

# **URBAN PLANNING 3**

**UNIVERSIDAD DE ALICANTE . COURSE 2013 - 2014**

**Informal notes from the course's theoretical  
and practical content**

# **CREDITS**

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## **URBAN PLANNING 3**

Informal notes from the course's  
theoretical and practical content

### **Course's main structure and practical exercises information**

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# **PREFACE**

This document compiles in an informal manner, some of the theoretical teaching content considered for the Urban Planning 3, course 2013- 2014.

It also includes the outline and hand-in instructions of the two practical exercises developed during the course.

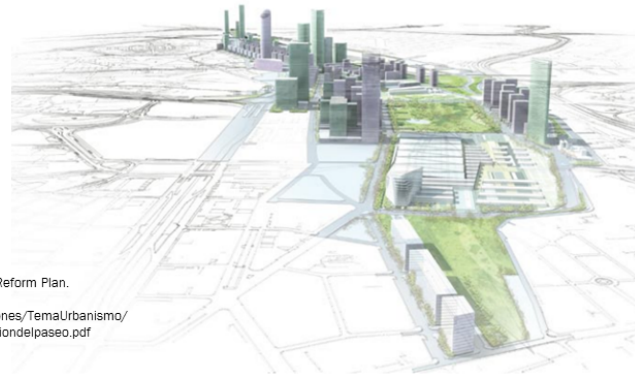
The purpose of this compilation of teaching notes is to serve as reference and basis for future courses taught in English, as this was the first experience for the subject Urban Planning 3.

*Alicante, July 2014*



# NOTES ON THE THEORETICAL CONTENT

## URBAN DEVELOPMENT PLANNING: THE PARTIAL DEVELOPMENT PLAN



Paseo de la Castellana extension project. Partial Interior Reform Plan.  
Source:  
<http://www.madrid.es/UnidadWeb/Contenidos/Publicaciones/TemaUrbanismo/MemoGest2009/60trasActuaciones/ficheros/2prolongaciondelpaseo.pdf>

> INTRODUCTION\_ The partial development plan

c. XX > Relation between master plan and partial development plan as we know it today.

## MASTER PLAN VS. PARTIAL DEVELOPMENT

Defines and delimites which areas are suitable for urban development.

Since 1976, there are two types of **developable land**:

**Programmed developable land (or sectorized land)** the sectors are precisely defined.

**Non Programmed developable land (or not sectorised land)** extensive area that could eventually be sectorised, and future development is previsible.

It is the "territorial urban planning instrument that defines the land use and spatial organisation of the Developable Land "

The set of **plans/drawings** and **texts** (with regulatory competence). It organises the growth of a new city territory (**or sector**) establishing:

- > **The streets layout**
- > **Parks and facilities location,**
- > **Characterising the built environment and defining land uses.**

According to the regulations established by the city's **master plan**.



## MASTER PLAN

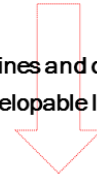
Establish the overall limits  
and conditions of the territory.



VS.

## PARTIAL DEVELOPMENT PLAN

Defines and details how the  
developable land is going to be used.



RESPONSIBLE FOR  
THE URBAN  
QUALITY OF THE  
CITY



> **INTRODUCTION\_ The partial development plan. From city growth to internal reform.**

Some cities of great dimension make abandoned land available to be developed by municipalities and districts >> **GREAT INTERIOR AREAS**

- > Most of them are located on the outskirts/ peripheries of the city
- > City centre areas with strong potentialities of urban transformation.



Allendeduero Plan. Aranda de Duero (Burgos).  
Pedrosa - Paredes. 1996.



> INTRODUCTION\_ The partial development plan. From city growth to internal reform.



Paseo de la Castellana extension.  
Internal Reform Plan

Source:

<http://www.madrid.es/UnidadWeb/Contenidos/Publicaciones/TemaUrbanismo/MemoGest2009/6OtrasActuaciones/ficheros/2prolongaciondelpaseo.pdf>

**What negative effects the partial development planning could lead to?**

**What possible benefits could be expected from the partial development planning?**

It is then convenient to...

- > Promote the city growth in itself.
- > Encourage the consolidation of the existing city.
- > Aim to enhance (renovate, improve) populated areas before considering the unjustified expansions of the city.



*Borneo Plan - Sporenburg, Amsterdam, 1995.*

**The function of the partial development planning, as integrated operations of Internal Reform, is then reinforced.**

## How to define a partial development plan?

The Partial development plan has a **program and** and a specific **location**.

> The **program** is defined by the **Master plan**:

densities, edificability, land usage percentage, its relation to the city and to other nearby Master Plan, specific characteristics should be assumed by the detailed planning, etc...

> The **location** imposes rules that affect the implementation of the above conditions.

**A rigorous cartography of the sector and its surroundings.**

The sector's information starts with a cartography.

It must cover the whole sector AND a **100 m. wide area outside the site limits**.

> **Basic cartography:**

Referenced to the UTM coordinates (Universal Transverse Mercator), it is convenient to fix the (topographic) contour lines to equidistance of 0,5m.

All road intersections, relevant elements and slope changes within or next to the site must be precisely drawn.

The drawing scale should be **1/1000** or **1/500** if necessary.

## > The partial development plan. Information

### > Existing constructions and environmental condition of the site

All existing constructions matter because of their economic impact on the site.

The pre-existing environmental condition of the site have become a relevant issue. **(Ley 9/06 de Evaluación de Planes y Programas). Ley Regional 4/09, de 14 de Mayo, de Protección Ambiental Integrada.**

### > Existing infrastructure and services

We must request for information/ plans to energy, water, network... supply companies/ undertakings.

### > Physical values, patterns, conditions: a virtual cartography

- Water courses:  
(channels, irrigation stations, river banks...).
- Road and railway networks:  
The line that defines edification.
- Cattle trails:  
Difficult width definition.
- Archaeological or historical areas.
- Affected roads, services and utility rights of way. (ex-. Power lines, gas pipelines, drainage ,... ).

### >History and territory implications

- Site plan
- Topography.
- Geology and geomorphology.  
Geotechnical map.
- Hydrology.  
All superficial water courses and the ground water level.
- Flood susceptibility.  
Determining information in the urban planning decisions.

Soil studies, local climate, micro climate, land uses, noise, pollution, existing vegetation, etc...

Identify what are the **site opportunities**.

### **Appreciate the landscape.**

> Identify which environmental circumstances (positive and negative) are relevant and specific to the site:

- a. Water bodies
- b. Puddling, erosion and runoff
- c. Humidity
- d. Dangerous borders
- e. Noise /Air pollution

> Accesibility to the site, what kind of nearby **residential typologies are there?**

> The partial development plan. Information

The direct contact with the site allows us to have a better understanding of its scale and its force lines.

A first **technique** to study the **natural environment** can be identified using the term: **LANDSCAPE**.

- Select a significant number of points of view and note/register what can be seen from each of them.
- The recommendation is always to emphasise natural site/region- specific characteristics.
  - a. Topography.
  - b. Hydrology
  - c. Ecology
  - d. Vegetation
  - e. Archaeology

**A second technique to analyse the urban scale environment characteristics is called**

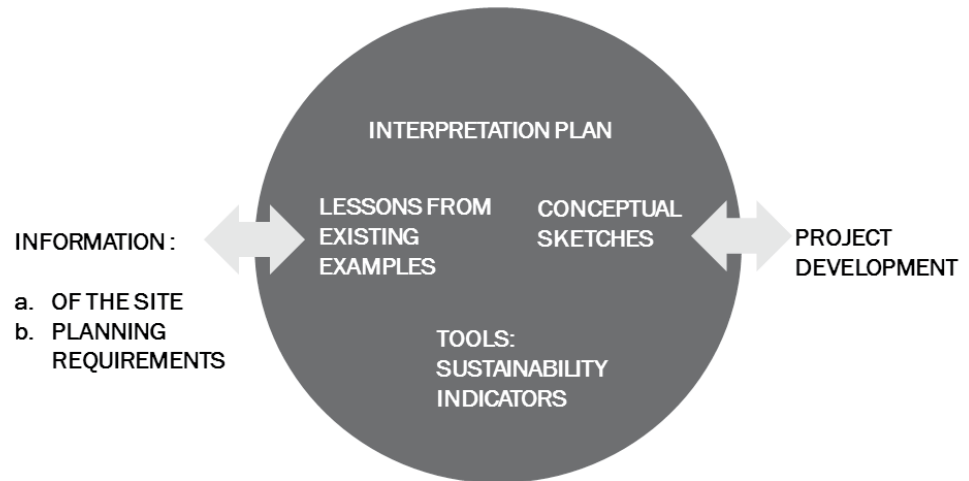
**TOWNSCAPE**

- a. Building densities and volumes.
- b. Building heights.
- c. Roof types and shapes.
- d. Built environment silhouette.
- e. Relation to its topography.
- f. The scale.
- g. The proportion of buildings.

