stba Contemporary City

The Familiar City - Density

Spatious DENSITY

Argument

1980s – 2000s

Problem: increasing consumption of land for development

Solution: return to traditional urban densities

2000 -

Problem: increasing consumption of energy and water
poor ecological performance

Solution: efficient and renewable consumption of energy and water
support urban ecological and climate performance
create a hierarchy of private to public spaces
give priority to public affluence over private wealth

Density paradox – Argued sustainability benefits of high density

Fact: migration to met areas / deconcentration within met areas
20th C paradox: urban desirability and suburban livability
Sustainability: consumption patterns must be changed / compact doesn't mean dense

ÖPNV:	ÖPNV not used (uneconomic) outside the center
Travel time:	Inner city commute longer than in suburbs
Air quality:	Feinstaub (microparticle pollution), emissions, waste heat, off-gassing
Health:	Density causes anxiety, stress and forces trips away from the city
Drainage:	Impermeability creates stormwater runoff; new infrastructure costly
Local food:	No space for groing food in cities;
Housing costs:	Growth boundaries, density and added height increase costs
High-rise:	High rise generates 2x CO2 emissions (lifts, pipes, pumps, structure)

Urbanists promote density as a formal, typological and technical fix
The market (people!) prefer low density, SFH and the mobility and access of the car

Spatious DENSITY

The spatiously dense city is:

- dense yet spatious
- socially sustainable
- cool and green

It links:

- social and environmental justice
- communal ethos
- greener urbanism

It is structured for:

- pedestrians and bicyclists
- forms of collective transport

Lecture structure

- Calculations on and geometries of density
- Principles of energy efficient city building
- Morphologies
- The Familiar City
- Density

Calculations on and geometries of density

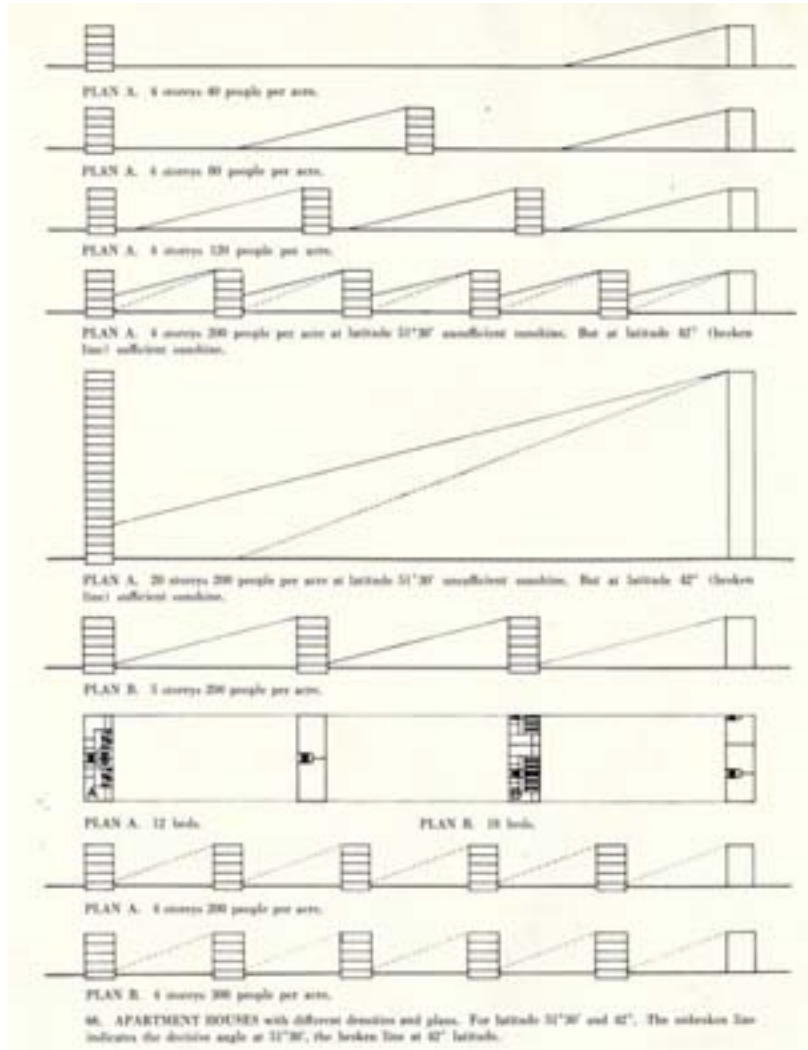
Highrise or midrise?

Taking into account a sufficient insolation, density increases 20% with each floor added – for one to five stories; from five to twenty stories only 4%

Plot pattern matters!
Relations between land available, built form and roads that serve them

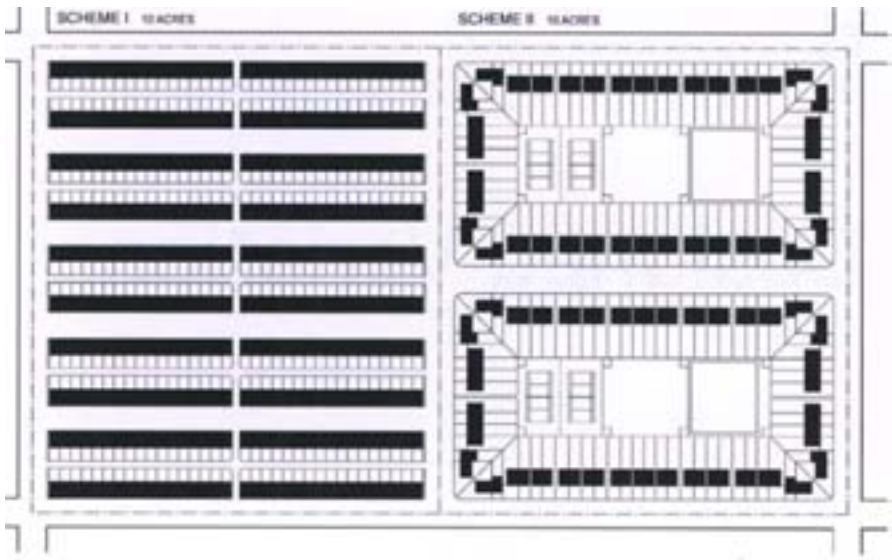
Conclusion: Quote Philipp Johnson:
„There is no reason why we should have tall buildings at all. We do not need them; we will them. We build them only because we want them. With proper planning and distribution of the citiy's functions smaller buildings could do the job. Tokyo has little over seven stories; Paris has one skyscaper. The high building is just American arrogance." Quoted in: Ada Louise Huxtable, Towering question: The skyscraper, 1960

The new city – Principles of Planning (Ludwig Hilbersheimer)

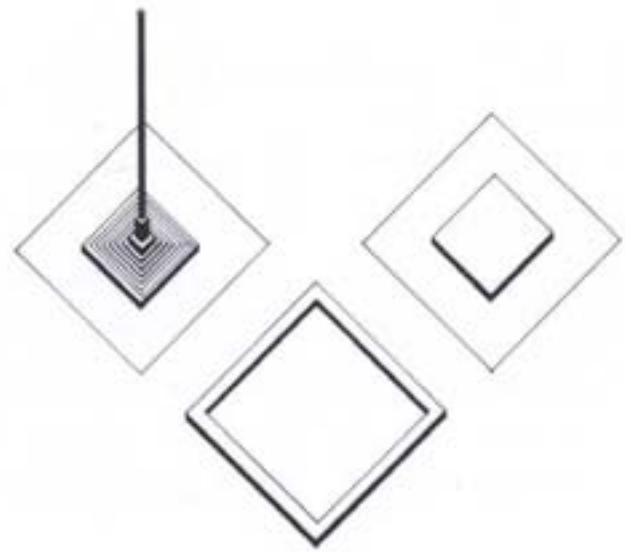


66. APARTMENT HOUSES with different densities and plans. For latitude 51°30' and 42°. The unbroken line indicates the decisive angle at 51°30', the broken line at 42° latitude.

Nothing gained by overcrowding (Raymond Unwin)



115 Raymond Unwin juxtaposes "two systems of development" of the same area.



116 Housing density in relation to its distribution.

Residential street patterns

Figure 1: Comparison of area used for streets, among five typical patterns

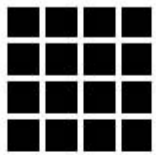
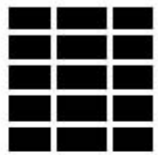
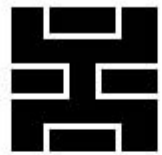
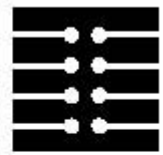
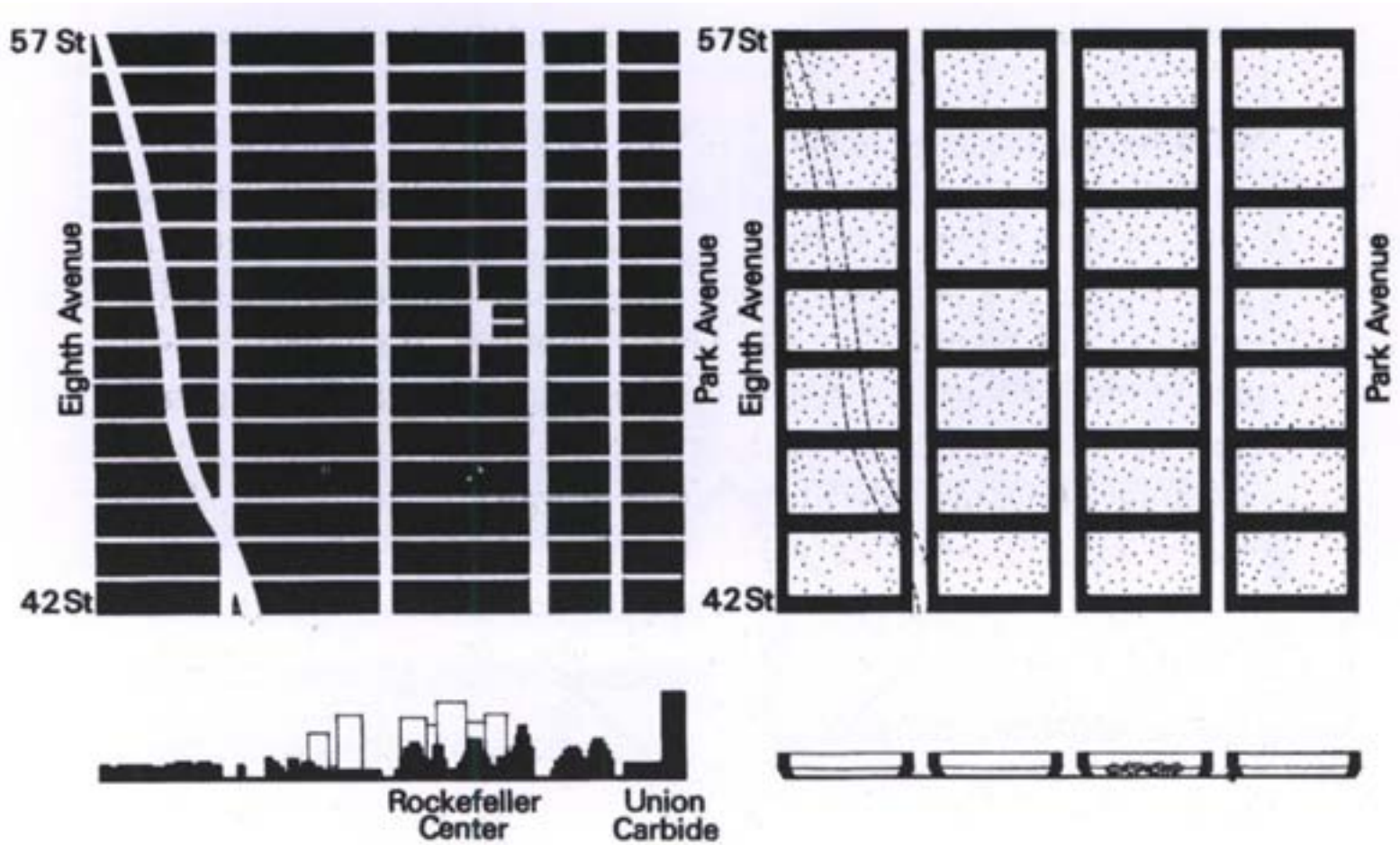
	 Square grid (Miletus, Houston, Portland, etc.)	 Oblong grid (most cities with a grid)	 Oblong grid 2 (some cities or in certain areas)	 Loops (Subdivisions - 1950 to now)	 Culs-de-sac (Radburn - 1932 to now)
Percentage of area for streets	36.0%	35.0%	31.4%	27.4%	23.7%
Percentage of buildable area	64.0%	65.0%	68.6%	72.6%	76.3%

Figure 2: Evolution of street patterns since 1900 showing gradual adaptation to the car (M. Southworth, 1997).

	Gridiron (c. 1900)	Fragmented parallel (c. 1950)	Warped parallel (c. 1960)	Loops and lollipops (c. 1970)	Lollipops on a stick (c. 1980)
Street patterns					

The skyscraper is a will of man! (Philip Johnson)



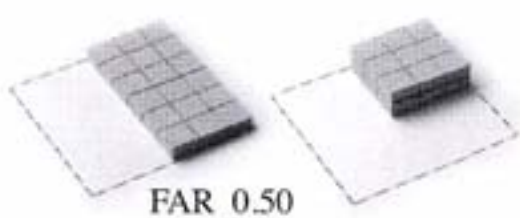
117 "We don't need them, we will them!"
Two variations on the same building mass in Midtown Manhattan.

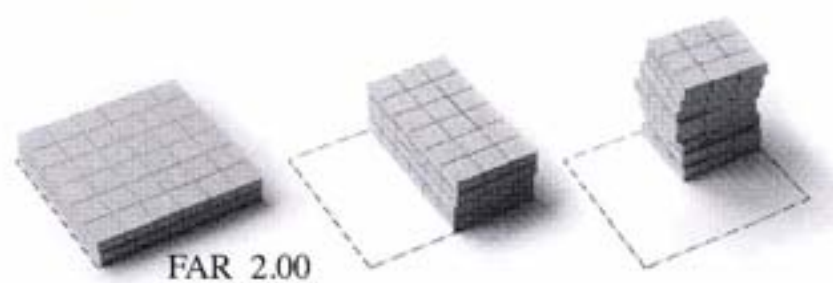
Calculations on and geometries of density

FAR (Floor Area Ratio) or inhabitants/sqkm?
Gfz (Geschossflächenzahl)

The Floor Area Ratio (FAR) or Floor Space Index (FSI) is the ratio of the total floor area of buildings on a certain location to the size of the land of that location, or the limit imposed on such a ratio.
Floor Area Ratio = (Total covered area on all floors)/(Area of the plot)

An FSI of 2.0 would indicate that the total floor area of a building is two times the gross area of the plot on which it is constructed, as would be found in a multiple-story building.





