

# A HANDBOOK OF PLANNING OF OFFICE BUILDINGS

*Published by*  
Directorate General  
Central Public Works Department





## **A HANDBOOK OF PLANNING OF OFFICE BUILDINGS**

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सत्यमेव जयते

शहरी विकास एवं संसदीय कार्य मंत्री  
भारत  
**MINISTER OF URBAN DEVELOPMENT  
AND PARLIAMENTARY AFFAIRS  
INDIA**

## MESSAGE

CPWD is releasing "A Handbook of Planning of Office Buildings" on 26 February, 2013 at Vigyan Bhawan, New Delhi.

Office is an architectural and design phenomenon, whether it is a small office or a massive building. The main purpose of an office environment is to support its occupants in performing their assignments at minimum cost and maximum satisfaction.

In recent times, the importance of changing climate and its effects on environment are being given more attention in design practices. Sustainable work spaces are becoming more prominent. More energy efficient buildings co-relate to a more efficient and productive work environment.

This handbook will act as a ready recokner and will be useful in making sustainable decisions quickly. I congratulate the Central Public Works Department in bringing out this Publication.

**(Kamal Nath)**





सत्यमेव जयते

## Foreword

**डा. सुधीर कृष्ण**  
**Dr. Sudhir Krishna**

With the rise of professionalism, the discipline of architecture has become increasingly specialized and focused on questions of basic functionality and aesthetics. This specialist role now forms the basis of the widely accepted modern definition of architectural practice. Architects, as licensed professionals, transform the space needs into concepts, images and plans of buildings and to be constructed by others. They are responsible for orchestrating and coordinating the work of many disciplines during the design phases and, at times, even during the execution. Their profession is responsible for safeguarding the health, safety and welfare of the public. The cultural definition of architecture characterizes the ways in which the discipline responds to social, aesthetic, and ethical aspects of making cities, buildings and landscapes. A "whole building" approach must necessarily incorporate both sets of disciplinary definitions.

The whole building design, which aims at integrated, high performance design, requires both efficiency and innovation. It is based on a design process in which the users, owners and project participants are all integral team members. With whole building design, the project team can be guided once again by a collective approach which encompasses site professionals, such as planners, civil and environmental engineers, and landscape architects. The profession gives a comprehensive vision in holistic problem solving and the understanding of broad cultural concerns make the architects ideally suited for the leadership of design teams.

The publication and widespread dissemination of this simple yet effective user friendly Handbook of Planning of Office Building in the country by Central Public Works Department, Ministry of Urban Development, marks another milestone in the journey of energy efficient buildings and productive work environment. I am positive that the options proposed in this Handbook will be suitably adopted throughout the country.

**Sudhir Krishna**  
**Secretary**  
**Ministry of Urban Development**  
**Government of India**







## About The Book

Central Public Works Department (CPWD) has more than 100 years of experience in design, construction and maintenance of buildings of the Government of India.

Office spaces are an environment in which people spend a large part of their day for productive work. The entire work space should bring out the best in people, in addition to being easily accessible to all, self-sustaining and efficient in energy and water use. Safety is another issue that needs to be taken care of.

With the advancement of technological options now available, a need was felt to prepare a Handbook, which will give us an overview about the new possibilities that have emerged. This publication then, is an initiative towards creating a user-friendly work space, that is modern sustainable and productive.

This handbook is easy to adopt. Compiled primarily for internal use, other organisations and the private sector will also find it useful.

CPWD has always been proud of its tradition of contributing to the built environment through various publications. This handbook is one more step forward in this journey towards technical excellence, to which CPWD is always committed.

I look forward to the widespread dissemination and use of this Handbook, and feedback on the same.

Ashok Khurana  
Director General  
Central Public Works Department  
Ministry of Urban Development  
Government of India



## Acknowledgement

The Central Public Works Department (CPWD) is a 158<sup>th</sup> years old Institution and providing comprehensive services including Architectural Planning, Designing, Construction and Maintenance of Office & Residential Buildings. A need was felt to publish "A Handbook of Planning of Office Buildings" to encourage the Planners and Architects about Whole Building Design Approach while under taking Architectural Design of Office Buildings.

I wish to show my deep gratitude to the esteemed Director General, CPWD, Sh. Ashok Khurana, for agreeing to publish this book.

I also express my deep appreciation to Sh. Naveen Bhatnagar, Architect & Liaison officer to CA (NDR), and Ms. Nidhi Anand Deputy Architect, SA (NDR-III), CPWD, who made their sincere efforts to bring out this publication.

Special mentioned must be made for Ms. Arti Printers for untiring efforts in printing the Handbook.

Rajesh K. Kaushal  
Chief Architect  
CPWD, New Delhi



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## Site Analysis

*All ideas come about through some sort of observation. It sparks an attitude; some object or emotion causes a reaction in the other person.*

- Graham Chapman

The site visit is the first gear in the design process. A detailed site analysis has to be done so as to understand the features of the site, which will be very important during the design. The purpose of the site analysis is to record and evaluate information on the site and its surroundings, and to use this evaluation in the design response.

### Location

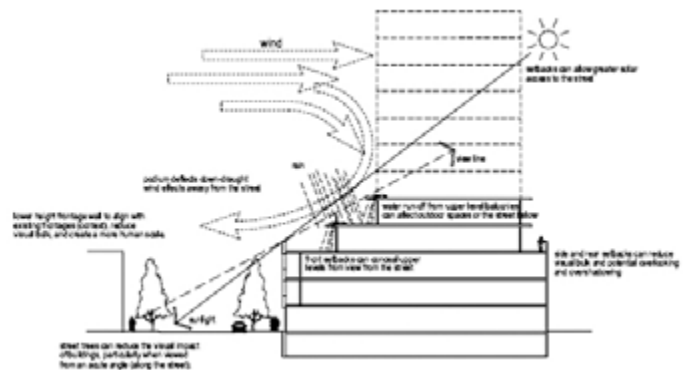
This is the first aspect that one needs to look at. Where is the site located? How is the site approached? What is the name of the street, the road etc on which the site is located? How far away is the major junction?

### Orientation

The orientation of the site plays a very important role in siting of the building. This, when combined with the wind direction and sun path, would give a good idea as to how the design should be oriented so as to optimize the design. The orientation along with the sun path will also determine the placement of rooms inside buildings.

### Wind Direction

Most of the locations will have a general major direction from which the wind comes. However, this will not always hold true and will vary from location to location. If we are to design a climatologically responsive building, it will be important to consider the direction of the wind so that it can be channelized through the interiors.



### Soil Type & Condition

Soils vary from place to place. Their properties also vary according to the type of soil. Sandy soil, clayey soil, laterite etc, all have different properties, which affect the design

of the building. This is very important from a structural point of view while designing buildings.

### **Topography**

Topography refers to the slope and level of the land – whether the land is flat and plain, or whether it is sloping? From a design point of view, a sloping site will be more challenging. If a site is sloping, the exact slope can be interpreted from a detailed Contour map. The contour



locations and spacing of contours will play a big role in the siting of the building. It is always better to design buildings along with the contours, integrating it into the design to reduce unnecessary cutting and filling of soil.

### **Vegetation & Natural Features**

The natural vegetation present on the site is very important. Any good design will integrate it into the design, highlight & accentuate it to create a harmonious whole. The vegetation will consist of all the trees, flora and fauna present on the site. These should be marked onto the site plan so that it will assist during the design stage. Along with the location, the type of trees, the size of the trees, diameter or spread of the branches, heights etc are to be identified

### **Precipitation & Hydrology**

The amount of rainfall that the site receives and also the time period during which the rainfall occurs are to be found out.

The Relative Humidity of the place also has to be found out to determine the moisture content in the atmosphere. A higher relative humidity suggests a humid climate, for which cross circulation of wind at the body level is a must for comfort. A lower relative humidity will suggest a dry climate.

### **Neighbourhood Character**

#### **Infrastructure facilities –**

This refers to the services present in the location. The major things to be considered are the water supply, drainage connection, waste disposal, electricity supply etc. These are



important while planning the zoning in the site.

**Surrounding land uses & buildings –**

One also needs to pay attention to the surrounding landuses and building around the site. If the landuses are incompatible, it may lead to creation of issues in the design. Also, the height and setbacks of adjacent buildings are important in affecting the flow of air and also sunlight.

**Prominent Vision lines / Visual linkages –**

This becomes a very important element in the design process. The views to the site as well as the views from the site are to be carefully considered while designing.

**Locally available resources -**

One also needs to find out what materials are available in and around the site, which can be used in the design. This is especially relevant today when the design has to be as sustainable as possible, by reducing the transportation energy & costs.

\*\*\*\*\*

# Site Planning

*Great things are done by a series of small things brought together.*  
- Vincent Van Gogh

Site planning and design require the professional to consider a broad range of concerns in the synthesis of a design concept. There are the physical aspects of the site itself, the vision or program of the client, the designer's own creative inclination, the concerns of the community, and the interests of the end user.

The zoning requirements are intended to regulate the density and geometry of development, specifying roadway widths and parking and drainage requirements, and define natural resource protection areas.

## Neighbourhood Character

A comprehensive understanding and appreciation of context and the balancing of neighborhood character and strategic planning objectives must be the starting point for any design. This requires an understanding of a proposed development and its relationships to the surrounding public setting, neighboring properties, and any identified strategic issues relating to the site.

## Site Planning

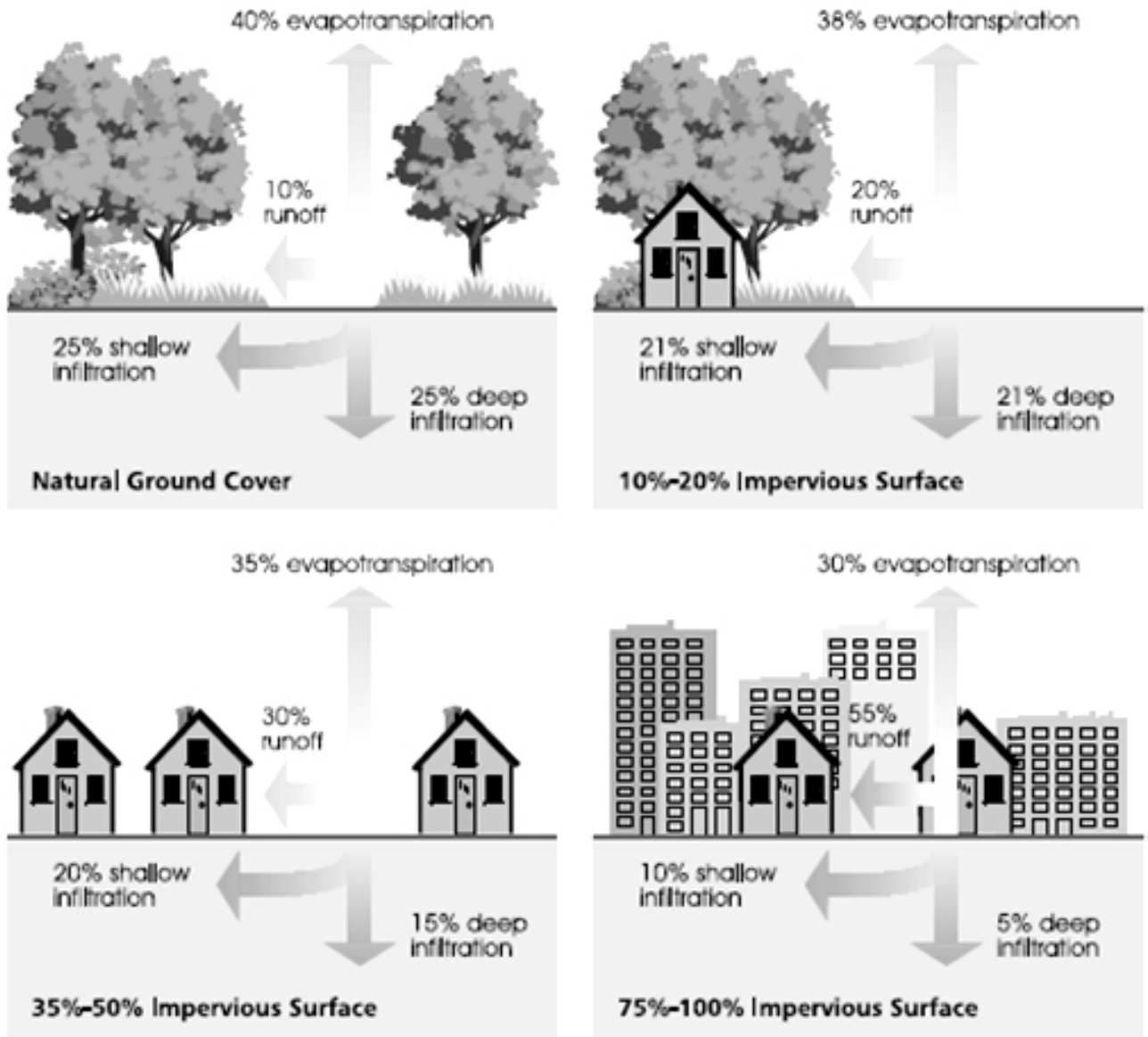
Must incorporate an accurate description of:

- Shape, size, orientation of the site and easements.
- Levels and contours of the site and the difference in levels between the site and surrounding properties.
- The location and height of existing buildings on the site and surrounding properties.
- The use of surrounding buildings, including location of habitable rooms.
- The location of private open space of surrounding properties and the location of trees, fences and other.
- Landscape elements.
- Solar access to the site and surrounding properties.
- Street frontage features such as poles, street trees, footpaths and kerb crossovers.

- The location of shops, public transport services and public open space within walking distance.
- Movement systems through and around the site.
- Any other notable feature or characteristic of the site or surrounding areas.
- Constraints and opportunities such as heritage places.
- Current access to direct sunlight in summer and winter.
- Reduce/minimize total impervious area.
- Demarcate the zone of development.



Site Plan



**Site and Slopes**

Good designing follow grades and run along ridge lines. Steep site slopes often require increased cut and fill if building are sited using conventional. If incorporated into the initial subdivision layout process, slope can be an asset to the development. For areas with rolling terrain with dissected ridges use multiple short branch cul-de-sacs off collector streets.

**Use Site Fingerprinting**

Site fingerprinting (minimal disturbance techniques) can be use to further reduce the limits of clearing and grading, thereby minimizing the hydrologic impacts. Site fingerprinting

includes restricting ground disturbance by identifying the smallest possible area and clearly delineating it on the site. Reduce paving and compaction of highly permeable soils.

### Site Planing Principles

#### Do not harm

Make no changes to the site that will degrade the surrounding environment. Promote projects on sites where previous disturbance or development presents an opportunity to regenerate ecosystem services through sustainable design.

#### Precautionary Principle

Be cautious in making decisions that could create risk to human and environmental health. Some actions can cause irreversible damage. Examine the full range alternatives – including no action and be open to contributions from all affected parties.

#### Design with nature and culture

Create and implant designs that are responsive to economic, environmental, and cultural conditions with respect to the local, regional, and global context.



### Planning New Pedestrian Links

#### Use a decision-making hierarchy of preservation, conversation, and regeneration

Maximum and mimic the benefits of ecosystem services by preserving existing environmental features, conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.

