GREEN UNLIMITED
by designing the United Nations Environmental Council
ASSIGNMENT
ASSIGNMENT BY THE UNITED NATIONS
FOR A NEW
ENVIRONMENTAL AUTHORITY

TO:

CREATE AWARENESS
&
EXCHANGE KNOWLEDGE
CONTENTS
GREEN UNLIMITED
by designing the United Nations Environmental Council

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2. URBAN ANALYSIS
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UNITED NATIONS
& LOCATION
Global organization as role model for society

UNITED NATIONS

IAEA

UNESCO

UNICEF

International Atomic Energy Agency

United Nations Educational, Scientific and Cultural Organization

United Nations Children's Fund
Structure of the UN organization

UN organization dealing with global challenges and focussing on global crises
Position of UN plot within Manhattan, New York City

UNITED NATIONS HEADQUARTERS

Manhattan Midtown East, New York City
Iconic location next to the East River

UNITED NATIONS HEADQUARTERS

Located next to the East River

Grandeur and peaceful location

Designed by the old masters:

- Le Corbusier
- Oscar Niemeyer
- W.K. Harrison
UN compound as part of iconic high rise within New York City

UN main secretariat building on list of New York tallest buildings

CHRYSLER BUILDING
Completed in 1930
Height of 319 meter

EMPIRE STATE BUILDING
Completed in 1931
Height of 381 meter

UNITED NATIONS HEADQUARTERS
Completed in 1952
Height of 154 meter
URBAN ANALYSIS
Manhattan Masterplan - Green belt around Manhattan

Current situation

Future plan
The East River Park Masterplan - part of Green belt

Site as part of future masterplan

UN Location
Main public spaces around the plot

Current situation

Future plan

1. Grand Central park
2. Bryant park
3. Dag Hammerskjöld Plaza
4. Rockefeller Center

Moving activities towards waterfront

Central Station
UN site
Green belt
New UN Center

URBAN ANALYSIS
Main traffic routes around the UN plot - existing situation

Main roads around the plot
(Main entrance at 1st Avenue)

Routing to the UN plot by visitors
(mainly pedestrians from Grand Central Station)
View along 1st Avenue - main routing visitors
Main city axis along the UN site and position of main entrance

Current situation

View on current main entrance of the UN compound
UN platform within the Manhattan grid

- 42nd street
- 47th street
- Main route to the Grand Central Station
- Routing along the plot to waterside
- Park along axis
- Green zone along the waterside

Future plan

View on current UN compound as fully secured area
Positioning of the new UN Council building

Possible positioning for new public park

Part of plot with sun all day long

Connecting the park to the waterside

Relevant buildings around the site

Trump tower

UN plaza hotel
View on existing Manhattan skyline
URBAN CONCEPT
Composition from waterside - by FDR canopy

The FDR canopy emphasizes the composition of the UN buildings seen from the waterside.
Composition from city side - no collective identity

the composition of the UN buildings as a whole is not visible from the city side, by extending the platform a collective identity is now also visible
Strategy for the new urban design

Step 1 - extending the green belt into the city

- clear identity of the UN compound, one platform with one identity
- the green belt becomes part of the city
Strategy for the new urban design

Step 2 - connecting the city to the waterside

- opening up the UN platform, by connecting the main city axis for pedestrians to the green belt
- the UN platform will be more accessible by dividing it into two areas: secured and non-secured
- attracting visitors from 42nd street, by a water element that guides towards the waterfront
Strategy for the new urban design

Step 3 - creating a new main entrance and a new park

- the new main entrance to the UN compound is positioned along the new connection to the waterside
- a new park is created in front of this new entrance for tourists and employees of the whole district
- this new park will be multifunctional in use during all seasons, providing activities for people of all ages
URBAN CONCEPT - NEW MASTERPLAN
URBAN DESIGN
URBAN DESIGN - NEW MASTERPLAN
New urban character: 1st Avenue Park