FAR – floor area ratio

Gründerzeit districts of Berlin 1919/1999

site occupancy stagnant while density decreases

	inhabitants		site occupancy		density	
	1919	1999	1919 ha	1999 ha	1919 inhab/ha	1999 inhab/ha
Mitte	292 779	73 258	1 037	1 069	282.3	68.5
Tiergarten	273 502	88 739	1 356	1 341	201.7	66.2
Wedding	337 193	159 080	1 306	1 537	258.2	103.5
Prenzlauer Berg	311 631	134 690	1 015	1 095	307.1	123.0
Friedrichshain	326 062	100 345	910	978	358.5	102.6
Kreuzberg	366 299	148 246	1 068	1 038	342.9	142.8
core city total	1 907 466	704 358	6 692	6 692	285.0	99.8
Berlin total	3 804 048	3 386 667	87 810	87 810	43.3	38.2

source: Statistisches Landesamt Berlin

Principles of energy efficient city building

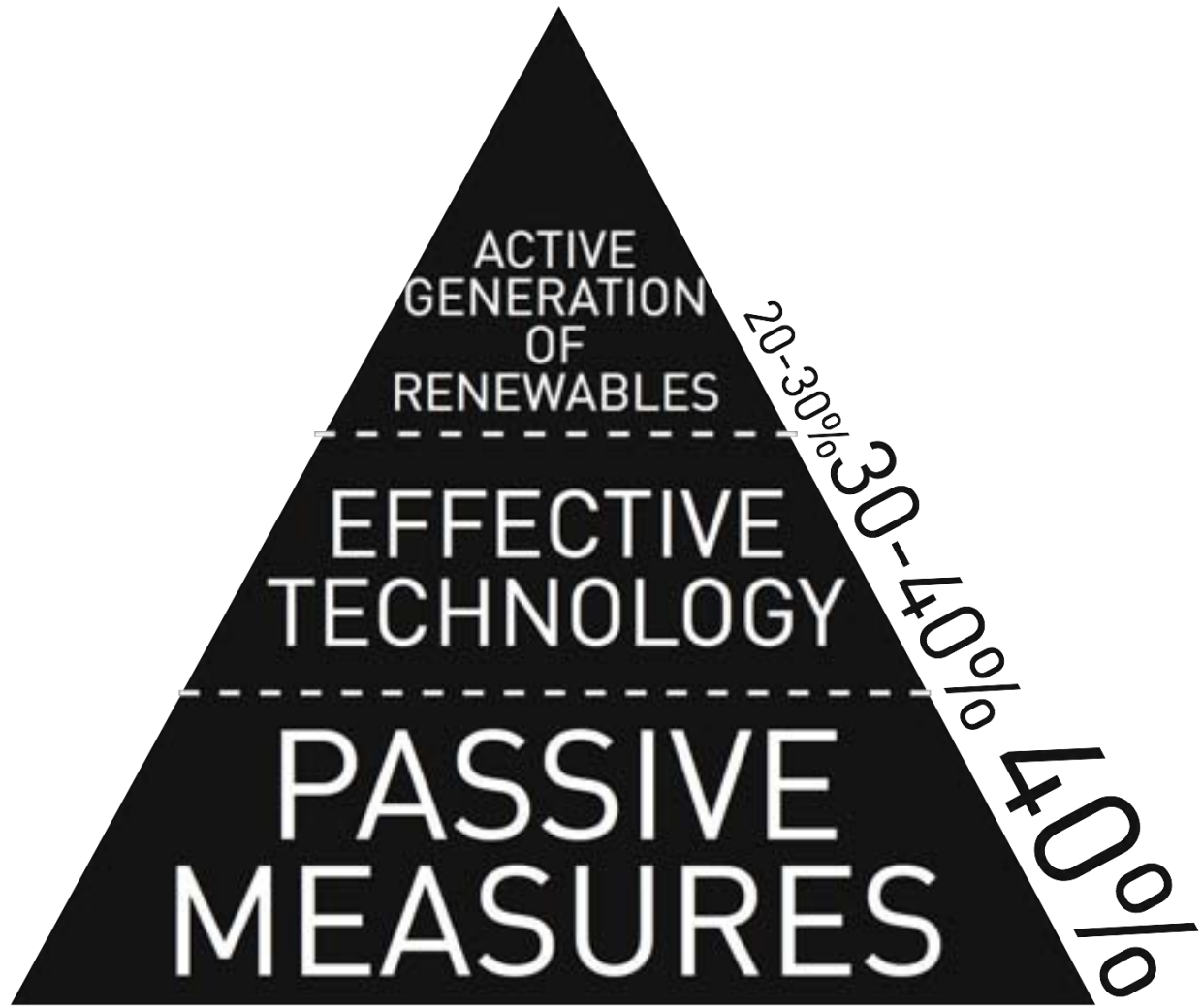
Save, gain and generate – carbon free energy efficiency

Save
Urban compactness: Save soil/ Save transportation energy
Building type compactness: A/V relationship

Gain
Passive gains through urban street layout
Passive gains through building orientation, depth and section

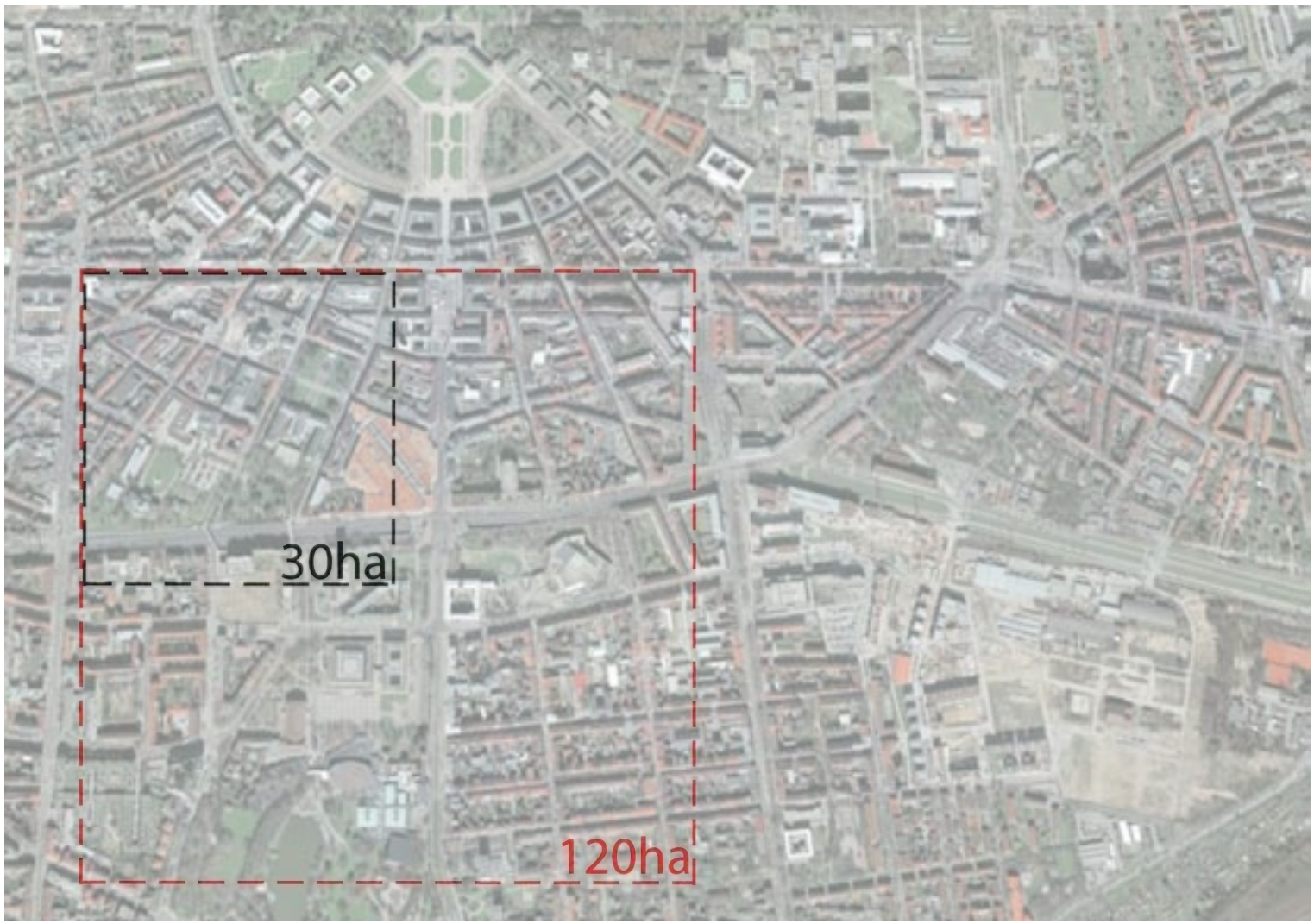
Generate
Generation of thermal and electrical energy through renewable energies

Primary Energy Reduction Strategy Masdar, N. Foster/Transsolar



German land use per year

German land use per day



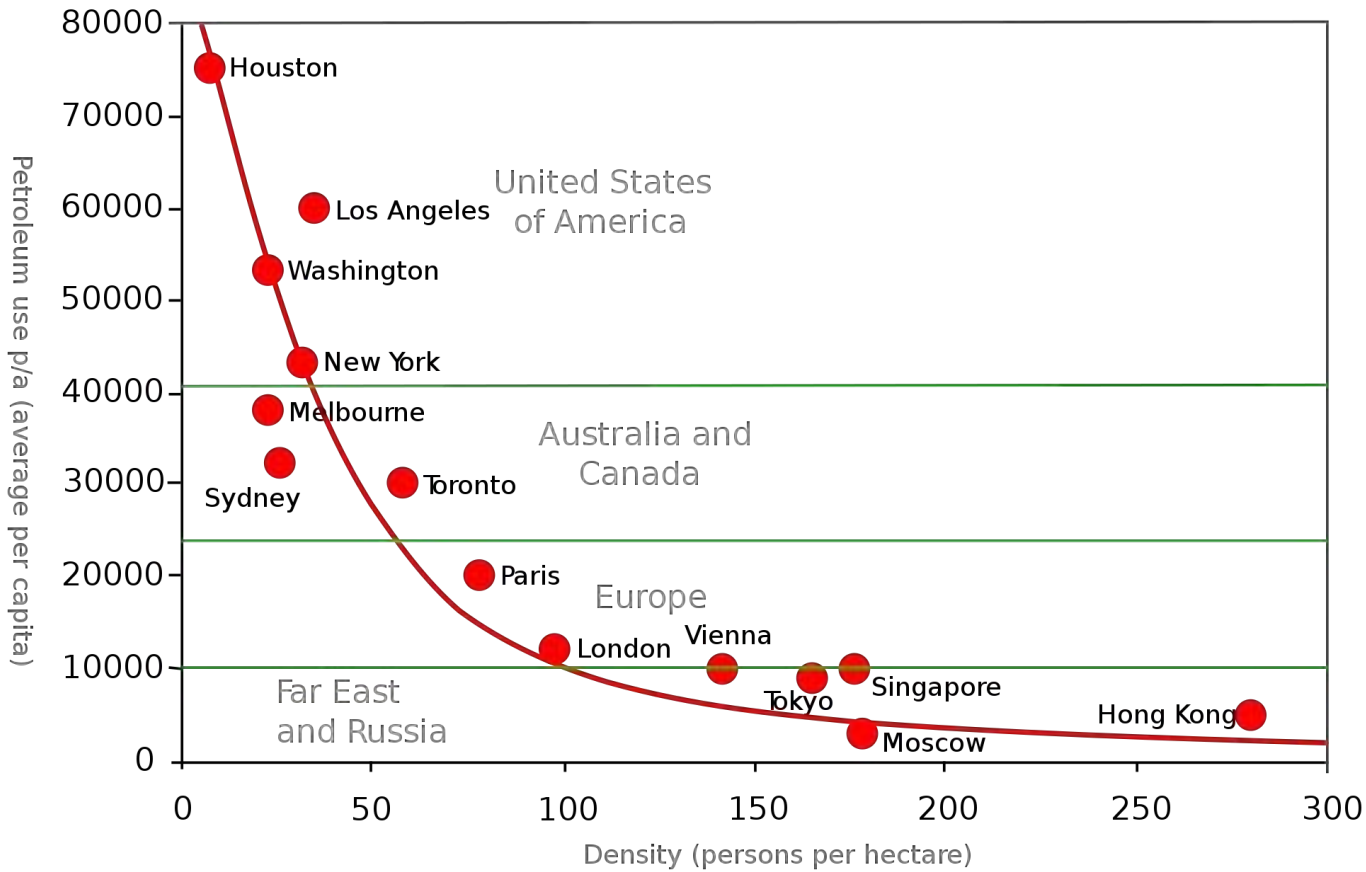
Save transportation energy

Zusammenhang von Energieverbrauch, Bevölkerungs- und Arbeitsplatzdichte und Anteil von alternativen Verkehrsmitteln in Städten weltweit

Stadt	Jährlicher Energieverbrauch für Personenverkehr (in Megajoules pro Einwohner)	Dichte: Bevölkerung und Arbeitsplätze pro Hektar	Anteil der Fahrten zu Fuß, Fahrrad, ÖPNV(%)
Houston *	86,000	13	4.5
Chicago	44,000	23.5	12.5
Melbourne*	32,000	21	26
Montreal*	29,500	45	25.5
Stuttgart	21,600	55	41,1
Dubai	18,100	54	22,7
London	16,100	90	50
Madrid	15,900	78	48,5
Clermont-Ferrand	14,700	67	39,3
Wien	10,900	103	64
Moskau	10,700	231	73.5
Warschau	9,900	82	71.5
Valencia	9,600	76	58.5

