Commercial Complex At Kurla

Positive Features:
- Self-Shading Building.
- Primary Treatment of Sewage Before Letting It Down the Municipal Sewer.
- Use of Solar Energy for Landscape Lighting.
- Use of Wind Energy for Terrace Lighting.
- Car Wash System for the Employees & General Public - Reducing the Carbon Footprint of the Employees.

Strategies Adopted:

Built Up Area Statement:

<table>
<thead>
<tr>
<th>Type</th>
<th>Area (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>12000</td>
</tr>
<tr>
<td>Internal</td>
<td>8000</td>
</tr>
<tr>
<td>External</td>
<td>4000</td>
</tr>
</tbody>
</table>

Project Brief:
- **Building Environment**
  - **Project Requirement**
    - Development of Office-Based Building
  - **Site Size**: 1000 sq ft
  - **Floor Size**: 2000 sq ft
  - **Office Spaces**: 800 sq ft
  - **Retail Spaces**: 1200 sq ft
  - **Parking Spaces**: 20 spaces

Sanitary Fittings Statement:

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilets</td>
<td>10</td>
</tr>
<tr>
<td>Showers</td>
<td>5</td>
</tr>
<tr>
<td>Wash Basins</td>
<td>10</td>
</tr>
</tbody>
</table>

Title: INTRODUCTION & DESIGN
Name: Anand Gupta
Roll No. 7

Name: Jayshree Gaydarkar
Roll No. 5

Rachana Sansad's Institute of Environmental Architecture
Environmental Architecture Design Studio III
Commercial Complex At Kurla
Semester- 03
M.Arch 2014-2015
Rachana Sansad's Institute of Environmental Architecture
Environmental Architecture Design Studio III

Commercial Complex At Kurla

Title: GRIHA ANALYSIS

USER JUSTIFICATION
- Design and Construction of Sustainable Commercial Structure.
- Office spaces for Accounting Firms to support various Corporate Giants/Firms in BKC.

Scale: N.T.S.

Name: Jayshree Gavandikar
Roll No: 5

Name: Anand Gupta
Roll No: 7

Semester- 03
M.Arch 2014-2015
CRITERION 5 - REDUCE HARDPAVING ON SITE & PROVIDE SHARED HARD PAVED SURFACES

CRITERION 10 - REDUCE LANDSCAPE WATER REQUIREMENT

CRITERION 29 - ACCEPTABLE OUTDOOR & INDOOR NOISE LEVELS

1. TREE AS NOISE BUFFERS
   • Combination of tree & shrub buffering can reduce noise levels by 3-10 dB
   • Plant buffers close to the noise source for effective buffering
   • Use of Aspalathus (Evergreen & Native Tree) as a sound barrier
   • Use of air pollution tolerant tree
   • Terrace gardens also act as sound absorption surface

2. USE OF AAC AS EXTERIOR WALLING MATERIAL
   • Sound absorption coefficient of AAC blocks for 250mm thick block is 0.80 - 0.85 (approx. 85 dB)

3. USE OF CORR BOARDS AS INDOOR SOUND INSULATION MATERIAL
   • Sound absorption coefficient of corr board is 0.55

Commercial Outdoor Noise Levels: 65 dB Day
55 dB Night
Commercial Indoor Noise Levels: 45 - 50 dB

Rachana Sansad’s Institute of Environmental Architecture
Environmental Architecture Design Studio III
Commercial Complex At Kurla

Title: LANDSCAPE LAYOUT
Scale: N.T.S.
Name: Anand Gupta
Roll No: 7

Semester- 03
M.Arch 2014-2015
CRITERION 18: RENEWABLE ENERGY UTILISATION

1. USE OF WIND ENERGY FOR TERRACE LIGHTING
   - Use of Wind Energy for Electricity Generation

2. RADIANT COOLING - STRUCTURAL WATER COOLING
   - Flooring: PVC pipes for the PVC pipes
   - Structural concrete for the panels - Hollow core slab panel

