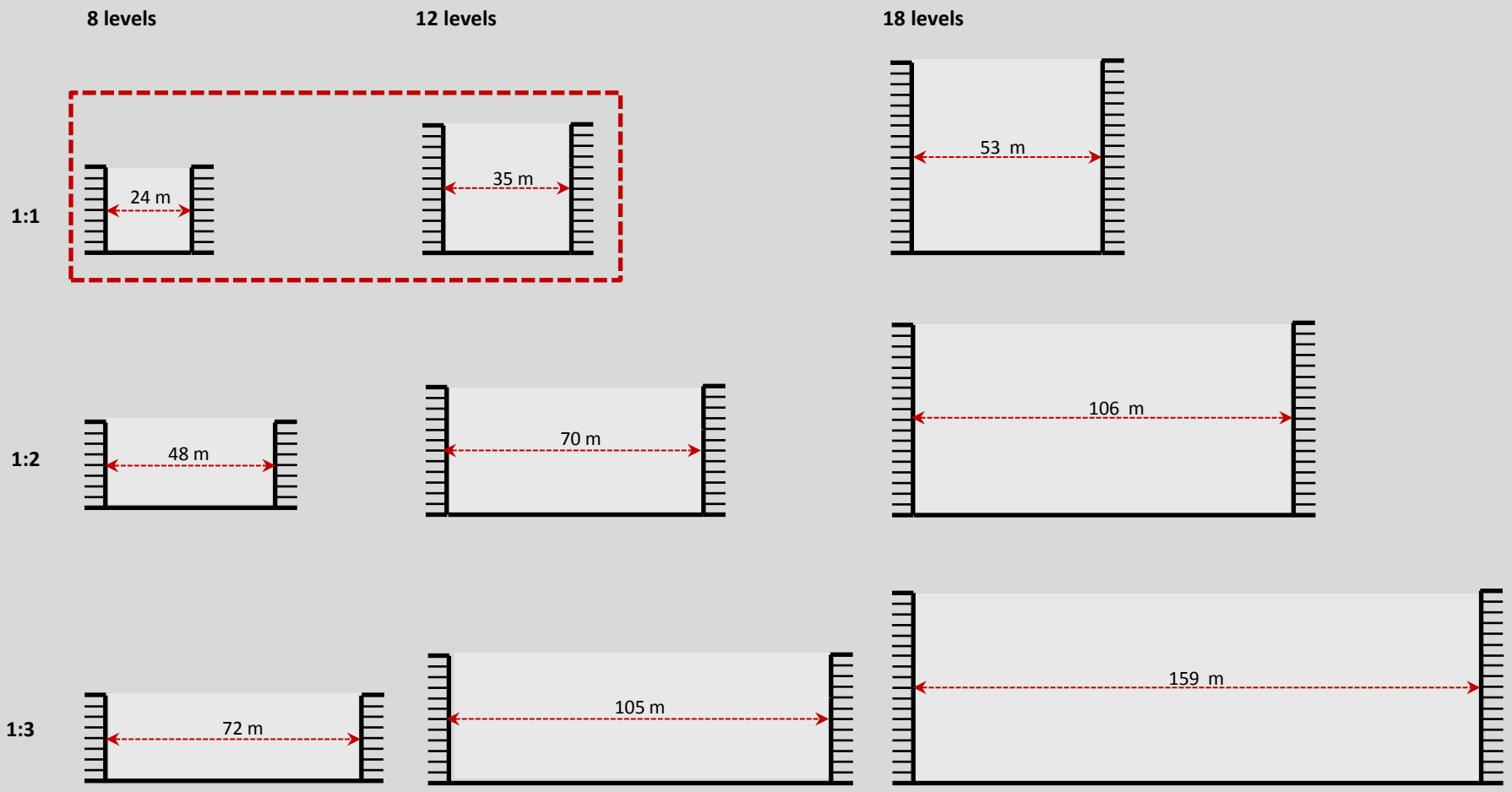




Building block / plot size : 113 x 113m
The blocks would have only 50% of their plot ratio constructed with perimeter coverage, the remaining left for central patios or gardens that would offer public open space as well as appropriate light and ventilation to the plots.

