GREEN INTERVENTION

RENOVATION OF BEURSGEBOUW

YU CHEN
CONTENTS

RESEARCH

Urban scale research
Site research
Program research

DESIGN

Culture value assessment
Context design
Space design
Facade design
Climate design
FUTURE DEVELOPMENT

GREEN CITY

"The city is part of nature" --- Almere Principle

Garden city  Green city
FUTURE DEVELOPMENT

GREEN CITY

GREEN NEW BUILDING  GREEN HERITAGE

RESEARCH QUESTION

How to integrate the heritage with nature and green technology?

How to use nature and green technology to revitalize the building?
The pioneer of office building

The minor and substitutable
Original design in 1979

Present

Ideal traffic and social hub

An isolated and inactive corner
How to use nature and green technology regain the identity of the building?

and to connect the building with the surrounding and even the city?
URBAN FARM

GOAL

CONNECT TO CITY
- Residents
- Professional and students
- Food business

BENEFIT TO CITY
- Healthy and fresh food
- Sustainable and healthy life awareness
- Research base for green city program
PROGRAM RESEARCH

URBAN FARMING RESEARCH CENTER

+ 

URBAN FARMING INTERPRETATION CENTER

PROGRAM

URBAN FARMING RESEARCH

- Farm guide tour
- Exhibition
- Class and training

URBAN FARMING JOURNEY

- Healthy kitchen
- Community food market
- Farming activity
DESIGN
CULTURE VALUE ASSESSMENT

CONCRETE SKIN

Aesthetic value
Historical value
Use value
City image - balance between old and new
Architecture value

Building expression and identity - new expression and identity
CULTURE VALUE ANALYSIS

ENTRANCE SPACE

Social value

City connection - regain social value
CULTURE VALUE ASSESSMENT

CULTURE VALUE ANALYSIS

SPACE PLAN

Use value
Social value
Architecture value

Heart of the building - new program new interpretation
**VALUE ASSESSMENT**

- **Stairs** - regain social value
- **Space plan** - original spatial quality
- **Skin** - contrast of old and new
- **Roof** - new building identity

**DESIGN STRATEGY**

- **Context design** - connect the building to the surrounding
- **Space design** - connect urban farm to people
- **Facade design** - building image and identity
CONTEXT DESIGN
CONTEXT DESIGN

VALUE ASSESSMENT

High value  Positive value  Low value
Increase social space quality
VALUE ASSESSMENT
DESIGN STRATEGY
NEW RYTHNM
GROUND FLOOR PLAN

- Playground with structure
- Ground soil base farm (vine plants with structure)
- Ground soil base farm (small plants)
Garden entrance
different layers integrate with green
UNDERGROUND LEVEL PLAN

- Auditorium 260m²
- Equipment
- Food processing
- Storage
CONSTRUCTION DETAIL
STRUCTURE DESIGN
URBAN FARM DESIGN
URBAN FARM TYPOLOGY CHOICE

Ground
- Soil-based ground garden
- Ground container garden
- Soil-based green house

Roof
- Open air roof garden
- Open air roof container garden
- Roof green house

Indoor
- Indoor farm with sunlight
- Indoor farm factory
- Indoor flexible farm

Facade
- Edible living wall
- Double skin green house

CONSIDERATION
1. Ground - soiled base garden - recreation
2. Indoor - hydroponic - environment control
3. Roof and facade - same design language, energy exchange
### Features of Vegetation Research - Hydroponic-Systems

<table>
<thead>
<tr>
<th>Plant</th>
<th>Light Requirement</th>
<th>Temperature</th>
<th>Growing Cycle (Days)</th>
<th>Yield/Area (Kg/m²)</th>
<th>Space/Plant (M²)</th>
<th>Vine Plant</th>
<th>Vertical Farm Requirement</th>
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<tbody>
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<td>Tomato</td>
<td>6-8 Hours/day</td>
<td>21-25°C</td>
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<td>195.3</td>
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<td>Pepper</td>
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<td>Carrot</td>
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<td>0.953</td>
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<tr>
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<tr>
<td>Mushroom</td>
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<td>16</td>
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**Vine Plant Requirement**
- Green house system
- Indoor farm with light
- Indoor farm without light
URBAN FARM TYPOLOGY