- a new park along 1st Avenue for pedestrians
- continues water element guiding towards the new UN Park
- relaxing area for inhabitants of the whole district

URBAN DESIGN
View along 1st Avenue Park, with guiding water element

Existing situation >
New urban character: UN Park

- a new park in front of the new UN main entrance
- the pond can be transformed into a square
- suitable for all season activities: pond, market square, festival area or ice track
View on the UN Park with multifunctional pond / square

Pond can be transformed into a square >
New urban character: UN Boulevard

- a new boulevard connecting the city centre to the waterfront
- the water element is guiding towards the UN main entrance
- connecting the new UN Park to the new UN Square
View along the city axis towards the new main entrance

View along UN boulevard towards the city >
New urban character: UN Square

- a new square as entrance to the new UN Council building
- smaller inner gardens form an art garden related to the UN Compound
- a new UN library is connected to the square, along with exposition- and product spaces
View towards the entrance of the new Council building

View on one of the inner art gardens of the UN Square

URBAN DESIGN - UN Square
ARCHITECTURAL CONCEPT
One collective identity and a new clear main entrance

1. Creating one UN platform with one collective identity

2. Creating a new clear main entrance by the new UN Park
Impression of the new UN main entrance out of the new UN Park
Creating a new iconic sustainable high rise building

3. Old icon vs new icon within the composition of UN buildings

4. Positioning the new icon in the surrounding city context
A new sustainable high rise building: crisis or chance?

Skyscraper booms vs. economic crises


- Chrysler building - 1930
- Empire State building - 1931
- Burj Khalifa - 2007

Big crisis 1929
Oil crisis 1973
Dot com crisis 2000
Global crisis 2008 until now

Source: Skyscraper Source Media, Barclays Capital
ARCHITECTURAL DESIGN
Strategies for a new sustainable UN high rise building

1. Program positioning & Routing
2. Flexibility in plan
3. Water concepts
4. Structural concept
5. Facade concepts & Ventilation and heating
Strategy for a new sustainable UN high rise building

1

Program positioning & Routing

ARCHITECTURAL DESIGN
### Division of the program and security levels

#### Program of requirements

<table>
<thead>
<tr>
<th>Category</th>
<th>NVO (67% of BVO)</th>
<th>BVO</th>
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</thead>
<tbody>
<tr>
<td>Entrance area</td>
<td>930 m²</td>
<td>1395 m²</td>
</tr>
<tr>
<td>Collect</td>
<td>1785 m² NVO</td>
<td>2690 m² BVO</td>
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<tr>
<td>Produce</td>
<td>1240 m² NVO</td>
<td>1880 m² BVO</td>
</tr>
<tr>
<td>Propagate</td>
<td>3545 m² NVO</td>
<td>5320 m² BVO</td>
</tr>
<tr>
<td>Exchange</td>
<td>3330 m² NVO</td>
<td>4995 m² BVO</td>
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<tr>
<td>General offices</td>
<td>2680 m² NVO</td>
<td>4020 m² BVO</td>
</tr>
<tr>
<td>Facilities</td>
<td>2790 m² NVO</td>
<td>4185 m² BVO</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16280 m² NVO</strong></td>
<td><strong>24420 m² BVO</strong></td>
</tr>
</tbody>
</table>

#### Division of the program for different users

- **Zone 1**
  - Visitors: 20%
  - Employees: 50%
  - Delegates: 30%

- **Zone 2**
  - Visitors: 20%
  - Employees: 50%
  - Delegates: 30%

- **Zone 3**
  - Visitors: 20%
  - Employees: 50%
  - Delegates: 30%

#### Combined program for all different users

- **Zone 1**
  - Visitors: 20%
  - Employees: 50%
  - Delegates: 30%

- **Zone 2**
  - Visitors: 20%
  - Employees: 50%
  - Delegates: 30%

- **Zone 3**
  - Visitors: 20%
  - Employees: 50%
  - Delegates: 30%

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**ARCHITECTURAL DESIGN**

47
Program base

- Coffee bar
- Delegate lounge
- UN Promenade
- New main entrance
- Entrance UN Assembly Hall
- UN Library
- Routing delegates
- Routing visitors