>A **direct contact with the inhabitants** of the site (if applicable) and its surrounding areas is crucial to understand their own appreciation and needs.



## How will we address the project?



> **Urban development potential:**

It is the urban project profitability concept used to achieve an **equal distribution of benefits** while assigning land uses to the developable land (and to the unconsolidated urban land).

It should be noted that the **developable land owners** are entitled to only **90% of the sector's developable land area**, giving the rest away to the Municipality.



· **Mandatory cession. Municipal Dedicated Lands**  
10 % of the developable gross area as municipal reserve

**PRIVATE LAND USE**

- > Residential
- > Tertiary
- > Institutional land

**PUBLIC LAND USE**

- > Institutional land
- > Infrastructure and facilities
- > Green areas
- > Red viaria

**MANDATORY CESSION**

**SUBSIDISED HOUSING**

> The partial development plan. LESSONS FROM EXISTING EXAMPLES

In a Partial Development Plan there are key decisions that have to be taken with regard to :

- >Urban pattern and road network
- >The building typologies and block sizes/ types
- >The open space system
- >Infrastructures
- >The neighbourhood lively centre

Note: building orientation, physical relation with the existing city, topography, project scale (hectares), number of dwelling units.....

**How are existing partial development plans organised?**

> The partial development plan. LESSONS FROM EXISTING EXAMPLES

**1. PARC BIT, 1994**

Richard Rogers (Mallorca, Spain)

**2. POTSDAMER PLATZ, 1991-1998**

Renzo Piano, Richard Rogers (Germany)

**3. SHANGHAI DISTRICT, 1992**

Richard Rogers (Shanghai, China)

**4. BUENA VISTA, 2001**

Richard Rogers (Singapore)

**5. SOLAR CITY**

Richard Rogers, Norman Foster, Thomas Herzog (Pichling, Linz, Austria)

**6. GREENWICH PENINSULA**

Richard Rogers (Londres, Inglaterra)

> The partial development plan. LESSONS FROM EXISTING EXAMPLES

**7. NEW CITY OF WILLIAMSBURG, 1995**

Manuel Arenas, Miguel Ruano (Virginia, USA)

**8. LINGANG NEW CITY**

Meinhard von Gerkan (near Shanghai)

**9. LAFAYETTE PARK, 1959**

Mies van der Rohe (Detroit, USA)

**10. RADBURN, 1929**

Clarence Stein and Henry Wright (New Jersey, USA)

**11. MASTERPLAN POZOKOETXE, SAN FAUSTO Y BIDEBIETA EN BASAURI**

UN Studio (Bilbao, Spain)

**12. CAMPUS BIOMETRÓPOLIS**

Foster and partners (Distrito Federal, México)

**13. ECOBARRIO LOGROÑO-OESTE, 2008**

## But... What does the **sustainable development** concept refer to?

> The concept was first born in the sixties (*ecodevelopment*), but it was profiled throughout the two following decades.

> In nature, **nothing grows indefinitely**, on the contrary, when it reaches maximum thresholds, it collapses and suffers severe degradation.

> The **idea of life-cycle** (ecology): the closer the development is to the cyclical character of nature, the more sustainable the human-guided processes will be. As a result, they will contribute to the balanced wellbeing conditions.

But... What does the **(eco) neighbourhood** concept stand for?

## A neighbourhood = an unit

The charter of the Congress for the New Urbanism characterises this unit as:

**«compact, pedestrian-friendly, and mixed-use»**

> The metrics of a neighbourhood vary in **density, population, mix of uses, and dwelling types, and by regional customs, economies, climates and site conditions.**

> The size is a defining feature of a neighbourhood and is typically based on a **comfortable distance for walking from the centre of the neighbourhood to its edge (16Has. - 64,7Has.)**

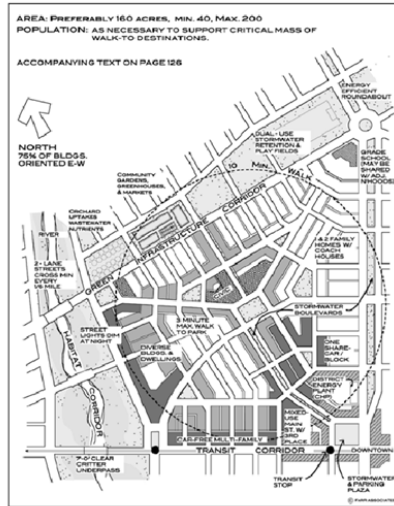
> Clarence Perry (1929) suggested a neighbourhood centre surrounded by civic uses, parks, residential uses, a school, and retail at the edge, **all within one-quarter mile or about 5-minute walk distance.**

## But... What does the (eco) neighbourhood concept stand for?

Figure 1. Clarence Perry's Neighborhood Unit, 1929.  
Source: Regional Plan Association



Figure 2. A "sustainable" update of Perry's neighborhood unit. Source: Douglas Farr, *Sustainable Urbanism*



Source: LEED Neighbourhood development manual.



But... What does the **(eco) neighbourhood** concept stand for?



Buena Vista  
Richard Rogers

> **Neighbourhood centre(s):**

- They do not need to be located in the neighbourhood geographic centre.
- The well-connected **polycentric** neighbourhoods promote movement and activity flows among the city spaces.

## But... What does the **(eco) neighbourhood** concept stand for?

**4 objectives** to be accomplished by the new sustainable urban developments:

> Design urban environments with an adequate **building density and urban compactness** which ensure the balance between the built space and the open space.

> Design urban environments that benefit from the **mix of uses**, promoting the **vitality of a neighbourhood**.

> **Optimisation of local resources' use** to minimise negative impacts over material and energy flows that hold the biosphere in balance.

> Design urban environments that promote the **social cohesion** of the future inhabitants.

> The partial development plan. TOOLS: SUSTAINABILITY INDICATORS

An **indicator** is a measurable aspect of environmental, economic, or social systems that is useful for monitoring changes in system characteristics, relevant to the continuation of human and environmental well being. They can be qualitative or quantitative measures; and they work as sustainability assessment.

**ORGANISATIONS THAT HAVE RECENTLY PUBLISHED SUSTAINABILITY INDICATOR SYSTEMS**

- >UNITED NATIONS (2007)
- >UN-HABITAT (2004)
- >WORLD BANK (2008)
- >EUROPEAN FOUNDATION (1998)
- >EUROPEAN COMMISSION ON SCIENCE, RESEARCH AND DEVELOPMENT (2000)
- >EUROPEAN COMMISSION ON ENERGY ENVIRONMENT AND SUSTAINABLE DEVELOPMENT (2004)

The '**INTERNATIONAL URBAN SUSTAINABILITY INDICATORS LIST (IUSIL)**' includes the 6 sets of sustainability indicator systems and comprises a total of 115 indicators classified into 4 areas: economical, social, environmental, governmental.

> The partial development plan. TOOLS: SUSTAINABILITY INDICATORS

**International URBAN SUSTAINABILITY systems based in the study of indicators:**

**LEED NEIGHBOURHOOD DEVELOPMENTS** (United States Green Building Council)

**BREEAM COMMUNITIES** (Building Research Establishment Global Ltd.)

**CASBEE for URBAN DEVELOPMENT** (Japan Sustainable Building)



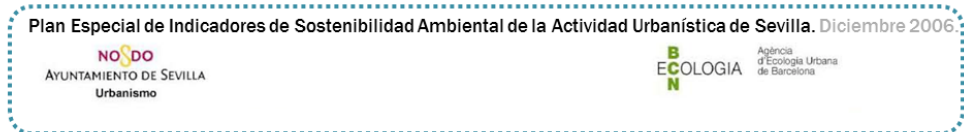
**BREEAM<sup>®</sup>**

**CASBEE<sup>®</sup>**

> The partial development plan. TOOLS: SUSTAINABILITY INDICATORS



INDICATORS SYSTEM



Prerequisites and credits  
address **5 topics**:



SLL	SMART LOCATION AND LINKAGE
NPD	NEIGHBORHOOD PATTERN AND DESIGN
GIB	GREEN INFRASTRUCTURE AND BUILDINGS
IDP	INNOVATION AND DESIGN PROCESS

Indicators address **7 topics**:



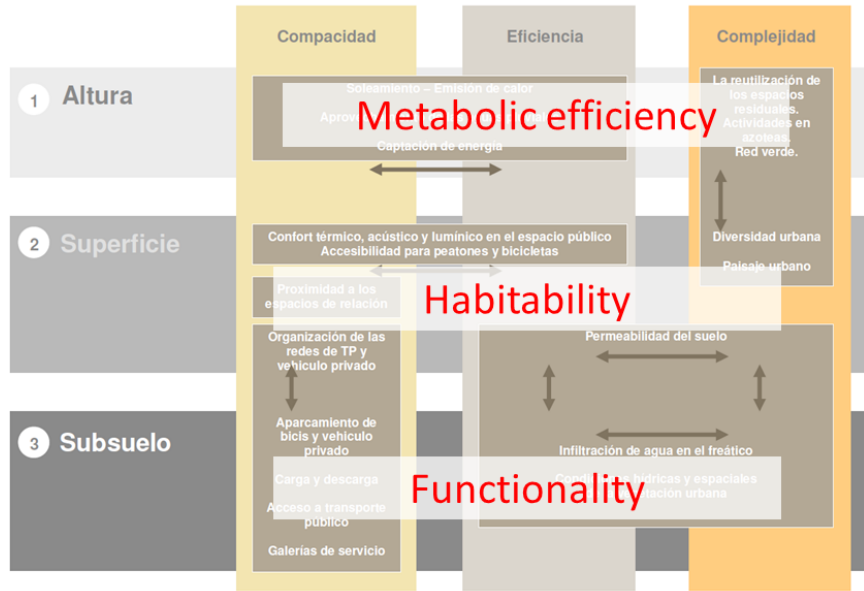
MU	MORFOLOGIA URBANA
EP	ESPACIO PÚBLICO; CONFORT Y CONTROL DE LAS VARIABLES DEL ENTORNO
MyS	MOVILIDAD Y SERVICIOS
CU	COMPLEJIDAD URBANA
MeU	METABOLISMO URBANO
BU	BIODIVERSIDAD URBANA
CS	COHESION SOCIAL

## Plan Especial de Indicadores de Sostenibilidad Ambiental de la Actividad Urbanística de Sevilla

4 AXIS of the sustainable neighbourhood development:

- > **Compactness** Addresses the physical reality of the territory, the formal solutions that are adopted in terms of: building density, spatial distribution of uses, percentage of green and/or open spaces...
- > **Complexity** Urban organisation, mix of uses and urban functions located throughout the territory.
- > **Efficiency** Urban metabolism: materials, water and energy flows that constitute the basis of any urban system in order to keep its correct organisation, and prevent future pollution.
- > **Social stability** It addresses people and social relationships within the urban system. (Social mixture: income, age, professions, cultures, etc...)

**Plan Especial de Indicadores de Sostenibilidad Ambiental de la Actividad Urbanística de Sevilla**



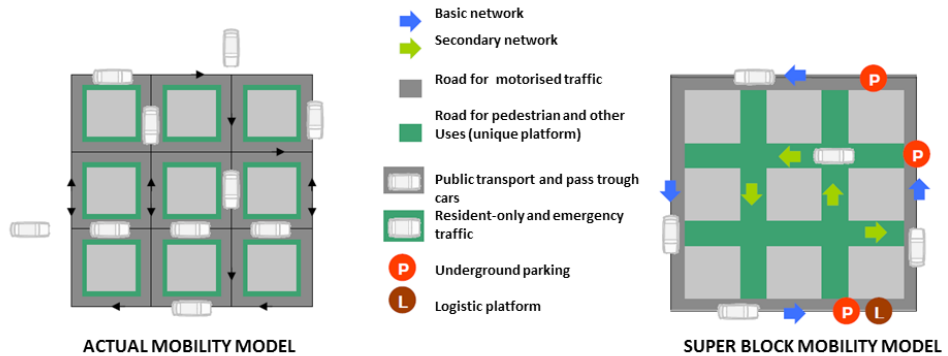
The 3 levels urbanism



Plan Especial de Indicadores de Sostenibilidad Ambiental de la Actividad Urbanística de Sevilla

**THE SUPER BLOCK:**

Mobility and public space model



Plan Especial de Indicadores de Sostenibilidad Ambiental de la Actividad Urbanística de Sevilla

LEED for NEIGHBOURHOOD DEVELOPMENTS



Parc Bit, Mallorca.

> **Building density / Residential density:**

Represents the maximum number of built residential dwellings per Hectare.

The idea of '**compact city**' rejects densities less than 20 viv/Ha since it's considered as the '**land waste threshold**'.

LEED ND: 157 du/Ha

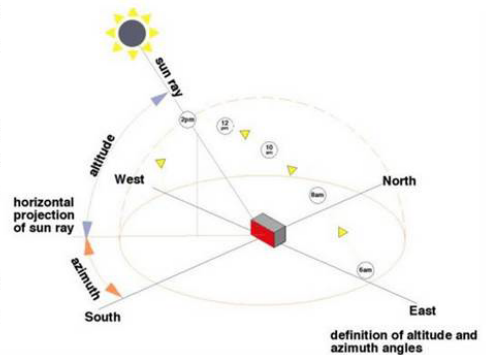
PEISAAUS : 60 du/Ha

## The city and the solar radiation

The journey of the sun in the celestial sphere should be considered as it influences the **well-being of the urban environment**.

**Building façades** and other physical elements of the city -**open spaces** and **green spaces networks**- must also be designed according to the solar incidence.

The **amount of solar radiation** incidence to the city's dwelling units will, in most cases, depend on the **urban density**.



Urbanismo bioclimático. Esther Higuera.

## The city and the solar radiation

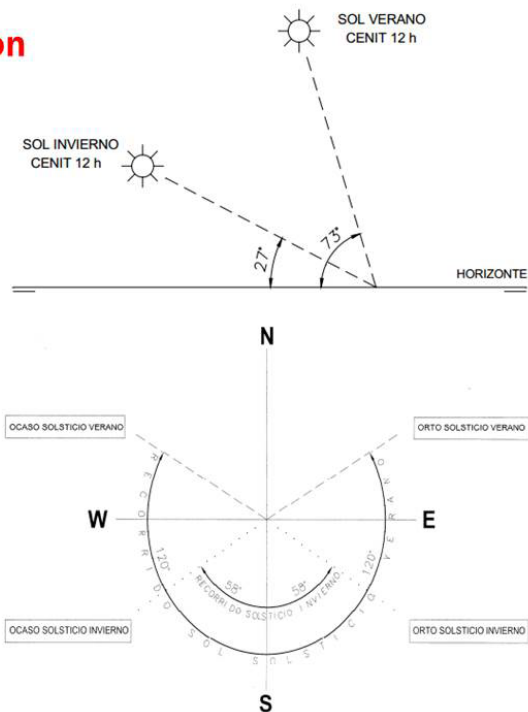
Recommended hours of solar radiation incidence:

The amount of required sun exposure is determined by the site's location.

In cold climates, in the worst case scenario (winter solstice), at least 4 hours of solar radiation should be provided.

**12 p.m.** is when the maximum solar height occurs, thus it is expected to have solar exposure at least from 10 to 14hrs.

[http://www.coag.es/websantiago/pdf/ester\\_higueras.pdf](http://www.coag.es/websantiago/pdf/ester_higueras.pdf)

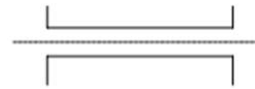


## The city and the solar radiation

### a. Street orientation



North-south axis streets generate west –east façade orientation.



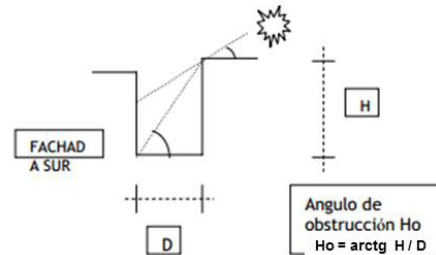
East-west axis streets generate north –south façade orientation.

- b. The street width
- c. The building height

$H^\alpha = 45^\circ$  .  $D = H$  No solar exposure of main floors.

$H^\alpha < 45^\circ$  .  $D > H$  Good sun exposure during winter months.

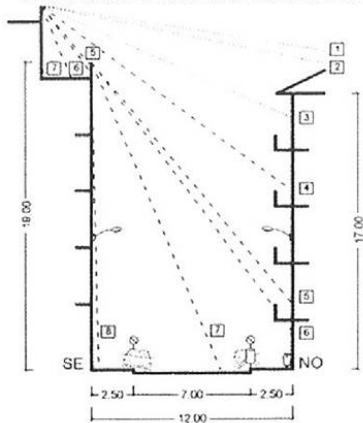
$H^\alpha > 45^\circ$  . Very low sun exposure during winter months.