3. POST & DURING CONSTRUCTION EDUCATIONAL TOURS

4. COMPANY POLICY ON USE OF ECO FRIENDLY RESOURCES & MODE OF TRANSPORT & OTHER PRODUCTS.

CRITERION 26: USE OF LOW VOC PAINTS/ SEALANTS & ADHESIVES

- LOW VOC EXTERIOR AND INTERIOR PAINTS FROM ASIAN PAINTS
  - Product Name: Visual
  - VOC in grams per liter: 15 g/L

- 100% Composite Wood with no Formaldehyde Resin from Greenply
- Particle Board
- Laminate Products
- LOW VOC ADHESIVE - FEVICOL SPEEDX

CRITERION 22: REDUCE WASTE DURING CONSTRUCTION

1. USE OF USED CEMENT BAGS TO LINE UP THE SEDIMENTATION POND FOR RECYCLED & RAIN WATER COLLECTION
2. BARRICADE THE SITE ALONG WITH
3. DUST SCREENS OF USED CEMENT BAGS
4. USE OF EXCAVATED SOIL TO MAKE PATHWAY PAVER BLOCKS USING AURAM
5. USE OF CRUSHED DEBRIS TO MAKE IMPERVIOUS PAVERS FOR CAR - WAYS

CIDCO - YUVA BUILDING CENTRE (NAVI MUMBAI) IS AN ORGANISATION WHICH CONVERTS CONSTRUCTION DEBRIS INTO PAVER BLOCKS.
CRITERION 13 - OPTIMISE BUILDING DESIGN TO REDUCE CONVENTIONAL ENERGY DEMAND

USE OF PREVAILING WIND - DIRECTION TO CREATE FUNNEL EFFECT & FOR EFFECTIVE CIRCULATION OF WIND

SHADOW ANALYSIS DONE FOR THE BUILDING SHOWING THE REQUIREMENT OF VERTICAL FINS ON THE WEST & EAST FACADE DURING AFTERNOON & MORNING TIME

3:00 PM 1ST JAN
10:00 AM 1ST JAN
3:00 PM 1ST APRIL
10:00 AM 1ST APRIL
3:00 PM 1ST OCT
10:00 AM 1ST OCT

HORIZONTAL PROJECTION CALCULATIONS FOR SOUTH FACADE OF THE BUILDING

BUILDING 1
- SOLAR AZIMUTH = 45°
- SURFACE AZIMUTH = 3°
- SOLAR ALTITUDE = 28°
- HSA = 33.11 - 15°
- TAN A = TAN 6° / COS 15°
- TAN A = 0.0377
- TAN 6° = 0.1051
- TAN E = TAN A / TAN 6°
- TAN E = 0.3311
- TAN E = 0.3311 / 0.1051
- TAN E = 3.17
- TAN E = 3.17

BUILDING 2
- SOLAR AZIMUTH = 51°
- SURFACE AZIMUTH = 113°
- SOLAR ALTITUDE = 28°
- HSA = 33.11 - 15°
- TAN A = TAN 6° / COS 15°
- TAN A = 0.0377
- TAN 6° = 0.1051
- TAN E = TAN A / TAN 6°
- TAN E = 0.3311
- TAN E = 0.3311 / 0.1051
- TAN E = 3.17
- TAN E = 3.17

SLAB PROJECTION OF 1.5 FT - RECEIVED WINDOW OF 0.5 FT HITS ON EACH FLOOR

SOLAR ACCESS ANALYSIS

SELF-SHADING BUILDING HELPS IN REDUCING THE SOLAR ACCESS IN THE LOWER FLOORS

TYPICAL FLOOR LAYOUT

DAY LIGHTING ANALYSIS

LIGHT SHELL REFLECTS DAYLIGHT DEEP INTO THE SPACE & BLOCKS THE SUN ON VIEW WINDOWS

SECTION THROUGH WALL

TINTED GLASS WITH ALUMINIUM FRAME - SHGC: 0.63
VLT: 66

EXTERNAL FINISH OF BRICK COLOURED CHINA MOSAIC CHIPS WITH HIGH SHGC (APPROX. 0.7)