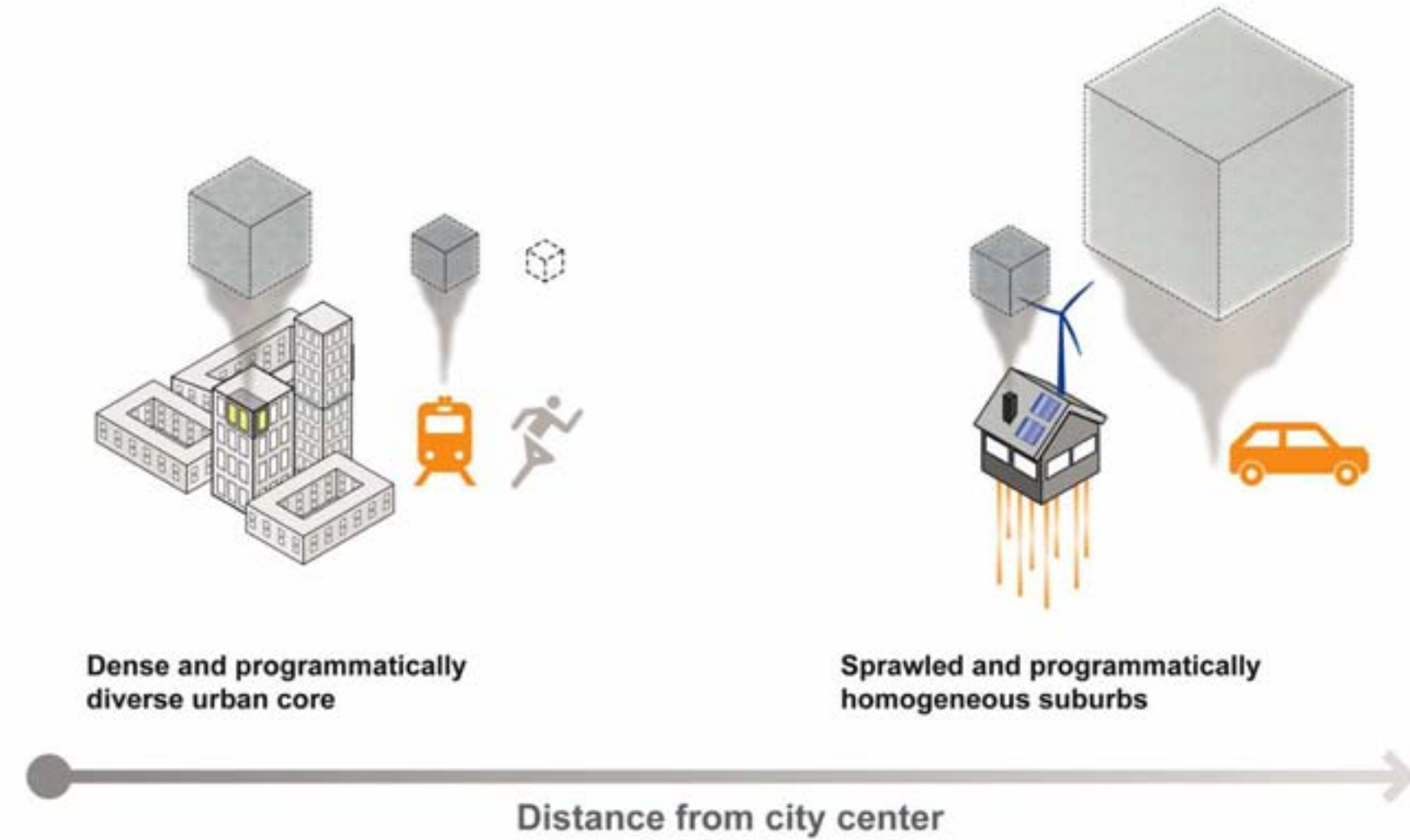
* Daten von 1995

Relationship between transport and land use

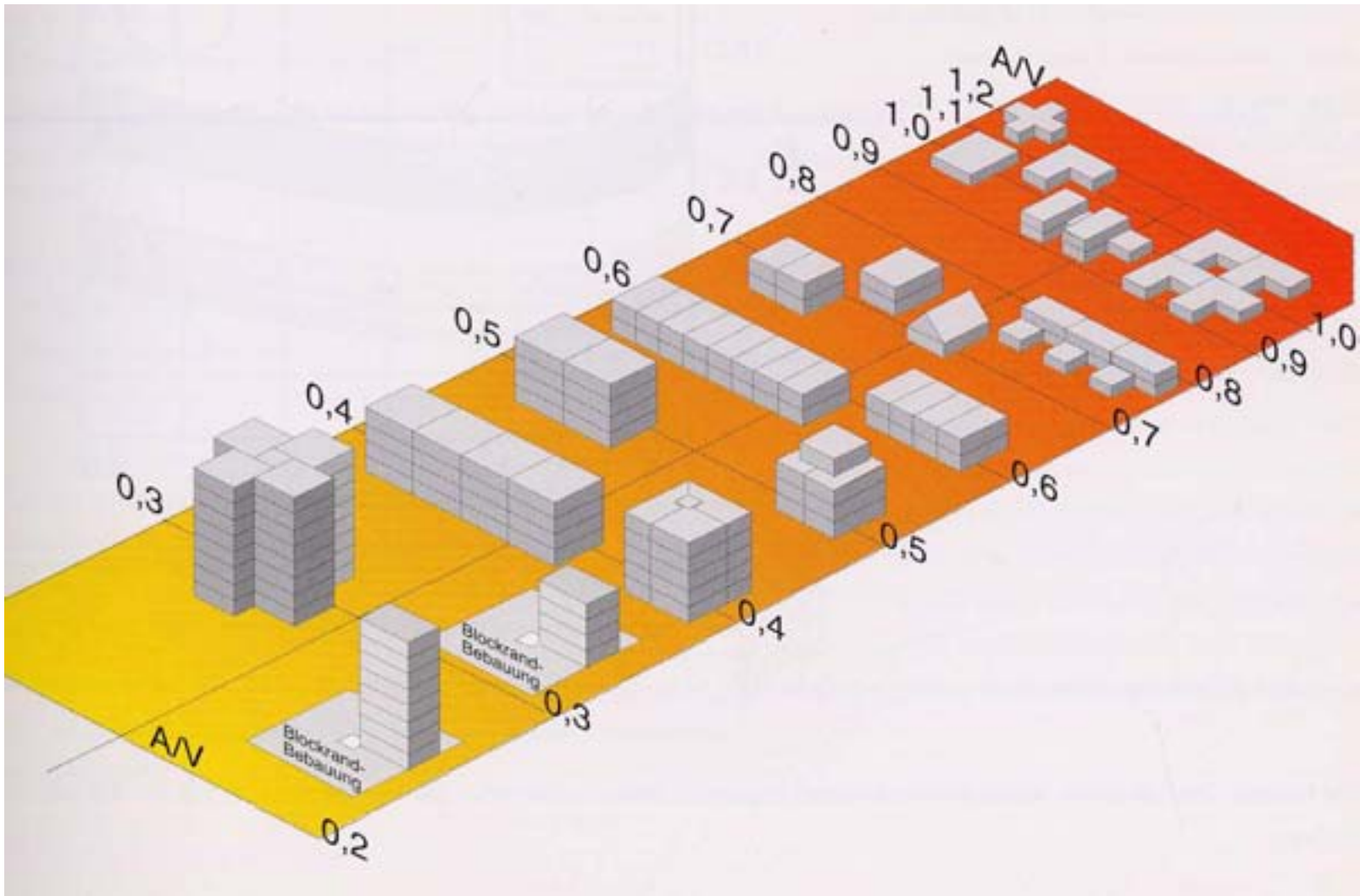


Annual petroleum use per capita adjusted to US MJ (1980)
After Andrew Wright Associates, small section taken from 'Towards an Urban Renaissance',
Urban Task Force Partnership, 1999, © DETR, 1999

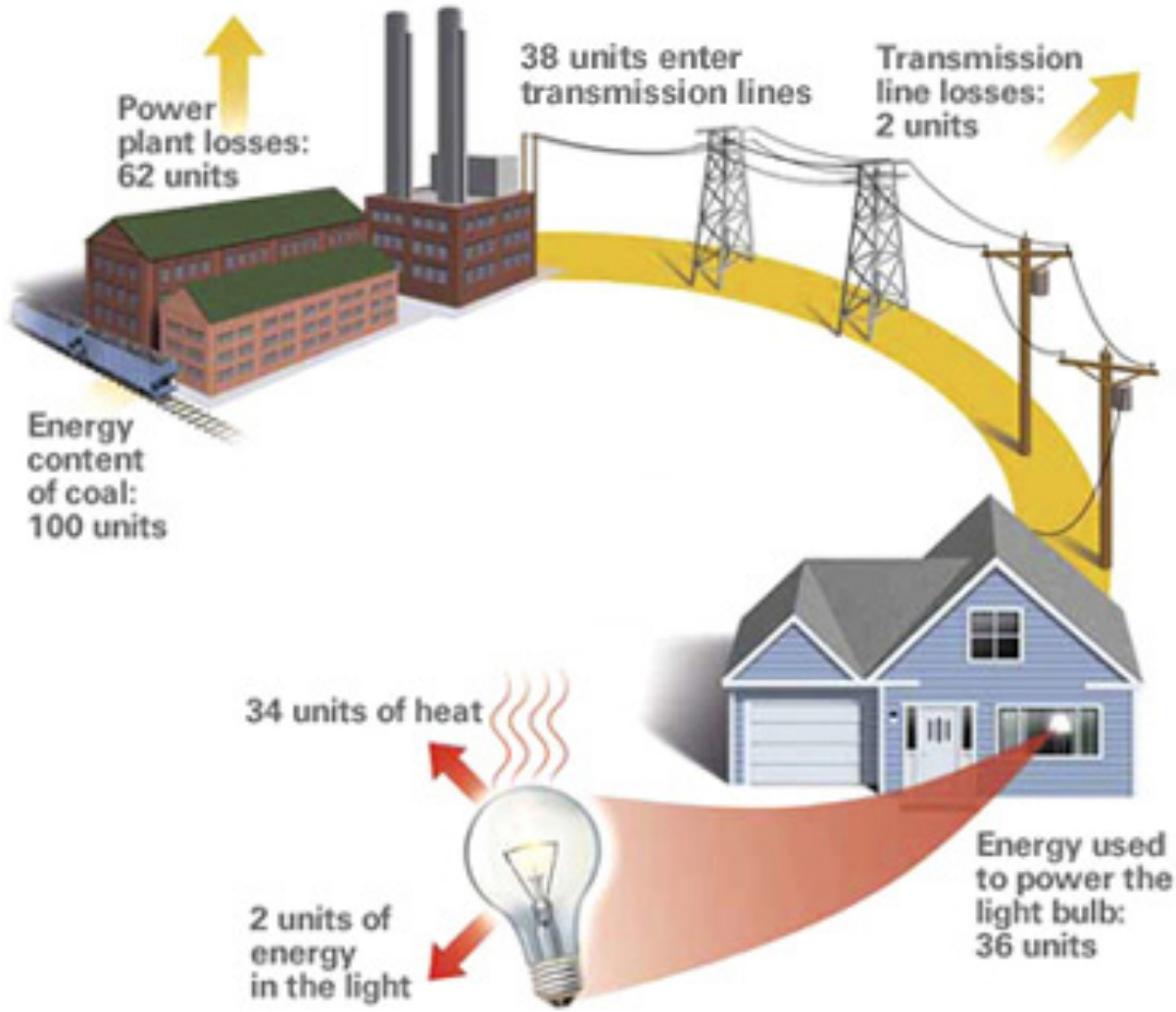
The compact city vs. suburban commuter dependant passive housing



Building type compactness - A/V relationship



What is feasible within dense urban contexts?

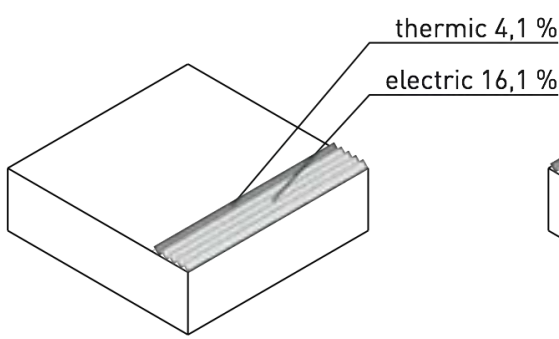


Can enough energy be generated on site?

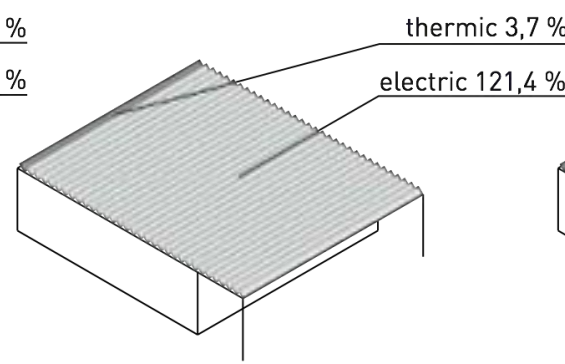
Gaining Solar Energy

required roof area in % for different types of energy production and program

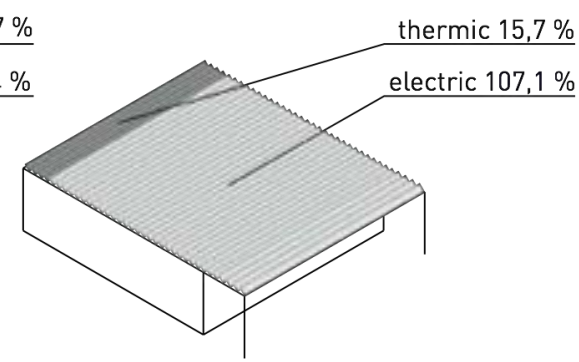
residential



office



hotel



Principles of energy efficient city building

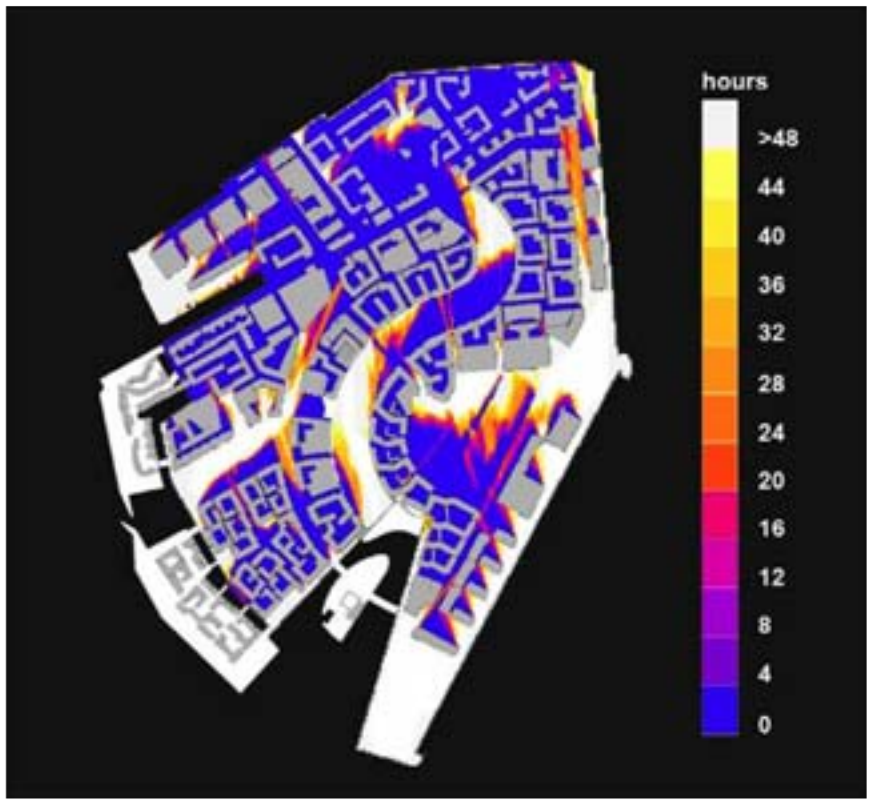
Solar Gymnastics

Compactness and solar gains are conflicting paths in moderate climate zones.
Which geometrical solution can be found?

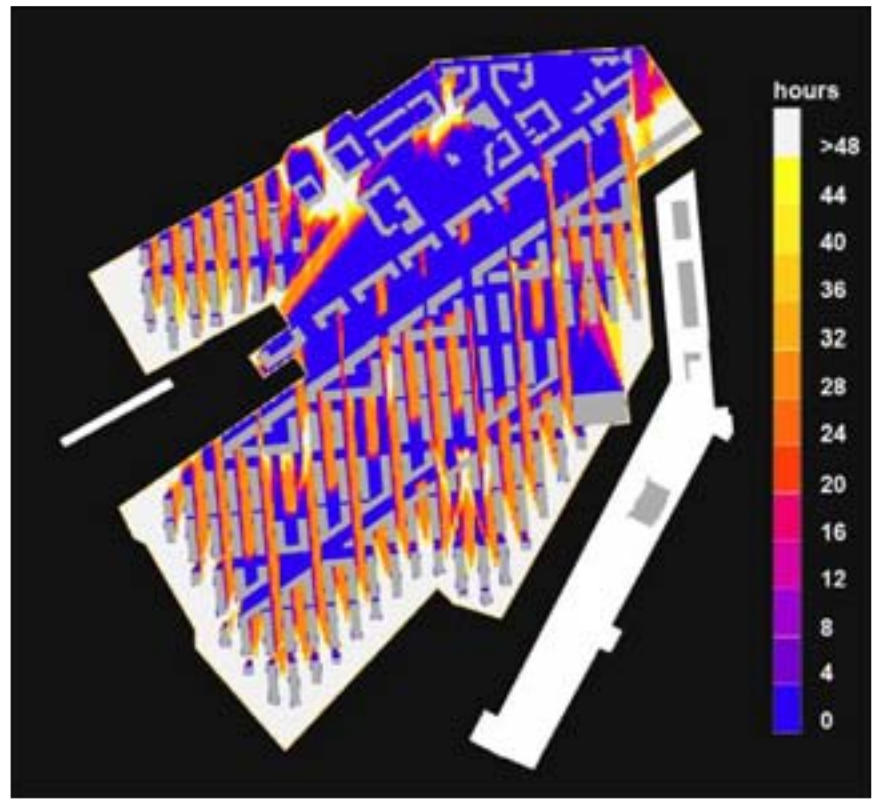
Solar gymnastics sequence: move closer, move farther

Geometrical solution, low2no, Rose and Partners

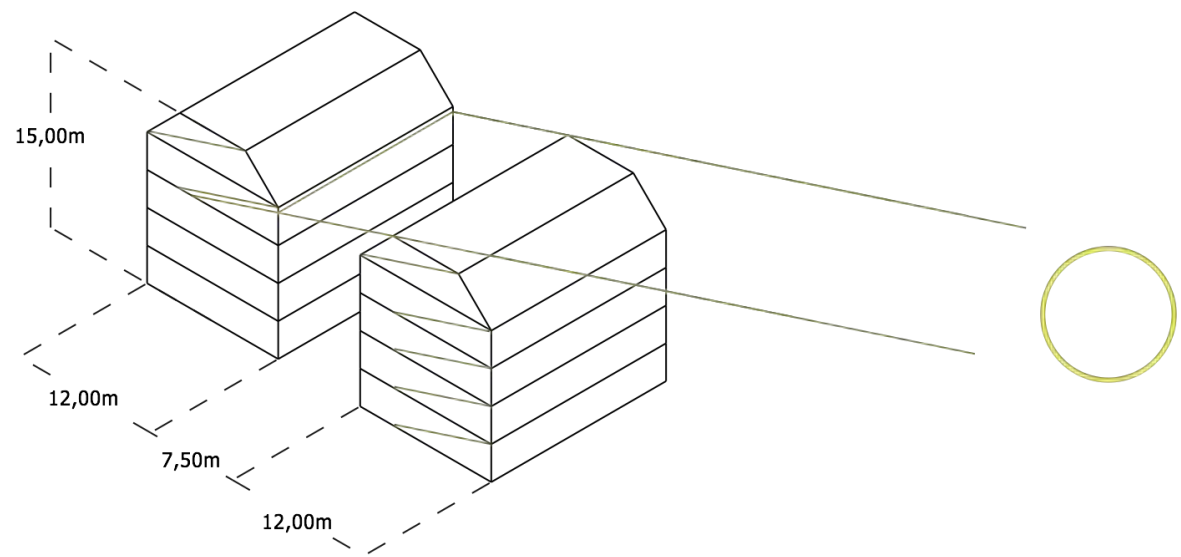
Current Master Plan - December
Most façades receive only **4 hours of sun**
the entire month out of a possible 168 hours.



Proposed Urban Strategy - December
Façades would receive **9 times more sun**
- more than 36 hours over the month.