http://www.resilience.org/stories/2012-03-26/solar-envelope-how-heat-and-cool-cities-without-fossil-fuels

Study of Open space with respect to Building Height – HWP Ratio

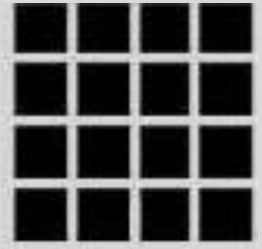
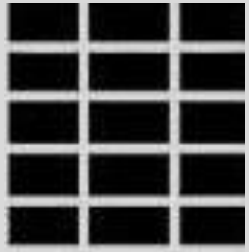
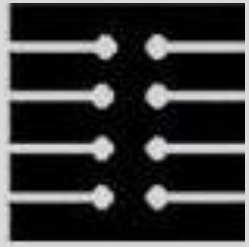


Inference :

*To ensure compactness and a desirable living condition (light penetration / shade / sense of enclosure) ratio of **1:1** can be considered for the Case of Palava .*

Max Building Ht. : 8 -12 Lvls.

Buildable area and Street area percentage comparison

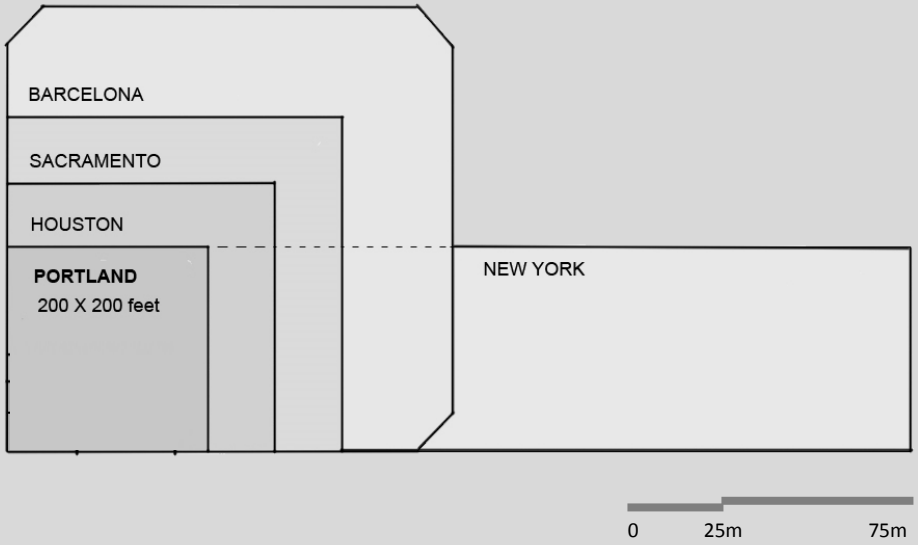
Pattern	 Square Grid	 Oblong Grid	 Oblong Grid 2	 Loops	 Cul-se-sacs
% of streets	36.0 %	35.0%	31.4%	**27.4%**	**23.7%**
% of buildable area	64.0%	65.0%	68.6%	72.6%	76.3%

For comparable residential densities, loop and cul-de-sac street patterns are more efficient than traditional gridiron geometry.

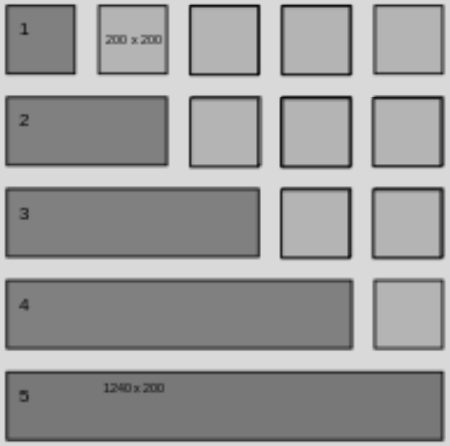
http://www.cardinalgroup.ca/nua/ip/ip02.htm

Study of Effective City Block sizes

Block sizes of known cities with grids (to same scale)



The effect of increasing block size on total street length.



