Joeri Slots

Friday April 20th 2012

Graduation presentation

One square kilometre
100,000 people
Chengdu, China
Vertical Cities Asia Competition

China’s urbanization rate exceeded 50% by the end of 2011
Competition Brief

Every year, for the next five years, a one square kilometre territory will be the subject of the Competition. This area, to house 100,000 people living and working, sets the stage for tremendous research and investigation into urban density, verticality, domesticity, work, food, infrastructure, nature, ecology, structure, and program – their holistic integration and the quest for visionary paradigm will be the challenges of this urban and architectural invention.

For this year, the theme is “Fresh Air” and the site is set in Chengdu, China. This city is surrounded by high mountain ranges in the west and hills in the east. A subtropical monsoon climate resulted in a mainly agricultural economy in the past. In the recent years however, IT and technology markets have emerged in Chengdu. The city has the ambition of becoming a flourishing high-tech centre of China.

The site area that we are dealing with, lies in the outskirts of Chengdu. It is about five square km of which only one square km is allowed to be built. Within this one square km, 100,000 people need to be housed while work, recreation and other amenities also have to be provided. The residential part will comprise 50% of the total floor space, the other 50% will be based on the outcome of our own research.
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Site area
Site area
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What does 100,000 people mean?

<table>
<thead>
<tr>
<th></th>
<th>Delft</th>
<th>Vertical City Asia</th>
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</thead>
<tbody>
<tr>
<td><strong>Area (2010)</strong></td>
<td>- Total 24.08 km²</td>
<td>- Total 1.0 km²</td>
</tr>
<tr>
<td></td>
<td>- Land 22.98 km²</td>
<td></td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>- Total 97,588</td>
<td>- Total 100,000</td>
</tr>
<tr>
<td></td>
<td>- Density 4.247/km²</td>
<td>- Density 100,000/km²</td>
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</tbody>
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<tr>
<td><strong>Build-Area (2010)</strong></td>
<td><strong>Area</strong></td>
</tr>
<tr>
<td>- Total: 1.22 km²</td>
<td>- Total: 1.0 km²</td>
</tr>
<tr>
<td>- Land: 1.21 km²</td>
<td></td>
</tr>
<tr>
<td><strong>Population (2010)</strong></td>
<td><strong>Population</strong></td>
</tr>
<tr>
<td>- Total: 5.220</td>
<td>- Total: 100,000</td>
</tr>
<tr>
<td>- Density: 4.314/km²</td>
<td>- Density: 100,000/km²</td>
</tr>
</tbody>
</table>

Odijk

Vertical City Asia

Area

- Total: 1.0 km²

Population

- Total: 100,000
- Density: 100,000/km²
China’s Prospects
Rural vs. urban population

“China has seen its rural population shrink in recent years as the country’s urbanization has gathered momentum.”

Xie Fuzhan, director of the National Bureau of Statistics (NBS)
12% of China’s total population is undernourished
Importing Food
China's import & export flows

Based on World Trade Organisation (WTO) data 2009
One of China’s Solutions...
China’s overseas land lease

China’s land leases overseas
- 50,000 ha

- Zimbabwe
- Russia
- Cameroon
- D.R Congo
- Tanzania
- Philippines
- Kazakhstan
- Laos
- D.R Congo
- Tanzania
- Laos
- Philippines
- Kazakhstan
- D.R Congo
- Tanzania
- Laos

China's Environmental Knowledge for Change, GRAIN, Mongabay 2008
...Not a Long Term Solution
Projected losses in food production due to climate change by 2080

Projected losses of countries due to climate change by 2080

Cline, 2007
Emissions

Based on World Trade Organisation (WTO) data 2009
Unstable Food Prices

Food prices in relationship to oil prices

Food prices (index)

Crude oil price (index)

Index reference: 100=1998-2000

Source: FAO, 2008; IMF, 2008
Percentage of Expenditure on Food

Percentage of total household consumption expenditure on food

source: Time Magazine, 2011
Employment Distribution in China

UN Labour (LABORSTA), 2010
Lowest Wages in Agriculture Sector

Wages per occupation (earnings per month in yuan)

- Financial intermediation
- Electricity, Gas & Water supply
- Mining and Quarrying
- Public administration and Defence
- Transport, Storage & Communications
- Real estate and business activities
- Education
- Retail, Hotel & Restaurants
- Manufacturing
- Construction
- Agriculture, Fishing, Forestry

UN Labour (LABORSTA), 2010
Time for a Change!