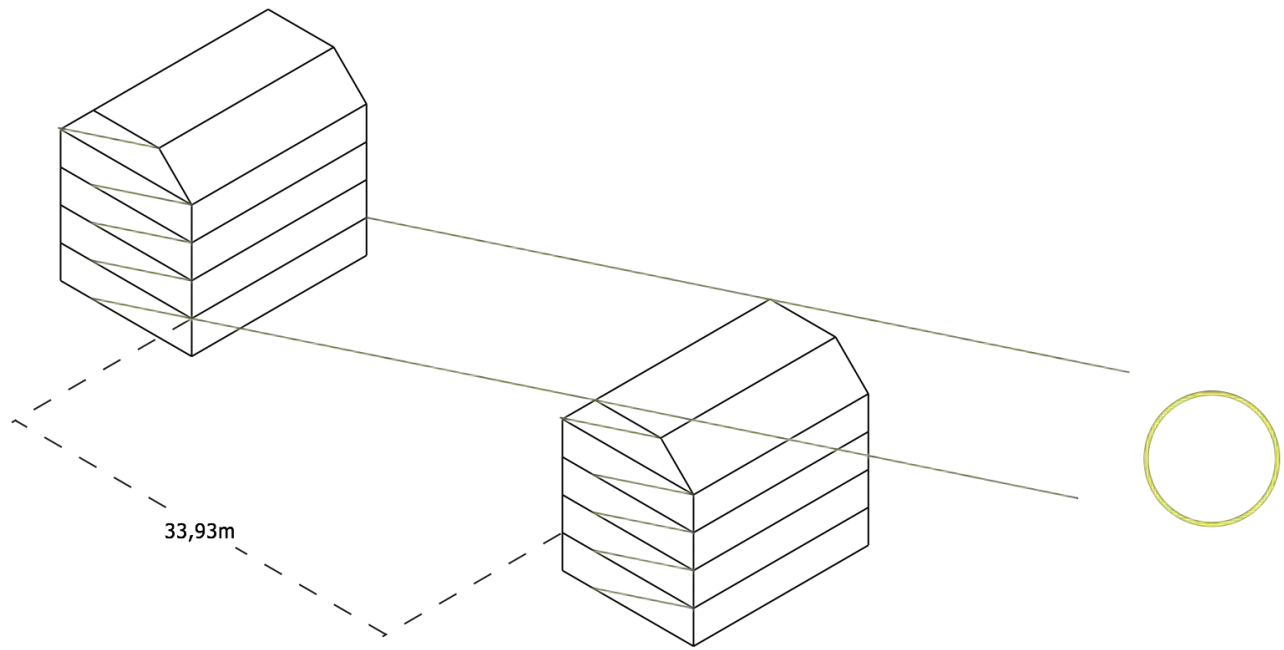


Solar gymnastics sequence: move closer, move farther



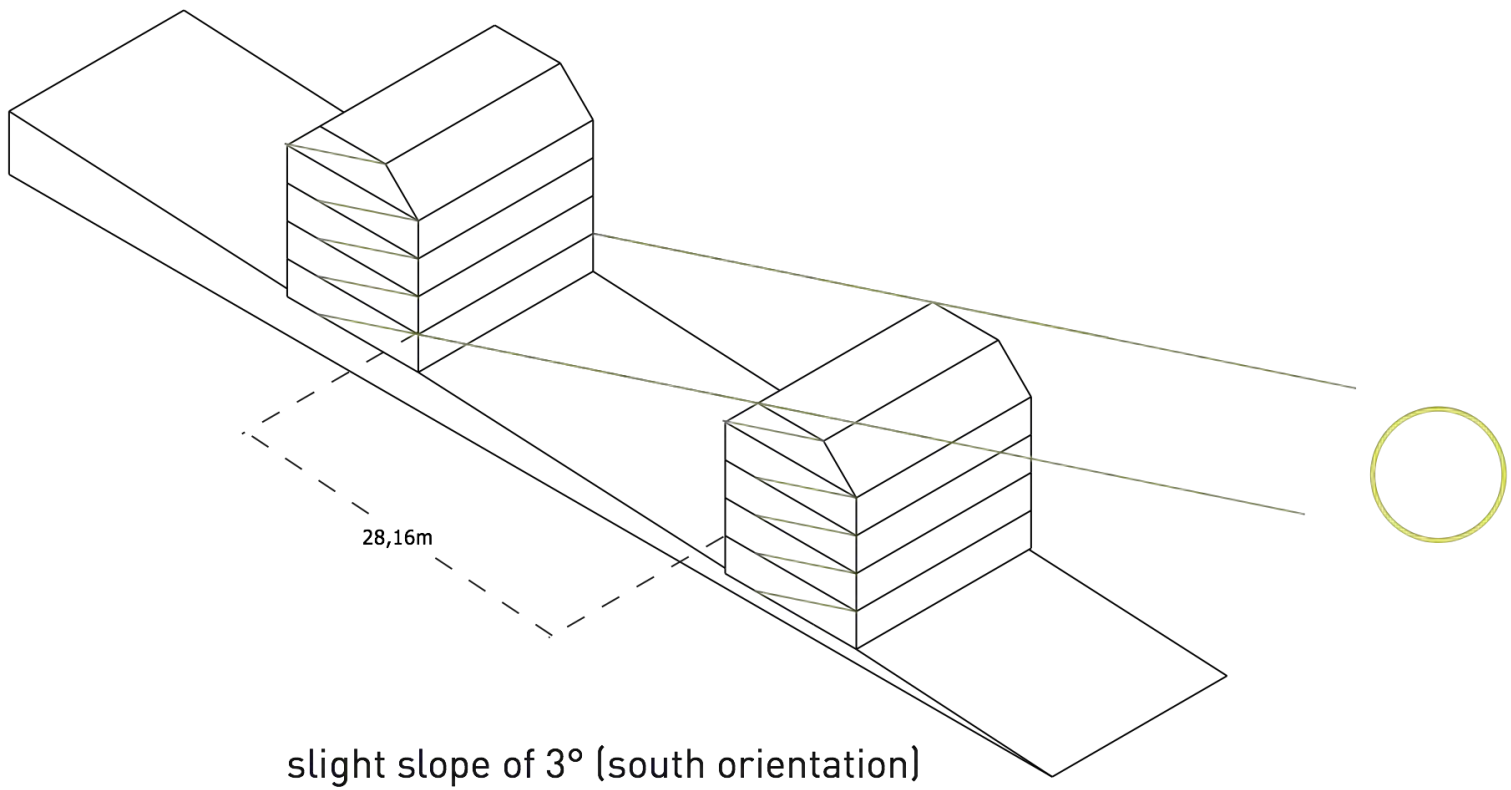
urban distance = building height x 0.5
fassades get no direct lighting

Solar gymnastics sequence: move closer, move farther



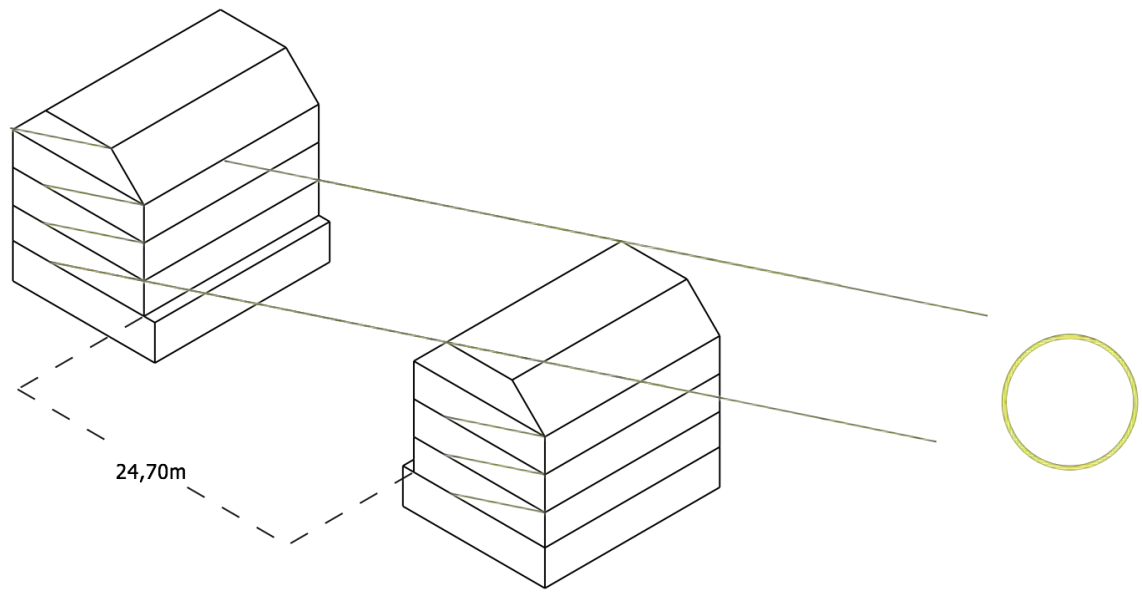
wintersun angle = 18° defines distance
distances become anti-urban

Solar gymnastics sequence: move closer, move farther



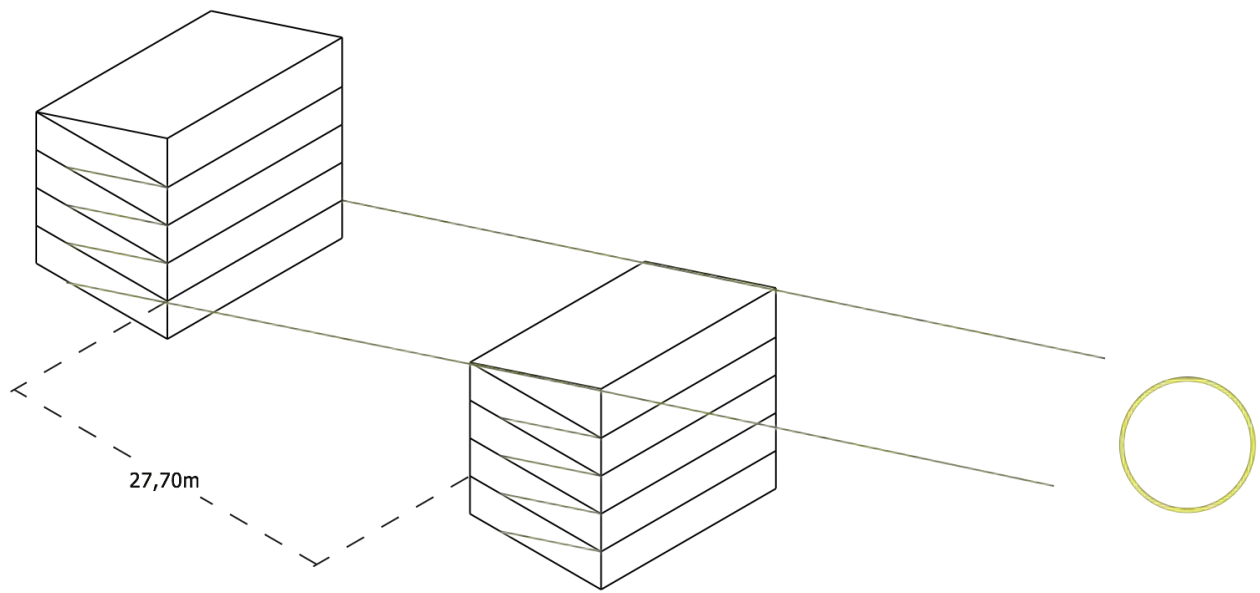
slight slope of 3° (south orientation)
distance decreases

Solar gymnastics sequence: move closer, move farther



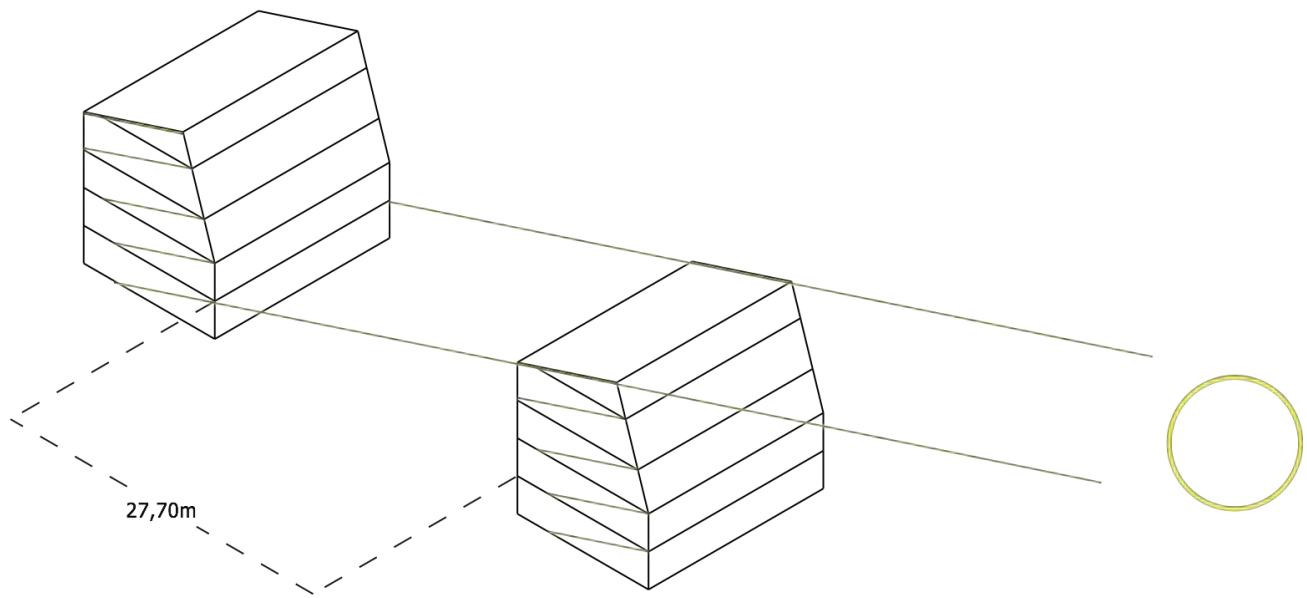
ground floor = commercial use - no direct sunlight needed
distance decreases

Solar gymnastics sequence: move closer, move farther



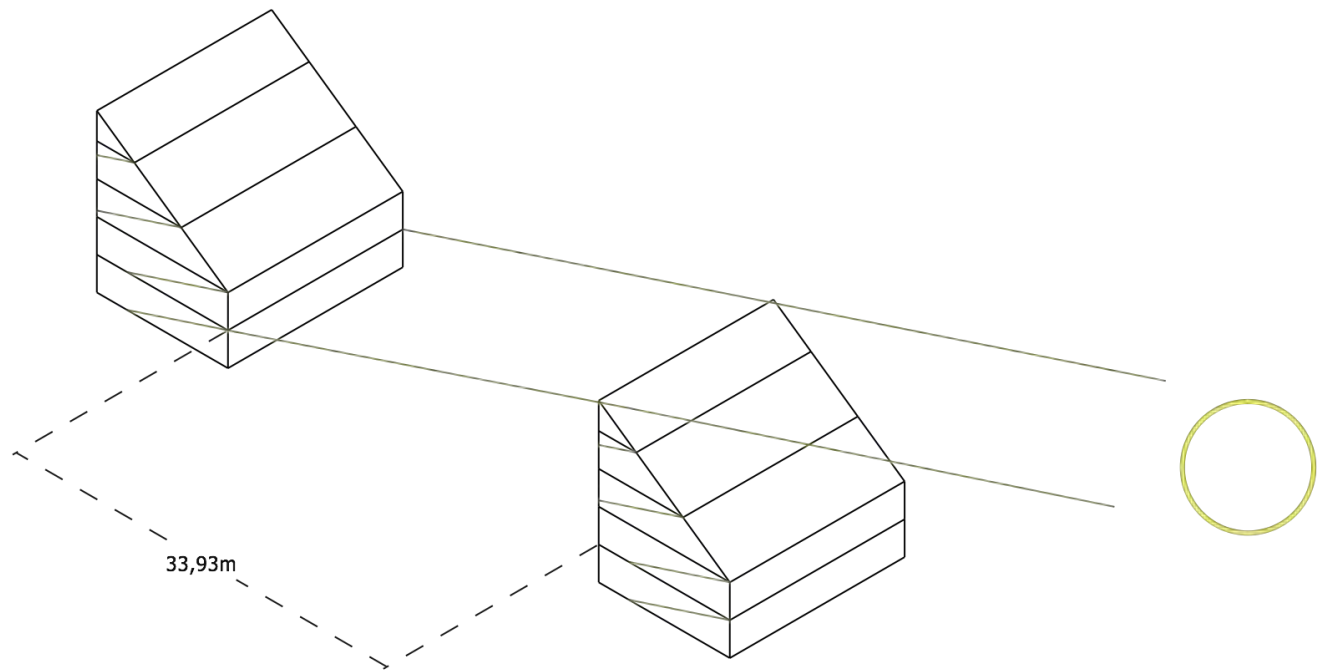
mono-pitched roofs allow sun to reach ground floor

Solar gymnastics sequence: move closer, move farther



using solar geometrie
sun can reach deeper into the building

Solar gymnastics sequence: move closer, move farther



optimized roof for active solar energy use (35° angle)

Morphologies

Morphology, pattern and urban structure

The European City - Berlin/Manhattan

Sprawl - Chicago Suburbia

Regional Cities – Istanbul

Drosscapes – urban wastelands

Barrios - Petare, Caracas

Neotowns - Alphaville, Sao Paolo

Tourist Cities/Camps - Benidorm/Refugee Camp, Sudan

The European City, Berlin

The European City, Manhattan

Sprawl, Suburbia, Chicago

Regional Cities - Istanbul

Drosscapes - commercial land waste

Drosscapes - wastelands

Barrios, Petare, Caracas

Neotowns, Alphaville, Sao Paolo

Tourist Cities, Benidorm

Camps, Refugee Camp, Sudan

The Familiar City

1980s- The Reconstruction of the European City

Robert and Leon Krier
Planwerk Innenstadt, Berlin

1990s- New Urbanism and the anti-sprawl movement

Neighborhood Unit
Duany + Plater-Zyberk (DPZ)

