SOUTH CHICAGO REGENERATION

URBAN & ARCHITECTURAL DESIGN

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CHAPTER 1 RESEARCH

1. URBAN QUESTION & DESIGN
XL _ MIDWEST: Less Competitiveness

L _ IL: Population Decline

M _ CHICAGO CITY: No Brand

S _ SOUTH CHICAGO NEIGHBORHOOD: Unemployment

XS _ SITE: Vacancy
MIDWEST BRAND
Develop a Midwest regional hub, AGRICULTURAL RESEARCH CENTER. Transform the region into a unify network, allow the region works as a competitive region around the world.
RESEARCH | Program

- **Other Service**: 147,346 sq m (10%)
- **Cultural**: 103,493 sq m (5%)
- **Commercial**: 498,412 sq m (20%)
- **Residential**: 234,740 sq m (10%)
- **Research**: 1,213,291 sq m (55%)
- **Research Lab**: 115,328 sq m
- **Greenhouse**: 80,451 sq m
- **Low Rise**: 54,560 sq m
- **High Rise**: 180,200 sq m
- **Office**: 190,200 sq m
- **Artist Community**: 29,620 sq m
- **Cultural & Sport**: 103,493 sq m (5%)
- **Recreation**: 56,856 sq m
- **Transportation**: 88,407 sq m
- **Energy**: 58,939 sq m

**GFA**
- **Total GFA**: 2,198,243 sq m
- **Research**: 45%
- **Residential**: 10%
- **Commercial**: 20%
- **Other Services**: 10%
- **Cultural & Sport**: 5%
- **Other**: 10%
CHAPTER 1 RESEARCH

2. ARCHITECTURAL INTERVENTION
National attraction for tourists
Leadership of healthy food in Midwest
Chicago brand
NEIGHBORHOOD

LOCAL RESIDENCE
LOW EDUCATION RATE
LACK OF HEALTHY & FRESH FOOD

There need a balance between local neighborhood and new built research center.

SITE DEFINATION

RESEARCH CENTER
HIGH-TECH RESEARCH CENTER
HIGH EDUCATION RATE
AGRICULTURAL FARMLAND
The neighborhood: "If it's nice, shiny and new, I don't see why they'd include us."

"They've never included us in any particular way before, so, you don't have enough people with the education to have the jobs to afford to buy the houses out here."
Remove the physical barrier between neighborhood and research center.

Provide the neighborhood with jobs and professional education, eliminating the social barrier between the two parts.

Create an area for the communication between local residents and the new arrivals.
Remove the physical barrier between neighborhood and research center
Both high speed rail and lake shore drive are moved underground. People can reach the highway on the -1 floor and the high speed rail station on -2 floor from the three islands in the middle of the strip.
Remove the physical barrier between neighborhood and research center
Routes connect neighborhood and research centers, creating a friendly environment on the ground floor.
Remove the physical barrier between neighborhood and research center
A continuous route from one end to another makes a tour of the strip possible.
Eliminate the social barrier by providing job opportunities and professional training.

High Speed Rail

jobs

Neighborhood

convenient transportation infrastructure

Researcher
Eliminate the social barrier by providing job opportunities and professional training.

- **High Speed Rail**
  - Jobs
  - Convenient transportation infrastructure

- **Neighborhood**
  - Training and purchasing power
  - Healthy food and labor force

- **Researcher**
Eliminate the social barrier by providing job opportunities and professional training. Programs are mixed so that people can have access to different programs in few minutes. At the same time, transportation including office, ticket hall and service mainly distribute around the station in the center.
Define an area for the communication between the neighborhood and researchers.
We use a light roof to create a half public space and unify the 1600m long space.
Define an area for the communication between the neighborhood and reseachers.
Along the 1600m distance, there are different environment below the roof, such as greenlands, plazas and buildings. As a result, adjustable louvers are installed above the plazas.
Define an area for the communication between the neighborhood and researchers. These louvers have solar panels on them. The energy they create can supply the demands of buildings.

**SUPPLY**

- 10m² PV panels produce 1KWh/h
- Solar glass system produces 1000KWh/h

**DEMAND**

- Commercial buildings in Chicago use 261 KWh per year per square meter
- Average area in each island: 3500m²
- Sun hours in Chicago: 3.14 h per day
- The demand: 797 KWh/h
- Derate factor: 0.77
- The output should be 1035KWh/h
Define an area for the communication between the neighborhood and researchers.

The adjustable louvers create micro-climate for the plazas.
CHAPTER 2 ARCHITECTURAL DESIGN

1. FARMER MARKETS — PENG ZHAO
The pavilion is a small city.
The 1600m long area comprises an integral part of a city. To create the 'small city', the pavilion should have characters of city:

- Landmark, path and domain
- Mixed program
- Density variation
- Hierarchy
- Diverse materials
- Infrastructure
Landmark
Path

Commercial and train station study in Rotterdam

Path near station 12m
Mian commercial road 15m
Secondary commercial road 10m

Considering the low FAR,
Path from station to the end: 10m → 6m → 4m
Domain
Domain as node
Mixed program

**Market (Food courts) 2700sqm*2**
- Entrance 40sqm
- Local specialties 30sqm* 50
- Storage 50sqm*4
- Freezing 50sqm*4
- Public space 660sqm
- Others 100sqm