#### Provide regenerative systems as intergenerational equity

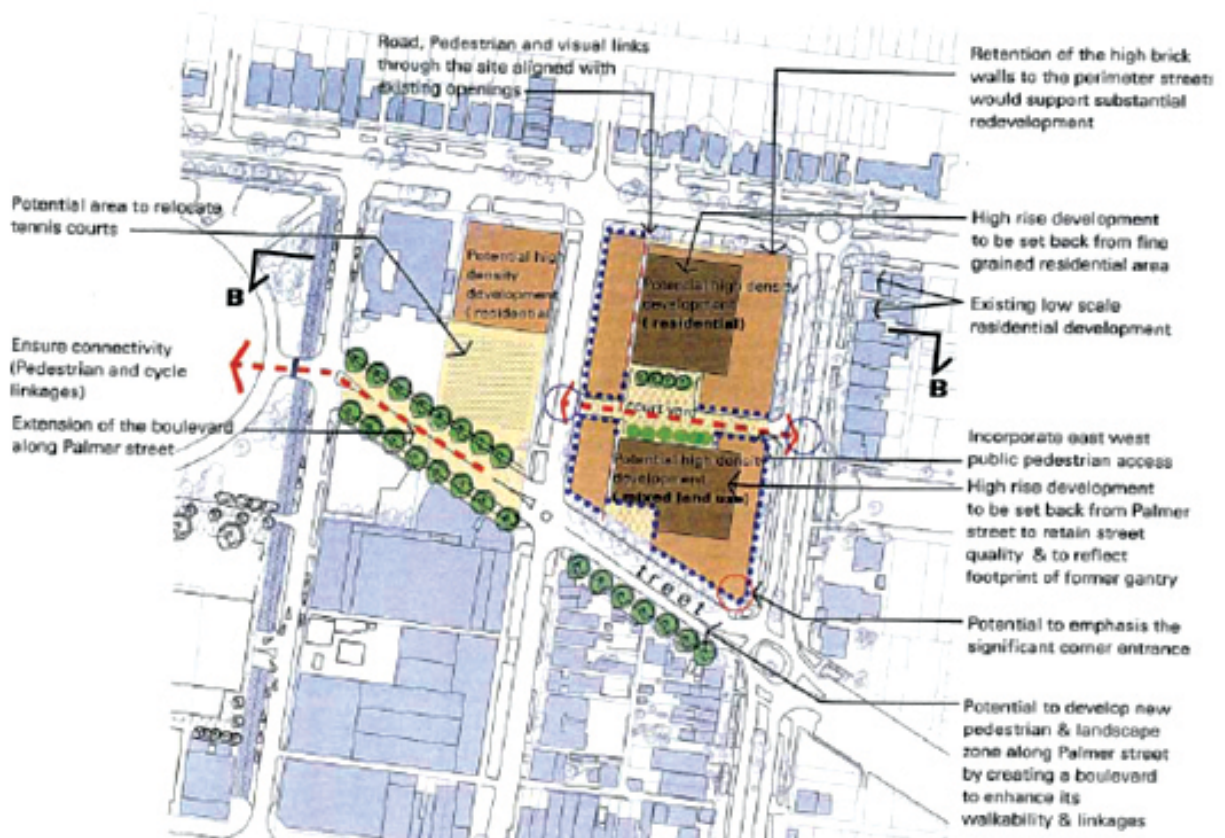
Provide future generations with a sustainable environment supported by regenerative systems and endowed with regenerative resources.

#### Support a living process

Continuously reevaluate assumptions and values and adapt to demographic and environmental change.

#### Use a systems thinking approach

Understand and value the relationships in an ecosystem and use an approach that reflects and sustains ecosystems services; re-establish the integral and essential relationship between natural processes and human activity.



**Survey Site Plan (Point to be considered)**

- (i) Survey site plan should be prepared to the scale and scale indicated in the name plate of the drawing.
- (ii) Side Dimensions/Angles/diagonals, as measured during survey should only be indicated in the plan. Any dimension indicated on the basis on 'scaled out' form the plan may lead to confusion/ complication while drawing plans etc.
- (iii) S.S. Plans should contain 'key plan' indicating board features of the surroundings. R.O.W. of the roads if any surrounding the plot should also be given.
- (iv) Reference to zone of Master Plan of DDA/MCD/NDMC should be given.
- (v) Detailed information about existing services (i.e. Water supply, Sewerage, Drains, Electricity) to be given.
- (vi) Location and size of trees and or any other obstacle (like Electric over head line) in the plot to be given.
- (vii) Reference to land (area, Revenue Khasra No. etc. ) as handed over to be given. Compare the land area as handed over and area of land as worked out on the basis of survey and reconcile the discrepancy, if any. (Detailed calculation of areas of land on the basis of survey to be given in the plan itself under "notes").
- (viii) 'Name plate' of drawing should be of standard size and should indicate following:
  - (a) Name of Division.
  - (b) Name of work.
  - (c) Name & Signature of the Person/official who has (have) done the survey.
  - (d) Date of Survey.
  - (e) Name & Signature of the Person/ Official who has (have) prepared and checked the plans.
  - (f) Scale.
  - (g) Name & Signature of J.E. , A.E. and Ex. Engr.
  - (h) Drawings No. (as recorded in the Drawing Register of the Division).
- (ix) North Line to be clearly indicated.
- (x) Legend/Symbols should be indicated properly.

\*\*\*\*\*

## Building Envelope & Insulation

*The interior of the house personifies the private world;  
the exterior of it is part of the outside world.  
- Stephen Gardiner*

The Building envelope building enclosure is the physical separator between the interior and the exterior environments of a building. It serves as the outer shell to help maintain the indoor environment (together with the mechanical conditioning systems) and facilitate its climate control. Building envelope design is a specialized area of architectural functions of the building envelope

- Support
- Control
- Finish

The Control function is the core of good performance, rain control, air control, heat control,

Control of air flow is important to ensure indoor air quality, control energy consumption, and avoid condensation and to provide comfort. Through components of the building envelope (interstitial) itself, as well as into and out of the interior space, affect building insulation , Hence air control includes the control of wind washing and convective loops.

Building envelopes – the location of buildings on their lot, their height and overall shape – can affect:-

- Neighborhood character.
- Sunlight to adjoining buildings.
- Open spaces.
- Privacy.
- Overlooking of other uses.
- The quality of spaces inside the building.
- The amenity and usability of private open spaces.
- The sense of pedestrian scale and amenity in nearby streets.



### Height and Massing

Building height can reinforce an area's character. Appropriate building height is derived from local context, street conditions and character objectives for an area, specific design objectives. For example, the protection of view lines, the natural features of an area, or solar access to the public realm may be important objectives.



### Street Setbacks

The setback of buildings from a street edge affects how uses relate to the public space of the street. Front setbacks, are also an important aspect, Setbacks add to the apparent breadth of the adjoining street and provide space for plantings.

### Relationships to Adjoining Buildings

The proximity of buildings to each other affects the amenity of spaces inside the building, the quality of space between buildings, visual and acoustic privacy and solar access to private and shared open spaces. The challenge is to provide appropriate separation between buildings to maximize light, air and outlook while meeting strategic planning goals and respecting neighborhood character.



### **Views to and from Residential Units**

Views onto and across streets and other public spaces are encouraged. For these frontages, the design of each building (or the use of blinds or other screening devices) is to deal with issues of privacy. Views from one building into adjoining buildings are, generally not acceptable, and the design of new buildings is expected to limit intrusion into the privacy of existing properties. The location and design of buildings, and open spaces must be carefully orchestrated to maintain reasonable levels of privacy for adjacent development.

### **Evaluation of Building Envelope**

“The area that separates conditioned space from unconditioned space or the outdoors. A building envelope includes all components of a building that enclose conditioned space. Building envelope components separate conditioned spaces from unconditioned spaces or from outside air.”

“A building envelop is the separation between the interior and the exterior environments of a building. It serves as the outer shell to protect the indoor environment as well as to facilitate its climate control.”

### **Improvement of Existing Building Envelope**

Reducing outside air infiltration into the building by improving building envelope tightness is usually quite feasible, during re-roofing; extra insulation can typically be added with little difficulty. Windows and insulation can be upgraded during more significant building improvements and renovations.

Installing a system in a new building or upgrading the equipment in an existing structure, its optimal performance (and reduced energy demand) depends on a high- performance building envelop. A tight, insulated shell including thermally efficient windows and doors, creates an environment that enables ultimate control of conditioned air and ventilation demand and costs.

A radiant floor system, for instance geothermal or passive solar energy are hard to implement short of gutting the place you call.

### **Efficiency and Building Envelope**

U-factor measures heat loss from a window. The rate of loss given as the U-factor of a fenestration assembly. The lower the number, the better the performance of the assembly, generally, those numbers range from 0.20 and 1.20. Most experts recommend that facility

executives seek out window assemblies with a U-factor lower than 0.35 in colder climates. Solar Heat Gain (SHGC) measures how well limits radiant heat gain that is caused by sunlight. This radiation is transmitted directly to the occupied space and lessens the heating load or increases the cooling load. The SHGC is expressed as a number between 0 and 1, and that fraction denotes how much radiation makes it into occupied space. As an example, a window with an SHGC of 0.35 would admit 35 percent of the radiant heat that hits the window and reflect 65 percent.

Visible Transmittance is a metric that measures how much light – not heat – comes through a product, other words, this metric determines how clear the glass is. Fenestration assemblies that reduce the visible transmittance the National Rating Council (NFRC), the visible transmittance is expressed as a number between 0 and 1. The higher the number, the more light is transmitted.

### **Walls and Roofing System**

Window assembly air leakage by a rating as the equivalent cubic feet of air passing through a square foot of window area – but it's also vitally important to determine heat loss through opaque walls and roofing systems.

Any roofing system is comprised, of two parts that affect energy efficiency roof material and the insulation in the sub – roof assembly.

Reflectivity values are measured on a scale of 0 to 1. A reflectivity value of 0.0 indicates that the surface absorbs all solar radiation, and a 1.0 reflectivity value represents total reflectivity.

### **R Value**

All main building materials (be it walls, floor, ceiling, loft or roof components) have known R-Values.

R-Value of a material can vary depending on the 'mode' of heat transfer you are trying to block (radiant or conductive); so for different seasons it can be advantageous to use materials with different qualities to suit whether you want to stop heat getting out (Winter) or heat getting in (Summer).

The higher the R-Value of a material the better an insulator it is, but this usually also implies higher costs.

Also of importance is the degree of external temperature range need to deal with where you live.

**Passive Solar & R Value**

Value is quite important in passive solar building design, knowing the correct R-Values for the external walls, floors and ceilings is key in working out what is termed ‘Skin Losses’; i.e. amount of heat that gets lost from the passive solar building the surrounding environment. The R-Value of a substance is its direct measure of its resistance to transferring energy or heat; R-Values are expressed using the metric units (m<sup>2</sup>.K/W). The higher the figure the better it is at resisting energy transfer, the easier it is to maintain a difference in temperatures across it for a longer time.

R-Value measures per meter squared the amount of degrees Kelvin temperature difference required to transfer one watt of energy. So an R-Value of 1 means per meter squared a single degree difference will transfer one watt of energy. So an R-Value of 2 will transfer half a watt of energy for a degree of difference.

\*\*\*\*\*

# Architectural Planning

*“Architecture is the will of an epoch translated into space.”*

*Meis Van Der Rohe*

An office building must have flexible and technologically-advanced working environments that are safe, healthy, comfortable, durable, aesthetically-pleasing, and accessible. It must be able to accommodate the specific space and equipment needs of the tenant. Special attention should be made to the selection of interior finishes and art installations, particularly in entry spaces, conference rooms and other areas with public access.

## Types of Spaces

An office building incorporates a number of space types to meet the needs of staff and visitors. These may include:

### Offices

- Offices: May be private or semi-private.
- Conference Rooms/ Meeting rooms

### Employee/Visitor Support Spaces

- Convenience Store, Kiosk, or Vending Machines
- Lobby: Central location for building directory, schedules, and general information
- Atria or Common Space: Informal, multi-purpose recreation and social gathering space
- Cafeteria or Dining Hall
- Toilets or Restrooms
- Physical Fitness Area
- Interior or Surface Parking Areas

### Administrative Support Spaces

- Administrative Offices: May be private or semi-private acoustically and/or visually.

### Operation and Maintenance Spaces

- General Storage: For items such as stationery, equipment, and instructional materials.
- Food Preparation Area or Kitchen
- Computer/Information Technology (IT) Closets. See WBDG Automated Data Processing Center for PC System related information.
- Maintenance Closets

### **Cost-Effective**

The high-performance office should be evaluated using life-cycle economic and material evaluation models. To achieve the optimum performance value engineering provides a means for assessing the performance versus cost of each design element and building component. In the design phase building development, properly applied value engineering considers alternative design solutions to optimize the expected cost/worth ratio of projects at completion.

### **Urban Planning**

The concentration of a large number of workers within one building can have a significant impact on neighborhoods. Consideration of transportation issues must also be given when developing office structures. Office buildings are often impacted by urban planning and municipal zoning, which attempt to promote compatible land use and vibrant neighborhoods.

- Consideration should be given when selecting office locations to the distance the majority of occupants will have to travel to reach the office.
- Once a building has been constructed and occupied, it is critical that long-term performance be confirmed through an aggressive process of metering, monitoring and reporting.

### **Functional/Operational**

The building design must consider the integrated requirements of the intended tenants. This includes their desired image, degree of public access, operating hours, growth demands, security issues and vulnerability assessment results, organization and group sizes, growth potential, long-term consistency of need, group assembly requirements, electronic equipment and technology requirements, acoustical requirements, special floor loading and filing/storage requirements, special utility services, any material handling or operational process flows, special health hazards, use of vehicles and types of vehicles used, and economic objectives.

### **Flexibility**

The high-performance office must easily and economically accommodate frequent renovation and alteration. These modifications may be due to management reorganization, personnel shifts, changes in business models, or the advent of technological innovation, but the office infrastructure, interior systems, and furnishings must be up to the challenge.

- Consider raised floors to allow for easy access to cabling and power distribution, as well as advanced air distribution capabilities to address individual occupant comfort.

- Incorporate features such as plug-and-play floor boxes for power, data, voice and fiber, modular and harnessed wiring and buses, and conferencing hubs to allow for daily flexibility at work as well as future reorganization of office workstations.

### **Productive**

Worker Satisfaction, Health, and Comfort of employees in a high-performance office are of paramount concern.

- Utilize strategies such as increased fresh air ventilation rates, the specification of non-toxic and low-polluting materials and systems, and indoor air quality monitoring.
- Provide individualized climate control that permits users to set their own, localized temperature, ventilation rate, and air movement preferences.
- Access to windows and view, opportunities for interaction, and control of one's immediate environment are some of the factors that contribute to improved workplace satisfaction.
- Natural light is important to the health and psychological well-being of office workers. The design of office environments must place emphasis on providing each occupant with access to natural light and views to the outside. A minimum of 100-150 LUX of diffused indirect natural light is desirable.
- The acoustical environment of the office must be designed and integrated with the other architectural systems and furnishings of the office. Special consideration must be given to noise control in open office settings, with absorptive finish materials, masking white noise, and sufficient separation of individual occupants.

### **Technical Connectivity**

Technology has become an indispensable tool for business, industry, and education. Given that technology is considered the following issues when incorporating it, particularly information technology (IT), into an office:

- Plan new office buildings to have a distributed, robust, and flexible IT infrastructure.
- During the planning stage, identify all necessary technological systems (e.g., voice/cable/data systems such as audio/visual systems, speaker systems, Internet access, and Local Area Networks [LAN] / Wide-Area Networks [WAN] / Wireless Fidelity [WI-FI]), and provide adequate equipment rooms and conduit runs for them.
- Consider and accommodate for wireless technologies, as appropriate.
- For existing office buildings, consider improving access to the IT infrastructure as renovations are undertaken.

## Architectural Design Features

### Glare Control

- Limit or protect the views of extremely bright exterior surfaces, such as parked cars and large paving or sand areas. The reflected glare from these surfaces can be visually uncomfortable.
- When using an interior shade, select a light-color shade to minimize heat gain.
- To maintain an exterior view while shading the window, consider fine screens that reduce illumination and glare while allowing contact with the view. Another option is to use screens or louvers that operate upward from the window sill.

### Glazing Selection

- Select insulated low-e glazing units to reduce thermal In general, spaces dominated by cooling loads should loads and provide better comfort in perimeter zones.
- Have glass with a low solar heat gain coefficient Low-emissivity (low-e) coatings and argon between the (SHGC), possibly with a reflective outer surface.
- Size all windows to provide the best daylighting.
- Add additional windows for view glass.
- Frame views without over glazing the space.
- Specify glazing properties to minimize heating and cooling loads, and maximize visual comfort.
- Place external overhangs on south-facing windows to prevent glare and summer solar gains. Depending on simulation results, some south-facing windows may be unshaded to allow for good daylighting.
- Use interior shade devices to provide user control of glare.

### Visible Transmittance

The percent of the visible spectrum striking the glazing that passes through the glazing mentioned as visible transmittance. This value changes with angle of incidence.

Lower transmittance glazing will also typically result in better distribution of daylight at a more appropriate illumination level.

### Solar Heat Gain Coefficient (Shgc)

SHGC ratio of total transmitted solar heat to incident solar energy. A value of 1.0 indicates that 100% of the solar gain enters the building. A value of 0.0 indicates no solar gain is entering the space.

- Windows shaded by overhangs on the south facade should have high SHGC (0.70 or greater).



- North-facing windows can typically have high SHGC values.

