UN HEADQUARTER of SUSTAINABILITY

Strategic Architectural Design Development / the chair of MATERIALIZATION

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ACADEMIC GOAL

1. IDEA \(\rightarrow\) Architectural FORM
2. Architectural FORM \(\rightarrow\) MATERIALIZATION
3. SUSTAINABLE Architecture
CONTENTS

1. PROJECT  purpose of the project
2. FORM    site analysis and ideas for building form
3. LAYOUT   programs and users analysis for building layout
4. INTERIOR DESIGN  climatic function and interior quality
5. EXTERIOR MATERIALIZATION  façade design and sustainability
1.1 Problem Statement
UN Headquarter of SUSTAINABILITY
1.2 Location

1 United Nations Plaza, Midtown, Manhattan, New York, NY 10017
1.3 Project Result _ Birds eye view
1.3 Project Result _ Main design feature
1.3 Project Result _ Main design feature
1.3 Project Result _ Main design feature
BUILDING FORM?
and 3 consideration

01. URBAN CONTEXT
02. PUBLIC DEMAND
03. PRIVATE NEED
2.1 URBAN CONTEXT: Manhattan island

In Manhattan, there are

- 220 streets
- 16 Avenues
- 6000 Towers

Q. Should the building form of UNHS follow the grid context?
2.1 URBAN CONTEXT
2.1 URBAN CONTEXT: Life in Manhattan

Grid + Tower matrix

Hectic life in a cage
2.1 URBAN CONTEXT: alternative space in Manhattan
2.1 URBAN CONTEXT: sustainable urban intervention

study works

How to distort?

TWISTED GRID 😊
2.2 PUBLIC DEMAND

a. New York city need more GREEN SPACE


c. NO public access from UN plot
   1. Security concern
   2. Lack of space along the FDR road
2.2 PUBLIC DEMAND: Public accessibility and masterplan redesign

Lack of space along the FDR road

New FDR road Underground + Wider Waterfront park

1. PROJECT
2. SITE ANALYSIS & BUILDING FORM
3. PROGRAMS/ USERS & BUILDING LAYOUT
4. INTERIOR DESIGN & CLIMATE
5. EXTERIOR MATERIALIZATION & SUSTAINABILITY
2.2 PUBLIC DEMAND: Public accessibility and Masterplan redesign

**Before**
- Scattered small green patches
- Crowdedness in junction point of FDR road & 42nd St.
- Waterfront is not open to public
- Week public access

**After**
- Green patch merge for better access environment
- New subway stop
- Replace the fly road to 34th St.
- Provide public access to waterfront
- Enhance pedestrian access by expanding existing green
- Continuous waterfront greenway
- Waterfront greenway

Scattered small green patches

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2.3 PRIVATE NEED: SECURITY and SAFETY

Need of SECURITY

Need of PUBLIC ACESS

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2.3 PRIVATE NEED: SECURITY and SAFETY

PRIVATE space
- Efficiency
- Clear spatial division

PUBLIC space
- Humanity
- Intimate face to public

Clear division by a border surface
2.3 PRIVATE NEED: welcoming border

PRIVATE space

“WELCOME!!”

PUBLIC space

+ Quality space for both zones
2.4 Building Form: 3 considerations

1. URBAN CONTEXT
   - High-rise towers on grid street structure=hectic life
   - Distorted grid space can be introduced for public space

2. PUBLIC DEMAND
   - To allow public connection between city and waterfront park on UN plot

3. PRIVATE NEED
   - Security, clear and friendly division between public zone and private zone

= One Simple Architectural FORM
2.4 Building FORM Design Process
2.4 Building **FORM** Design Process
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2.4 Building FORM Design Process

PUBLIC ACCESS from CITYSIDE
PUBLIC ACCESS from RIVERSIDE

EAST RIVER
2.4 Building FORM Design Process
2.4 Building FORM Design Process
2.4 Building **FORM** Design Process
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PUBLIC ACCESS from CITYSIDE

EAST RIVER
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![Building FORM Design Process Diagram](image-url)
2.4 Building FORM Design Process
2.4 Building FORM Design Process

2. SITE ANALYSIS & BUILDING FORM

1. PROJECT

4. INTERIOR DESIGN & CLIMATE

3. PROGRAMS/ USERS & BUILDING LAYOUT

5. EXTERIOR MATERIALIZATION & SUSTAINABILITY
2.4 Building FORM Design Process
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3.1 Conditions for building layout

: 4 types of **USERS**

- Secretariats
- Researchers
- Delegates
- Press
- Businessmen
- Visitors

**PUBLIC area**

**OFFICE area**

**MIXED USER’s area**

**SECURED**

**OPEN**
3.1 Conditions for building layout

: 6 types of PROGRAMS

COLLECT
PRODUCE
PROPAGATE
EXCHANGE
GENERAL
SERVICE

LIBRARY
EXHIBITION
AUDITORIUM
COUNCIL CHAMBER

office
Brain storming
Meeting room
Video conference
workshop
canteen
archive
storage

cafeteria
ICT

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5. EXTERIOR MATERIALIZATION & SUSTAINABILITY
3.2 Building form refinement for Building LAYOUT
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3.2 Result of the urban intervention: Masterplan

- ROOF view

1st Ave.