[http://www.coag.es/websantiago/pdf/ester\\_higueras.pdf](http://www.coag.es/websantiago/pdf/ester_higueras.pdf)

## The city and the solar radiation

Winter solar radiation reaches from the third floor up in this narrow street example:



1 21 DICIEMBRE 1 MIN (0°)  
ESTE: 7.30 h  
OESTE: 16.30 h

2 21 ENE-NOV 1/2H (3,5°)  
ESTE: 7.23 h a 7.53 h  
OESTE: 16.07 h a 16.37 h

3 21 FEB-OCT 1,30H (17,7°)  
ESTE: 6.40 h a 8.10 h  
OESTE: 15.50 h a 17.20 h

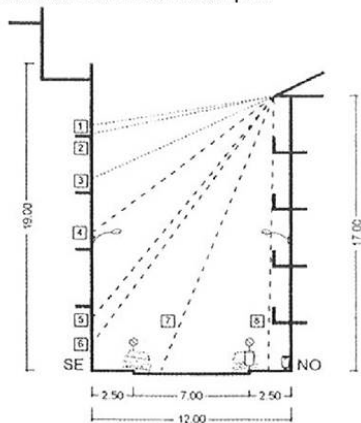
4 21 ABRIL-AGOSTO 3H (18,6°)  
ESTE: 7.00 h a 10.00 h  
OESTE: 14.00 h a 17.00 h

5 21 MAYO-JULIO 3H (24,3°)  
ESTE: 7.00 h a 10.00 h  
OESTE: 14.00 h a 17.00 h

6 21 JUNIO 3H (30°)  
ESTE: 7.30 h a 10.30 h  
OESTE: 13.30 h a 16.30 h

7 21 JUNIO MÁX PERP. (39°)  
ESTE: 8.10 h  
OESTE: 15.50 h

8 21 JUNIO MÁX (66,1°)  
ESTE: 10.30 h  
OESTE: 13.30 h



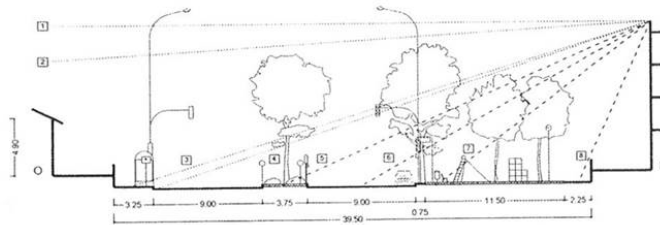
----- PROTECCION SOLAR  
Debemos usar protección solar para protegernos de la incidencia solar.

..... CAPTACION SOLAR  
Incidencia solar < 30° respecto a la perpendicular a la fachada.  
No puede haber ningún elemento que obstruya desde la horizontal hasta este ángulo.

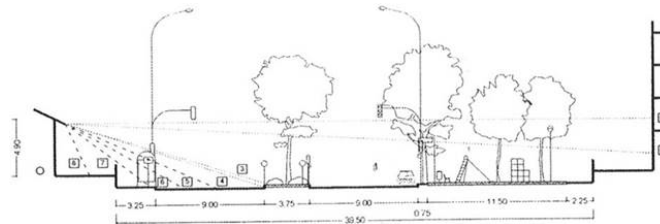
Urbanismo bioclimático, Esther Higuera.

## The city and the solar radiation

Wide streets allow solar incidence to most of the façade surfaces.



CALLE ARTURO SORIA  
ORIENTACIÓN N-S

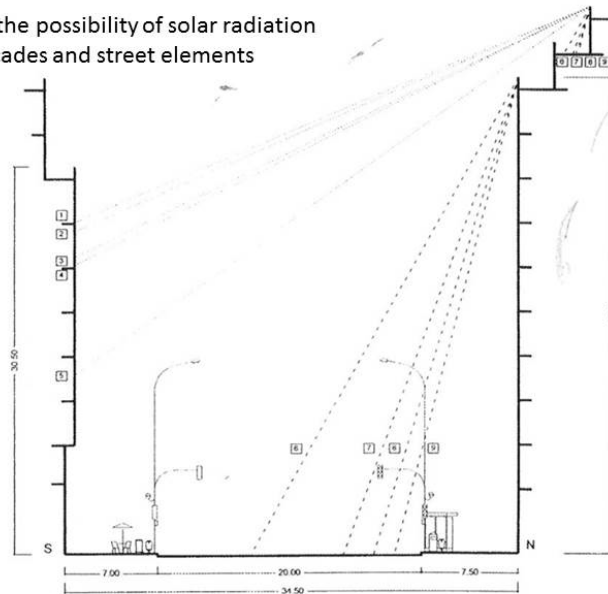


CALLE ARTURO SORIA  
ORIENTACIÓN N-S

Urbanismo bioclimático. Esther Higuera.

## The city and the solar radiation

High buildings reduce the possibility of solar radiation over other building façades and street elements



CALLE GRAN VÍA  
ORIENTACIÓN E-O

Urbanismo bioclimático, Esther Higuera.



## The city and the solar radiation

In a street section, over the south facade:

$D < H$  There will not be any solar incidence on main floors, however, there will be summer sun.

( $H^\circ > 45^\circ$ )

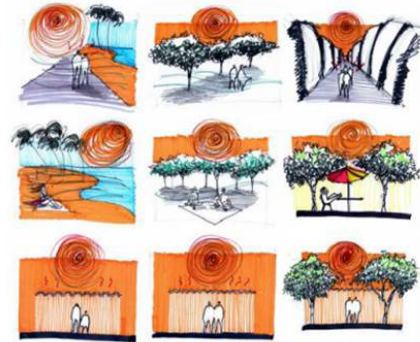
$D = H$  There will not be any winter solar incidence on main floors.

( $H^\circ = 45^\circ$ )

$D > 1,7 H$  There will be good winter solar incidence.

( $H^\circ < 45^\circ$ )

The «fifth facade», the roof, receives a huge amount of solar radiation. It can be used as a solar/water/energy collector-surface.



LABAUT eco-eficiencia

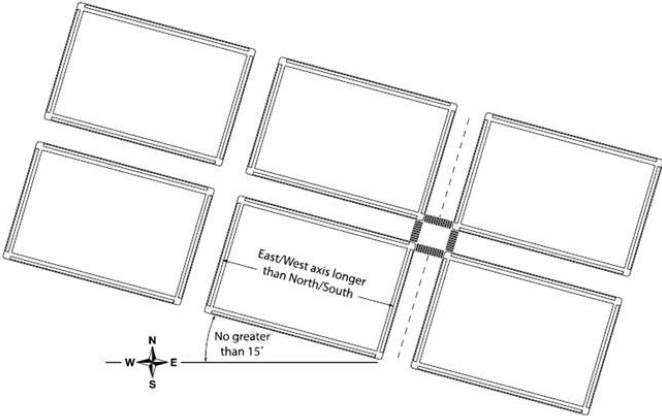
Brasil, soluciones frente a la radiación solar directa

[http://www.coag.es/websantiago/pdf/ester\\_higueras.pdf](http://www.coag.es/websantiago/pdf/ester_higueras.pdf)

# The city and the solar radiation



**Figure 1.** Solar-oriented blocks with east-west lengths equal to or greater than north-south lengths, and east-west axis within 15 degrees of geographic east-west

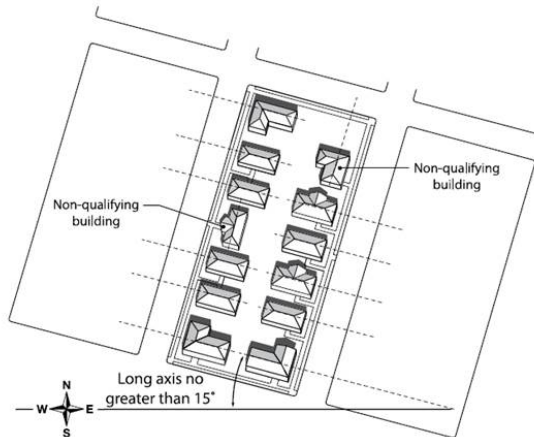


Source: LEED Neighbourhood development manual.