### Shading Coefficient (SC)

Shading Coefficient ratio of solar gain of a particular glazing compared to the solar gain of clear single and double pane glazing and many tinted single pane glazing windows

### Maintain Thermal Comfort

- Window and shading design are strongly linked to perimeter zone comfort, regardless of air temperature. Hot or cold glass behaves comfort independent of air temperature.
- Consider the effect of the window's mean radiant temperature on thermal comfort, poorly insulated window (high U value) decrease the surface temperature in winter. Fenestration should be designed to facilitate daylighting and reduce the need for electric lighting.

Effective daylighting strategies should include a combination of the following strategies:

- **Exterior shading:** Overhangs and vertical fins block direct sun and can bounce reflected light into interior spaces.
- **Interior light distribution:** Light shelves, diffusers, or reflective surfaces move the light further back into the space.
- **Daylighting controls:** Automatic or manual controls dim or turn-off electric lighting when there is sufficient daylight.

Rules of thumb that can be followed to maximize daylighting without compromising thermal performance are as follow:

- Know the true north orientation of the site and include it on all plan drawings. Lot property lines are typically given relative to true north.
- If the site allows, the first attempt at building placement should be with the long axis running east-west.
- Minimize apertures on the east and especially the west. Low sun angles for these orientations makes shading extremely difficult without blocking the entire window. Keep window-to-wall ratio between 0.30 and 0.40. Higher WWR will require careful handling.
- Study the potential for (a) an articulated form that yields a high percentage of perimeter space, (b) an envelope structure and cladding that can integrate shading, and (c) opportunities for the building to shade itself.
- Develop initial thoughts about shading strategy and glazing type.
- Determine whether your project budget will allow consideration of a light shelf or

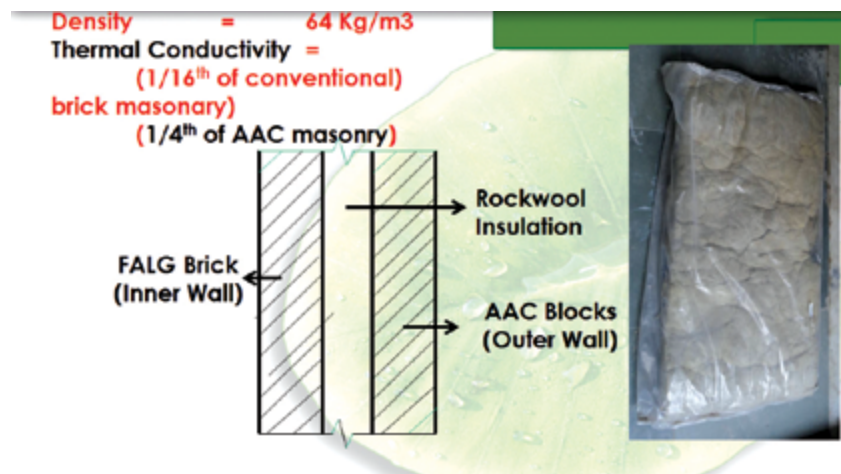
exterior projecting shading elements.

- Begin window design with both interior consideration and exterior appearance concerns simultaneously. Place windows primarily to provide view and light.
- Identify which occupant task best benefit from daylight before laying out task locations on floors. Put tasks requiring low, uniform light levels or with periodic occupancy (e.g. telephone closet) in the building core. Keep interior finishes light-colored.
- Discuss daylighting concepts with lighting designer or consultant to ensure that electric lighting design process.
- Built a simple model and view it outdoors for lighting quality and glare.

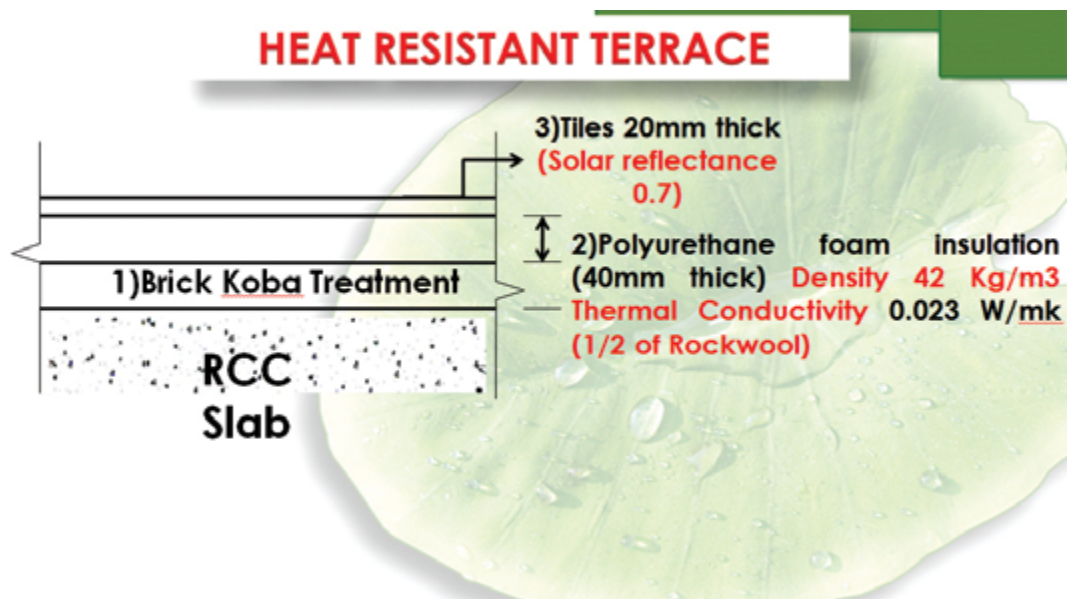
## Technical Tips For Roofs and Walls

- Additional cost of insulation pays back in energy savings that result from correctly sizing the HVAC equipment to reduced cooling loads. Good insulation also extends the life of the roof system.
- Insulation of walls is important for reducing conduction losses especially where significant difference between inside and outside temperature. Many types of insulation are available, some that prevent air movement and moisture movement into and out of the conditioned space.
- Infiltration and exfiltration is the unwanted air movement through a building and is caused by a pressure difference (air move form high pressure to a lower pressure). Limiting air infiltration and exfiltration is key to improving energy efficiency.
- Optimize insulation by applying it to the outside of the wall components to minimize thermal bridging.

## Wall Assembly With Rock Wool Insulation



## Roof Assembly



- Choose between dual-pane and single-pane glazing. This is the critical first decision in glazing selection. Although higher in first cost, dual-pane insulating glazing typically improves comfort in perimeter zones, improves acoustic performance, Single-pane glazing with exterior shading can be effective in mild climates.
- Choose a spectrally selective glazing. Select a moderate visible transmittance for glare control (50-70% is good starting point, depending on visual tasks, window size and glare sensitivity; the larger the windows or the more critical the glare control, the lower the desirable visible transmittance).
- Balance the conflict between glare and use light. If glare is an anticipated problem, and if an architectural solution to glare is not possible then select a glazing visible transmittance that is a compromise between glare and light. A visible transmittance as low as 25% may still provide adequate daylight.
- Window size and glazing selection can trade off with each other. Use the effective aperture approach when making these decision: Larger window area requires lower visible transmittance; smaller windows requires high visible transmittance. A good target value for effective aperture is between 0.30 and 0.40.
- Big windows require better glazing. The bigger the window, the lower the required solar heat gain coefficient and visible transmittance. The bigger the window, the greater the need for insulating glazing. Large areas of inefficient glazing bring major comfort and energy cost penalties, cooling system penalties, and may not be permitted by building codes.

- Don't assume that dark glass provides good solar control. Dark glazing can block more light than heat, and therefore only minimally reduce cooling load. Dark glass can produce gloomy interior atmosphere and may affect productivity and absenteeism. Today, solar control is available in much clearer glazing.
- Don't count on glazing alone to reduce heat gain and discomfort. If direct solar beams come into the building, they still create a mechanical cooling load and discomfort for occupants in their path. Exterior shading combined with a good glazing selection is the best window strategy. Interior shading options can also help control solar heat gain.

\*\*\*\*\*

# Fire and Life Safety

## Relevant Extract from NBC-2005

### Fire Prevention

#### Classification of Building Based on Occupancy

All buildings, whether existing or hereafter erected shall be classified according to the use or the character of occupancy in one of the following groups:

Group A	Residential
Group B	Educational
Group C	Institutional
Group D	Assembly
Group E	Business
Group F	Mercantile
Group G	Industrial
Group H	Storage
Group J	Hazardous

#### *Group E Business Buildings*

These shall include any building or part of a building which is used for transaction of business (other than that covered by Group F and part of buildings covered for keeping of accounts and records and similar purposes, professional establishments, service facilities, etc. City halls, town halls, court houses and libraries shall be classified in this group so far as the principal function of these is transaction of public business and keeping of books and records.

Business buildings shall be further sub-divided *as follows*:

E-1 Offices, banks, professional establishments, like offices of architects, engineers, doctors, lawyers and police stations.

### Fire Zones

The fire zones shall be made use of in land use development plan and shall be designated as follows:

- a) *Fire Zone No. 1* — This shall comprise areas having residential (Group A), educational (Group B), institutional (Group C), and assembly (Group D), small business (Subdivisions E-1 ) and retail mercantile (Group F) buildings, or mess which are under development for such occupancies.

### **Restrictions on the Type of Construction for New Buildings**

Buildings erected in Fire Zone No. 1 shall conform to construction of Type 1, 2, 3 or 4.

### **Openings in Separating Walls and Floors**

At the time of designing openings in separating walls and floors, particular attention shall be paid to all such factors as will limit fire spread through these openings and maintain fire rating of the structural member.

For Types 1 to 3 construction, a doorway or opening in a separating wall on any floor shall be limited to 5.6 m<sup>2</sup> in area with a maximum height /width of 2.75 m. Every wall opening shall be protected with fire-resisting doors having the fire rating of not less than 2 hr. All openings in the floors shall be protected by vertical enclosures extending above and below such openings, the walls of such enclosures having a fire resistance of not less than 2 h. Openings in walls or floors which are necessary to be provided to allow passages of all building services like cables, electrical wirings, telephone cables, plumbing pipes, etc, shall be protected by enclosure in the form of ducts/shafts having a fire resistance not less than 2 h.

### **Vertical Opening**

Every vertical opening between the floors of a building shall be suitably enclosed or protected, as necessary, to provide the following:

- a) Reasonable safety to the occupants while using the means of egress by preventing spread of fire, smoke, or fumes through vertical openings from floor to floor to allow occupants to complete their use of the means provide a clear height of 2 100 mm in the passage/escape path of the occupants.

### **Fire Stop or Enclosure of Openings**

Where openings are permitted, they shall not exceed three-fourths the area of the wall in the case of an external wall and they shall be protected with fire resisting assemblies or enclosures having a fire resistance equal to that of the wall or floor in which these are situated.

### **Air-conditioning and Ventilation**

Air-conditioning and ventilating systems shall be so installed and maintained as to minimize the danger of spread of fire, smoke or fumes from one floor to other or from outside to any occupied building

Air-conditioning and ventilating systems circulating air to more than one floor or fire area shall be provided with dampers designed to close automatically in case of fire.

### **Arrangement of Exits**

Exits shall be so located that the travel, distance on the floor shall not exceed the distance given in Table.

The travel distance to an exit from the dead end of a corridor shall not exceed half the distance specified

### **Travel Distance for Occupancy and Type of Construction**

*(Clauses 4.4.1,4.5.1 and 4.5.2)*

#### **S1 Group of Occupancy**

##### **Maximum Travel Distance**

- |               |     |
|---------------|-----|
| i) Mercantile | 30m |
|---------------|-----|

All buildings, which are 15 m in height or above, and all buildings with any of the occupancies, having area more than 500 sq.m. on each floor shall have a minimum of two staircases. They shall be of enclosed type; at least one of them shall be on external walls of buildings and shall open directly to the exterior, interior open space or to an open place of safety.

### **Internal Staircases**

#### **Office Building Shall Have Staircase Width 1.5 M**

The exit sign with arrow indicating the way to the escape route shall be provided at a suitable height from the floor level on the wall and shall be illuminated by electric light connected to corridor circuits.

### **Horizontal Exits**

The width of horizontal exit shall be same as for the exit doorways.

A horizontal exit shall be equipped with at least one fire/smoke door of minimum 1 h fire resistance, of self-closing type. Further, it is required to have direct connectivity to the fire escape staircase for evacuation.

### **Refuge Area**

For buildings more than 24 m in height, refuge area of 15 SQ.M. or an area equivalent to 0.3 SQ.M.per person to accommodate the occupants of two consecutive floors, whichever is higher, shall be provided as under:

The refuge area shall be provided on the periphery of the floor or preferably on a cantilever projection and open to air at least on one side protected with suitable railings.

For floors above 24 m and Up to 39 m —

One refuge area on the floor immediately above 24 m.

For floors above 39 m —

One refuge area on the floor immediately above 39 m and so on after every 15 m. Refuge area provided in excess of the requirements shall be counted towards FAR.

### **Fire Lifts**

Where applicable, fire lifts shall be provided with a minimum capacity for 8 passengers and fully automated with emergency switch on ground level. In general, buildings 15 m in height or above shall be provided with fire lifts.

### **Emergency and Escape Lighting**

Emergency lighting shall be powered from a source independent of that supplying the normal lighting.

Escape lighting shall be capable of indicating clearly and unambiguously the escape routes.

### **Fire Detection and Warning**

In buildings of such size, arrangement or occupancy where a fire may not itself provide adequate warning to occupants, automatic fire detection and alarm facilities shall be provided, where necessity, to warn occupants early of the existence of fire, so that they may escape, and to facilitate the orderly conduct of fire exit drills.

### **Fire Protection**

Fire Extinguishers/Fixed Fire Fighting Installations

All buildings depending upon the occupancy use and height shall be protected by fire extinguishers, wet riser, down-comer, automatic sprinkler installation, high/medium velocity water spray, foam, gaseous or dry powder system in accordance with the provisions



### **Static Water Storage Tanks**

A satisfactory supply of water for the purpose of fire fighting shall always be available in the form of underground/terrace level static storage tank with capacity specified for each building with arrangements or replenishment by mains of alternative source of supply at the rate of 1000 litre/minute for underground static tank. When this is not practicable, the capacity of static storage tank(s) shall be increased proportionately in consultation with the local fire brigade.

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# Natural Lighting

## Relevant Extract from NBC-2005

### **Lighting**

Principles of Lighting

*Aims of Good Lighting*

Good lighting is necessary for all buildings and has three primary aims. The first aim is to promote work and other activities carried out within the building; the second aim is to promote the safety of the people using the building; and the third aim is to create, in conjunction with the structure and decoration, a pleasing environment conducive to interest of the occupants and a sense of their well-being.

### **Daylighting**

The primary source of lighting for daylighting is the sun. The light received by the earth from the sun consists of two parts, namely, direct solar illuminance and sky illuminance. For the purposes of daylighting design, direct solar illuminance shall not be considered and only sky illuminance shall be taken as contributing to illumination of the building interiors during the day.

### **General Principles of Openings to Afford Good Lighting**

Generally, while taller openings give greater penetrations, broader openings give better distribution of light. It is preferable that some area of the sky at an altitude of  $20^\circ$  to  $25^\circ$  should light up the working plane.

Broader openings may also be equally or more efficient, provided their sills are raised by 300 mm to 600 mm above the working plane.

For a given penetration, a number of small openings properly positioned along the same, adjacent or opposite walls will give better distribution of illumination than a single large opening.

Unilateral lighting from side openings will, in general, be unsatisfactory if the effective width of the room is more than 2 to 2.5 times the distance from the floor to the top of the opening.

Openings on two opposite sides will give greater uniformity of internal daylight illumination, especially when the room is 7 m or more across

Cross-lighting with openings on adjacent walls tends to increase the diffused lighting within a room.

Openings in deep reveals tend to minimize glare effects.

Openings shall be provided with *CHAJ.LAHS*, louvers, baffles or other shading devices to exclude, as far as possible, direct sunlight entering the room.

Light control media, such as translucent glass panes (opal or matt) surfaced by grinding, etching or sandblasting, configurated or corrugated glass, certain types of prismatic glass, tinted glass and glass blasts are often used.

### **Artificial Lighting**

Artificial lighting may have to be provided

- a) where the recommended illumination levels have to be obtained by artificial lighting only,
- b) to supplement daylighting when the level of illumination falls below the recommended value, and
- c) where visual task may demand a higher level of illumination.