**Supermarket 600sqm*3**
- Unloading bay 10sqm
- Storage 50sqm
- Bakery 30sqm
- Entrance 70sqm
- Sales area 330sqm
- Checkout area 30sqm
- Staff office 15sqm*2
- Others 50sqm

**Hotel 800sqm*7**
- Entrance 10sqm
- Dining area 200sqm
- Kitchen 100sqm
- Storage 50sqm
- Staff space 10sqm*5
- Counter 10sqm
- Luggage room 30sqm
- Room 25sqm*12
- Others 50sqm

**Bar 100sqm*30**
- Counter 10sqm
- Dining area 55sqm
- Kitchen 15sqm
- Staff space 10sqm
- Others 10sqm

**Farm school 1000sqm*6**
- Lecture room 100sqm
- Library 160sqm
- Classroom 50sqm*12
- Administration office 20sqm*4
- Others 60sqm

**Food school 150sqm*10**
- Kitchen - preparation 5sqm*2
- Kitchen - storage 10sqm*2
- Kitchen - washing 10sqm*2
- Kitchen - cooking 10sqm*2
- Kitchen - dining 10sqm*2
- Administration office 15sqm*2
- Others 15sqm*2

**FAR 0.2**
Mixed program

Barcelona is a city famous for food market. I take it as a reference for the study of program density.

market 400-1000m

hotel 300-450m

supermarket 200-600m

restaurant 15-50m
Mixed program

- market
- supermarket
- restaurant and hotel
- bars
- farm school
- cook school
- office building for station staff
- technical room

- market 700m
- supermarket 400m
- restaurant and hotel 150m
- bars 30m
Density Variation

- market
- supermarket
- restaurant and hotel
- bars
- farm school
- cook school
- office building for station staff
- technical room
Hierarchy
Diverse materials
Infrastructure - furniture

pavement in academic yard

pavement in entertainment plaza
Infrastructure: soil energy

suiter layer in Chicago on -250m (summer)
Infrastructure: soil energy

sulfur layer in Chicago on -250m (winter)
Infrastructure- discharge system
CHAPTER 2 ARCHITECTURAL DESIGN

2. TRANSPORTATION HUB _ SIWEN LIU
TRANSPORTATION HUB

- High-speed train station
- Metra station
- Shuttle bus station
- Car parking
1 PROGRAM & CIRCULATION
CIRCULATION | Designed station

MARKETS ─ WALKING PEOPLE ─ SQUARE ─ ENTRANCE ─ WAITING (COMMERCIAL) ─ PRIVATE CAR ─ TICKETS ─ PLATFORM ─ CHECKTICKET ─ TAXI ─ BUS ─ BICYCLE ─ MARKETS

Stuttgart Main Station
Rotterdam Central Station
King Cross Station
Schipol Station
2 ARCHITECTURAL ELEMENTS
5 LOUVRE FRAME (Identify Space)

4 FILLED-IN SPACE (Blur Space)

3 BLOCK BUILDINGS (Support Functions)

2 ATRIUM (Monumental)

1 BASEMENT (Traffic line)
UNDERGROUND CEILING TYPOLOGY STUDY

BERLIN HBF (BY WINKENS)

BERLIN HBF (BY GMP)

LONDON UNDERGROUND STATION
ELEMENTS | Basement

Spot Light

Natural Light

Indirect Light
1. OPEN SPACE AS VERTICAL TRANSPORTATION FOR THE ENTRANCE

2. MAINTAIN SENSE OF SPATIAL RELATIONS WITH THE STREET ABOVE
STAIR WITH COLUMN TYPOLOGY CASE STUDY

BERLIN HBF

ROTTERDAM CENTRAAL

STATION SCHIPHOL
ELEMENTS | Outer Space

Narrow Corridor, 2m

Wide Corridor, 4m

Non Corridor
GLASS – Transparency view

ALUMINAL PANEL - Reflection
Commercial space

Dinning space
ALUMINIUM PANEL FACADE BUILDING FAMILY

LUGGAGE STORAGE

TOILET

INFORMATION CENTRE

LOUVRE MUSEUM, LENS
ELEMENTS | Filled-in Space
Parallel – Quiet Space

Round – active Space
PAVILION FAMILY (SEATS, ADVERTISEMENT, INFORMATION)

SMALL ROUND PAVILION

BIG ROUND PAVILION WITH DRINK BAR

WAVE PAVILION
3 TECHNOLOGY
PREFABRICATED CONCRETE FRAME STRUCTURE
STEP01 COLUMNS
TECHNOLOGY | Structure
STEP02 ONE DIRECTION BEAMS
TECHNOLOGY | Structure

STEP03 TWO DIRECTION BEAMS
CELLULAR BEAM
HOLLOW-RIB SLAB
LICHTBETON GEVELELEMENTEN

LIGHT WEIGHT CONCRETE
MAX SIZE 11M X 3M
The advantages:

- Very rapid economic construction
- Good thermal properties
- Excellent sound insulation and absorption value
- Excellent fire resistant properties
- Large maximum dimensions 11 x 3 meters
TECHNOLOGY | Heating

FLOOR HEATING
COMBINE WARM LIGHT
TECHNOLOGY | Cooling

RIVER WATER COOLING
4 Conclusion on design strategy
design strategy

• Underground facilities free ground to be green belt

• Multiple transportation

• Flexible Move Line

• Architectural design with artificial light

• Prefabricated structural design

• Natural Ventilation