## The city and the solar radiation



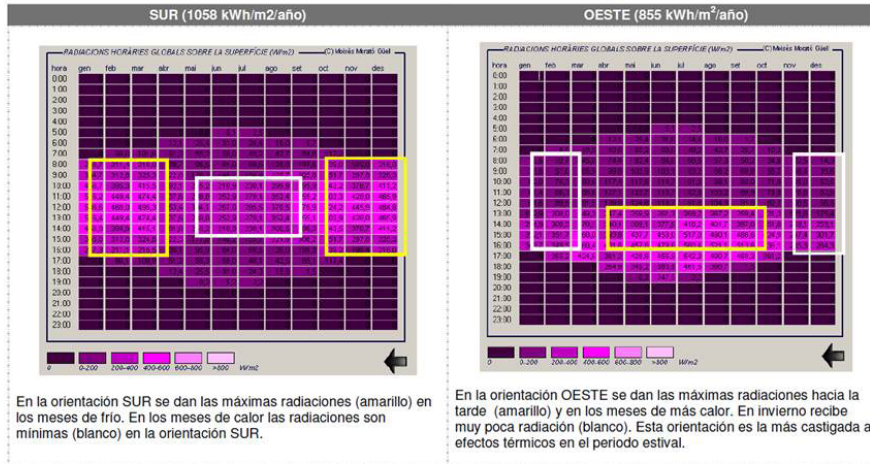
**Figure 2.** Solar-oriented buildings with longer axis (at least 1.5 times length of other axis) within 15 degrees of geographic east-west



Source: LEED Neighbourhood development manual.

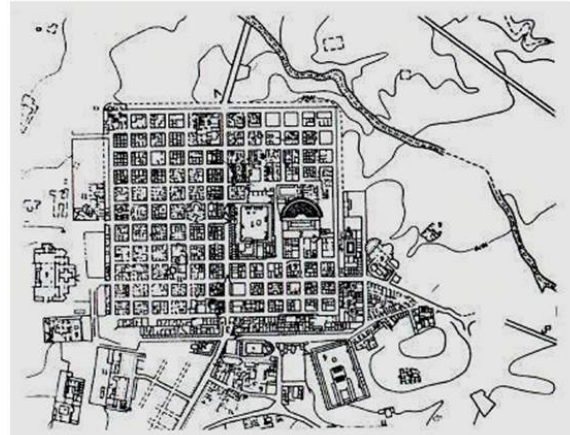
## The city and the solar radiation

A good orientation allows solar collection in winter and attenuates solar radiation in summer time.



Irradiaciones libres para orientación SUR y OESTE en Sevilla. Fuente: Cercasol, Moisés Morató

## The city and the solar radiation



Urban pattern of Timgad (Argelia). It deviates a little from the four compass points.

**A repetition of the interior dwelling units distribution must be avoided.** Each façade and its corresponding orientation has a unique and specific incidence of sun and wind.

## The city and the solar radiation

Graphic analysis. Thermal comfort strategies for the central space of open-block typologies.



South-east and south-west orientation façades should be protected with greenery and vegetation.

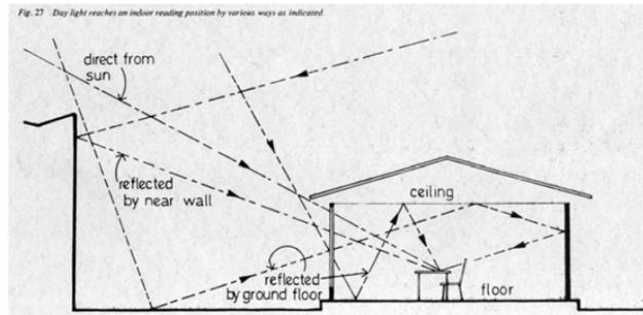
The right portion of the space could be used as a playground since it receives direct solar heat in winter afternoons.



Plaza Vicente Aleixandre

## The city and the solar radiation

### Direct solar radiation **Vs.** Diffuse solar radiation



#### **Fig. 5 Sun light Reflection Patterns**

Day light penetrating the interior of a building is not only direct sunlight. Much of it is first reflected off of other surfaces in the exterior and the interior (Kureja 1978, p. 37). For this reason, it is important to consider the nature of landscaped and interior surfaces.

<http://drum.lib.umd.edu/bitstream/1903/208/1/umi-umd-1256.pdf>

## vegetation as bioclimatic strategy

### > Vegetation for sun control:

Trees and greenery are an excellent option to avoid excessive solar heat gain.

Deciduous trees allow solar radiation to pass through during winter time, but prevent solar access during summer time.

The trees location, orientation, type, size and shadow casted over building surfaces should be carefully addressed.

**Safe distance from buildings:** 8 - 10m for 6-7m high trees.



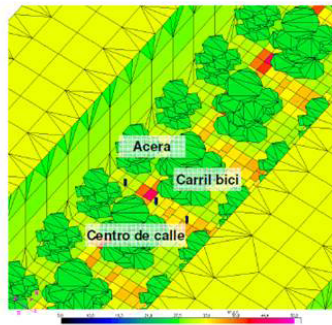
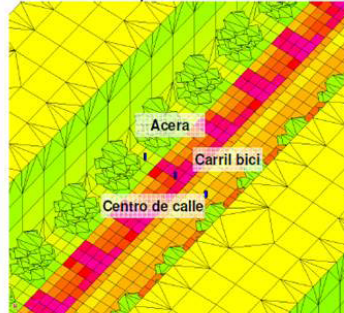
Urbanismo bioclimático. Esther Higuera.

<http://www.solarchoice.net.au/blog/partial-shading-is-bad-for-solar-panels-power-systems/>



Potencial de confort tèrmic segùn tipologies de secci3n de calle.

Secci3n h/d = 1 Tipo avenida



**B**  
**ECOLOGIA**  
**N**

Agència  
d'Ecologia Urbana  
de Barcelona

Aug 15, 2006 04:00:00	44,6	41,2	83,0
Aug 15, 2006 05:00:00	41,3	37,8	60,6
Aug 15, 2006 06:00:00	38,7	34,9	57,8
Aug 15, 2006 07:00:00	56,3	49,5	75,5
Aug 15, 2006 08:00:00	80,1	70,3	103,6
Aug 15, 2006 09:00:00	87,9	106,2	146,9
Aug 15, 2006 10:00:00	151,4	138,3	185,9
Aug 15, 2006 11:00:00	154,5	142,7	183,5
Aug 15, 2006 12:00:00	182,6	168,8	117,8
Aug 15, 2006 13:00:00	197,2	100,2	118,9
Aug 15, 2006 14:00:00	98,9	100,9	124,2
Aug 15, 2006 15:00:00	95,9	99,2	126,3
Aug 15, 2006 16:00:00	84,5	89,8	116,8
Aug 15, 2006 17:00:00	69,9	73,8	90,6
Aug 15, 2006 18:00:00	62,1	64,1	80,4
Aug 15, 2006 19:00:00	64,2	65,0	83,1
Aug 15, 2006 20:00:00	60,4	61,1	79,8
Aug 15, 2006 21:00:00	59,9	59,6	79,2
Aug 15, 2006 22:00:00	57,6	56,6	77,1
Aug 15, 2006 23:00:00	56,2	54,5	76,0

Potencial cal3n (%) 72% 6%

	Acera	Centro de calle	Carril bici
Aug 15, 2006 05:00:00	-3,2	-3,7	-4,1
Aug 15, 2006 06:00:00	-0,6	-4,4	0,0
Aug 15, 2006 07:00:00	-2,9	-7,2	-2,4
Aug 15, 2006 08:00:00	-5,5	-10,4	-5,0
Aug 15, 2006 09:00:00	-6,1	-11,3	-5,3
Aug 15, 2006 10:00:00	-9,0	-14,7	-8,2
Aug 15, 2006 11:00:00	-15,5	-21,2	-16,2
Aug 15, 2006 12:00:00	-6,5	-11,9	-8,3
Aug 15, 2006 13:00:00	7,5	4,0	5,0
Aug 15, 2006 14:00:00	24,1	66,6	51,4
Aug 15, 2006 15:00:00	81,8	92,6	95,1
Aug 15, 2006 16:00:00	89,3	103,9	102,9
Aug 15, 2006 17:00:00	122,5	134,6	41,7
Aug 15, 2006 18:00:00	129,6	29,0	27,6
Aug 15, 2006 19:00:00	17,2	17,5	17,0
Aug 15, 2006 20:00:00	15,8	17,4	17,5
Aug 15, 2006 21:00:00	5,8	6,0	6,5
Aug 15, 2006 22:00:00	-3,7	-4,6	-6,7
Aug 15, 2006 23:00:00	-8,6	-10,9	-12,4
Aug 15, 2006 00:00:00	-5,4	-5,1	-9,1
Aug 15, 2006 01:00:00	-7,8	-7,6	-11,7
Aug 15, 2006 02:00:00	-5,6	-5,2	-8,9
Aug 15, 2006 03:00:00	-5,3	-8,2	-7,8
Aug 15, 2006 04:00:00	-5,0	-6,7	-7,5

Potencial confort (%) 72% 80%

## vegetation as bioclimatic strategy

### > Vegetation for noise control:

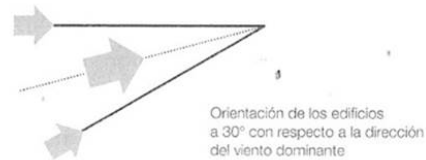
Broad-leafed trees are capable of attenuating 17 dB / 100 linear metres of vegetation, and 9 dB / 100 linear metres of vegetation for perennial deciduous trees .