### **Artificial Lighting Design for Interiors**

For general lighting purposes, the recommended practice is to design for a level of illumination on the working plane for Office on the basis of the recommended levels for visual tasks is 300-750 lux

# Ventilation

## Relevant Extract from NBC-2005

### General

Ventilation of buildings is required to supply fresh air for respiration of occupants, to dilute inside air to prevent vitiation by body odours and to remove any products of combustion or other contaminants in air and to provide such thermal environments as will assist in the maintenance of heat balance of the body in order to prevent discomfort and injury to health of the occupants.

### Recommended Values for Air Changes

The standards of general ventilation are recommended/ based on maintenance of required oxygen, carbon dioxide and other air quality levels and for the control of body odours when no products of combustion or other contaminants are present in the air the values of air changes in case of Offices is 6-10 Air Change per Hour.

### Methods of Ventilation

General ventilation involves providing a building with relatively large quantities of outside air in order to improve general environment of the building. This may be achieved in one of the following ways:

- a) Natural supply and natural exhaust of air
- b) Natural supply and mechanical exhaust of air;
- c) Mechanical supply and natural exhaust of air,
- d) Mechanical supply and mechanical exhaust of air.

### Natural Ventilation

The rate of ventilation by natural means through windows or other openings depends on:

- a) direction and velocity of wind outside and sizes and disposition of openings (wind action), and
- b) convection effects arising from temperature of vapour pressure difference (or both) between inside and outside the room and the difference of height between the outlet and inlet openings (stack effect).

### Design Guidelines for Natural Ventilation

#### By wind action,

A building need not necessarily be oriented perpendicular to the prevailing outdoor wind;

It may be oriented at any convenient angle between  $0^\circ$  and  $30^\circ$  without losing any beneficial aspect of the breeze. If the prevailing wind is from East or West, building may be oriented at  $45^\circ$  to the incident wind so as to diminish the solar heat without much reduction in air motion indoors.

Inlet openings in the buildings should be well distributed and should be located on the windward side at a low level, and outlet openings should be located on the leeward side. Inlet and outlet openings at high levels may only clear the top air at that level without producing air movement at the level of occupancy.

Maximum air movement at a particular plane is achieved by keeping the sill height if the opening at 85 percent of the critical height (such as head level) for the following recommended levels of occupancy:

- 1) For sitting on chair 0.75 m,

Inlet openings should not as far as possible be obstructed by adjoining buildings, trees etc.

In rooms of normal size having identical windows on opposite walls.

Greatest flow per unit area of openings is obtained by using inlet and outlet openings of nearly equal areas at the same level.

Where the direction of wind is quite constant and dependable, the size of the inlet should be kept within 30 to 50 percent of the total area of openings and the building should be oriented perpendicular to the incident wind.

Horizontal louvers, horizontal sashes affects wind motion in the space.

Ventilation conditions indoors can be ameliorated by constructing buildings on earth mound having a slant surface with a slope of  $10^\circ$  on upstream side.

### **By Stack Effect**

Natural ventilation by stack effect occurs when air inside a building is at a different temperature than air outside. Thus in heated buildings or in buildings cool outside air will tend to enter through openings at low level and warm air will tend to leave through openings at high level. It would, therefore, be advantageous to provide ventilators as close to ceilings as possible. Ventilators can also be provided in roofs as, for example, cowl, ventpipe, covered roof and ridge vent.

# Development Control Rules

## Relevant Extract from MPD 2021

Notes:

**Table 8.2: Development Controls - Govt. Offices**

Use/ Use Premises	Maximum			Parking Standard ECS/100 sq.m. of floor area	Definition	Activities permitted
	Ground	FAR	Height (m)			
(i) Integrated Office Complex	30	200	NR, subject to approval of AAI, Fire Department and other statutory bodies.	1.8	Premises used for the office of Central Government, Local Government and Local Bodies.	Government Offices, Watch and Ward Residence/ residential maintenance staff (maximum 5% of FAR), Retail shop of Chemist, Book and stationery, Consumer Store, Canteen, Post office, Bank Extension Counter etc. Public sector Undertaking/ Commercial offices (restricted to 10% of the total floor area)
(ii) District Court	30	200	NR, subject to approval of AAI, Fire Department and other statutory bodies.	1.8	Premises used for the offices of Judiciary.	Court, Residential maintenance staff (maximum 5% of FAR), Canteen, Restaurant, Ancillary services and Retail shop, Library, Dispensary, Administrative offices, Banks, Post offices, Police post, Fire post, Lawyer's chamber.

- (i) The norms for Local Government offices / Public Sector Undertakings under Government Land use shall be as per Integrated office complex.

- (ii) The norms of Govt. use (undetermined) shall be as per approved layout / scheme, which development controls shall be as per respective use premises.

Use Premises Use Zones

	RD	C1	C2	M	PS
<b>GOVERNMENT</b>					
(i) Local / Government maintenance Offices	P	P	P	P	P
(ii) Offices of utility services providing agencies	P	P	P	P	P

P Permitted

RD –Residential area

C1 Retail Shopping, General Business and Commerce, District Centre, Community Centre, Non Hierarchical Commercial Centre.

C2 Wholesale, Warehousing, Cold Storage and Oil Depot

M Industrial

PS PUBLIC AND SEMI PUBLIC FACILITES

**Regulations for Building Controls within use Premises**

**Table 17.1: Minimum Setbacks (Other than Residential Plotted Development)**

S.No.	Plot size (in sq.m)	Minimum Setbacks			
		Front (m)	Rear (m)	Side (m) (1)	Side (m) (2)
1.	Upto 60	0	0	0	0
2.	Above 60 & upto 150	3	1.5 (avg.)	-	-
3.	Above 150 & upto 300	4	2 (avg.)	-	-
4.	Above 300 upto 500	4	3	3	-
5.	Above 500 upto 2,000	6	3	3	3
6.	Above 2,000 upto 10,000	9	6	6	6
7.	Above 10,000	15	12	12	12

**Parking Standards**

Parking Standards have been prescribed for Government 1.8 Equivalent Car Spaces (ECS) per 100 sqm. of floor area.

- (i) In existing buildings having plot area of more than 2000 sqm., an extra ground coverage of 5% shall be permissible for construction of automated multi-level parking to provide dedicated parking structures for additional needs.

- (ii) For the provision of car parking spaces, the space standards shall be as given
- (iii) In the use premises, parking on the given standards shall be provided within the plot.

**Table 17.3: Space Standards for Car Parking**

S.No	Type of Parking	Area in sqm. per ECS
1.	Open	23
2.	Ground floor covered	28
3.	Basement	32
4.	Multi level with ramps	30
5.	Automated multilevel with lifts	16

**Basements**

- (a) Basement(s) upto the setback line maximum equivalent to parking and services requirement, such as Air Conditioning Plant and equipment, water storage, Boiler, Electric Sub-Station HT and LT Panel rooms, Transformer Compartment, Control Room, Pump House, Generator Room and other mechanical services and installation of electrical and fire fighting equipments, and other services required for the maintenance of the building with prior approval of the concerned agencies, could be permitted and not to be counted in FAR. However, the area provided for services should not exceed 30 % of the basement area.
- (b) The basement(s) above the plot level shall be kept flushed with the ground and shall be ventilated with mechanical means of ventilation; and
- (c) Basement(s) shall be designed to take full load of the fire tender, wherever required and subject to adequate safety measures.
- (d) In case the basement is used for activity in conformity with the use premises, wherever permitted, the same shall be counted in FAR subject to clearance from the Fire Authorities and other statutory bodies.
- (e) The ESS, fire fighting installations and underground water tank shall neither be counted in ground coverage nor in FAR.

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# Building Services-HVAC

## Heating, Ventilation and Air Conditioning

HVAC systems have a significant effect on the health, comfort, and productivity of occupants. Issues like user discomfort, improper ventilation, and poor indoor air quality are linked to HVAC system design and operation and can be improved by better mechanical and ventilation system design.

## Factors Affecting Thermal Comfort

Thermodynamic processes take place between the human body and the surrounding thermal environment. Our perception of thermal comfort and acceptance of indoor thermal environment is a result of the heat generated by metabolic processes and the adjustments that the human body makes to achieve a thermal balance between our body and the environment.

## Determining Loads

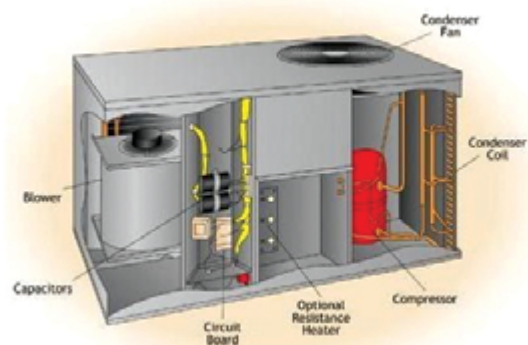
Projected load for new buildings can be analyzed accurately by using Computer Simulation. Hourly simulation models designed for energy analysis, calculate hourly cooling loads from detailed building geometry, scheduling, and equipment data.

## Types of Air-Conditioning Systems

There are 4 primary types of heating and cooling systems: split systems, hybrid systems, duct-free split systems and packaged systems.

## Room and Split Air-Conditioners

Room air-conditioners cool rooms rather than the building. They provide cooling only when needed. Room air-conditioners are less expensive to operate than central units, even though their efficiency is generally lower than that of central air-conditioners.



In a split-system central air-conditioner, an outdoor metal cabinet contains the condenser and compressor, and an indoor cabinet contains the evaporator. In many split-system air-conditioners, this indoor cabinet also contains a furnace or the indoor part of heat pump.

### Packaged Air-Conditioners

In a packaged air-conditioners, the evaporator, condenser, and compressor are all located in one cabinet, which usually is placed on a roof or on a concrete slab adjacent to the building.

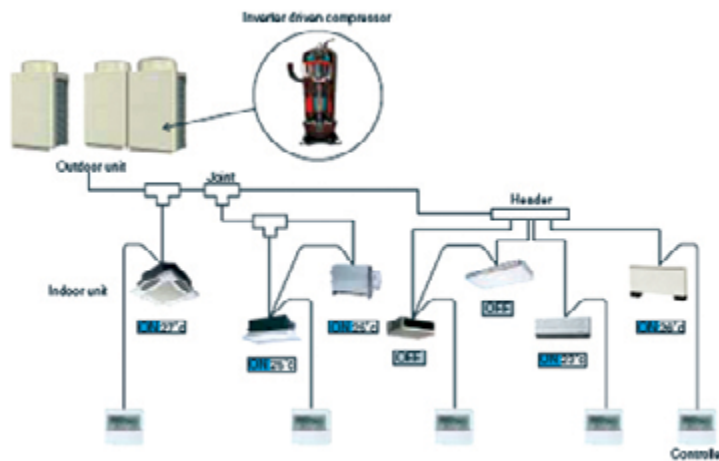
This type of air-conditioner is typical in small commercial buildings and also in residential buildings. Air supply and return ducts come from indoors through the building's exterior wall or roof to connect with the packaged air-conditioners, which is usually located outdoors. This combination of air-conditioner and central heater eliminates the need for a separate furnace indoor.

### Central Air-Conditioners

In central air-conditioning systems, cooling is generated in a chillers and distributed to air-handling units or fan-coil units with a chilled water system. This category includes systems with air-cooled chillers as well as systems with cooling towers for heat rejection

### VRV Air Conditioning System

VRV is a multi and direct expansion type air conditioning system that one outdoor unit can be connected with multiples of indoor units. The amount of refrigerant can be changed freely according to the load in the indoor unit because inverter compressor is used in the outdoor unit. Zoning in a small office is easily made possible with indoor unit whose minimum capacity is very small. Energy conservation is easily handled because individual indoor unit can stop and start its operation as needed.

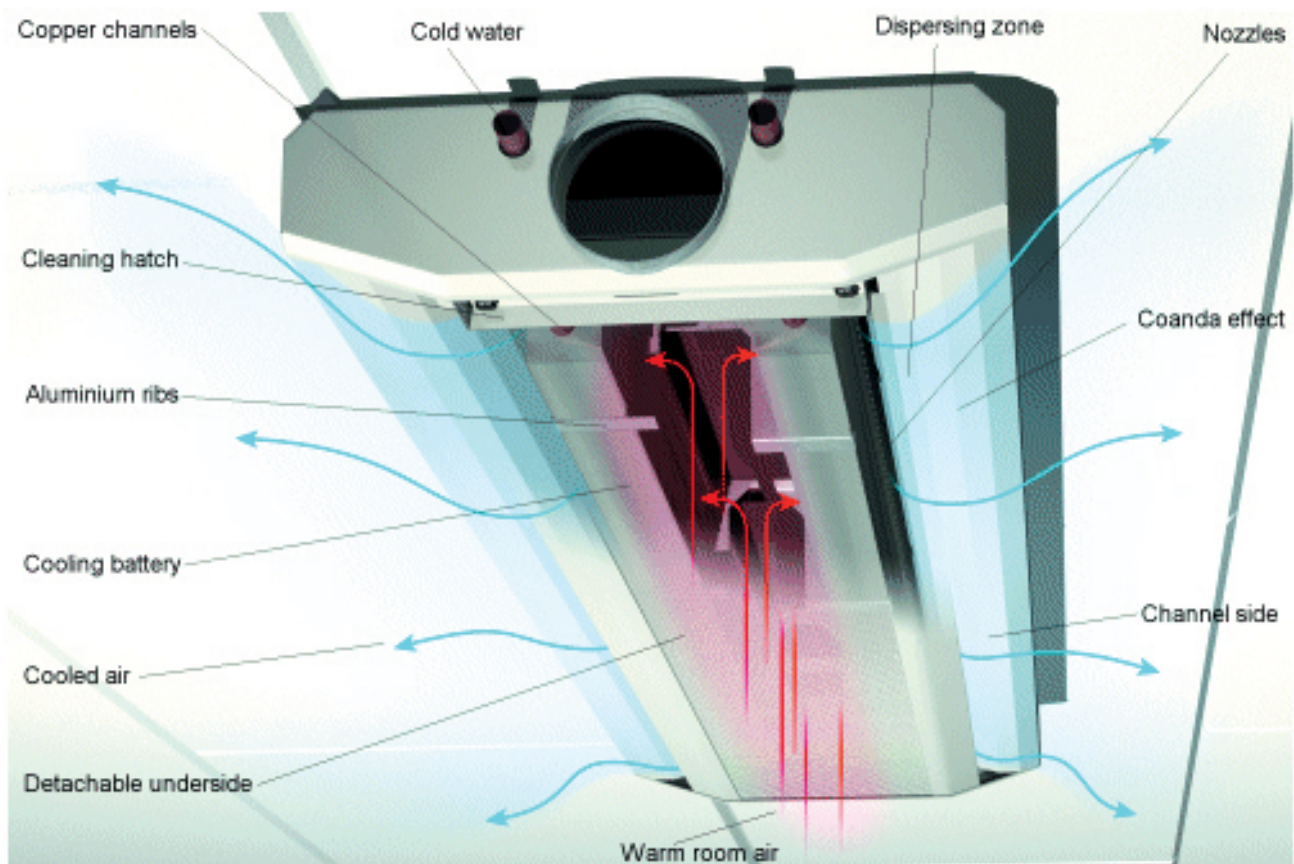


Schematic Diagram of VRV System

## Chilled Beam

Chilled beams are predominantly used for cooling and ventilating spaces, where a good indoor environment and individual space control is valued. Chilled beams use water to remove heat from a room and are located in the room space. Chilled beams are primarily used in locations where the humidity can be controlled.

Chilled beams provide excellent thermal comfort, energy conservation and efficient use of space due to high heat capacity of water used as heat transfer medium. Chilled beam operation is simple and trouble free due to having minimum maintenance requirements. Chilled beam also supplement the flexible use of available space, at the same time as the high temperature cooling and low temperature heating maximizing the opportunity for free cooling and heating. Operation of the chilled beams is used where the internal humidity loads are moderate, the primary air is dehumidified and any infiltration through the building is limited and controlled.



Schematic Diagram of Chilled Beam

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## Barrier Free Parameters

*“All of us do not have equal talent, but all of us should have an equal opportunity to develop our talents.”*  
- J.F.Kennedy

To accommodate the persons with disabilities and elderly, each building and its site should be planned and designed as an integral unit from the very beginning of the design process. Few integral components of the building design can be planned following these considerations.