2000s- Density as concept for the city in the era of urbanization and climate change

Delirious New York, Walled City of Kowloon
West 8 and K. Sakamoto
D. Fernandez Pascual

The Reconstruction of the European City (1970s)

"Critical Reconstruction," Berlin (1990s-)

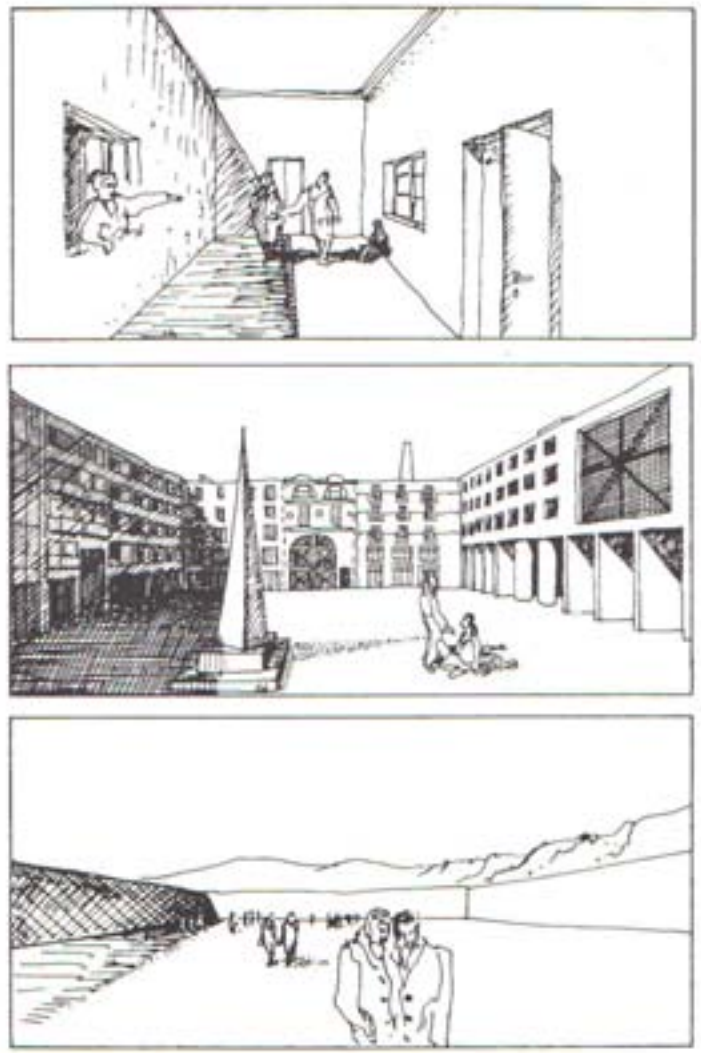
concept: recovery of urban space and culture

critique: European city as a system of spaces was being replaced by the modern city as a system of bodies/objects.

agent: the car decomposes the city, and dominates the space of the street.

thesis: city built of centers, quartiers, neighborhoods with integrated functions.

Hierarchy of Urban Public Spaces (R Krier)



The Familiar City

Urban Public Policy: “Critical Reconstruction”, Berlin (1970s-2000)

critique: Wartime bombing, post-war “functionalist” planning with its Autobahns, high-rise housing (Gropiusstadt)

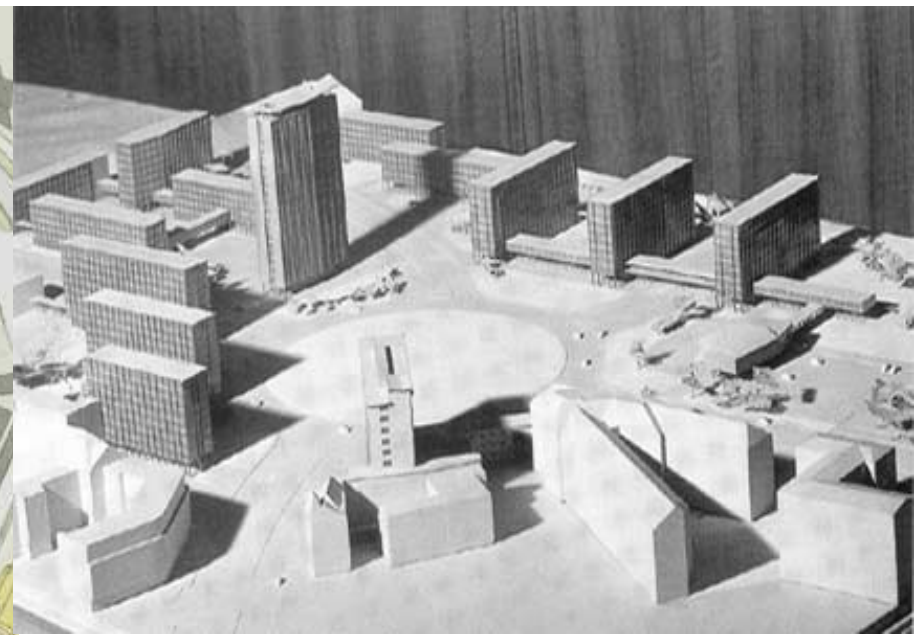
thesis: International Bau Austellung (IBA), Berlin 1984 (1979-87), “architectural coherence,” design guidelines

Planwerk Innenstadt (Inner City Plan Project), Berlin 1996
Hans Stimmann, Berlin - “Berlin is a museum for every failed planning attempt since 1945.”... “I want to make the city readable again.”...

method: Reestablish system: streets, blocks, boulevards + squares
19th C building codes: 22m eaves, 33m peak

Berlin, Planwerk Innenstadt, (H. Stimmann 1991-96)

Reconstruction: Ernst-Reuter-Platz



Reconstruction alternatives for street, block, square, park

Variante zum Bereich Kurfürstendamm / Joachimstaler Straße

Variante zum Bereich Kantstraße / Hardenbergstraße

Variante zum Bereich Tauentzien / Budapester Straße

Flugisometrie: Blick von Norden über Zoo, Breitscheidplatz und Hardenbergplatz (Diskussionsgrundlage im 2. Werkstattgespräch)

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The Familiar City

Congress of New Urbanism (CNU)
Anti-Sprawl Movement: North America (1983-)

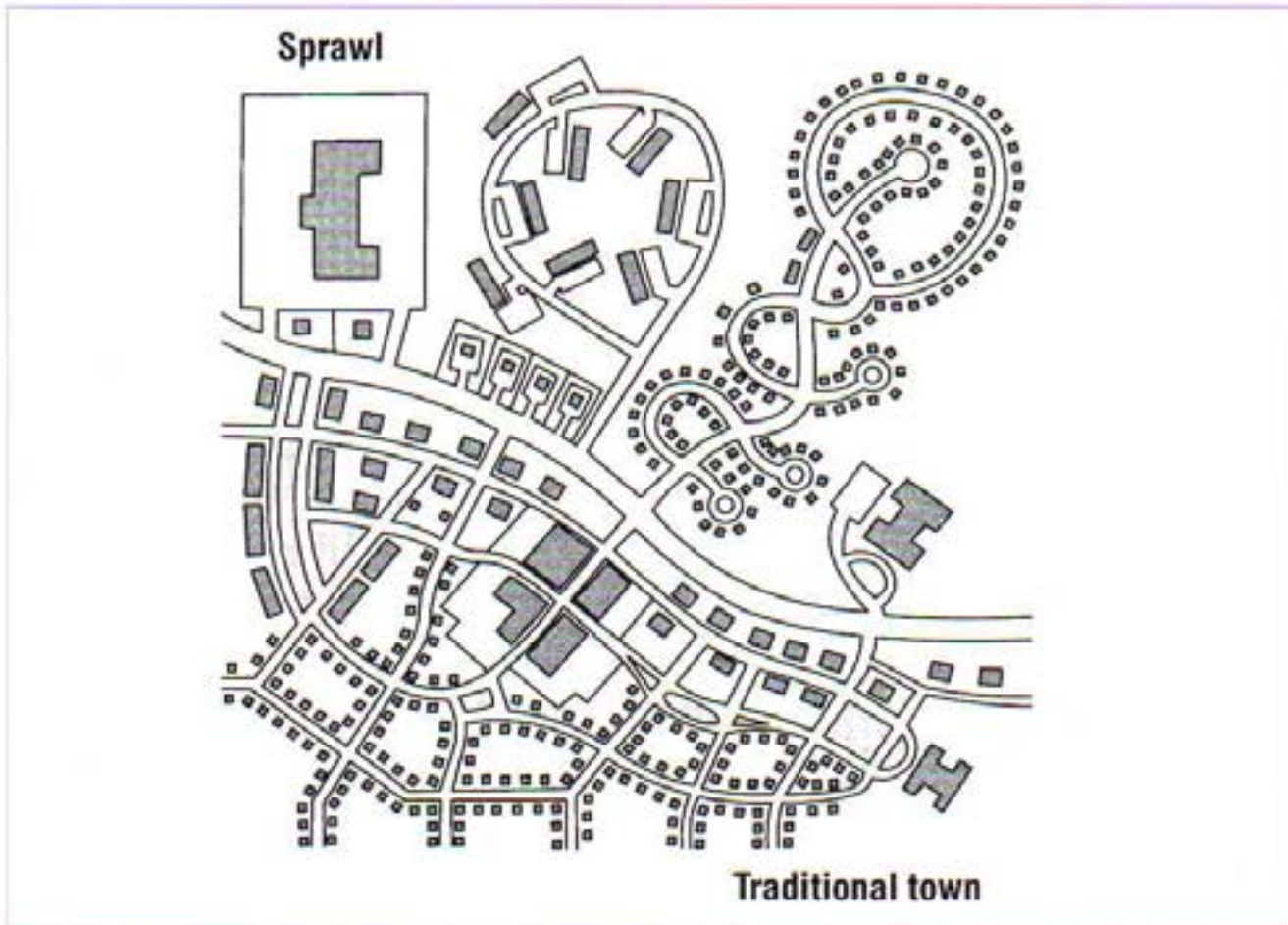
critique:	critique of the modern city: as Europeans
concept:	"Neo-traditional" town design; community design, robust public realm
thesis:	Good urban form - supports social cohesion
goals:	reverse sprawl; re-establish coherance, legibility, and human scale
method:	precedent-based methodology transect: a cross-section of a town with 6 zones form-based codes

Neighborhood Unit (C. Perry 1929-DPZ, 1980s)

DUANY PLATER-ZYBERK'S DIAGRAM OF AN URBAN NEIGHBORHOOD

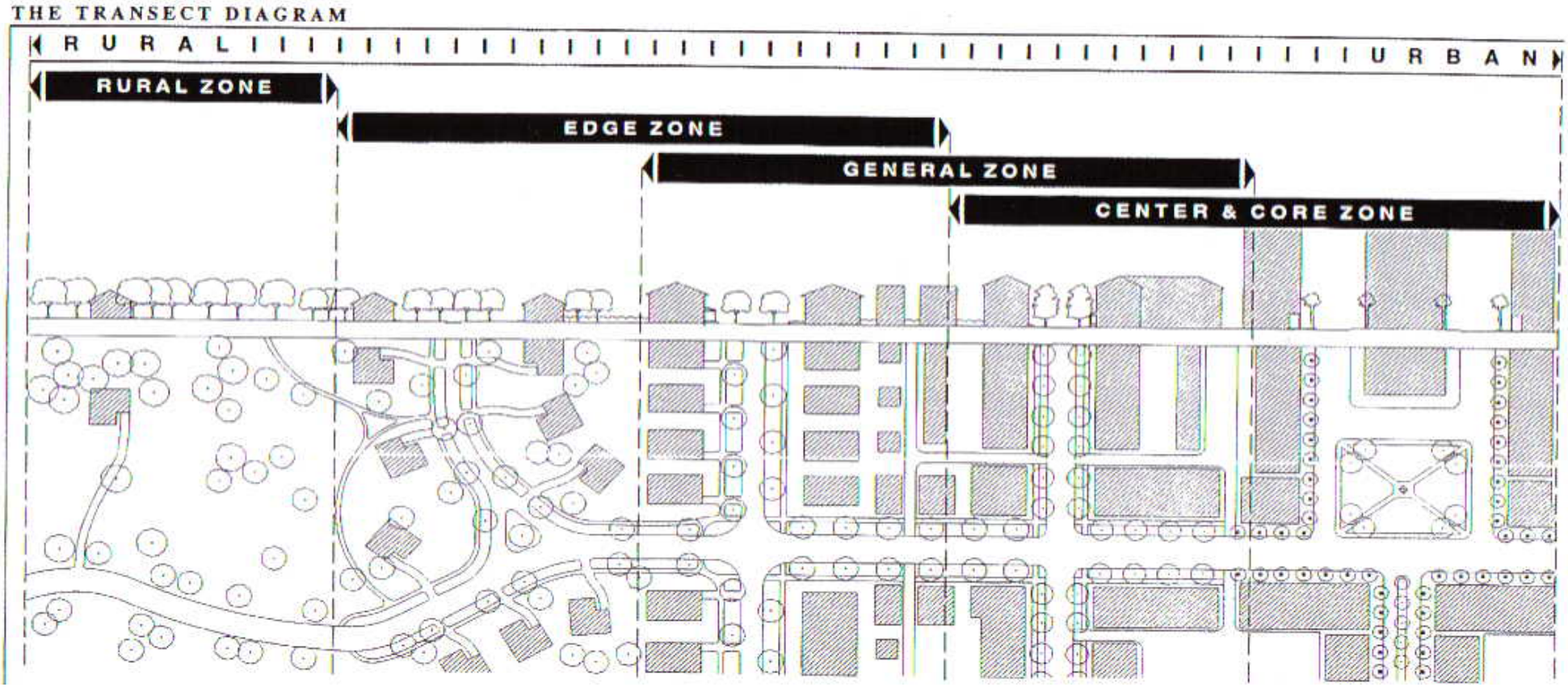
PERRY'S PLAN FOR A NEW NEIGHBORHOOD

Sprawl vs. Traditonal Town

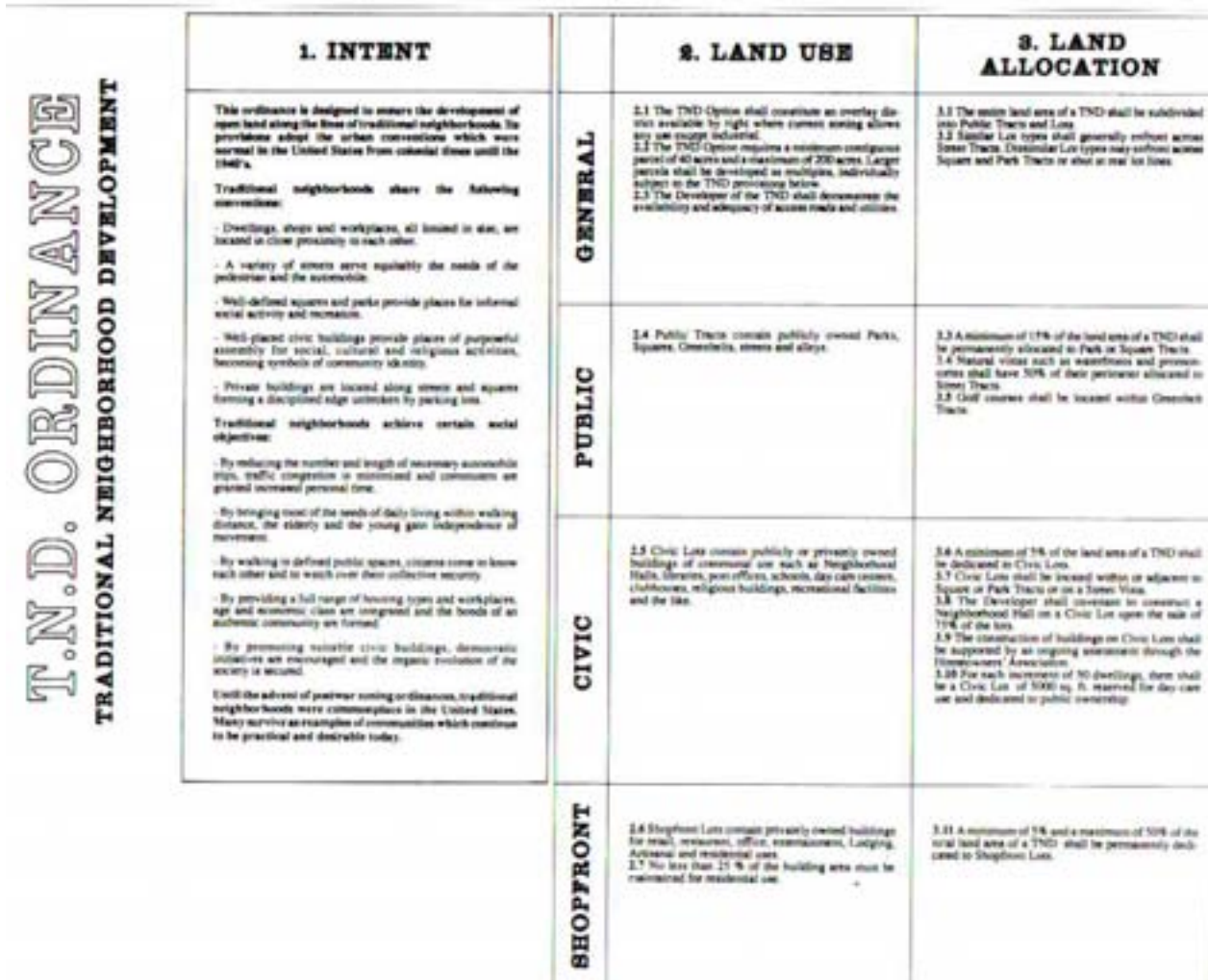


Traditionelle Stadt und Sprawl-Siedlung. Schema

Rural to Urban Transect (5 morphologies)



Traditional Neigborhood Development Ordinance



T.N.D. ORDINANCE

TRADITIONAL NEIGHBORHOOD DEVELOPMENT

1. INTENT

This ordinance is designed to ensure the development of open land along the lines of traditional neighborhoods. Its provisions adopt the urban conventions which were normal in the United States from colonial times until the 1940's.