Barreras/seto	Altura (m)	Especies más aconsejables
Barrera alta	12,50	arce, olmo, haya, tilo, tuya, abeto, pino, chopo, álamo
Barrera media	7,50	sauce, mostajo, peral y espino
Seto rústico	4,50	endrino, espino blanco, cornejo, avellano, saúco, espino cerval
Seto alto	4,50	laurel, ciruelo, fabo ciprés
Seto medio	1,20	acebo, tejo, boj, haya, lavanda, romero

Vegetative barrier measures: appropriate trees and hedges and their heights.

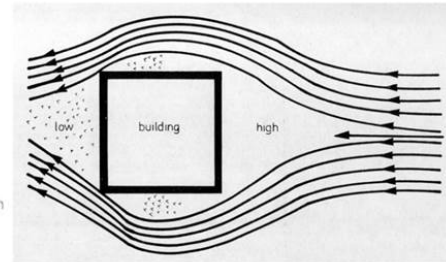
## wind as bioclimatic strategy

- > In cold weather, wind speeds start to feel uncomfortable at 0,5 m/s.
- > In warm weather, admissible wind speeds are around 3 - 3,5 m/s.



Fernando de Terán.

**In cold climates, the 30° angle should not be exceeded, while in warm climate conditions should not be inferior.**



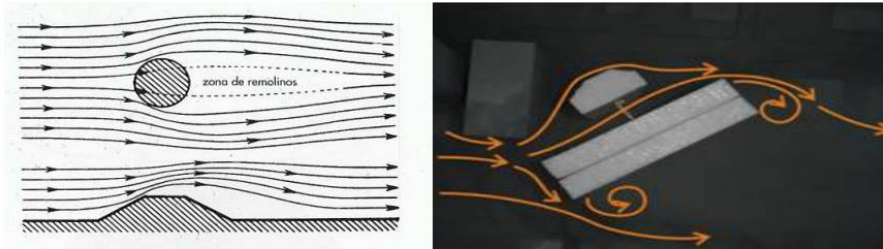
**Fig. 9 Diagram, Wind flow around buildings**

As the wind flows towards and past a building, it causes pressure differences which aid in ventilation. An area of high pressure is formed in front of the wall towards which the air is flowing. The opposite side, as well as the sides of the building, become areas of low pressure. Because of its low pressure, it helps to suck air out of the building, a very important part of establishing proper ventilation within a building (Kureja 1978, p. 93).

<http://drum.lib.umd.edu/bitstream/1903/208/1/umi-umd-1256.pdf>

Urbanismo bioclimático. Esther Higuera.

## wind as bioclimatic strategy



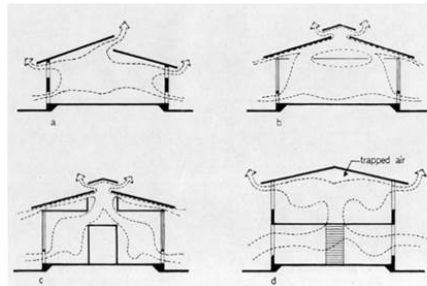
>In cold climate, there should not be any straight and long street aligned to winter winds.

>In warm climate, long and straight streets aligned to the direction of summer winds must be provided.

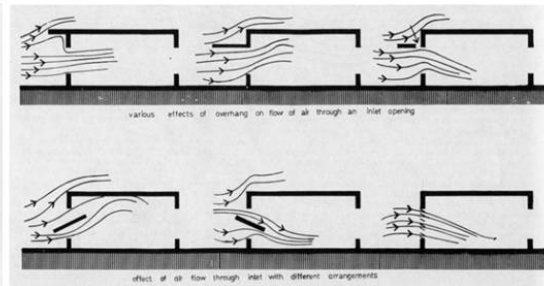
Urbanismo bioclimático. Esther Higuera.

[http://www.coag.es/websantiago/pdf/ester\\_higuera.pdf](http://www.coag.es/websantiago/pdf/ester_higuera.pdf)

## wind as bioclimatic strategy



**Fig. 7 Air flow patterns within a building**  
Patterns are dependant on the location of openings (Kureja 1978, p. 92).



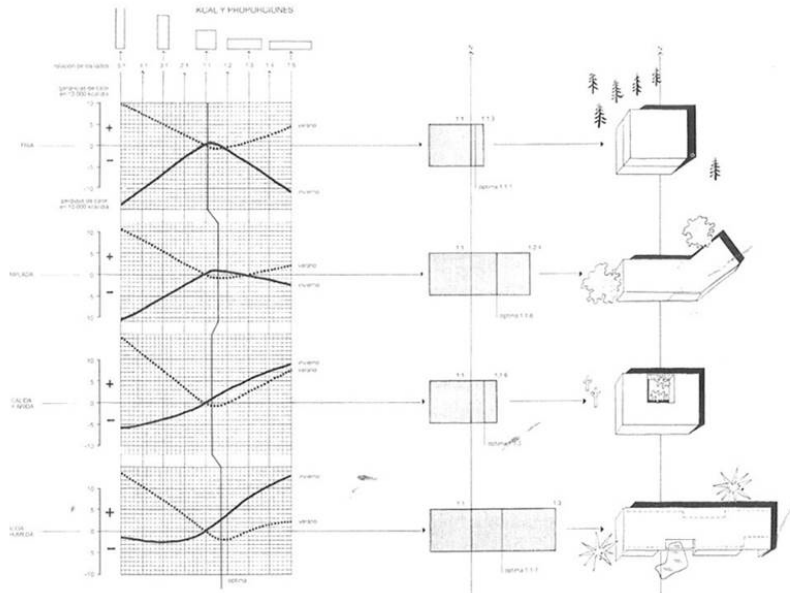
**Fig.8 Air flow patterns**

Diagrams show the effects that different overhang conditions (top) and different inlets (bottom) have on airflow into a building assuming a constant opening in the rear (Kureja 1978, p. 94).

<http://drum.lib.umd.edu/bitstream/1903/208/1/umi-umd-1256.pdf>

Urbanismo bioclimático. Esther Higuera.

## The shape as bioclimatic strategy



The shape and proportion of building typologies according to their climate region.

Urbanismo bioclimático. Esther Higuera.

## The shape as bioclimatic strategy

### City scale:

Climate comfort by

- The street network design hierarchy and orientation.
- The overall urban shapes respond to topographic, solar and wind conditions, etc...



"Lu Zia Sui", Richard Rogers



## The shape as bioclimatic strategy

### Neighbourhood scale

Climate protection to pedestrian activity by

- The green and open spaces networks.
- Block shapes that respond to a topographic, solar and wind conditions.



*La red peatonal de Raburn, concebida en los años 20, conecta con los destinos más habituales (estación, comercio, etc), tiene un paso a distinto nivel para que los niños puedan caminar a la escuela y discurre por un continuo de parques, por lo que resulta funcional, segura y atractiva, y todo ello en un entorno unifamiliar.*

La ciudad paseable. Julio Pozueta

- Vía de tráfico motorizado
- Comercial
- Residencial unifamiliar
- Residencial mixto
- Colegio
- Zona Verde
- Senda peatonal y ciclista
- Tínel peatonal
- Líneas de f.c.c.
- Estación de f.c.c.