### Kerb Ramp

- Width should not be less than 1200mm
- Useful for a smooth transition.
- Footpath flushed with roadway, at a gradient not exceeding that 1:12.
- Warning strip to be provided on the kerb side edge of the slope.

### Footpath

- Obstruction-free for the convenience of all users.
- Height of the footpath not to be more than 150 mm from the road level.
- Change in level on the footpath should be made clearly visible.
- Width of the footpath should 1800 mm and minimum clear unobstructed path should be 1200 mm.
- Street furniture should be placed outside the path of travel.
- **Resting Places** should be provided along travel routes.
- **Protruding elements** should be avoided.
- **Bollards** should be 1000 mm high, painted in contrasting colour stripes with clear minimum gap of 1200 mm.

### Parking

- Parking should be within 30 meters of the main entrance the building.
- Two accessible parking lots with dimension 3600mm X 5000mm.
- International symbol of accessibility painted on the ground and also on a signpost/board.
- Directional signs guiding people to the accessible parking.
- Wheel stoppers to be provided, to

## Ramps

- Gentle slope: 1:12 max. 1800 x 1800 landing after 9m of travel distance.
- Width: 1800mm or more.
- Handrails to be on both sides and at two levels – 760mm and 900mm. Extend 300mm beyond top and bottom of ramp.
- Warning tile should be placed at 300mm before and the ramp edges.

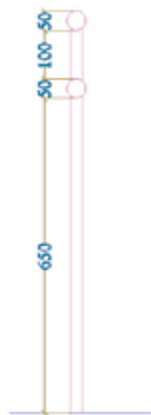
## Steps and Stairs

- Uniform risers : 150mm and tread: 300mm.
- Stair edges should have 50mm wide, bright/ contrast colour band.
- Maximum height of a flight between landings to be 1200mm.
- Landing should be 1200mm clear of any door swing.
- The steps should have an unobstructed width of at least 1200mm.
- Continuous handrails on both sides including the wall (if any) and at two levels – 760mm and 900mm.
- Warning tile to be placed 300mm at the beginning and at the end of all stairs.
- Nosing should be avoided.

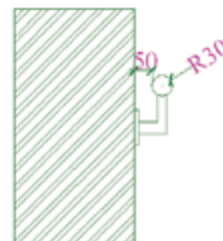
## Handrails

Handrails/ Grab bars are extremely important features and must be designed to be easy to grasp and to provide a firm and comfortable grip so that the hand can slide along the rail without obstruction.

Handrails should be circular with a diameter of 38mm, at least 50mm clear two levels – 760mm and 900mm from the finished floor, extend by at least 300mm.



Section of A Railing



Grab Bar Fixed on Wall

Grab bars should: -

- Be slip-resistant with round ends;
- Have a circular section of 38-50 mm in diameter;
- Be free of any sharp or abrasive elements;
- Have continuous gripping surfaces, without interruptions or obstructions that can break a hand hold;
- Have a minimum clear space of 50 mm from the wall;
- Be installed at a height of 760 mm to 900 mm

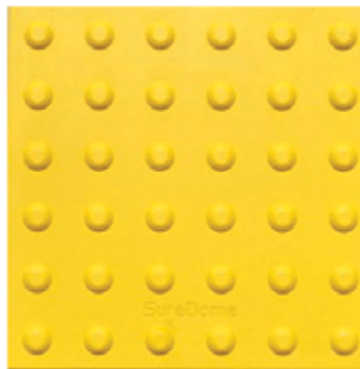
### Tactile Surface

**Line-type blocks (Guiding tile):** indicate the correct path/ route to follow.

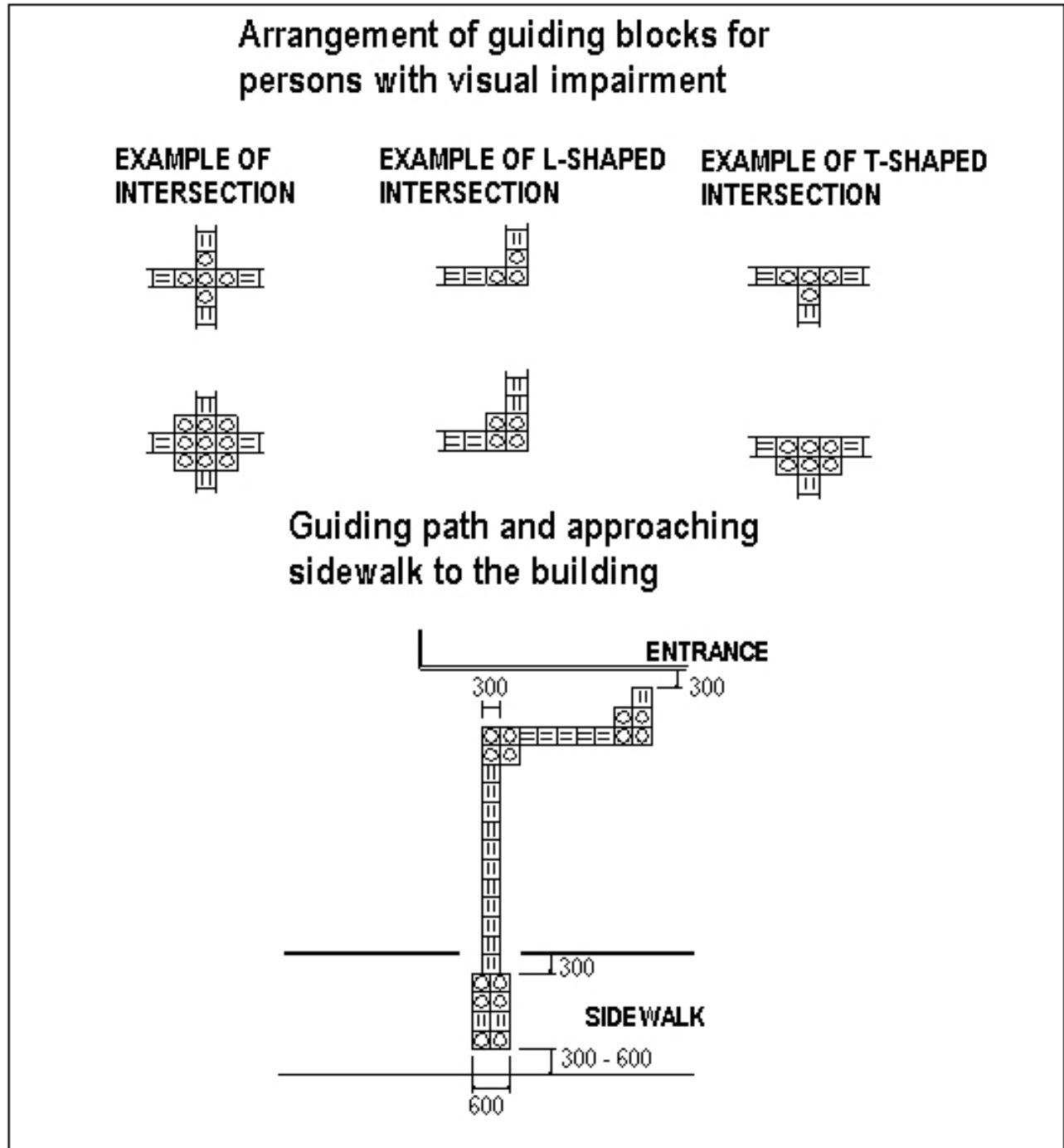
**Dot-type blocks (Warning Tile):** indicate warning signal, to screen off obstacles, drops – offs or other hazards, to discourage movement in an incorrect direction and to warn of a corner or junction. These tiles shall be placed 300mm at the beginning and end of the ramps, stairs and entrance to any door.



Guiding Block



Warning Block



**Figure 1-5-2:** *Diverse arrangements of guiding blocks.*

### Some Examples of Placing Guiding and Warning Tiles at Different Types of Intersection

### **Circulation Area**

- Corridors should have an unobstructed width of 1800mm.
- Level differences should be beveled.
- Thresholds and gratings should not be more than 10mm.
- Protruding objects (more than 100mm from the wall) to be placed either in a niche or above 2100mm from the floor.
- Open spaces below ramps, escalator and stairs should be blocked out completely by protective guard rails, raised curbs or marked with a tactile surface.

### **Door**

- Should provide a clear opening of 900mm.
- Be fitted with lever action locks and D shape handles of circular section, between 800mm and 1000mm from floor level.
- Also be fitted with vision panels at least between 900mm and 1500mm from floor level.
- Be colour contrasted with the surrounding walls and should not be heavier than 22N to open.
- A distance of 400mm to 600mm should be provided beyond the leading edge of door to enable a wheelchair user to maneuver and to reach the handle.
- Kick plates are recommended 300mm from the bottom, to resist wear and tear.

### **Accessible Toilet**

A minimum of one toilet compartment with minimum size of 2000 x 1750mm is required on each floor having all barrier free provisions.

### **Accessible Lift**

A minimum of one 13 passenger lift is required having all barrier free provision.

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# Green Building Materials

*“No mode of creation is more direct or naturally arrived at than the accumulation and agglomeration of materials found close at hand.”*  
*-William Seitz*

Green Building, also known as green construction or sustainable building, is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle: from sitting to design, construction, operation, maintenance, renovation, and deconstruction.

## Materials Efficiency

Building materials typically considered to be ‘green’ include rapidly renewable plant materials like bamboo. Total energy consumed in the life cycle of a product includes flowing process:

- Extraction
- Processing
- Transportation
- Disposal

Material	Embodied Energy(MJ/Kg)
Concrete	1.10
Steel	40.00
Stainless Steel	57.00
Clay Bricks	3.00
Terrazo Tiles	1.40
Ceramic Tiles	12.00
Aluminium	230.00

## Strategies Being Followed

- Maximum Utilization of FLY ASH in structure ,filler walls ,mortars and plasters
- Reduction in Volume/Weight of Construction.
- Low Energy materials

### **Green Building Material/Product Selection Criteria**

The selection criteria for green building materials shall be based broadly on:

- Resource efficiency
- Indoor air quality
- Energy efficiency
- Water conservation
- Affordability

**Resource Efficiency** can be accomplished by utilizing materials that meet the following criteria:

- **Recycled Content:** Products with identifiable recycled content, including post-Industrial content with a preference for post consumer content.
- **Natural, plentiful or renewable:** Materials harvested from sustainably managed sources and preferably have an independent certification (e.g., certified wood) and are certified by an independent third party.
- **Resource efficient manufacturing process:** Products manufactured with resource-efficient processes including reducing energy consumption, minimizing waste (recycled, recyclable and or source reduced product packaging), and reducing greenhouse gases.
- **Locally available:** Building materials, components, and systems found locally or regionally saving energy and resources in transportation to the project site.
- **Salvaged, refurbished, or remanufactured:** Includes saving a material from disposal and renovating, repairing, restoring, or generally improving the appearance, performance, quality, functionality, or value of a product.
- **Reusable or recyclable:** Select materials that can be easily dismantled and reused or recycled at the end of their useful life.
- **Recycled or recyclable product packaging:** Products enclosed in recycled content or recyclable packaging.
- **Durable:** Materials that are longer lasting or are comparable to conventional products with long life expectancies.

**Indoor Air Quality (IAQ)** is enhanced by utilizing materials that meet the following criteria:

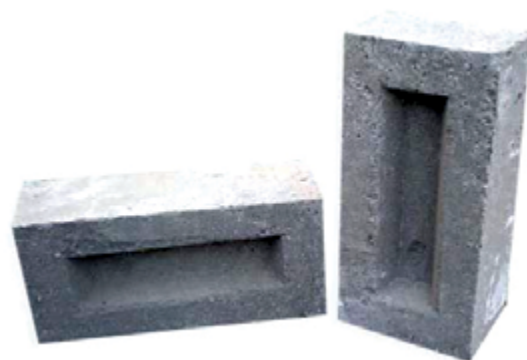
- **Low or non-toxic:** Materials that emit few or no carcinogens, reproductive toxicants, or irritants as demonstrated by the manufacturer through appropriate testing.
- **Minimal chemical emissions:** Products that have minimal emissions of Volatile Organic Compounds (VOCs). Products that also maximize resource and energy efficiency while reducing chemical emissions.
- **Low-VOC assembly:** Materials installed with minimal VOC-producing compounds, or no-VOC mechanical attachment methods and minimal hazards.
- **Moisture resistant:** Products and systems that resist moisture or inhibit the growth of biological contaminants in buildings.
- **Healthfully maintained:** Materials, components, and systems that require only simple, non-toxic, or low-VOC methods of cleaning.
- **Systems or equipment:** Products that promote healthy IAQ by identifying indoor air pollutants or enhancing the air quality.

### Some Green Building Materials

#### 1. Fly Ash Bricks

Pulverized fuel ash commonly known as fly ash is a useful by-product from thermal power stations using pulverized coal as fuel and has considerable pozzolonic activity.

Fly ash-lime bricks are obtained from materials consisting of pulverized fuel ash in major quantity, lime and an accelerator acting as a catalyst. These bricks are suitable for use in masonry construction just like common burnt clay bricks.



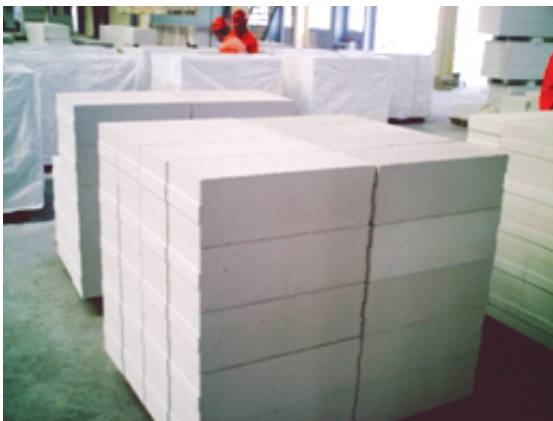
## Advantages

- **Embodied Energy:** In case of using Fly ash lime Gypsum bricks 40% reduction can be done in embodied energy of masonry.
- **Environment Friendly:** Fly ash brick uses unfired Fly Ash technology hence the CO2 emissions in the manufacturing process are limited..
- **Excellent Thermal Insulation:** The buildings using fly ash bricks are cool in summers and warm in winters.
- **Fire Resistance:** Fire resistance of fly ash bricks is very high as these bricks are composed of fly ash as its major constituents, which is the un-burnt residue of the coal fired in a thermal power plant.
- **Nil Efflorescence:** Fly ash bricks resist salt and other sulphate attack, ensuring no efflorescence in the structure.

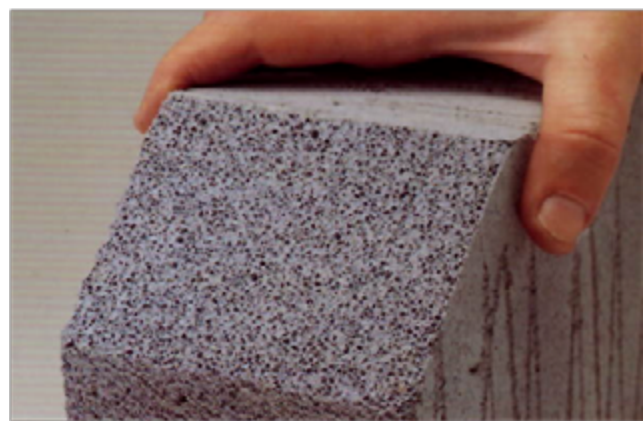
## 2. Autoclaved Aerated Concrete

Autoclaved aerated concrete is a versatile lightweight construction material and usually used as blocks. Compared with normal (ie: “dense” concrete) aircrete has a low density and excellent insulation properties. Autoclaved aerated concrete blocks are excellent thermal insulators and are typically used to form the inner leaf of a cavity wall. They are also used in the outer leaf, when they are usually rendered, and in foundations.

Autoclaved aerated concrete is easily cut to any required shape. Aircrete also has good acoustic properties and it is durable, with good resistance to sulfate attack and to damage by fire and frost.