EAST RIVER

- MASTERPLAN 1:1500

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3.2 Result of the urban intervention: Masterplan

MAP OF THE URBAN INTERVENTION:
- GROUND ACCESS
- PUBLIC ACCESS
- EAST RIVER

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4. INTERIOR DESIGN & CLIMATE
5. EXTERIOR MATERIALIZATION & SUSTAINABILITY
3.2 Result of the urban intervention: wide-open public accessibility
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3.3 CIRCULATION plan

: ACCESS of Visitors/Press/Secretariats

LEVEL 0
3.3 CIRCULATION plan

: ACCESS of Visitors/Press/Secretariats
3.3 CIRCULATION plan

: ACCESS of Visitors/Press/Secretariats
3.3 CIRCULATION plan

: ACCESS of Delegates/ Secretariats

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3.3 CIRCULATION plan

ACCESS of Delegates/ Secretariats
3.3 **Circulation** plan

: **Access** of Delegates
CIRCULATION plan:

ACCESS of Visitors

LEVEL - 2

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3.4 MAIN SPACE PLAN_ LOBBY

: Separation and Connection of users

LEVEL 0 : PUBLIC LOBBY

LEVEL -1 : DELEGATE LOBBY

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3.4 MAIN SPACE PLAN_ LOBBY

: Separation and Connection of users
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: Separation and Connection of users
3.4 MAIN SPACE PLAN_ EXHIBITION

LEVEL 0
3.4 MAIN SPACE PLAN _ EXHIBITION
3.4 MAIN SPACE PLAN _ OFFICE

: Separation and Connection of users

LEVEL 0
3.4 MAIN SPACE PLAN _ OFFICE

: Separation and Connection of users
3.4 MAIN SPACE PLAN_ AUDITORIUM

: Separation and Connection of users

B1: DELEGATE LOBBY
BG: PUBLIC LOBBY

LEVEL 0
3.4 MAIN SPACE PLAN_ AUDITORIUM

: Separation and Connection of users

LEVEL 0
3.4 PROGRAMS
: COUNCIL CHAMBER/AUDITORIUMS/PRESSROOMS

a) COUNCIL CHAMBER
b) 6 AUDITORIUMS

c) 2 PRESSROOMS
3.4 MAIN SPACE PLAN_ PRESSROOM

: Separation and Connection of users
5. FACADE Materialization

: sustainable facade for renewable energy and passive building

**TYPE 1> Ruled surface façade**
- Laminated timber grid shell
- double curved fritted glass(insulated)

**TYPE 2> PV cell facade**
- PV panel module with 4 different transparency
- aluminum ventilation grill module
- parallel operable window module

**TYPE 3> Fixed Louver facade**
- solid Trespa module
- Fixed Trespa louver on outer wall
- insulated glass
5. FACADE Materialization

: sustainable facade for renewable energy and passive building

TYPE 4> TPV panel sky roof
- Thermal Photovoltaic panel
- insulated glass module
/ aluminum louver inserted

TYPE 5> Green roof
- greens on cabinet roof

TYPE 6> Ruled surface green
- extension of ruled surface facade
5. FACADE Materialization
: sustainable facade for renewable energy and passive building

5 types of building skin

1) Ruled surface facade
2) PV cell facade
3) Louver facade
4) TPV cell sky roof
5) Green roof
5.1 Ruled surface facade

- Double curved fritted glass on intersected laminated timber beams
5.1 Ruled surface facade

: Double curved fritted glass on intersected laminated timber beams
5.1 Ruled surface facade

: Double curved fritted glass on intersected laminated timber beams
5.1 Ruled surface facade

: prototype design for joint between ruled surface façade and South facade
5.1 Ruled surface facade

: Double curved fritted glass on intersected laminated timber beams
5.2 **PV cell facade**

: producing **electricity** for **heat pump**

**SEMI-TRANSPARENT PHOTOVOLTAIC DOUBLE GLAZED INSULATING UNITS**

BEJAR MARKET (SPAIN)
5.3 Insulated Louver facade
: fixed louver for sun-shading

TYPE 3> Fixed Louver facade
- solid Trespa module
- Fixed Trespa louver on outer wall
- insulated glass
5.4 **INSULATED** sky roof

: with 3 different sky roof modules

1) **opaque module**
   - 2mm anodized sheet aluminum
   - 50mm mineral wool
   - 0.75 galvanized sheet steel
   - 50mm mineral wool
   - 1.5mm anodized sheet aluminum

2) **photovoltaic module**
   - 6mm float glass
   - 2mm resin coating w/12.5x12.5 mono-crystalline cells
   - 4mm float glass
   - 18mm argon-filled cavity
   - 2x6mm lam. safety glass

3) **louver module**
   - 6mm float glass
   - 24mm argon-filled cavity, w/ aluminum louver
   - 2x6mm lam. safety glass

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Cite du Design
5.5 GREEN roof

: controlling heat island effect

Vegetation
Growth medium
Drainage, aeration, water storage and root barrier
Insulation
Membrane protection and root barrier
Roofing membrane
Structural support

Source: Earth Pledge
4.1 CLIMATE Design
: sustainable design for **renewable energy and passive building**

- **AHU (air handling unit)** for auditorium modules (occasionally used)
- **FCU (fan coil unit)** for office modules (daily used rooms)
- **Climate Ceiling** for office modules (daily used rooms)
4.2 RE-NEWABLE ENERGY

b. AIR distribution (supplied from heat pump)

- AHU (air handling unit) for auditorium modules (occasionally used)
- FCU (fan coil unit) for office modules (daily used rooms)
4.2 RE-NEWABLE ENERGY

b. Water distribution (supplied from PVT cell)
- FCU (fan coil unit) for office modules (daily used rooms)
- Climate Ceiling
4.3 Interior design and Climate

: sustainable design for renewable energy and passive building
4.3 Interior design and Climate
THANK YOU