Traditional neighborhoods share the following conventions:

- Dwellings, shops and workplaces, all located in close, are located in close proximity to each other.

- A variety of streets serve equitably the needs of the pedestrian and the automobile.

- Well-defined squares and parks provide places for informal social activity and recreation.

- Well-placed civic buildings provide places of purposeful assembly for social, cultural and religious activities, becoming symbols of community identity.

- Private buildings are located along streets and squares forming a disciplined edge unbroken by parking lots.

Traditional neighborhoods achieve certain social objectives:

- By reducing the number and length of necessary automobile trips, traffic congestion is minimized and commuters are granted increased personal time.

- By bringing most of the needs of daily living within walking distance, the elderly and the young gain independence of movement.

- By walking on defined public spaces, citizens come to know each other and to watch over their collective security.

- By providing a full range of housing types and workplaces, age and economic class are integrated and the bonds of an authentic community are formed.

- By promoting suitable civic buildings, democratic initiatives are encouraged and the organic evolution of the society is secured.

Until the advent of postwar zoning ordinances, traditional neighborhoods were commonplace in the United States. Many survive as examples of communities which continue to be practical and desirable today.

2. LAND USE

GENERAL

2.1 The TND Option shall constitute an overlay district available by right where current zoning allows any use except industrial.
2.2 The TND Option requires a minimum contiguous parcel of 40 acres and a maximum of 200 acres. Larger parcels shall be developed as multiples, individually subject to the TND principles below.
2.3 The Developer of the TND shall demonstrate the availability and adequacy of access roads and utilities.

PUBLIC

2.4 Public Tracts contain publicly owned Parks, Squares, Greenbelts, streets and alleys.

CIVIC

2.5 Civic Lots contain publicly or privately owned buildings of communal use such as Neighborhood Halls, libraries, post offices, schools, day care centers, clubhouses, religious buildings, recreational facilities and the like.

SHOPFRONT

2.6 Shopfront Lots contain privately owned buildings for retail, restaurant, office, entertainment, Lodging, Artisanal and residential uses.
2.7 No less than 25 % of the building area must be maintained for residential use.

3. LAND ALLOCATION

3.1 The entire land area of a TND shall be subdivided into Public Tracts and Lots.
3.2 Similar Lot types shall generally enfront across Street Tracts. Dissimilar Lot types may enfront across Square and Park Tracts or abut at rear lot lines.

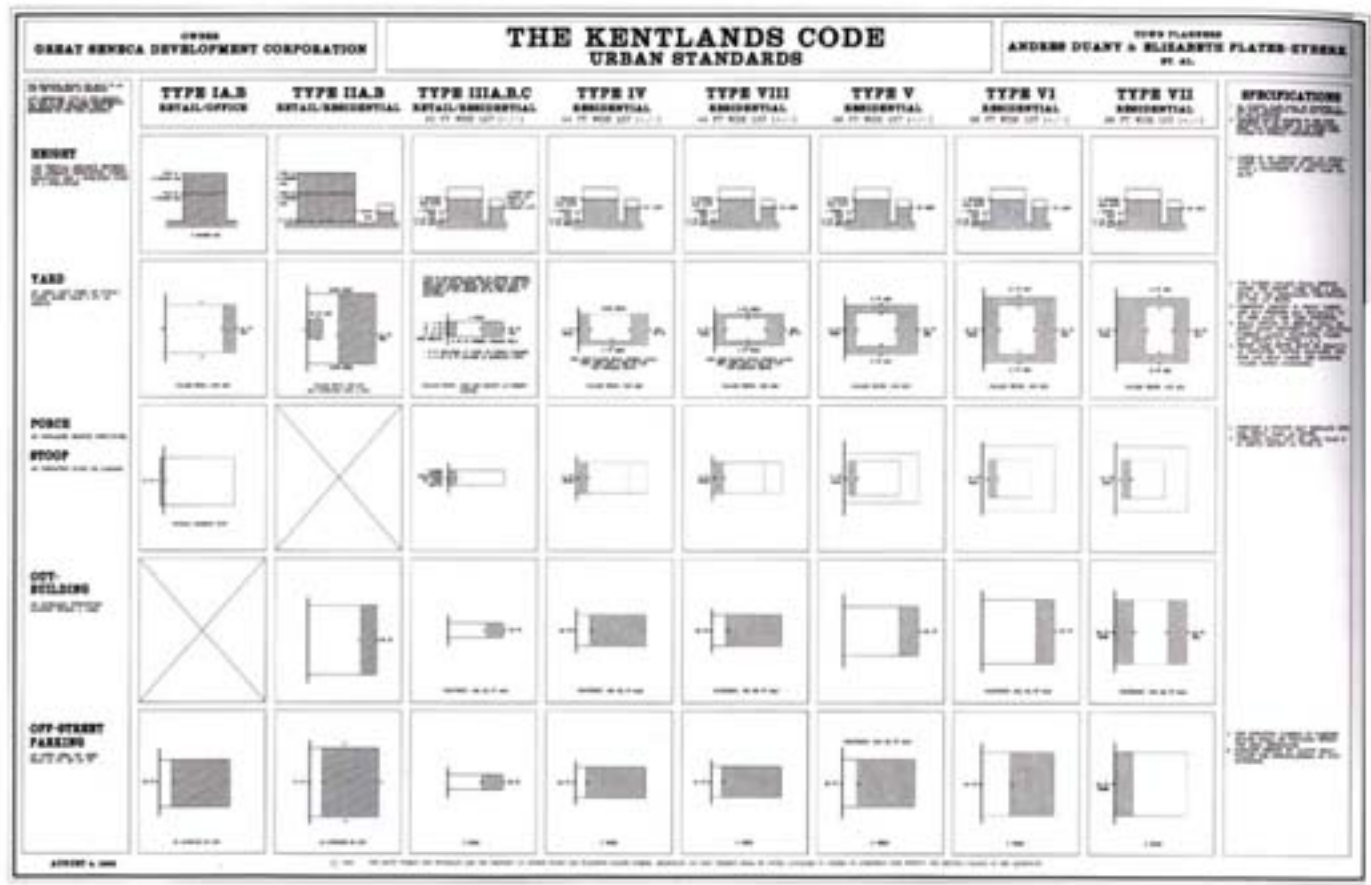
3.3 A minimum of 15% of the land area of a TND shall be permanently allocated to Park or Square Tracts.
3.4 Natural vistas such as waterfronts and promontories shall have 50% of their perimeter allocated to Street Tracts.
3.5 Golf courses shall be located within Greenbelt Tracts.

3.6 A minimum of 5% of the land area of a TND shall be dedicated to Civic Lots.
3.7 Civic Lots shall be located within or adjacent to Square or Park Tracts or on a Street Vista.
3.8 The Developer shall covenant to construct a Neighborhood Hall on a Civic Lot upon the sale of 75% of the lots.
3.9 The construction of buildings on Civic Lots shall be supported by an ongoing assessment through the Homeowners' Association.
3.10 For each increment of 50 dwellings, there shall be a Civic Lot of 5000 sq. ft. reserved for day care use and dedicated to public ownership.

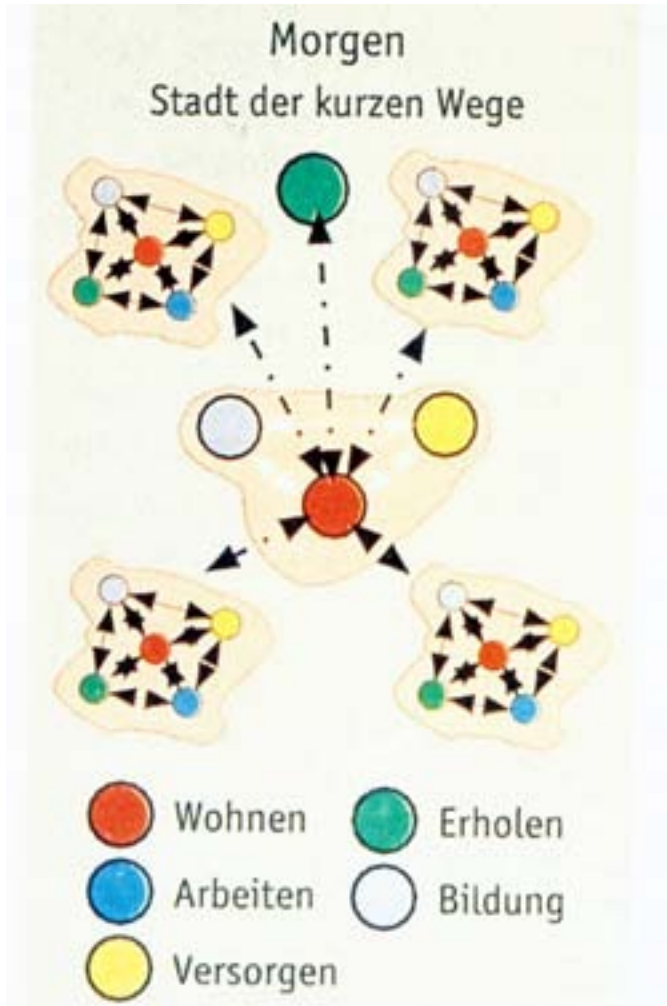
3.11 A minimum of 5% and a maximum of 50% of the total land area of a TND shall be permanently dedicated to Shopfront Lots.

The Kentlands Code

the urban code for Kentlands
el código urbanístico para Kentlands



Morgen: Stadt der kurzen Wege

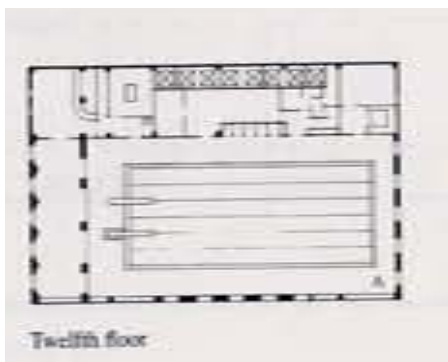


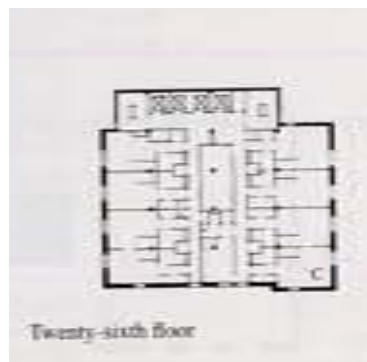
Density

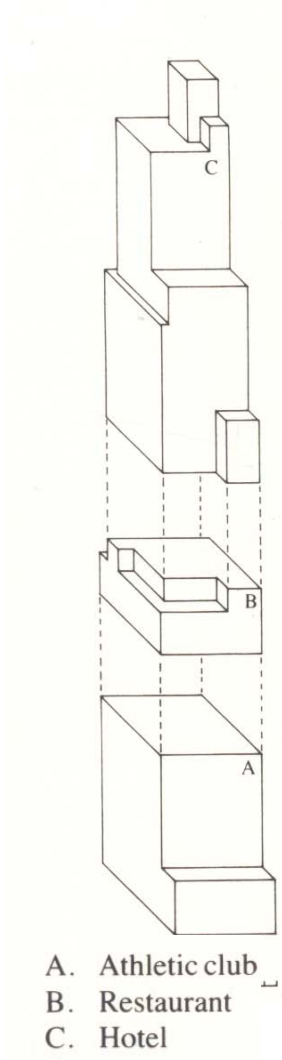
How dense can you get?

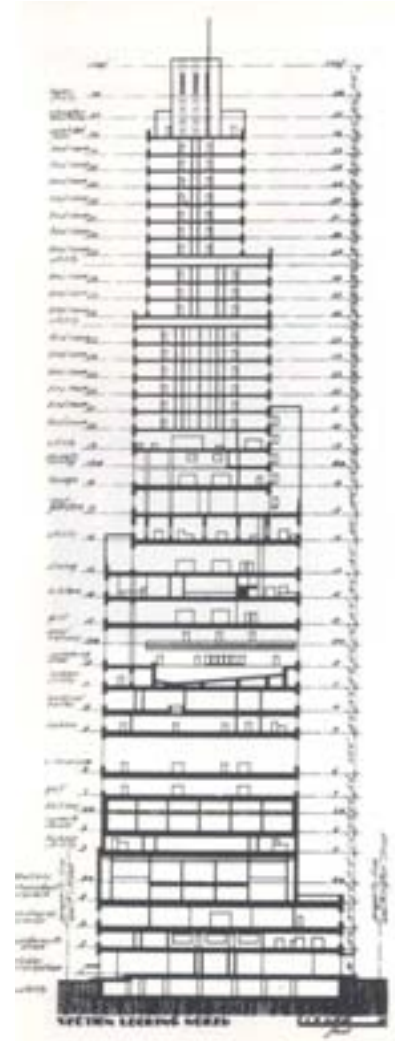
Manhattan	273 p/ha	New York	105 p/ha
Quartier Latin, Paris	235 p/ha	Paris	210 p/ha
Ensanche, Barcelona	351 p/ha	Barcelona(center)	156 p/ha
Kreuzberg, Berlin	125 p/ha	Berlin (center)	99 p/ha
Quartieri Spagnoli, Neapel	321 p/ha	Neapel	91 p/ha
Informal districts:			
Dharavi Chambda Baazar, Mumbai	3.366 p/ha	Mumbai	220 p/ha
Kowloon Walled City, Hong Kong	11.000 p/ha	Hong Kong	67p/ha

Downtown Athletic Club, NY (Starrett & Van Vleck 1931)









Walled City, Kowloon (Hong Kong)