AAC Blocks



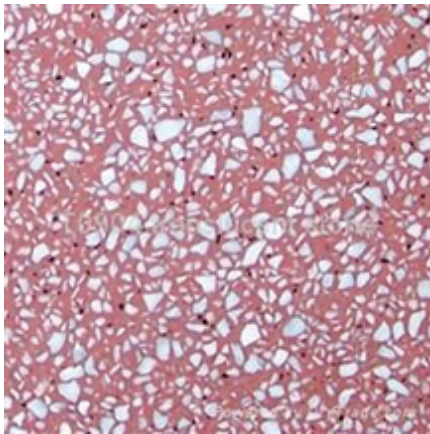
AAC Block

### Advantages

- **Embodied Energy:** In case of using AAC bricks 14% - 20% reduction can be done in embodied energy of masonry.
- **Environment Friendly:** AAC bricks help reduce at least 30% of environmental waste, decrease over 50% of greenhouse radiation and over 60% integrated energy on the surface of brick.
- **Excellent Acoustic Insulation:** has excellent acoustic performance and can be used as an effective sound barrier, e.g., intertenacy walls (aac wall panel).
- **Ventilation:** AAC is very airy thus allowing more diffusion of water, reducing humidity of the building. AAC Wall self-adjusts the humidity by absorbing moisture and releasing humidity automatically, helps prevent condensation.

### 3. Terrazo Tiles

Terrazzo consists of marble, granite, onyx, or glass chips in Portland Cement, Portland Cement, or resinous matrix binder. The Terrazzo is poured, cured, ground, and polished. Terrazzo is typically used as a finish for floors, stairs or walls. Terrazzo is used in both interior and exterior applications. Portland Cement and Polyacrylate Matrix Terrazzo can be used for both interior and exterior applications, however. Epoxy Resin Matrix Terrazzo is not recommended for exterior use.



Terrazo Tile



Crazy Marble

### Advantages

- **Embodied Energy:** In case of using Terrazzo flooring 4% - 10% reduction in overall volume of construction can be done..
- **Low Maintenance:** Terrazzo does not support microbial growth, does not allow accumulation of water, absorbing water at a rate 1/10th that of cementitious terrazzo, resulting in greatly increased stain resistance.

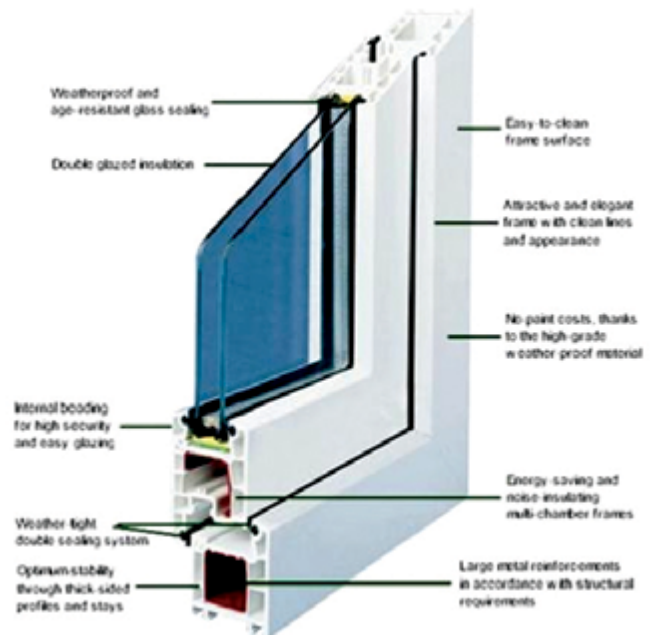
- **Environment Friendly:** Made from recycled material, terrazzo is not only environmentally friendly, but it also produces zero harmful chemicals. Making a terrazzo floor doesn't release any volatile organic compounds (VOCs) into the atmosphere because the material is all natural, so it is one of the "greenest" floors available
- **Indoor Air Quality:** Advantages in sanitation result in an overall improvement of the indoor air quality of buildings such as hospitals and schools, and anywhere else indoor air quality is a factor.

#### 4. UPVC Windows

The New age window making material UPVC( Unplastized Polyvinyl chloride) is formed from Polymerization of Ethylene and Chlorine .UPVC is considered as the most preferred contemporary window making material because of its efficient features .The Vinyl windows are excellent insulators :They reduce heating and cooling loads by preventing thermal loss through the frame and sash material .It is not affected by the weather or air pollution ,salt ,acid rain industrial pollution ,pesticides ,smog and discoloration and structural damage . Its user friendly and Eco Friendly ,Its readily accepted and safe .



UPVC Doors And Windows



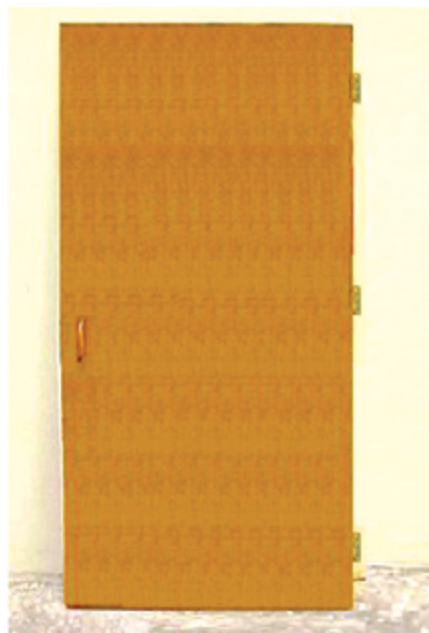
Window Section

### Advantages

- **NO WEATHERING EFFECT:** do not absorb moisture and do not alter under extreme weather conditions.
- **GOOD THERMAL INSULATOR:** With a heat insulation at least 2.2 times better than Aluminum windows, UPVC windows save a lot of energy, and keep the interiors cool and comfortable.
- **ACOUSTIC INSULATOR:** Protection against noise pollution and higher levels of privacy is ensured. Sound insulation is increasingly becoming a compliance issue in many sensitive areas e
- **ECO FRIENDLY:** UPVC is energy efficient compared to other materials. The compound used is recyclable and the longevity of the product makes it a very strong option to wood, which reduces deforestation considerably

### 5. Bamboo Jute Composite Doors

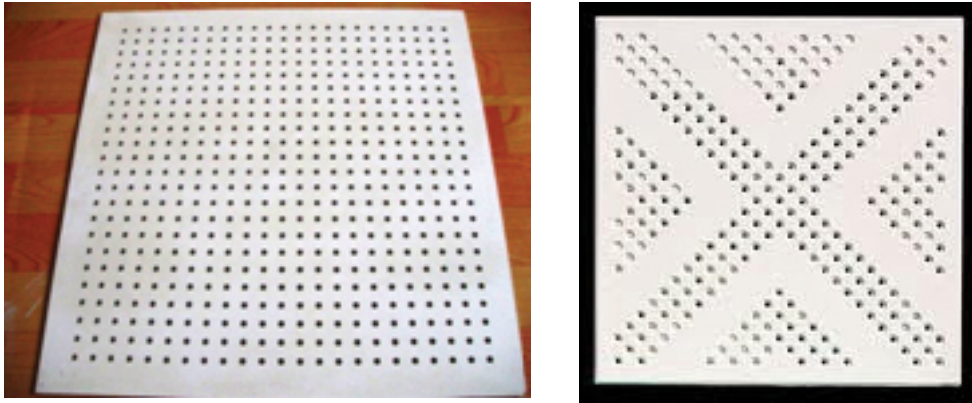
This product is rapidly renewable and is manufactured by using composite materials made from renewable natural fibre i.e. non-oven jute felt and jute stick fibre with suitable aqua based binder for manufacturing of flush door shutter of solid core type was investigated. Flush door shutter of solid core type has been made using jute composite in the form of non-woven fiber felt of weight 1900 to 1950 gm/m<sup>2</sup> and of thickness 10 mm by impregnating with low condensed PF resin liquid (resol type of 50% solid content).



Bamboo-Jute Composite Door Doors

**6. Calcium Silicate Tiles**

Calcium Silicate Tiles are Lightweight with densified edges, to give high edge Strength, which minimizes damage in handling, Transport, storage, and installation of the tiles. 100% RH Humidity resistance which eliminates Sagging of the product in high humidity Environments and do not lose their physical Integrity even in the case of condensation from air Conditioning ducts.



Calcium Silicate Tile

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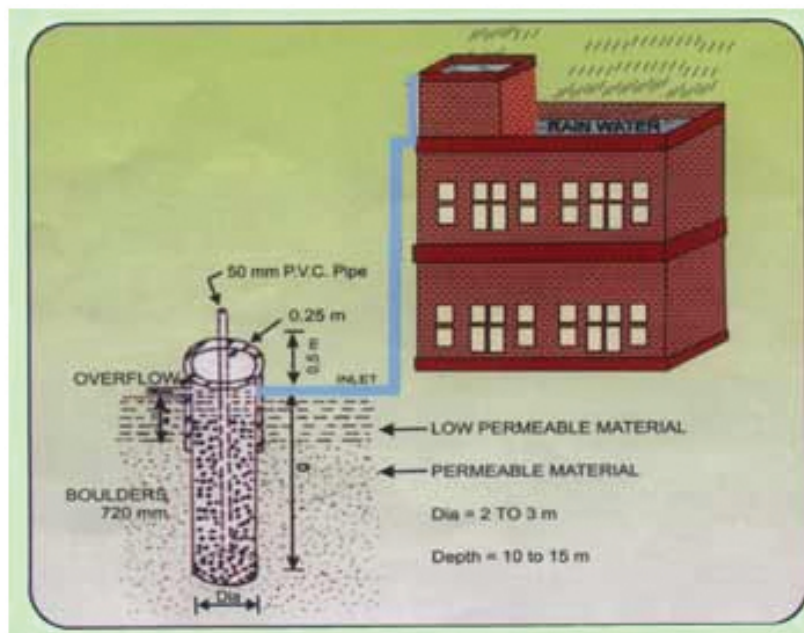


# Rain Water Harvesting

Water conservation has become the need of the day. Rainwater harvesting is a way to capture the rainwater at the time of downpour, recharge the underground water and use it later. In urban areas, the construction of houses, roads and footpaths has left little exposed parts of earth for water to soak in. Most of the water, therefore, runs wastefully through drains.

Rainwater harvesting has become a very popular method of conserving water, particularly in the urban areas. It conserves water as a valuable source and stops it from running off wastefully as sewerage water. It recharges the aquifers or the reservoirs of water below the surface of the earth, thus raising the level of underground water table. This is highly beneficial for trees and other vegetation cover which draw mainly from underground water.

- Since June 2001, the Ministry of Urban affairs and Poverty Alleviation has made rainwater harvesting mandatory in all new buildings with a roof area of more than 100 sq m and in all plots with an area of more than 1000 sq m, that are being developed.
- The Central Ground Water Authority (CGWA) has made rainwater harvesting mandatory in all institutions



## Gazette Notification

The copy of the Gazette Notification issued by Ministry of Urban Development & Poverty Alleviation vide No.N-11011/9/98-DDVI(Pt.)/DDIB dtd 28<sup>th</sup> July, 2001 regarding modifications / additions to the building bye laws 1983 is as under:-

### NOTIFICATION

S.O.—Whereas the issue of making suitable provision in the Building Bye laws 1983 to ensure that the buildings that are erected in Delhi provide for the water harvesting through storing of rain water runoff to recharge underground aquifers has been under the consideration of the Government.

Whereas the following modifications/additions which the Central Government proposed to make in the Building Bye-laws, 1983 in this regard were published for public information vide Public Notice dated 20<sup>th</sup> June, 2001 and were advertised in the leading newspapers on 30.6.2001. In all five objections/suggestions were received and they were examined by a Committee under the convenorship of Chief Planner of Town and Country Planning Organisation.

Whereas after thorough consideration of the report Central Government has decided to make the following Modifications/additions in the Building Byelaws, 1983.

Now, therefore, in exercise of the powers conferred by sub-section (2) of Section 11A of Delhi Development Act, 1957, the Central Government hereby makes the following modifications/additions to the Building Bye-laws, 1983 with effect from the date of publication of this notification in the Gazette of India.

### MODIFICATIONS

1. Clause 22.4 Part – III (Structural Safety and Services) of the Building Bye-laws, 1983.
2. 22.4.1 Water harvesting through storing of water runoff including rain water in all new buildings on plots of 100 sq. mtrs and above will be mandatory. The plans submitted to the local bodies shall indicate the system of storm water drainage along with points of collection of rain water in surface reservoirs or in recharge wells. These provisions will be applicable as per the Public Notice (s) of Central Ground Water Authority issued from time to time.
3. 22.4.2 All buildings having a minimum discharge of 10,000 litres and above per day shall incorporate waste water recycling system. The recycled water should be used for horticultural purposes.

Note: These modifications/amendments will be applicable from the date of Notification.

(No.N-11011/9/98-DDVI(Pt) DDIB)

Sd/-

(Devendra Kumar Goel)

Under Secretary to the Govt of India

**Annexure – A**

**Certificate:** The following certificate is to be submitted along with the building drawings while submitting the plans.

- 3. Certified that the building plans submitted for approval satisfy the water harvesting requirements as well as minimum anticipated discharge of waste water as stipulated under clause 22.4.1 , 22.4.2 and the information given therein is factually correct to the best of our knowledge and understanding.**

**Signature of owner with date**

**Name in Block Letters**

**Address**

**Signature of Architect with date**

**Name in Block letters**

**Address**

# Net Zero Building

## Indira Paryavaran Bhawan

Ministry of Environment and Forests (MoEF) in Govt. of India carries the responsibility for planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes. Preliminary concerns of this Ministry relate to conservation of country's natural resources including its biodiversity, forests, wild life and prevention/abatement of pollution besides conserving and nurturing the natural environment of India.



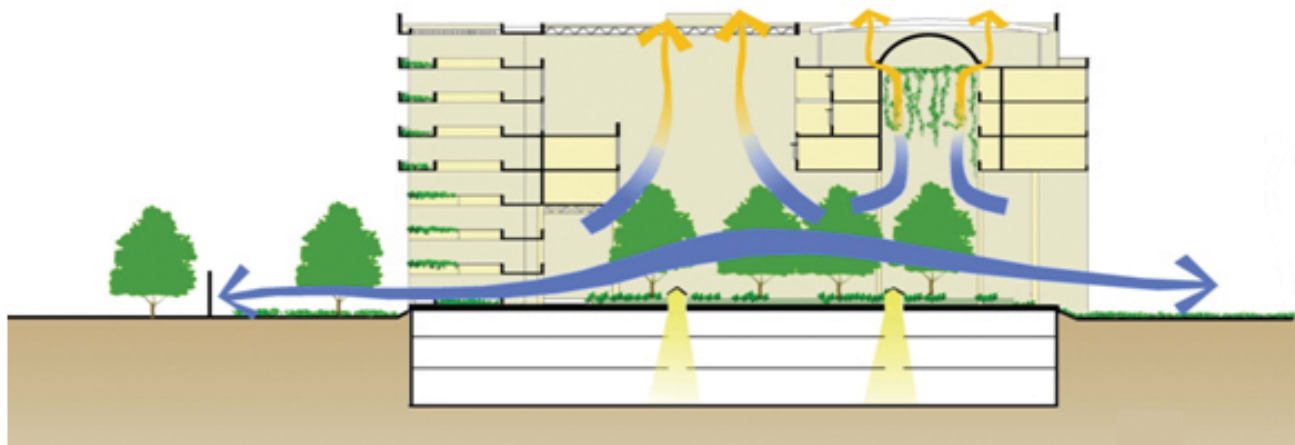
Office building shall be the result of a design philosophy that focuses on increasing the efficiency of resource usage i.e. energy, water and materials while minimizing the impact of the building on Human Habitat and the Environment.

This intended to be done through careful site planning, most appropriate building form, usage of materials which incorporate low embodied energy operation efficiently, easy

maintenance, very low effluent disposal and part energy production on-site. Needles to state, while meeting the above parameters requirement of a 'Green Building' this building will be state of art in modern amenities and comfort with Intelligent Building Management System which optimizes the energy consumption in the Government's programme of building 'Green' and to set as a flag bearer. Towards this purpose it is proposed to go in for highest rating of 'platinum of LEED India – India Green Building Congress.