0 100 m

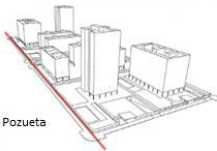


## The shape as bioclimatic strategy

### Block scale:

Climate protection by

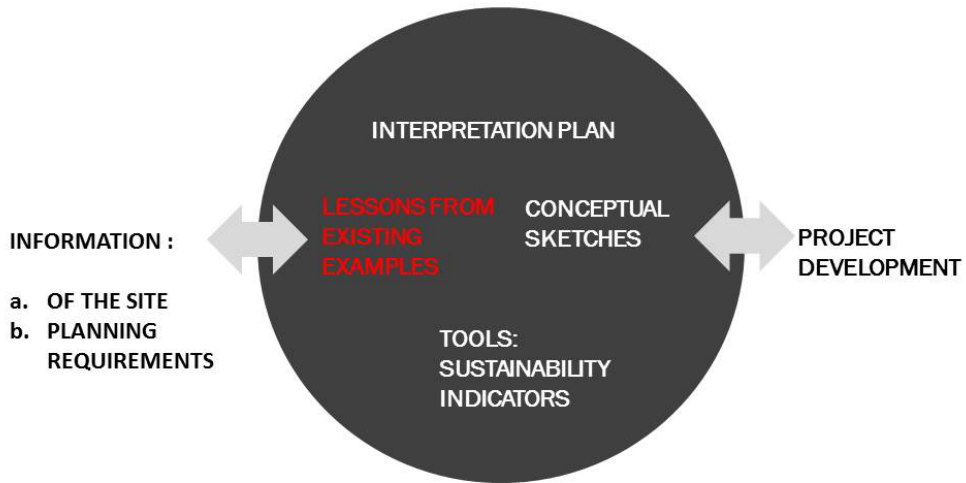
- The orientation, dimension and shape of building typologies with respect to the public space.



La ciudad paseable. Julio Pozueta

### A escala de calle:





> **The partial development plan. LESSONS FROM EXISTING EXAMPLES**

1. **VIIKKI (FINLAND)**
2. **KRONBERG (GERMANY)**
3. **SARRIGUREN (SPAIN)**
4. **GWL –TERREIN (HOLLAND)**
5. **ECOCIUDAD MASDAR (UNITED ARAB EMIRATES)**
6. **DONGTAN (CHINA)**
7. **THE HYDROGEN CITY H2PIA (DENMARK)**
8. **SOCIOPOLIS (SPAIN)**
9. **SAGRERA (SPAIN)**
10. **GREAT CITY (CHINA)**
11. **HAMMARBY SJÖSTAD (STOCKOLM)**
12. **ILE SEGUIN-RIVES DE SEINE (FRANCE)**
13. **NORRA DJURGÅRDSSTADEN (STOCKOLM)**
15. **Bo01(SWEDEN)**



# PRACTICAL CONTENT INSTRUCTIONS

## **EXERCISE 1: INTEGRATED DEVELOPMENT OF A RESIDENTIAL SECTOR (ECO-NEIGHBOURHOOD)**

### 1. INTRODUCTION

The purpose of the Urban Planning 3 course is to have a first approach to the city planning and construction.

The first half of the academic year (Urban Planning 2) the student was able to:

- Study the city from the public space perspective.
- Identify what the fundamental criteria are that public spaces should have in order to promote sociability and public life.
- Recognise how existing urban spaces are perceived by the citizens and what physical characteristics contribute to their success.
- Analyse and develop an unsuccessful public space transformation proposal, applying the theoretical and practical strategies learned throughout the course and recognise its relation to other spaces and functions of the existing city.

The objective of Urban Planning 3 is to work on new (barely built) territory areas, where an integrated residential sector will be developed. The aim of this exercise is to achieve urban settings (eco-neighbourhoods) where Environmental Sustainability Indicators are implemented in order to guarantee a sustainable city growth.

Two areas of the city of Cartagena have been selected:

- The West area (composed by Zones 1, 2 and 3) is bordered by the consolidated city on the Northeast side, and by peripheral small residential urban centres on the Southeast side.
- The East area (composed by Zones 4, 5 and 6) is bordered by agricultural plots —farmlands— and an industrial complex on the North side, by the A-30 motorway on the East side, and by the consolidated city on the Southwest side. The A-30 motorway is the main access road to Cartagena.

These areas integrate aspects in both environmental and building processes, taking into account:

- Land-parcelling
- Landscape
- Vegetation
- Existing road networks
- Existing building developments: residential, urban facilities and infrastructure...

All the above elements are crucial in considering new urban developments based on sustainability and efficiency criteria.

The proposals must consider the site's existing characteristics, the urban border treatment, the public spaces configuration, the construction of private environments, the spatial and functional relation to the rest of the city and, most importantly guarantee Cartagena's sustainable growth.

## 2. GENERAL APPROACH

- Apply the Environmental Sustainability Indicators addressed during the course.
- Develop open public spaces network integrated through green belts, allowing for smaller spaces to stay, plazas and pedestrian streets. The project must include **NOT ONLY THE DEFINED SITE AREA, but also the ADJACENT URBAN AREAS.**
- Design centrality areas with enough urban facilities and infrastructure:
  - a.Sanitary facilities
  - b.Educational institutions
  - c.Sports and social centers
  - d.Administrative

These all should be connected to the main green public spaces system.

- Design a collective transportation system (electric bus, compressed natural gas bus, minibus, tram, light rail, etc.) that enhance mobility within the proposed compact development and avoid traffic congestion. Other alternative transportation must be conside-

red such as bike tracks, pedestrian streets, etc.

- Look for high diversity in urban typologies:

-Urban and building model types (garden city, new expansion —ensanche—, linear blocks, towers...) unified through the green structure of the city.

-Medium-high density predominantly residential sector that configures a continuous and





cohesive urban fabric.

- Give response to the site's urban border, integrating the urban and environmental context surrounding it.
- Consider the consolidated city as well as the existing infrastructures and facilities, in order to achieve the highest degree of urban unification and integration.

### 3. URBAN PLANNING PARAMETERS

- Areas of analysis (guide values):

West area: Divided into zones: Zone 1, Zone 2 and Zone 3.

East area: Divided into zones: Zone 4, Zone 5 and Zone 6.

Zone 1: 65 Has.      Zone 4:      79 Has.

Zone 2: 68 Has.      Zone 5:      65 Has.

Zone 3: 72 Has.      Zone 6:      69 Has.

- Development potential (edificability index): 0,5 m<sup>2</sup>/m<sup>2</sup> (to be defined).

#### GENERAL SYSTEMS:

- G. S. of Open Spaces:

20 m<sup>2</sup>/100 m<sup>2</sup> of residential use.

- G. S. of Urban Infrastructure:

5m<sup>2</sup>/100 m<sup>2</sup> of residential use.

## **LOCAL SYSTEM:**

### **-Public Green Zones:**

**Minimum 10% of the total site area (subtracting the area considered for the G.S. of open Spaces).**

**Green zones classification: playgrounds, gardens and urban parks.**

### **-Urban infrastructure and facilities (public sector):**

**Minimum 10% of the total site area (subtracting the G.S. of urban infrastructure).**

**Land reserved for public use classification (for institutional purposes): recreational-sports, educative-cultural, healthcare, administrative-institutional and infrastructure-urban service.**

**The edificability of private institutional purposes will not count towards the public use standard; however it must be included in the m<sup>2</sup> of the total ceiling area.**

### **-Road network (public sector):**

**Road network classification: Transit Road, Pedestrian Area, Parking: 1 private parking space + 1 public parking space / 100m<sup>2</sup> of residential edificability.**

### **-Private sector land**

- **Unsubsidised /non-regulated housing.**
- **Subsidised housing: 30% of the total built area.**

- Commercial uses on exclusive plot or/and on the ground floors of predominantly residential buildings.

**-Building conditions**

- Buildings: Ground floor + 5 to 7-stories high (to be defined). Building heights above the standard must be justified.
- Ground floor uses must be justified.
- Industrial uses are not allowed.

**-Mandatory cession. Municipal Dedicated Lands**

**10 % of the developable gross area as municipal reserve.**

**-Environmental Sustainability Indicators**

In order to define the diversity of elements that will eventually compose the final proposal, the Environmental Sustainability Indicators will be studied, especially those related to:

- The urban morphology
- The public space and mobility
- The complexity
- The urban metabolism

- The biodiversity
- The social cohesion

#### **4. HAND IN DOCUMENTATION**

##### **4.1 MEMORY**

**-Informative Documentation (Memory):**

Relevant circumstances, site's physical description, biological characteristics, existing infrastructure, buildings...

**-Supporting Urban Planning Documentation (Memory):**

Explanation of the urban planning proposal (eco-neighbourhood) indicating all references and urban models taken into account for the project development, as well as the site's potential opportunities detected. Include a summary table with all areas assigned for building uses, sessions, etc... and a second summary table that shows the results of the applied Sustainability Indicators.

Photographical documentation should be included in the annex.

##### **4.2 PLANS / DRAWINGS**

## **INFORMATION PLANS**

### **I1. Site plan**

Location plan, orthophoto ...

### **I2. Physical site conditions and data collection**

- Existing buildings: typology, uses...
- Topography: Slope of the terrain, views... and landscape characteristics such as the hydrology (water course), vegetation...
- Existing infrastructures of the sector: road network, rail network, cycle network, foot-paths/ trails network, etc.

### **I3. Connections plan**

- Existing city
- Green spaces

Urban facilities

Urban infrastructures (roads, hydrological, rail...)