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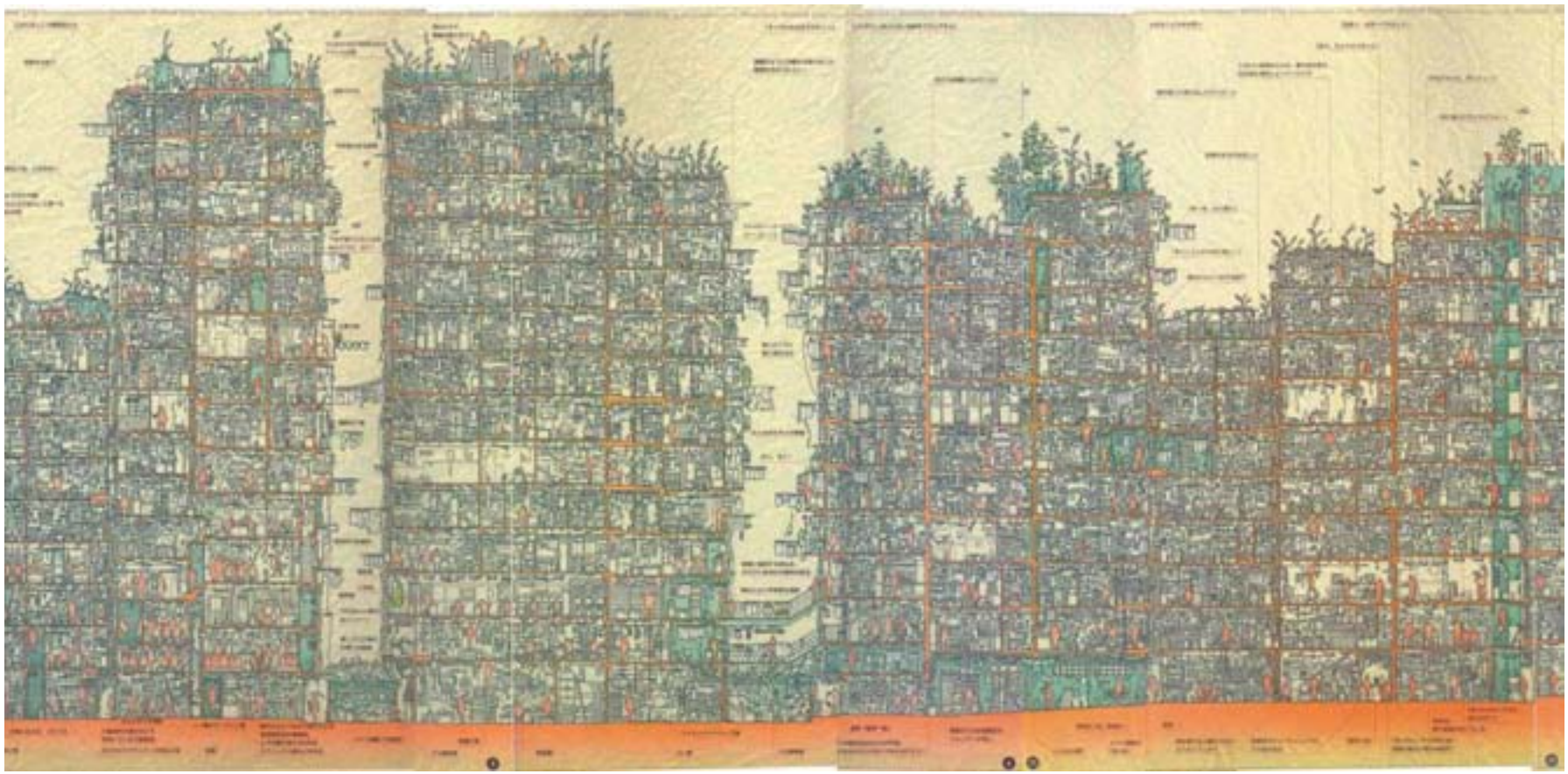
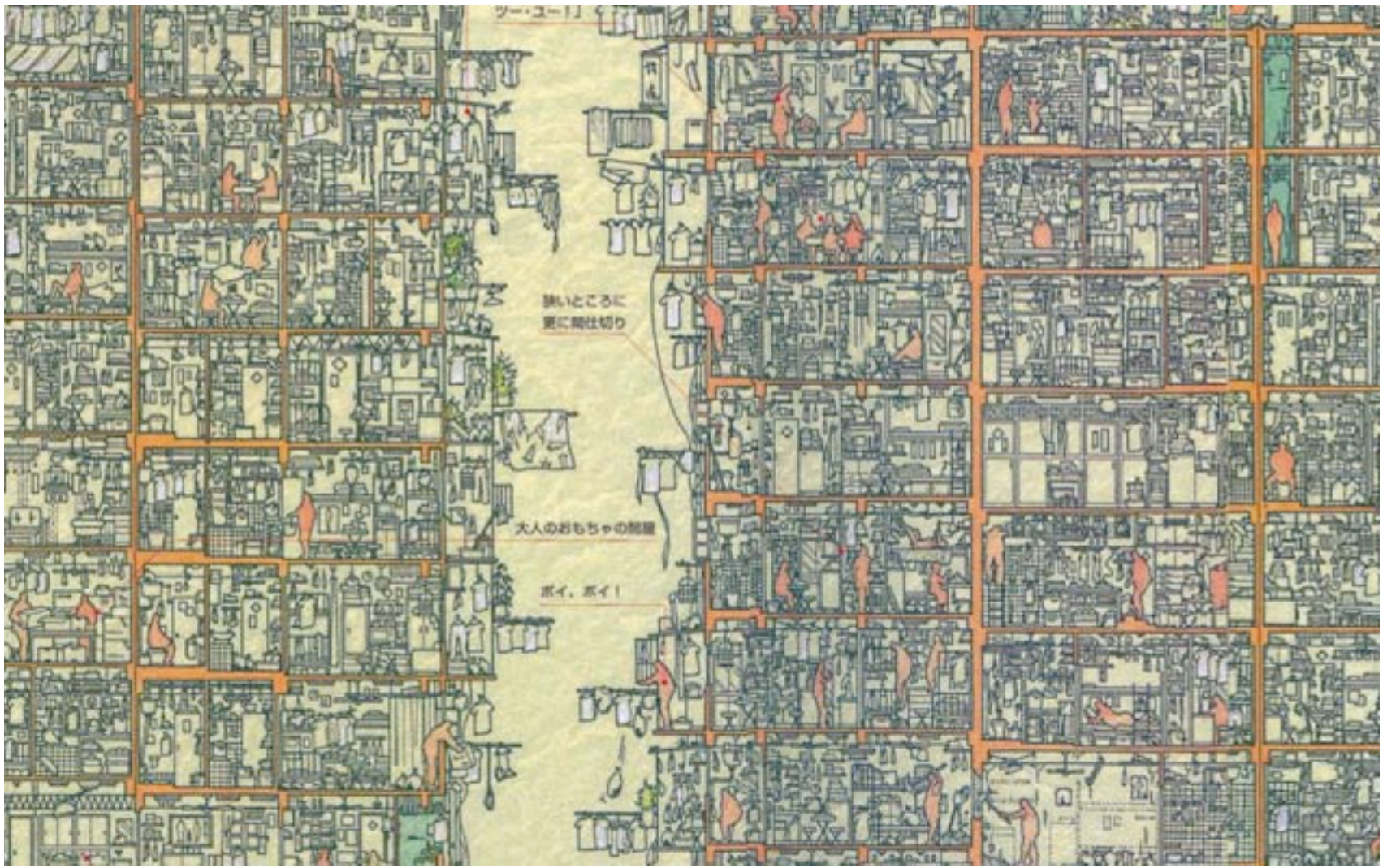
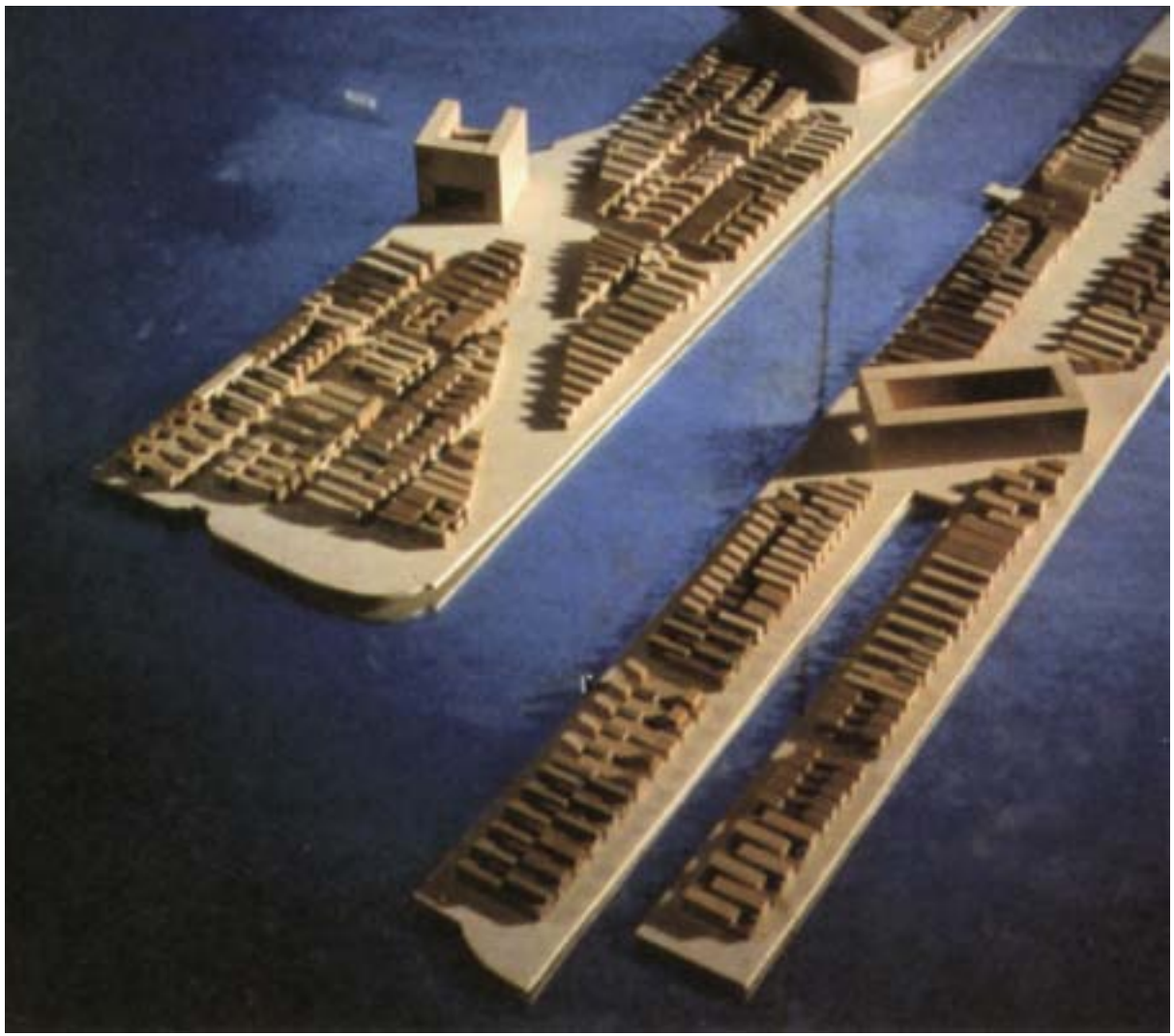


Walled City, Kowloon (Hong Kong)

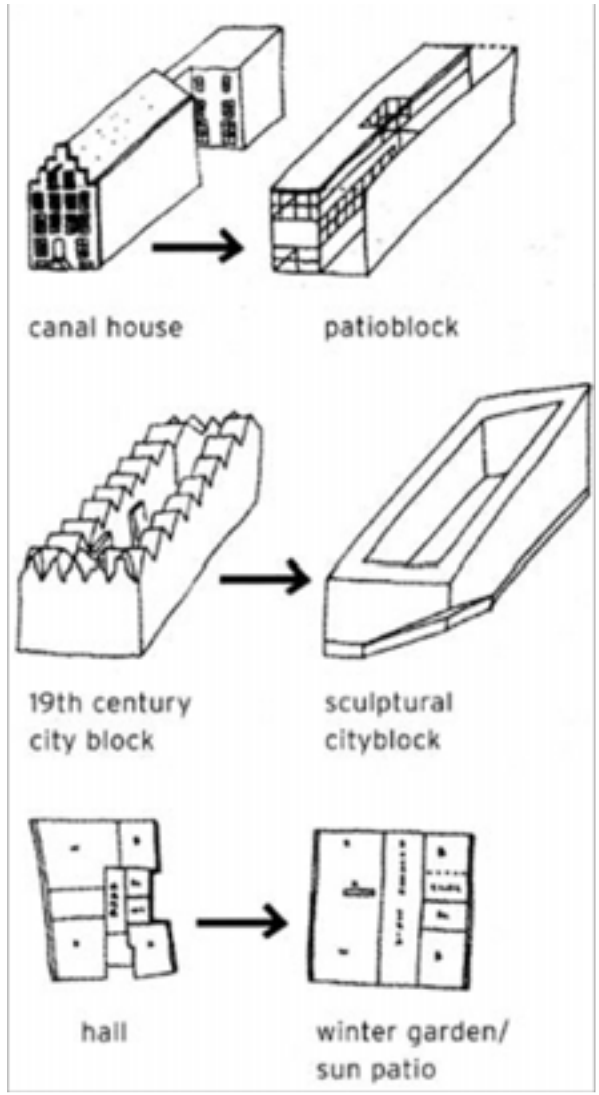


Walled City, Kowloon (Hong Kong)