### Site - Planning

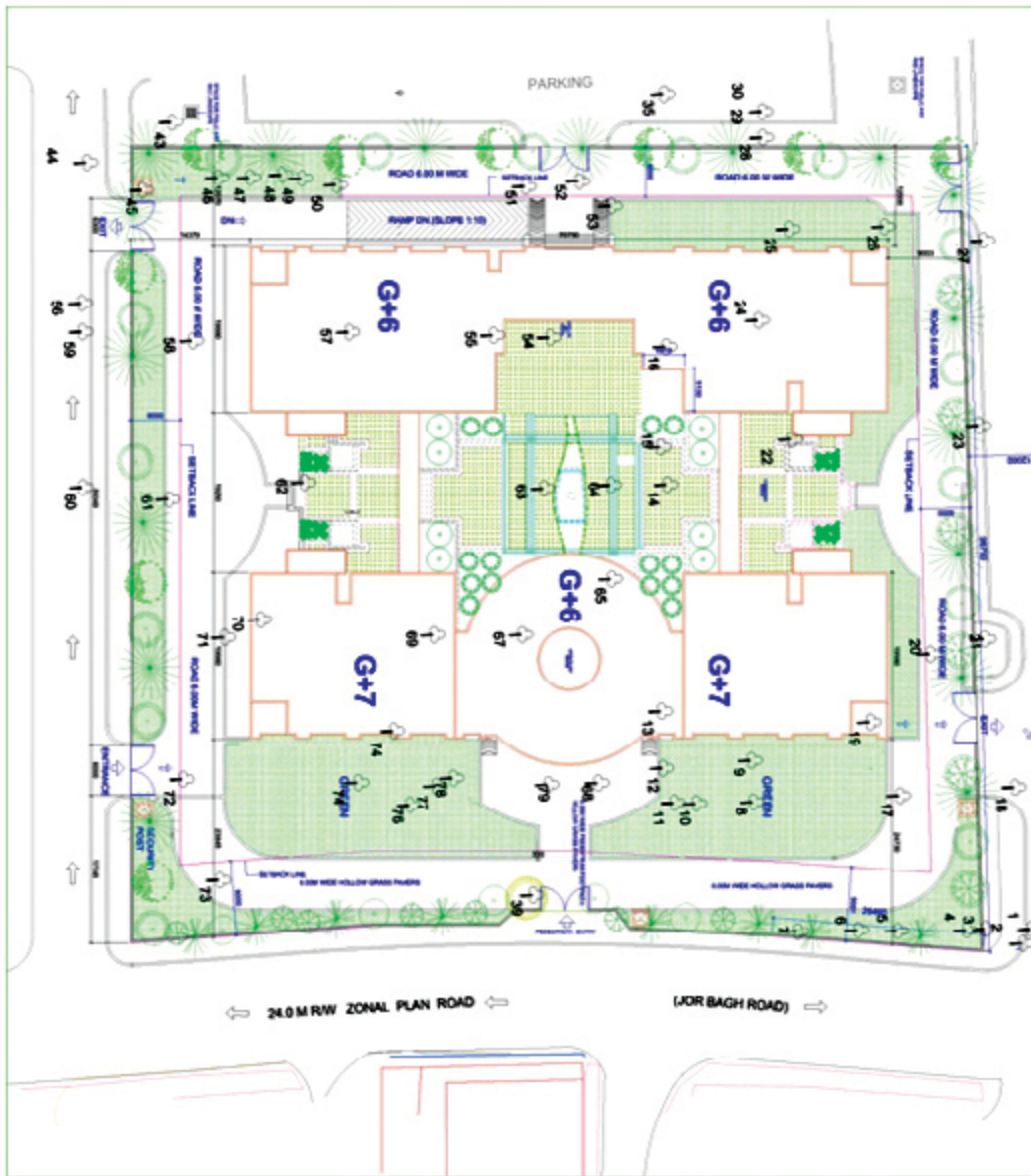
- Building form wrapped around a pedestrian friendly shaded green open courtyard with dense plantation aimed at eco-park concept.
- A continuous green axis from front of site across the atrium to the rear.
- Eco park within the courtyard shall contain a self sustaining low requirement floor fed with rain water harvesting.
- Large openings in buildings in building form on South and North sides to promote cross passage of air.



Natural Ventilation With Stack Effect

### Architectural Features

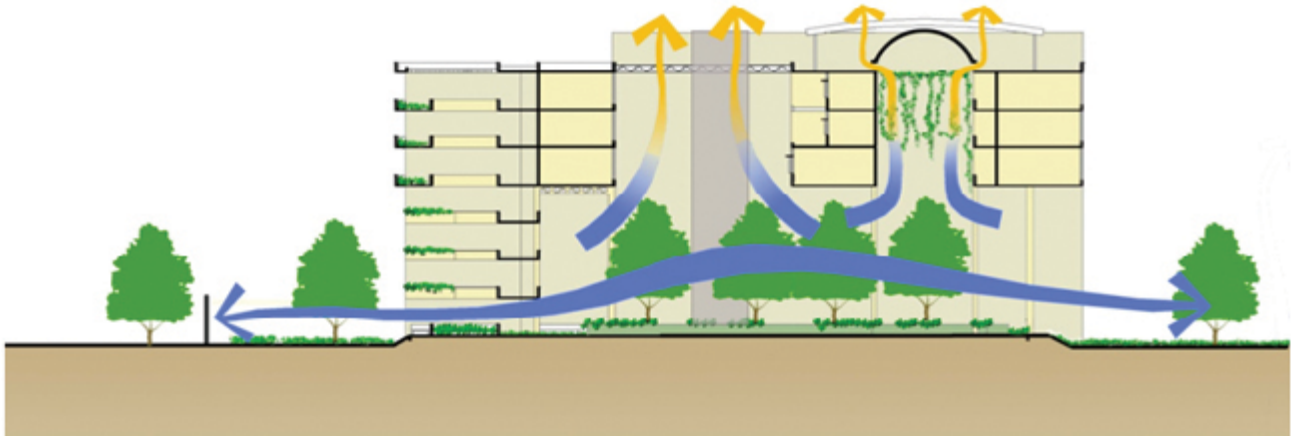
- Priority for pedestrians in the front with vehicular access on the sides.



Layout Plan

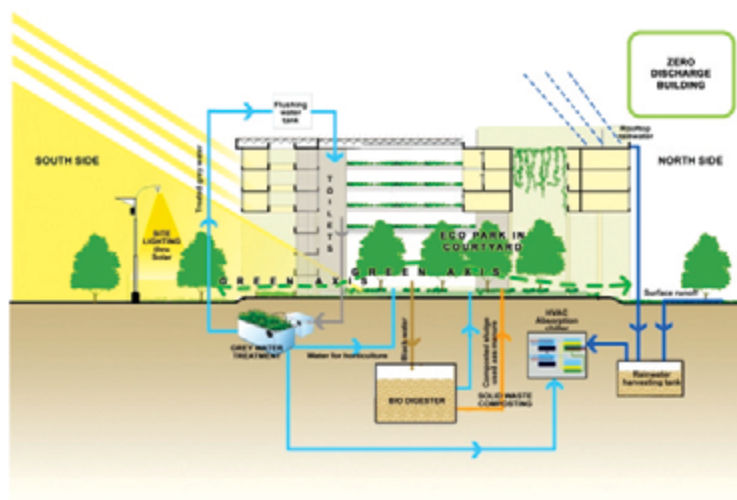
- Use of permanent, durable and local materials such as sand stone on exterior face, low heat transmission glass, reflective roofing.
- Use of ECBC compliant design practices.
- Adoption of Universal design parameters to provide barrier free movement for physically challenged.

- Appropriate building envelope design by orientation specific shading devices and envelope insulation to reduce heat intake.

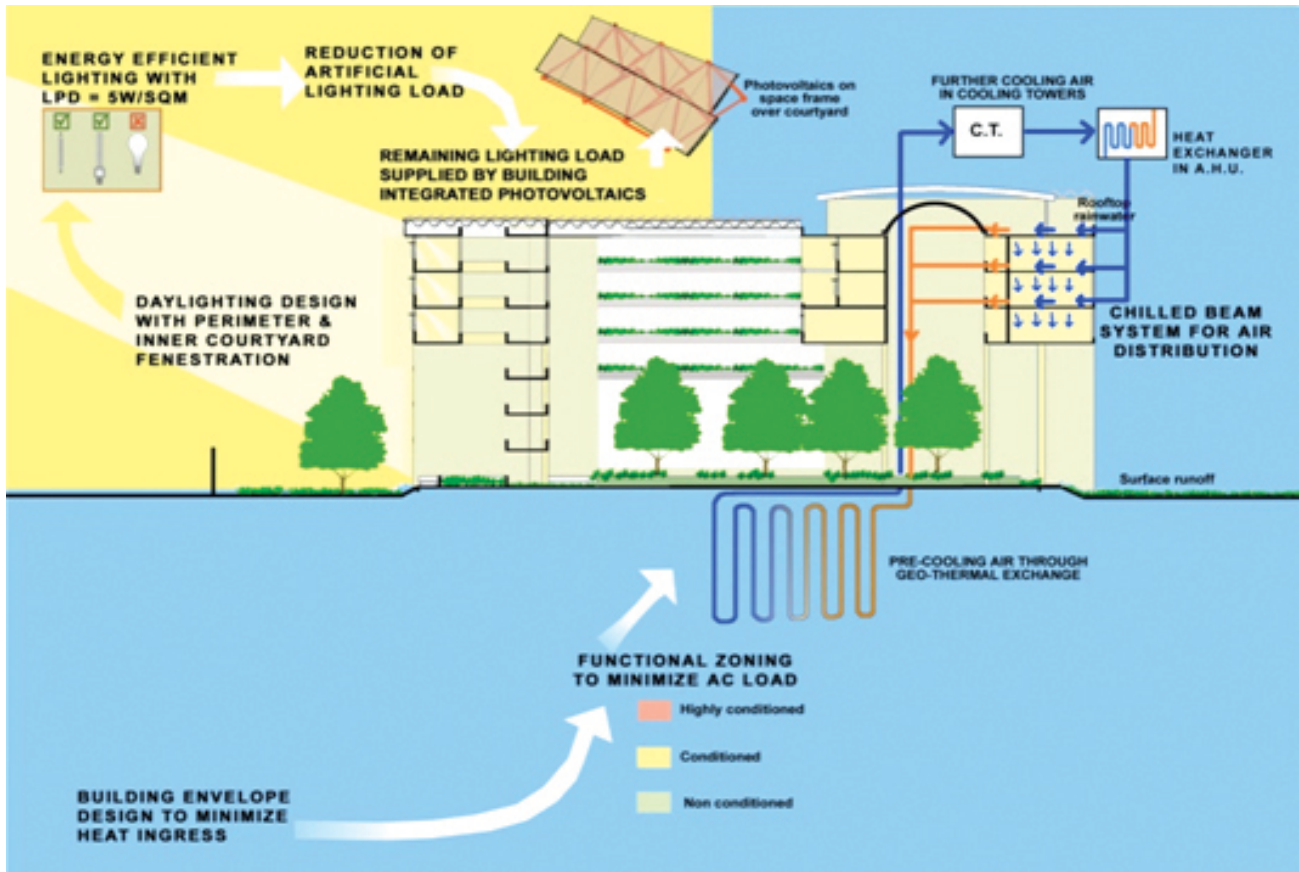


### Building Punctures Are Designed To Aid Cross Ventilation

- Preservation of maximum possible number of trees standing at site.
- Intelligent Building Management System to optimize energy usage through occupancy sensors, fire prevention and fighting and parking management.
- Highly sensitive security system including access control using bio metric smart card readers, Radio frequency tags, CCTV surveillance etc.
- Reduction of conventional lighting load by ensuring 75% day light use as per LEED requirement.
- Generation of energy by deploying thin film transparent PV modules on space frame over the courtyard.
- Usage of high efficiency lighting fixtures, astronomical/ time switches and occupancy sensors.



- To provide facility for the treatment of wastewater generated in the building so as to have safe disposal and use of by-products.
- To provide Geo thermal technology for heat rejection of AC system

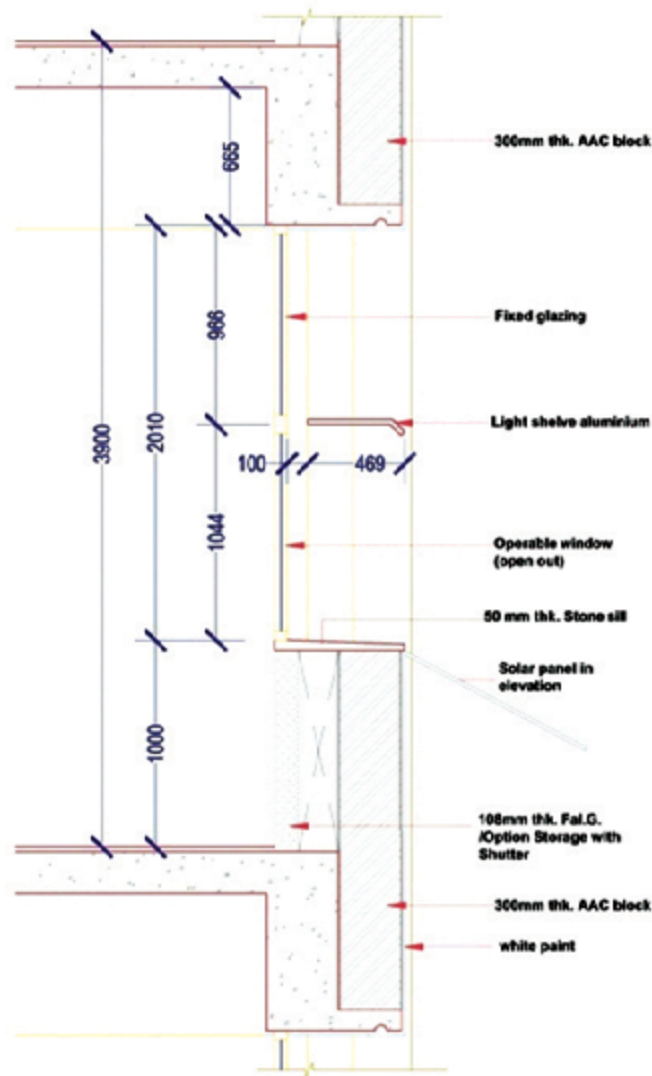




## Material Specifications

### Masonry wall

- AAC block masonry wall



### Window glazing:

- Hermetically sealed double glass windows with high efficiency high VLT (visual light transmittance) & low u – value (heat transmittance) glass

### Flooring

- Kota stone with marble strips
- Patterned multi-coloured terrazzo with salvaged stone pieces
- Grass paver blocks pavements



### External finishing

- High gloss white paint & red sandstone

### Daylighting Analysis:

This will be carried out by simulating daylight model of proposed building to ensure maximum regularly usable area is well daylit. Daylighting simulation is done using Ecotect 2008 software.

GRIHA: The proposed Office Building meets the GRIHA requirement of Daylighting Credit. The Proposed design provides daylit spaces for approximately 76.7% of the total usable area. The analysis will be responsible to fetch 2 mandatory credits for daylighting i.e. minimum 25% daylit areas and 2 credits more, each for 50% and 75% daylit spaces. Total of 4 points under the GRIHA Rating System are earned by the well daylit design.

The typical floor plan layout below shows the areas receiving / not receiving adequate daylight.

## Whole Building Energy Simulation For Indira Paryavaran Bhawan, Delhi

### Interior Lighting Assumptions:

• Lobbies and Corridors:	0.4W/sft
• Basement Parking:	0.15 W/sft
• Offices:	0.5W/sft
• Toilets:	0.57 W/sft
• Staircase:	0.35 W/sft
• Auditorium:	0.7 W/sft
• Kitchen:	0.7 W/sft
• Gym:	0.5 W/sft

Merely 70% of the regular interior space lights will be switched 'on' during normal office hours. Considering good day lighting in the building for core office spaces and 30% for the perimeter office spaces.

Aggressive interior lighting power density, LPD (W/sft) could be targeted for all the space types but especially for offices, the inter LPD is shown here as 0.5 W/sft includes a general lighting of 200 Lux and an optimum 350 to 400 Lux on the desk with LED based task lighting.