The information plans cover the analysis from the sector/ site scale up to the city scale (urban morphology, infrastructures, facilities, green spaces network...)

## **DEVELOPMENT PLANS**

### **O1. General Initial sketches**

Interpretation plan: what already exists and what is proposed

Identify the site's opportunities and issues (what already exists), overall problems of

surrounding areas, actions and data (what exists in other places), main action plans and definition of objectives to accomplish (what I want to achieve), occupation strategies (how to achieve the defined objectives).

## **02. Structural development plan**

Connection of both defined areas (East and West) with the rest of Cartagena city and its territory.

The structural development plans have a twofold intention: the area development (comprised by 3 Zones or Sectors) and the connection to the city.

## **03. Integrated development plan**

Development plan of the corresponding zone or sector

## **04. Zoning plan**

- Urban qualification (residential, tertiary...)
- Public and private sector land
- Green areas
- Collective transportation
- Buildable plots

A summary table that includes all numeric characteristics of the project must be included.

## **05. Road infrastructure**

Types of networks:

- Main roads, secondary roads...
- Smaller roads or intervías (building block scale- access to buildings)

- Pedestrian and coexistence (motorists and pedestrians sharing the same space)
- Exclusive collective transport lanes
- Cycle path/track/lane

Pedestrian areas and parking spaces, dissuasive parking sites (park and ride concept).

Include street sections, dimensioned and indicating functional lanes.

Sustainability Indicators related to PUBLIC SPACE AND MOBILITY.

#### **06. Private plots**

Areas, edificability, heights...

A summary table that includes all numeric characteristics of the project

Sustainability Indicators related to URBAN MORPHOLOGY.

#### **07. Green Zones**

Parks, squares, gardens, playgrounds... an overall scheme of the proposed green network.

Sustainability Indicators related to BIODIVERSITY.

#### **08. Urban infrastructure and facilities (private and public)**

Educative facilities

Healthcare facilities

Cultural facilities, administrative facilities, etc.

Urban services and infrastructure. An overall scheme of the proposed infrastructure network.

**Sustainability Indicators related to SOCIAL COHESION.**

**09. Public domain. Municipal Dedicated Lands**

**10 % of the developable gross area as municipal reserve**

**010. Management**

**Territorial action unit definition**

**Total areas and edificability schemes**

**011. Proposed volumetric drawings**

**3D views, infographs and perspectives characterising at least three different environments of the project.**

**Model/prototype pictures**

**HAND IN FORMAT:**

**Scale to be defined by each group**

**DIN-A3 size booklet with all requested documentation**

**CD with a digital copy of all requested documentation (.pdf)**

**Hand in delivery time and place: 13:00 – 14:00hrs, in the lecturers' office**

**Date: to be defined**



## **EXERCISE 2: RESIDENTIAL BUILDING TYPOLOGY DEVELOPMENT**

### **1. INTRODUCTION**

From the proposed eco-neighbourhood (Ex 1), one residential block -or a group of blocks- will be selected in order to define its relation to the city and its architectural features considering bioclimatic and energy efficiency criteria. Strategies related to flexibility, diversity and space aggregation possibilities must be taken into consideration.

### **2. GENERAL APPROACH**

Under the sustainable and energy efficient city perspective, it is strongly recommended to acknowledge the following general aspects:

#### **2.1. Related to the building shape**

The longer façade must be the one that is best oriented towards the solar incidence

The shape of the building must favour cross ventilation throughout the interior spaces

#### **2.2. Related to the building openings and sun control**

Buildings provided with exterior shading devices

Buildings which has an opening size that responds to their solar orientation

#### **2.3. Related to the building's weather protection elements**

Façade overhangs, eaves, projected or cantilevered features...

#### **2.4. Related to the building's roof**

**Buildings with a ventilated roof system**

**Buildings with vegetated roof in at least 25% of the total roof area**

#### **2.5. Related to hygienic and sanitary conditions**

**Optimise the use of natural light throughout all interior spaces**

**Rainwater collection or harvesting systems**

**Building's greywater reuse**

**Buildings with permanent ventilation systems**

#### **2.6. Related to building's equipment and systems**

**Natural refrigeration system (passive cooling)**

**Centralised system of heating and hot water**

**Low consumption elevators**

#### **2.7. Related to pedestrian and bicycle accessibility**

**Buildings providing the minimum number of automobile parking spaces required**

**Buildings provided with the required bicycle parking area by the studied sustainability indicators**

#### **2.8. Related to the comfort and security of the building's adjacent public space**

**Good quantity of floor openings or doors (at least 1/ 30 metres)**

#### **2.9. Related to the exterior climate improvement and thermal comfort**

**Deciduous trees**

**Humidification systems that increase the relative humidity level in summer**

**Exterior permeable pavement**

**Other factors related to urban quality:**

**2.10. Building typologies**

**Diversity of building typologies**

**2.11. Complexity**

**Mix of uses and city functions**

**Public spaces as gathering places that promote citizen interaction**

**2.12. Introduction of new urban networks – urban metabolism**

**Integration of solar photovoltaic energy networks to buildings and public spaces**

**Preferred use of renewable energy sources**

**2.13. Solar paths consideration**

**The south façade and the roof surface receive more solar radiation**

**The north façade receives diffuse radiation**

**Solar protection to avoid overheating of south and west-facing façades**

**2.14. Bioclimatic recommendations**

**Building interior liveable spaces located at the best building orientation**

**Residential units must be facing two opposite directions for natural ventilation purposes**

**Passive refrigeration systems in south facades**

**Variation in facades' openings percentage according to their orientation**

**Façade opening protection devices**

Terraces on the best oriented façade

Draining ponds

Greenery and water in public spaces to create comfortable microclimates

### 3. URBAN PARAMETERS

- Building depth  $\leq 15$  metres

(Recommended 10 – 12 metres)

- Private parking: 1 parking space/100 m<sup>2</sup> of built gross area.
- Main floor minimum ceiling height: 3.60 metres.
- Garage ramp width  $\geq 3.00$  metres.

(Max. ramp slope  $\leq 16\%$  in straight section and  $\leq 12\%$  in curved section)

- Free parking space dimension: 2.50 m. x 4.50 m.
- Free height of underground or semi-underground floors: 2.30 m.
- Free height of residential units: 2.70 m.

### 4. HAND IN DOCUMENTATION

#### 4.1. MEMORY / VIDEO explaining:

- The contextualisation of the selected typology within the eco-neighbourhood and the

city.

- The building typology and its highlighting features
- The flexibility of the typical floor plan proposed demonstrating the multiple possibilities of its physical configuration
- The bioclimatic criteria and energy efficiency features considered for the building definition

#### **4.2. PLANS THAT DESCRIBE THE PROJECT**

As a suggestion, the following plans could be included:

##### **4.2.1 Location map**

(Indicating the building orientation)

##### **4.2.2 Main floor (ground level)**

Describing the building's main floor relationship to the public space:

- Underground parking access ramp location
- Building access to residential units and to the commercial activities establishments
- Adjacent public spaces and tree / greenery location
- Indicate with a dotted line, the overall underground parking area outline

##### **4.2.3 Floor plans**

- Typical floor plan
- Attic floor plan
- Underground or semi-underground floor

- Roof plan
- Detail of typical floor plan. Scale: 1/50.

#### 4.2.4 Elevations

- North, south, east and west (as needed)
- Detail of a façade section. Scale: 1/50

#### 4.2.5 Sections

- Lengthwise and crosswise section

#### 4.2.6 Volumes / Infographics

### 4.3. FLEXIBILITY, DIVERSITY AND AGGREGATION OF SPACES

Study different alternatives of the use of the typical floor plan.

4.3.1. Strategies (Technical flooring, acoustic mobile partitions, modular bathroom and kitchen, perfectible façade...)

4.3.2. Objectives (Flexible residential unit: home office, modular configuration of spaces, neighbor relationship spaces within buildings, hybrid buildings...)

#### 4.4. BIOCLIMATIC CRITERIA AND ENERGY EFFICIENCY

Represent the bioclimatic strategies considered in the building and public space design in plans, elevations and sections. Scale: 1/50

4.4.1. Urban recommendations

4.4.2. Passive strategies (Solar paths)

4.4.3. Active strategies

## **5. HAND IN DELIVERY INFORMATION**

- **Scale to be defined by each team**
- **DIN-A3 printed off of all plans**
- **The video must be a short clip (up to 5 minutes)**
- **A CD containing the PDF file of all plans and the video file**

**Hand in due date and all video presentations will take place the 21st May, 2014 at the same time and place where classes are held.**