Relation between Building Block and Walkability

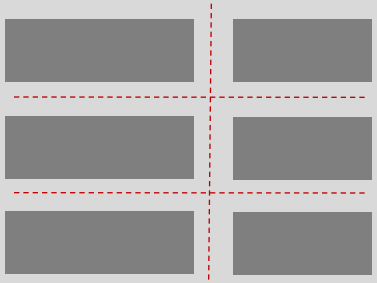
For high degree of walkability, block lengths of:

90m are desirable
120- 150m workable
180-240m are not desirable

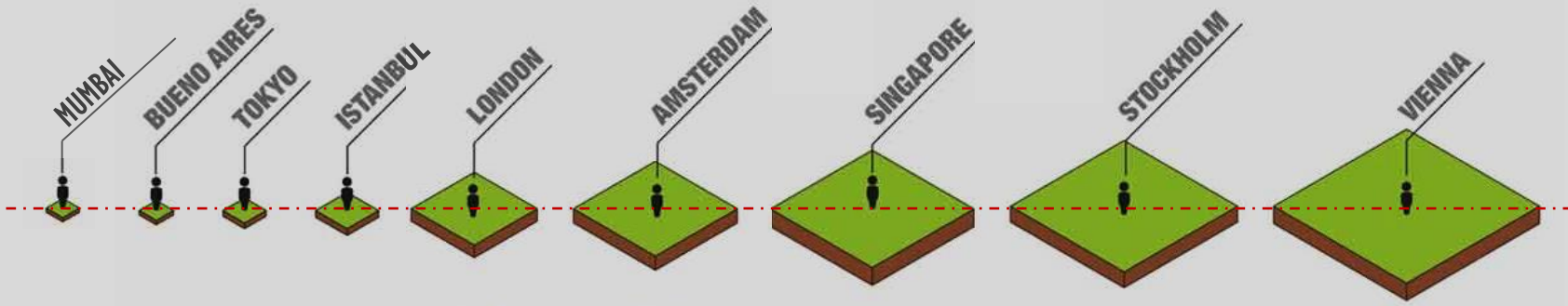
Inference :

Effective compactness (Street to Built Ratio) is achieved in a ***Rectangular Building block.***
Desirable Building Block sizes must range in ***90 – 150 M*** *(based on walkability)*

At Palava ***Block Size*** *54.3 X 150M*
54.3 x 110M



An Overview - Open space / Habitant in major cities



	MUMBAI	BUENO AIRES	TOKYO	ISTANBUL	LONDON	AMSTERDAM	SINGAPORE	STOCKHOLM	VIENNA
OPEN SPACE/PERSON	1.1m²	1.9m²	3m²	6.4m²	27m²	45.5m²	66m²	87.5m²	120m²
% LAND (OPEN SPACE)	2.5%	5%	3.44%	1.5%	38.50%	9.09%	47%	30%	51%

Open Space Required

UDPFI guidelines

Area under recreational	**15-20% of site**
Open space per person	**10-12 m² / person**

WHO recommendation

Open space per person	**9 m² / person**

At Palava

6.4 m² / person
(including forest and Gauchar)



Note: Open Spaces considered: park, gardens. Tree lined streets not considered in open spaces.