- Indoor farm with sunlight
- Indoor farm factory
- Soil-based ground garden
- Indoor flexible farm
- Roof green house
- Double skin green house
EXISTING BUILDING SPACE ANALYSIS

LIGHT ANALYSIS

GENERAL LAYOUT

URBAN FARM DESIGN

- Indoor farm factory
- Office
- Food testing lab
- Indoor farm with sunlight
- Double skin green house
URBAN FARM DESIGN

VERTICAL FARM SPACE STRUCTURE ANALYSIS

- Circulation space
- Indoor farm with sunlight
- Indoor farm factory
URBAN FARM DESIGN

URBAN FARM LAYOUT
SPACE DESIGN

URBAN FARM TOUR DESIGN

VALUE ASSESSMENT

[Diagram showing the value assessment with areas colored in different shades indicating high, positive, and low values.}

[Images of an empty building showing different areas.}
URBAN FARM TOUR DESIGN

WORKING HEART

SPACE DESIGN
DESIGN CONCEPT

- Exhibition circulation
- Visual connection
- Food transportation and mechanical system
- Exhibition area
- Light urban farm
- Dark urban farm
- Green house facade
- Professional working area
SPACE DESIGN

STRUCTURE DESIGN
EXHIBITION AREA DESIGN

DARK URBAN FARM
LAYOUT OF PIPE

VENTILATION

urban farm ventilation
exhibition and office ventilation

WATER PIPE

water
electricity
LAYOUT OF PIPE

<table>
<thead>
<tr>
<th>Size (Diameter/mm)</th>
<th>Urban farm ventilation</th>
<th>Exhibition &amp; Office Ventilation</th>
<th>Water pipe</th>
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<tr>
<td>Secondary Pipe</td>
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urban farm ventilation
exhibition and office ventilation
water
electricity
DARK URBAN FARM
FACADE DESIGN
FACADE DESIGN

CONCEPT
FACADE CONSTRUCTION

Trickle ventilation device incorporating bimetal shape memory alloy springs to automatically open or close the vent based on external air temperature.

AWS

ENTIENT
ROOF STRUCTURE
CLIAMTE DESIGN
CLIMATE SCHEME

FOOD FLOW

- Warm water irrigation
- Irrigation & grey water
- Solar panel
- Heat recovery ventilation
- Water treatment
- Biogas
- Anaerobic digestion
- Compost
- Fertilizer
- Ground soil base farm
- Urban Farm
- Food waste
- Biogas
- Lighting
- Floor heating
- Floor cooling
- Geothermal source heat pump
- Air source heat pump
- Boiler
- Transformer
- Anaerobic digestion
- Surplus electricity is stored in electricity grid
- Rainwater collection
- Water treatment
- Building use
- Food
- Waste
- Compost
- Ground soil base farm
- Biogas
- Anaerobic digestion
- Fertilizer
- Urban Farm
- Food

FOOD FLOW

- Surplus electricity is stored in electricity grid
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- Ground soil base farm
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- Waste
- Building use
- Food

BUILDING USE

- Ground soil base farm
- Urban Farm
- Food
- Waste
- Fertilizer
- Compost
- Biogas
- Anaerobic digestion
Day / summer: >35 °C
Building - cold air - green house

Night / winter: <15 °C
Building - waste heat - green house
Mechanical ventilation system

Winter
Preheated / prehumidified outside air to reduce heat demand

Summer
Inside: cool temperature
Double skin: too high temperature
Conduct the cool air to maintain the temperature of green house

Summer
The plants as shading to reduce heat gain

Winter
Exhausted air with residual heat conduct to the double skin green house to maintain the temperature

Winter night
GREEN INTERVENTION
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