GLASS FOR WINDOW: DGU TINTED GLASS WITH ALUMINIUM FRAME - SHGC: 0.63
VLT: 66

IN PLACE OF NON TINTED GLASS - SHGC: 0.76
VLT: 76

WALL TO WINDOW COMPLIANCE AS PER ECBC

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Commercial Complex At Kurla
CRITERION 14 - OPTIMISE ENERGY PERFORMANCE OF BUILDING WITHIN THE SPECIFIED COMFORT LIMITS
Criterion 15 - Utilisation of Fly Ash in Building Structures

AAC Blocks with Fly Ash for Walling

- AAC blocks (400-700 kg/m²) are one fifth by weight of solid brick wall.
- Thermal conductivity of AAC is 0.09 W/mK compared to 0.17 of clay bricks.
- Fire resistance of approximately 700 deg C & does not emit harmful gases in high temperatures.
- Noise absorption coefficient of AAC is 0.2 - 0.3 reduces around 45-53 dB.

Fly Ash Cement for Plastering

Fly Ash Cement Concrete for Filling in the Gaps in the Hollow Core Slab Panels

Criterion 16 - Reduce Volume, Weight & Construction Time by Using Efficient Technologies

Use of AAC Blocks for Walls

- AAC Blocks (400-700 kg/m²) are one fifth by weight of solid brick wall.
- Thermal conductivity of AAC is 0.09 W/mK compared to 0.17 of clay bricks.
- Fire resistance of approximately 700 deg C & does not emit harmful gases in high temperatures.
- Noise absorption coefficient of AAC is 0.2 - 0.3 reduces around 45-53 dB.

Precast Hollow Core Block

- Use of precast slab reduces the total time required for construction.
- Weight of hollow core concrete slab is 307 kg/m².

Criterion 17 - Use Low Energy Materials in Interiors

- Natural hydrocarbon based cooling system: R390 central A/C system

Achieves minimized environmental impact through combination of natural refrigerants and optimal energy efficiency.

Approximately 20% annual savings.

Reference: Natural Gas, CIBSE Journal, June 12; 2. Case Study, Church House, Westminster Abbey - Nicholas Cox, Earthcare

- Coco fibre mat insulation - No CFC/HFC material embodied energy: 0.037 kg CO2 per kg.
### CRITERION 23 - EFFICIENT WASTE SEGREGATION

<table>
<thead>
<tr>
<th>Calculations for solid waste</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waste generated / day / max.</strong></td>
<td>3300 kg</td>
</tr>
<tr>
<td><strong>Total population to be considered</strong></td>
<td>3200</td>
</tr>
<tr>
<td><strong>Dry waste generation / day</strong></td>
<td>1385.9 kg</td>
</tr>
<tr>
<td><strong>40% dry, non-recyclable</strong></td>
<td>446.0 kg</td>
</tr>
<tr>
<td><strong>60% non-recyclable</strong></td>
<td>833.2 kg</td>
</tr>
<tr>
<td><strong>Dry waste / day</strong></td>
<td>4599 kg</td>
</tr>
</tbody>
</table>

### CRITERION 24 - STORAGE & DISPOSAL OF WASTE

- Wastes: Water, paper, plastic, metal, glass, etc.
- Storage: On-site disposal, off-site disposal
- Disposal: Landfills, incineration

### CRITERION 25 - RESOURCE RECOVERY FROM WASTE

- Waste-to-energy plants
- Recycling centers
- Composting

### CRITERION 31 - PROVIDE ATLEAST MINIMUM LEVEL OF FACILITIES FOR THE DISABLES

- Wheelchair ramps
- Handrails
- Accessible restrooms

### CRITERION 30 - TOBACCO & SMOKE CONTROL

- No smoking signs
- Dedicated smoking areas

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#### SERVICES LAYOUT

1. **Service Corridor along Building with Manholes at regular intervals for maintenance**
2. **Minimized road area for circulation, parking and pedestrians marked in grey**

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**Typical Floor Layout**

- Mall
- Internal road
- Section showing service corridor & building