Source : http://www.baharash.com/liveable-cities-how-much-green-space-does-your-city-have/
http://www.skyscrapercity.com/showthread.php?t=1660203

Open space Structure - Regional policy and strategy in London and Hong Kong

The two main characters of open space that affect urban sustainability are **structure** and **pattern.**

Structure - The hierarchy of different types of opens spaces related to the number of habitants of the city
Pattern - spatial arrangement, size and connectivity of landscape habitat patches

Open space structure : London

Open space categorization	**Area (ha)**	**Parameter** (Distance from home (km))
Regional Parks	400	3.2 - 8
Metropolitan parks	60	3.2
District Parks	20	1.2
Local parks and Open spaces	2	400
Small open spaces	Under 2	less than 400km
Pocket parks	under 0.4	less than 400km
Linear open spaces	Variable	wherever feasible

Open space structure : Hong Kong

Open space categorization	**Parameter** (Opens space/Person)
Regional Parks	-
District Parks	10 Ha / 1,00,000 (Min)
Local parks and Open spaces	10 Ha / 1,00,000 (Resi)
	5 Ha / 1,00,000 (Com)

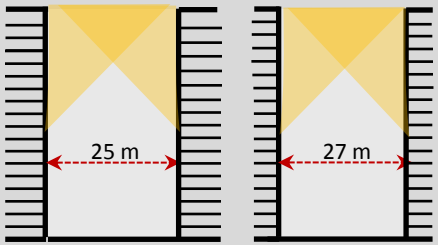
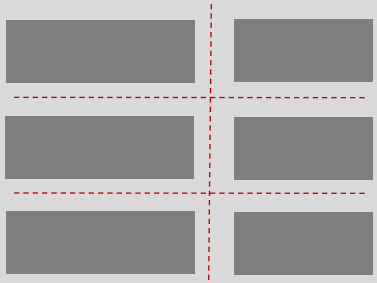
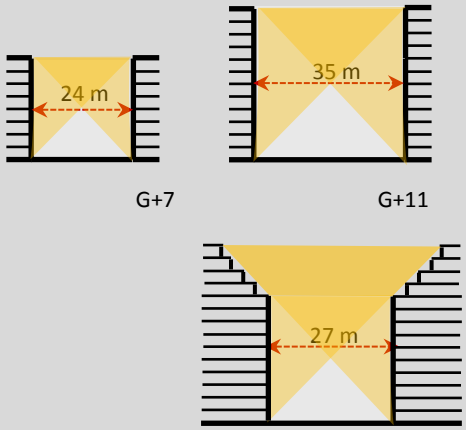
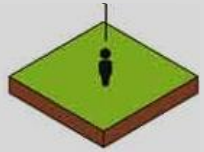
Open space / person (at city level) 10-12 sq.m. / person

Area under Recreation				
Settlement type	**Avg densities (pp ha)**		**% of land under recreation**	**open space area / 1000 persons**
	Plain areas	**Hill areas**		
Small town	75-125	45-75	12-14%	1-1.2 ha
Medium town	100-150	60-90	18-20%	1.4-1.6 ha
Large cities	100-150	60-90	18-20%	1.2 – 1.4 ha
Metro cities	125-175		20-25%	

** The proportion for large cities is avg. of small and medium town as the land is costlier in case of large cities*

Recreational facilities	
Planning unit	**No and typology of open space**
Housing cluster	3-4 local parks and playgrounds
Sector	3-4 local parks and playgrounds
Community	2-3 community level park and open space
District	1 district level park and sports center, maidan
Sub city center	1 city level park, sports complex, botanical / zoological garden, maidan

Inferences drawn For Palava II (570 Acres)

	Residential Density	*Ratio - Building height : Street width*	*City Block*	*Structure of open space*
EXISTING - SECTOR 3	 *1100 ppHa*	*2:1*  G+17	 ***Block Size*** *54.3 X 150M* *54.3 x 110M*	 **6.4 m ²/person**
DESIRABLE FOR 570 ACRES	 ***665 ppHa – 740ppHa***  = 200 people	*1:1*  G+7 G+11 G+13	-	 **10 - 12 m²/person**



July 2016