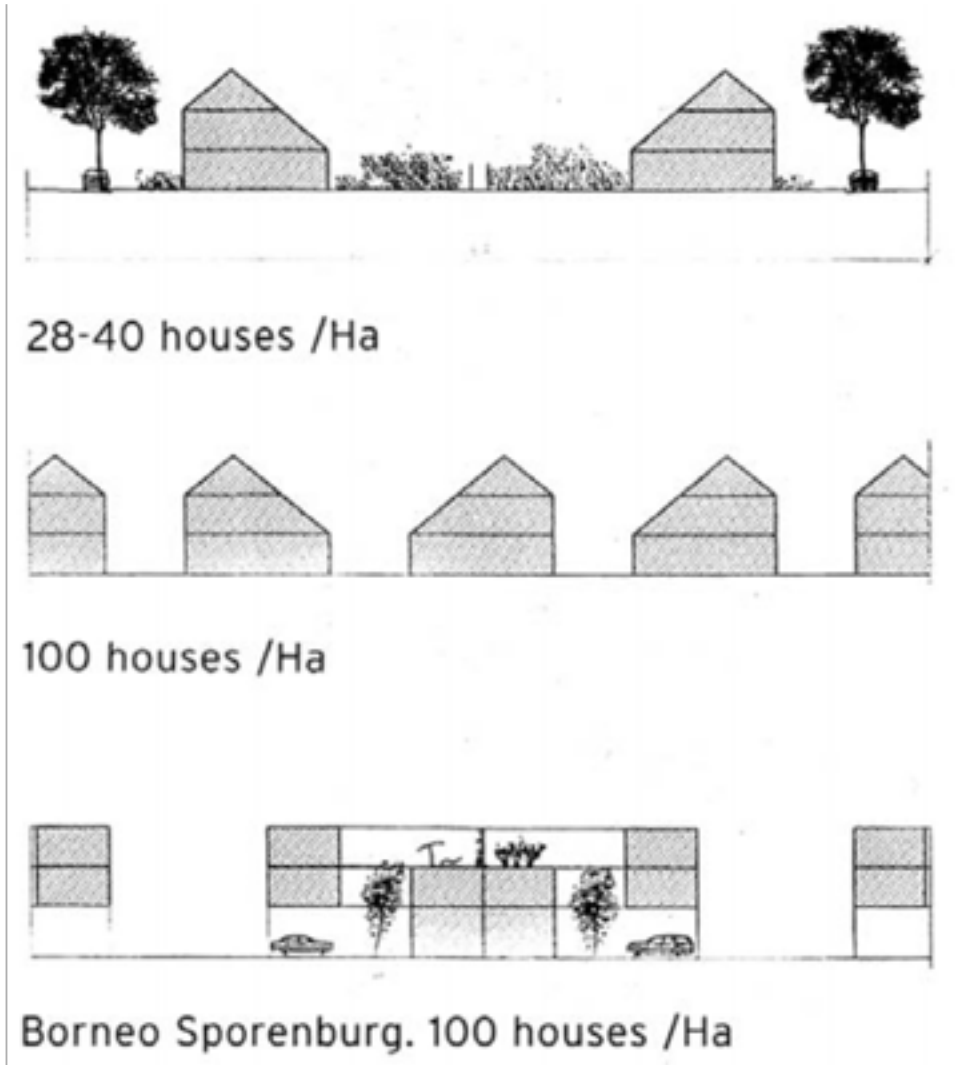
Borneo Sporenburg, West 8



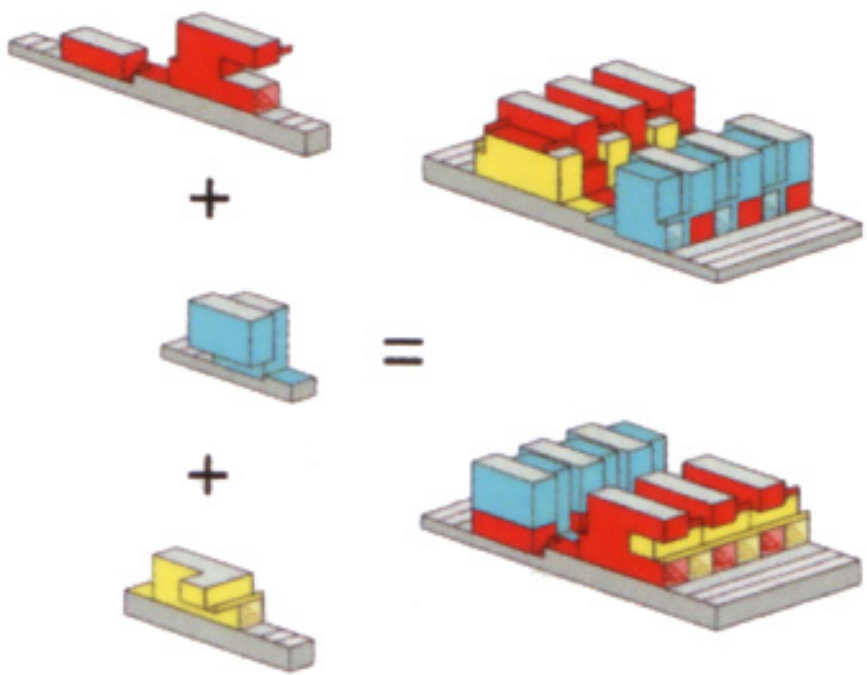
Principle: typological derivation



Principle: density despite open space



Interpretation of density



Neutelings Riedijk, Borneo

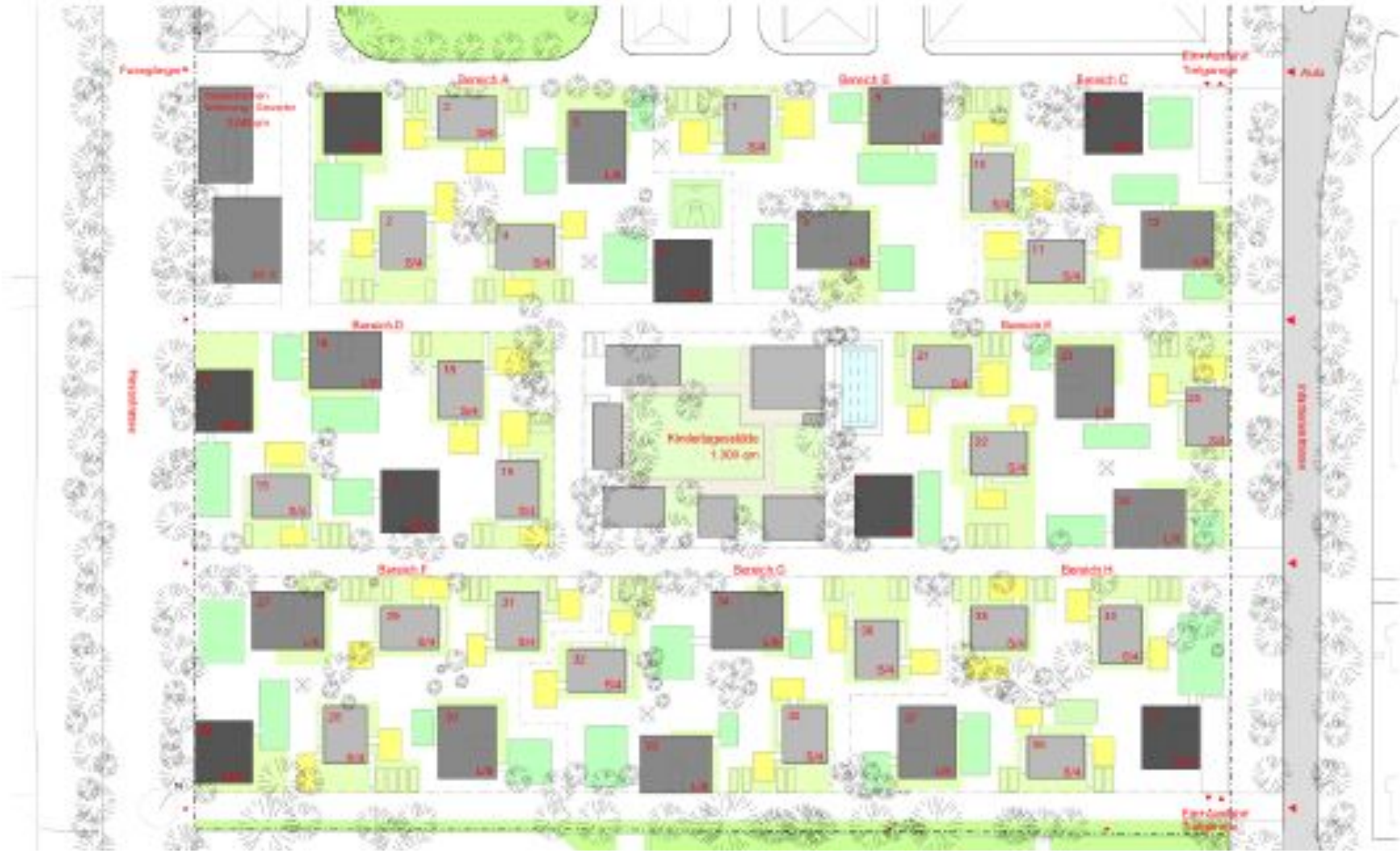
Voids: private open space

Contrast of scale

Werkbundsiedlung, München (K. Sakamoto)

Evenly loose spread density

Continuous open space



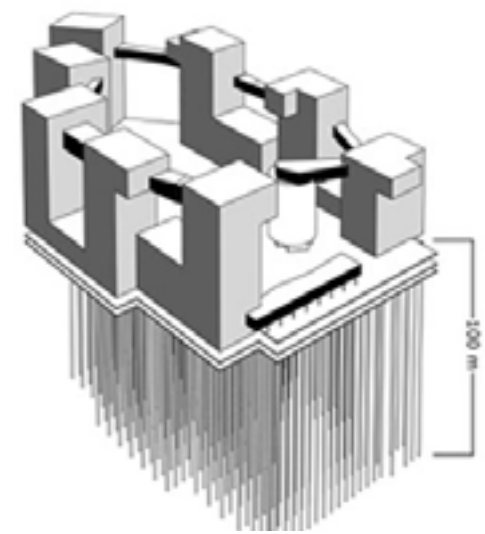
Openness, appropriation

Linking - stacking

Linked Hybrid
8 buildings, 220k m2 – 750 apartments
+montessori school, kindergarten, cinematheque, hotel, shopping
open city within the city / porous urban space
skybridges 12-18 floor
pool, fitness gym, gallery

big Yard zanderroth, Berlin
typological fantasy
72 member baugemeinschaft
blockrandbebauung Nordwest Ecke
22m brandschutzwand
2 zeilen

Linked Hybrid, Bejing (Steven Holl)



Linked Hybrid, Bejing (Steven Holl)

Linked Hybrid, Bejing (Steven Holl)

bigYARD, Berlin (Zanderroth)

bigYARD, Berlin (Zanderroth)

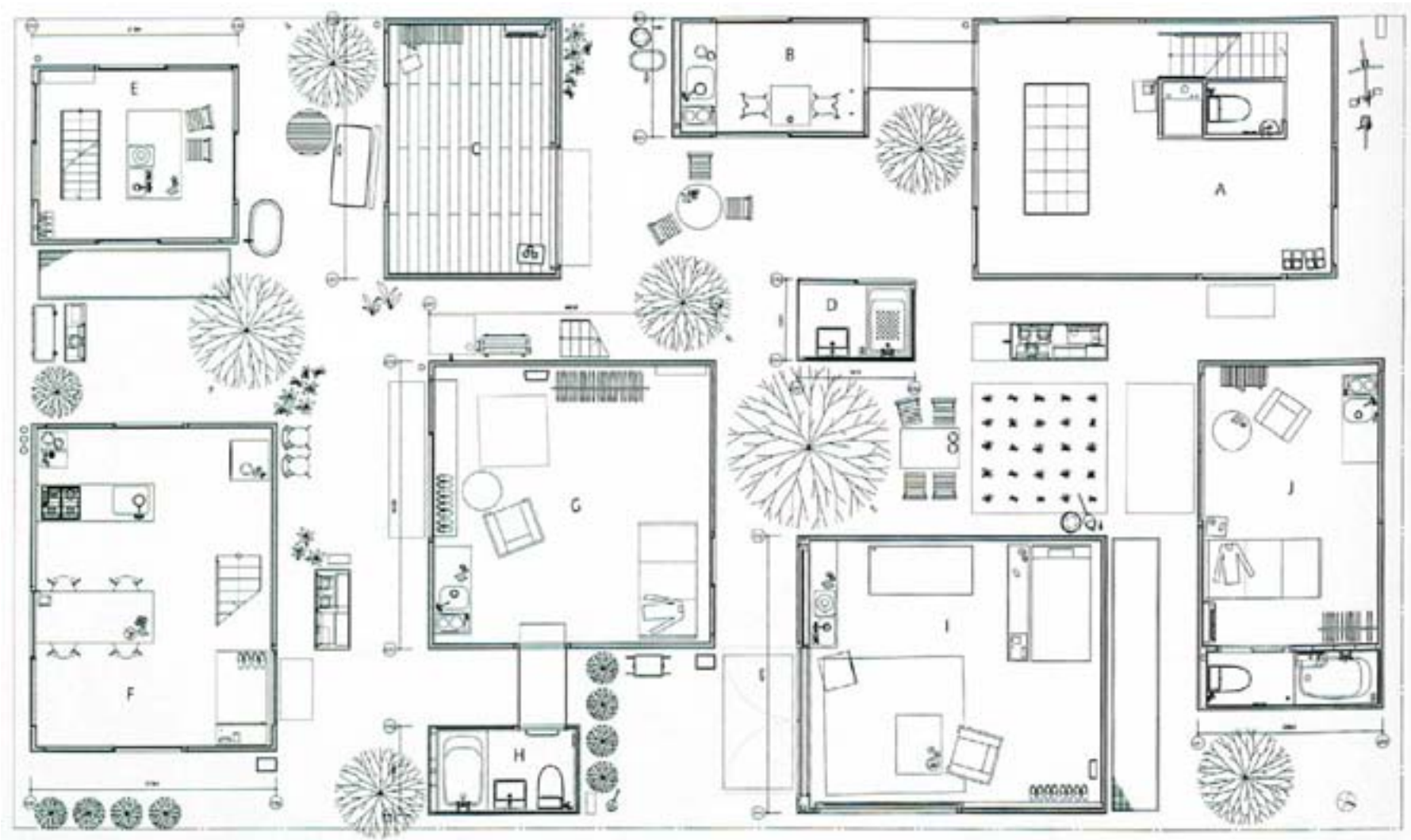
Density: cluster – interlocking

Moruyama House
Ryue Nishegawa (Kazuo Sejima)
10 buildings
stands out – blends in
conflict
folien f

Habitat
Moshe safdie MA Thesis McGill U
New modern apartment lifestyle
Affordable housing with private garden
Concrete building technology
Modular interlocking

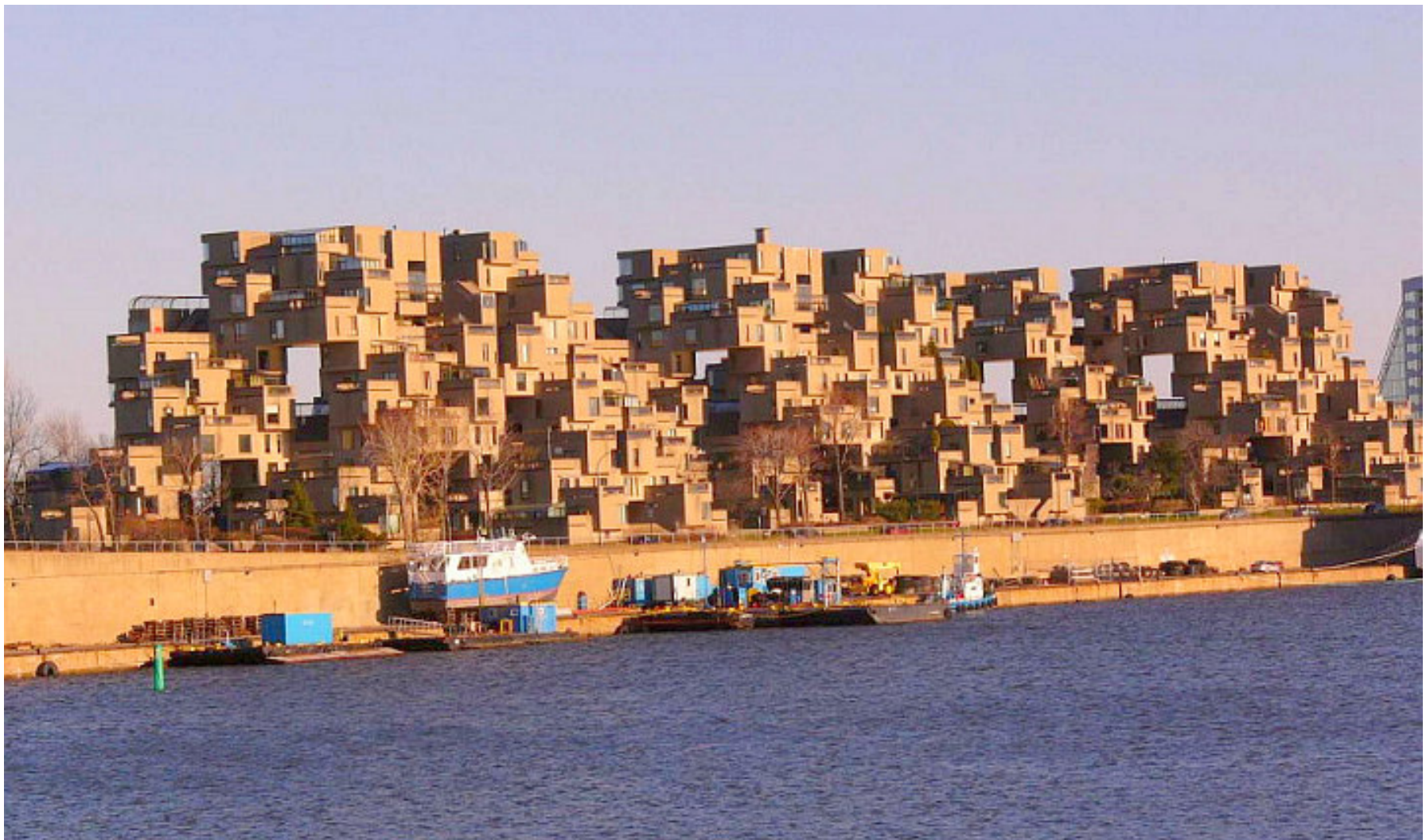
Moriyama House, Tokyo (SANAA)

Moriyama House, Tokyo (SANAA)



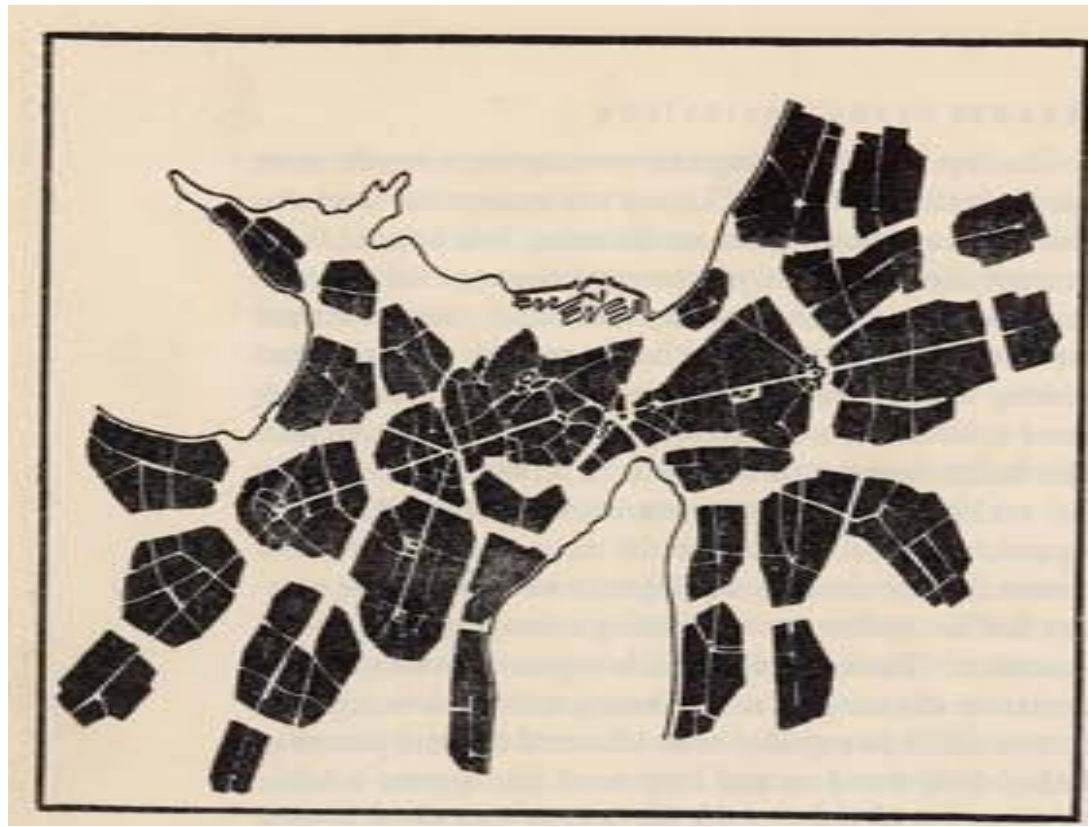
Moriyama House, Tokyo (SANAA)

Habitat 67, World Expo ´67 Montreal (Moshe Safdie)



Habitat 67, World Expo ´67 Montreal (Moshe Safdie)

Dezentralization pattern of Greater Tallin, Estonia (Eliel Saarinen, 1918)



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