LEGEND
- Visitors
- Employees
- Delegates

ARCHITECTURAL DESIGN

9:00
12:00
16:00
Program tower

LEGEND
- VISITORS
- EMPLOYEES
- DELIGATES

INSTALLATIONS:
- Resturant
- Press rooms
- Video conference

PRODUCE:
- Offices
- Meeting rooms
- Brainstorm rooms

GENERAL OFFICES:
- General offices
- Archive
- Workshop units

PROPAGATE:
- Offices
- Press rooms
- Video conference

ARCHITECTURAL DESIGN

UNDERGROUND PARKING
Strategy for a new sustainable UN high rise building

Flexibility in plan
Flexibility in plan tower

Tower divided in 3 flexible zones
Flexibility in plan tower - standard floor

Buildup of the tower:
- centralized cores with fire escapes
- middle zone for installations and shafts (lowered ceiling)
- standardized office sizes to unit sizes of 2.7 meter

Buildup of the tower:
- routing zoning in the center
- new semi-outdoor spaces are integrated on each floor
- flexible division between open plan offices and enclosed offices
- office spaces can be extended to the outside facade
Flexibility in plan tower - mixed zone (lobby and offices)

Plan Lobby with enclosed offices - based on workstyle A and B

semi-outdoor space

Plan Lobby with open plan offices - based on workstyle C and D

Offices in existing UN Secretariat building

Existing

New

Workstyle A
USG/ASG (384sqft)
(Enclosed)

Workstyle B
Directors
(192sqft)
(Enclosed)

Workstyle C
Professionals
(96sqft)
(Open)

Workstyle D
General Services (64sqft)
(Open)
**Flexibility in plan base**

- **Auditoria spaces**

Using telescoped platforms in auditoria spaces

Auditoria spaces can be turned into:
- extension of the lobby space
- large press room
- exposition space

Plan ground floor - base
Flexibility in plan base

Section through lobby and auditoria - with auditoria in use

Section through lobby and auditoria - auditoria transformed into new program spaces

ARCHITECTURAL DESIGN
Strategy for a new sustainable UN high rise building

Water concepts
Water concept - routing and security

Water cycle around the plot for security

New main entrance

Existing main entrance

UN Square

1st Avenue Park

New UN Park always accessible for the public
Water concept - routing and security

LEGEND

- Water
- Emergency stair case
- Elevators
- Routing visitors
- Routing employees
- Routing delegates

Plan ground floor - base
Water concept - routing and security
Water concept - heating and cooling

- Cooling of the facade by low H2O radiators
- Collection of energy by solar cells in facade
- Heating of water by piping system running through the water elements on the UN square
- Low temperature floor-heating in base
- Heatpump
- Heat storage in summer

Cooling in summer
Water concept - heating and cooling

- Heating of the facade by low H2O radiators
- Collection of energy by solar cells in facade
- Cooling of water by piping system running through the water elements on the UN square
- Low temperature floor-cooling in base
- Heat pump
- Cold storage in winter

Heating in winter
Water concept - sprinkler

- Fully sprinklered tower concept
- Sprinkler system uses heat/cold storage
- Pressure tank needed on top of roof
- Using a 'wet' sprinkler system for lower capacity of pressure tank

Water concept - rainwater use

- Usage of rainwater for secondary water system
- Collection of rainwater in water system around plot
- Storage of rainwater in basement of the tower
- Storage of rainwater on roof
Strategy for a new sustainable UN high rise building

Structural concept
Structural concept - high rise in timber

Overview of tall timber structures:
‘The tallest timber structure in the world is a tree!’