[Diagram showing changes in population, land use, and food import/export over time.]
Intentions

• Preservation of agricultural land
• Reduce deficit of agricultural land
• Local production
• Organic farming
Advantages of Urban Agriculture

Environmental

• Reduction of freshwater use by reuse of wastewater
• More green improves the quality of urban environment and reduction in pollution
• Wastewater and organic solid waste can be transformed into fertilizer

Socio-economic

• Savings in transportation costs and storage space
• Better food security and more stable prices
• Increase awareness of food production
Acting On the Cause of Air Pollution

*Instead of resolving air pollution only locally and partially, we believe it is better to act on the cause; minimize transportation.*
Chengdu
Growth of Chengdu

1978-1988

1988-1995

1995-2002
Growth of Chengdu

1988-1995
Growth of Chengdu

1995-2002
Current Situation of Chengdu
Doom Scenario

- 4.9 million
- 5.4 million
- 5.9 million
- 6.2 million
Ideal Scenario
Urban and rural synergy
Ideal Growth of Chengdu

Growth of ‘fingers’ in order to preserve agriculture land.
Border between urban and rural land has an advantageous condition for Agropolises to emerge.
Coverage

Every Agropolis has a certain cover area that corresponds to the adjacent productive agriculture land.
Introduction of Food Park

Introduction of a continuous Food Park where the recreative urban parts flow out into the productive agriculture land.
Introduction of Express Line

Introduction of a circular Express Line that connects the ‘fingers’ and all Agropolises.
Public Transport Connections

Express Line connects to the public transportation network.
Virtual Connections

Virtual connections between the Agropolises and existing agriculture institutions.
Recapitulation
Masterplan
Land Preservation

The skyscraper is a necessary response to urban sprawl. The skyscraper has many potential economic advantages where there is minimal land use and the amount of usable space per available land area is maximised.

Compactness
land preservation & proximity
But make Life vertical, not JUST the buildings!
Horizontal City vs. Vertical City

Conventional High Rise City

Continuous routing instead of 1 way up

VS.
Massing

Minimal outdoor surface

Maximize outdoor surface
Urban Grain

9.6m structure

variable positions of the core

variable plan layout and facades

Arrangement rules of the blocks

option 1
minimal 1/4 overlap

option 2
divide structure over 2 blocks

option 3
attach blocks to each other
Urban Grain

Arrangement examples of the blocks
Vertical City

Toronto city grid

Flip grid up

Creating vertical streets
Vertical City

Toronto city grid

Flip grid up

Creating vertical streets
Activating Higher Levels

La Rambla Barcelona

The lifted urban deck is a continuing linear urban (pedestrian) route like La Rambla

La Rambla Barcelona

120 meters high
Site Plan
Site Plan
Selection

new block arrangement according to stacking principles

FAR 12

Selection has a FAR of 12

Plot area = 20,000 m²

20,000 m² x 12 = 240,000 m² min program

24 cubes = max 400,000 m²
Increase Middle and Upper Class

“The Chinese middle class will continue to rise and income distribution will widen”

Insights China, McKinsey & Company
Selection
Daylight and shadow studies
Daylight calculations in AutoDesk Ecotect
Daylight and shadow studies

Daylight calculations in AutoDesk Ecotect
Slicing Cubes
Slicing Cubes
2nd Urban Level
Cores
Energy concept
Combining functions make a very energy efficient building
Second Urban Deck
2nd Urban Route
Housing block
Floors
Floors
Floors

RESIDENTIAL

DEPARTMENT STORE

3rd Floor

5th Floor

PS | MATERIALISATION | TALL | VERTICAL CITIES ASIA | APRIL 20TH 2012 | JOERI SLOTS
Floors
Floors

+144.5 meters
7th floor

+143.0 meters
9th floor
Floors

+160.6 meters
12th floor

+159.5 meters
10th floor
Elevations
Elevations
Elevations
Elevations
Facade and Detailing
Facade and Detailing
Detail

- lightweight
- minimal floor thickness
- high adaptable
- sustainable
- ability to change functions inside block
Floors penthouse
Floors penthouse
5th floor penthouse
5th floor penthouse
5th floor penthouse
dwelling section
Penthouse Entry
Penthouse open floor plan
Penthouse bedroom
Balcony penthouse
Thank you