Design of a structural timber tower (up to 30 storeys)
by Michael Green Architects, Vancouver; Canada
New icon as timber high rise within skyscraper city?
Structural concept - high rise in timber

STEP 1: BASE

Column - beam system of lower part is based on the existing load-bearing system of the UN compound

STEP 2: CORES

Massive timber cores

Lowest 2 floors are concrete cores
Structural concept - high rise in timber

STEP 3: COLUMNS AND BEAMS

Timber column-beam system in facade as rigid framework

STEP 4: CONCRETE FLOORSLAPS

Timber column-beam system combined with prefab concrete floors for stability
Structural concept - high rise in timber

STEP 5: SUPERSTRUCTURE

Superstructure is needed for the stiffness of the facade

STEP 6: TIMBER PANELS

Timber panels are integrated in the facade to give the timber structure more expression
Structural concept - high rise in timber

Slab width = 2.7 meters
Slab span = 8.5 meters

Position of installations in the structural concept

Structural concept is based on the Life Cycle Tower (reference image)

Composite slab → timber-concrete bond

ARCHITECTURAL DESIGN
Strategy for a new sustainable UN high rise building

5

Facade concepts & Ventilation and heating
Ventilation- and heating principle in section

ARCHITECTURAL DESIGN

LEGEND

- AIR FLOW
- INSTALLATION SPACE
- NATURAL VENTILATION COMBINED WITH LOW H2O-HEATING SYSTEM
- MECHANICAL VENTILATION COMBINED WITH FLOOR-HEATING SYSTEM
- COMPLETE AIR SYSTEM COMBINED WITH AIR-HEATING SYSTEM
Facade principle base

East facade

South facade

West facade

Facade concept based on existing UN Assembly Hall

Sun studies for all facades - dimensioning and spacing columns

Passive sun shading by gradient facade

ARCHITECTURAL DESIGN
Base facade interior - auditoria space

- Acoustic panels on walls (in between columns)
- Indirect lightning through column structure
- Acoustic panels hanging on ceiling
- Relation between program and masterplan

Impression of auditoria interior - interior
Base facade - structural details

Facade concept in plan (fragment)

Facade concept in elevation (fragment)

Facade concept in horizontal detail
Base facade exterior - auditoria space

- Stone cladding based on the UN Assembly Hall
- Indirect lightning through column structure (by reflection)
- Stucco finish on sides of the columns
- Spacing of columns based on sun studies

Impression of auditoria - exterior
Facade principle tower

Passive sun shutters in outer facade

Solar cells in outer facade

Active individual sunscreens

20 % closed by panels

20 % closed by solar cells (dotted)
Ventilation and cooling principle tower - summer

Natural ventilation (hot air)

Air cooled by radiator system (low H₂O)

Additional mechanical ventilation (pre-cooled)

Mechanical extraction

Open offices

Cell offices

Open offices
Ventilation and heating principle tower - winter

- Natural ventilation (cold air)
- Additional mechanical ventilation (pre-heated)
- Heated air by radiator system
- Mechanical extraction
- Open offices
- Cell offices
Tower facade interior - office spaces

- Electrical installations and sprinkler in between beams
- Inner glass facade structure is openable (summer situation)
- Wall connection onto column structure
Tower facade - structural details

Facade concept in plan (fragment)

Facade concept in elevation (fragment)
Tower facade exterior - office spaces

Visible superstructure
Openable exterior facade at inner balconies
Sunscreens hidden inside the facade structure
Massive timber wall panels used as passive sun shading
CONCLUSION
A new sustainable high rise building: crisis or chance?

Chances enough for sustainable development in this time of crisis!
Chances for the UN Environmental Council...

...by introducing a new building system for office buildings
Chances for New York city...

...by introducing a new masterplan
Chances for sustainable development worldwide...

...by introducing the tallest timber highrise in the world
GREEN UNLIMITED
by designing the United Nations Environmental Council

we can push the boundaries of sustainable development!
QUESTIONS?