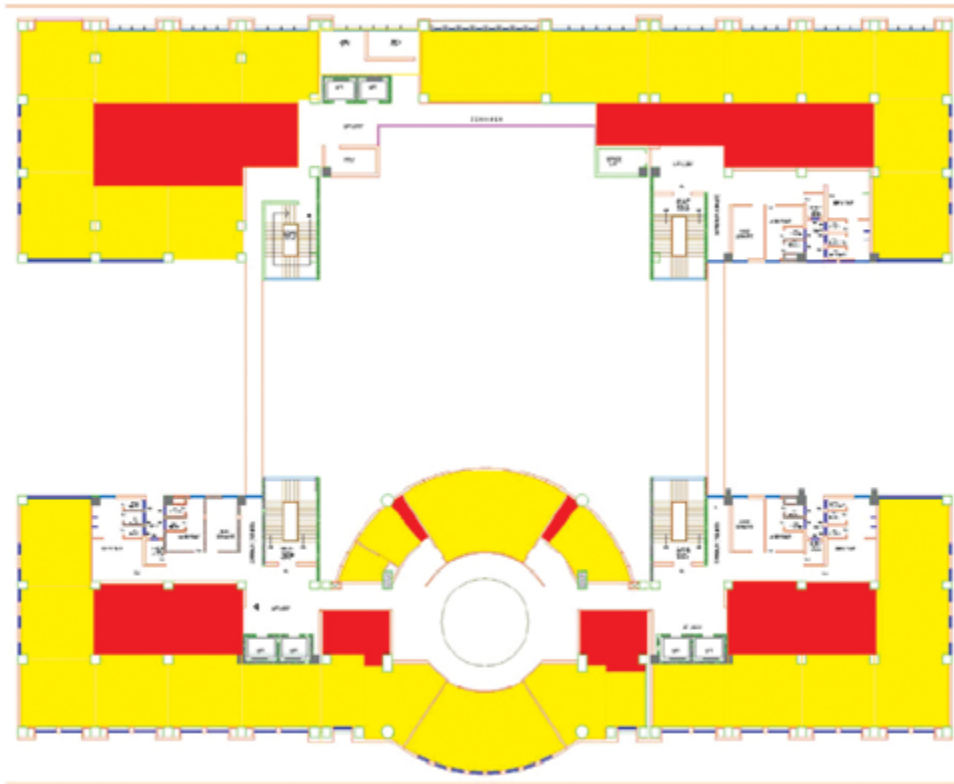
The AHU fans must have 'Premium' quality motors that must meet or exceed 0.7 W/CFM performance efficiency.

A 10kW exterior lighting power capacity is provided for the building and the campus to aggressively target not merely reduced lighting consumption but sensitive reduced light pollution as per LEED.

Staircases and Lobbies being on the exterior of the building perimeter are naturally ventilated and not pressurized.

Restrooms and Corridors are forced ventilated only.

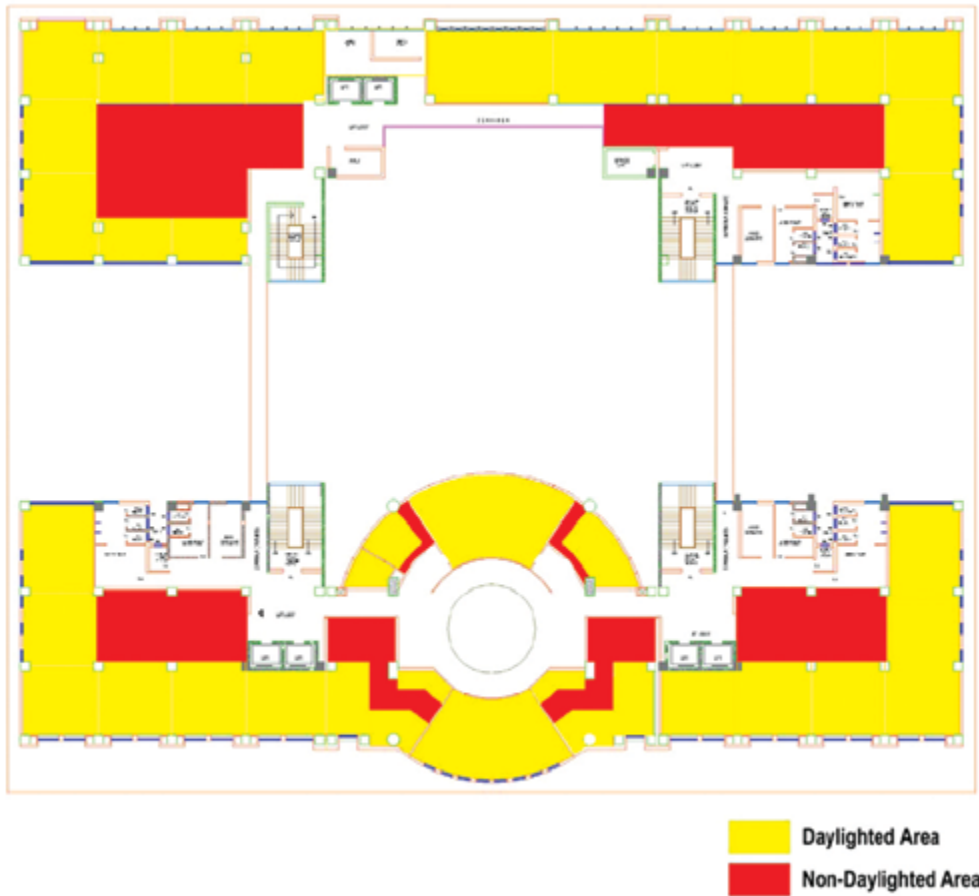
- In HVAC system by condenser water heater rejection through geo thermal heat exchange and use renewable energy in part.
- Lifts, toilets, service areas orientated in such a manner and office areas mainly facing the South facing the South and norm to reduce A/C load.



LEED India: The typical floor of the proposed Office Building does not meet the LEED India requirement for Daylighting Credit. The proposed design provides approximately 73.4% of the total regularly usable area under minimum 2% daylight factor. The proposed design does not earn us any point for daylighting credit in the LEED India green building rating system.

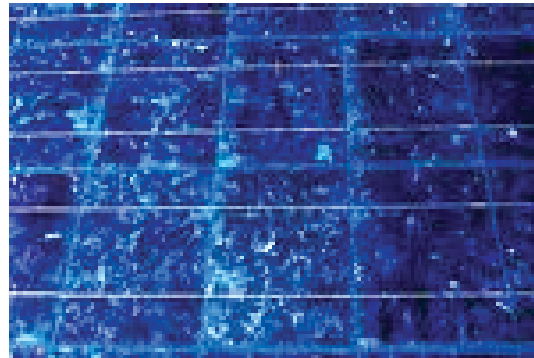
Therefore, appropriate measures have been taken to achieve the required daylight factor for usable non daylit areas. One of the measures could be to use clear double glass in glazing along the courtyard side for the South-East block of the building.

The typical floor plan layout below shows the areas receiving / not receiving adequate daylight.



### Use of Solar Photo Voltic Panels (SPV's)

- Use of Renewable Energy is important for all TERI-Griha 5 Star and LEED India platinum buildings.
- Solar PV cells shall be located on available terrace and solar film shall installed on glass.



## Office Memorandum

Subject: - Revised scales of office accommodation for various categories of officers of central Secretariat excluding those serving in the Income Tax, Central Excise and Customs Departments.

The undersigned is directed to refer to the then Ministry of Works & Housing OM of even number dated 24-11-1987 and to say that consequent upon revision of pay scales of the central Govt. Employees on the recommendations of the Vth pay commission as notified vide CCS (Revised Pay) Rules, 1997, it has been decided to prescribe revised entitlement of office space for various categories of officers as detailed below:-

S. No	Existing Category	Proposed Category	Entitlement of office space (in sq. Ft.)
1.	Officers drawing Rs. 5000/- & above per month	Officers drawings Rs. 15,200/- & above per month	240
2.	Officers drawing Rs. 3,000/- & above but less than 5,000/- per month	Officers drawings Rs. 10,000/- & above but less Rs. 15,200/- per month	120
3.	Gazetted officers drawing Rs. 3,000/- per month excluding section officers	Gazetted officers drawings pay less than Rs. 10,000/- per month excluding section officers	80
4.	Section officers in the sectt. / Attached offices	Section officers in the sect. / Attached Offices	80
5.	Technical staff such as Draughtsman, tracer & Estimators etc.	Technical staff such as Draughtsman tracers & Estimators etc	60
6.	Ministerial staff such as superintends, Head clerks, daftries, etc.	Ministerial staff such as Superintends Head clerks Assistants, Clerks, Daftries etc.	40
7.	Ministerial staff of Audit Officers.	Ministerial staff of Audit officers	40

(R.K. Singh)

Directorate of Estates

The total screened requirements of office accommodation determined on the basis of revised scales will be subject to the following austerity cuts: -

**Entitlement**

Upto 30,000 sq. ft.

More than 30,000 sq. ft.

So far as special requirement of office space such as reception room, conference room, space for special equipments, library requirements, old records etc, are concerned, these should be examined in consultation with the Directorate of Estates with a view ensuring that the requirement is kept to the absolute minimum.

To

1. All Ministries/Departments of Gove. of India, including the comptroller and Auditor General of India.
2. All attached/subordinate offices of Govt. of India.
3. Works Division, Ministry of Urban affairs & Employment Nirman Bhawan, New Delhi.
4. D.G. (W), C.P.W.D, New Delhi.

Copy to: - All sections and Officers in the Directorate of Estates they may also calculate to their units: -

No.11015(2)/75-Pol-IV  
Government of India  
Ministry of Works & Housing  
Directorate of Estates

.....

New Delhi, the 8<sup>th</sup> June, 1977

**Office Memorandum**

**Sub: Revised scale of office accommodation for various categories of officers of the Central Secretariat, attached and subordinate offices etc. in Delhi excluding those serving in the income-tax, Central Excise and Customs Department –scale for special requirements.**

The undersigned is to refer to this Directorate's Office Memo of even No. dated 125<sup>th</sup> November, 1976 as amended vide office memo. Of even number dated 20.2.77, on the subject cited above and to state that it has been decided to prescribe the following scales for special requirements of office accommodation:-

<u>S.No.</u>	<u>Particulars of Prescribed entitlement of office accommodation Requirements</u>
1. Conference Room	Conference Room should be subject to the requirement of the Ministry/Department concerned with Minimum space of 22 sq.m. and maximum 44 sq.meters.
2. Visitor's Room	Visitor Room should be according to the requirement of a Ministry/Department but it should not be more than 44 sq. Meters
3. Receptionist/For Security Staff	11 sq. Meters.
4. Canteen/Tiffin Room	1 sq. ft. (0.09 sq. meters) per person in an office including The spaced for Dining Hall and Kitchen etc.
5. Telephone Exchange	22 Sq. meters.
6. Class Room	According to the requirement of a Department but should not be more than 44 sq. meters.
7. Library	One sft. For 25 books or one sq. meter for 275 books



8. Old Records recorded files One sft. For 20 recorded files or one sq. meter for 220 recorded files

2. It has been decided that no separate space should be provided to the peons in Room or Hall. On introduction of "Messenger System" peons, normally, are not required to sit in the sections to which they are attached. However, whenever necessary they should be accommodated in the rooms or halls in which the sections concerned are accommodated.
3. The question of quantum of provision for future expansion of an office to be accommodated in a new building whether in the general pool or in departmental pool, had been under consideration. It has now been decided that provision for additional space should be limited 10% of total requirement of an office for further expansion and that if any Ministry/Department want more than 10% of the total requirement as additional space for expansion, they may do so with the approval of their Integrated Finance, keeping in view the need for maximum economy.

Sd/-

(I.Chaudhuri)  
Director of Estates.

To

1. All Ministries/Departments of Government of India, excluding the Comptroller and Auditor General of India.
2. All Attached/sub ordinate offices of the Government of India.
3. Works Division, Ministry of Works & Housing ( 5 copies)
4. Engineer-in-Chief, C.P.W.D., New Delhi ( 20 copies)

Sd/-

(Jit Singh)  
Asstt. Director of Estates

(Tel.374305

# 1% of The Project Cost for the Work of Art

No. 1(2)82-DUAC

March 11, 2011

## MEMORANDUM

### **Sub: Use of Traditional building crafts in buildings as Work of Art.**

The Central Government in 1972 through the then Ministry of Works and Housing Memorandum no. 18012(23)-W1 dated: 5<sup>th</sup> June 1972 issued guidelines in terms of which every public project should earmark at least 1% of the project cost for the work of art in public buildings. Unfortunately these orders, except in the case of a few prestigious buildings, have largely not been acted upon. Often it is observed that the work of art is added to a building project as an afterthought. In many cases there is lack of clarity on the nature of work of art.

The Delhi Urban Art Commission has from time to time emphasized that the work of art in public projects needs to be an integral part of the project and could include the following:

-

1. Outdoor sculptures
2. Murals and frescos
3. Mobiles and bas-relief
4. Folk and Tribal Art
5. Artisan craft
6. Indoor sculptures
7. Other art forms relevant to the habitat

The Commission at its meeting held on 09-03-2011 has further resolved that building elements created using traditional building craft techniques, using traditional materials and tools and used as an integral part of the building will be considered as 'art work' required to be included in public buildings. This can include hand carved stone elements, hand carved wood terracotta, decorative wrought, iron, amongst other traditional materials. Each region of India has traditional building craft and this step is taken to encourage this craftsmanship in construction of new buildings and encourage the sensitive use of traditional materials.

It may be ensured that work of art is conceptualized at the time of formulation of the project itself and be brought to the Commission so that it can be completed along with the building project. The Commission while considering cases for grant of NOC for completion certificates entertains applications for the same, only if these are accompanied with photographs of the works of art in place. Each project of work of art will be assessed separately on a case to case basis by the Commission.

The local bodies and other local authorities while sending proposals to the Commission are requested to ensure that the amount spent by the project proponent on the work of art is in terms of the aforesaid guidelines of the Government.

The local bodies and other local authorities while sending proposals to the Commission are requested to ensure that the amount spent by the project proponent on the work of art is in terms of the aforesaid guidelines of the Government.

**(Navneet Kumar)**

**GRIHA-3 STAR RATING**

**CENTRAL PUBLIC WORKS DEPARTMENT  
CONTRACT, SPECIFICATION & QUALAITY  
QUALITY ASSURANCE CORE WNG  
NIRMAN BHAWAN, NEW DELHI**

No. CE(CSO)/SE(QA) II/G-1/2011/

Dated: 16-11-2011

**Subject:** Guidelines for Green Building Construction and achieving 3 Star Rating.

CPWD has decided vide letter no. 18/19/2010-WI(DG)/410 Dated: 31-03-2011 that provision for atleast GRIHA- 3 Star Rating should be made in all new building and those at initial stage of construction. GRIHA manuals issued by MNRE and TERI provide a comprehensive understanding of provision of green building parameters their underlying criteria and the rating procedure.

In order to facilitate CPWD unit for incorporating necessary features as per GRIHA rating system, guidelines suggesting the minimum score to be achieved against each parameter along with self evaluation form have been prepared for guidance of our planning and field units.

A copy of the guideline is enclosed herewith for guidelines of our field and planning units with the request to circulate these guidance amongst all SEs / SAs/ Dir(H) & EEs/Dy. Archs/ DD(H) under your jurisdiction.

Sd/-  
(Vinayak Rai)  
SE(QA) II

# Relevant Extracts from MOEF Notification

Dtd. 14.09 2006

## Requirements of Prior Environmental Clearance (EC)

The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category '8' in the said Schedule, before any construction Work, or preparation of land by the project management except for securing the land, is started on the project or activity:

- (i) All new projects or activities listed in the Schedule to this notification;
- (ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;

## Categorization of Projects and Activities

- (i) All projects and activities are broadly categorized in to two categories - Category -A and Category -8, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.
- (ii) All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification;
- (iii) All projects or activities included as Category '8' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal

Committee (SI;AC) as to be constituted for in this notification. In the absence of a duly constituted SEIAA or SEAC, a Category '8' project shall be treated as a Category 'A' project;

### **Application for Prior Environmental Clearance (EC)**

An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 annexed herewith and Supplementary Form 1A, if applicable, as given in Appendix II, after the identification of prospective site(s) for the project and l or activities to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant shall furnish, along with the application, a copy of the pre•feasibility project report except that in case of construction projects or activities (item 8 of the Schedule) in addition to Form 1 and the Supplementary Form 1 A, a copy of the conceptual plan shall be provided, instead of the pre-feasibility report.

### **10. Post Environmental Clearance Monitoring**

- (i) It shall be mandatory for the project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 15t June and 15t December of each calendar year.
- (ii) All such compliance reports submitted by the project management shall be public documents Copies-of the same shall be given to any person on application to the concerned regulator authority. The' latest such compliance report shall also be displayed on the web site of the concerned regulatory authority.

### **11. Transferability of Environmental Clearance (EC)**

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor, or by the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period, No reference to the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned is necessary in such cases.

### **12. Operation of EIA Notification, 1994, till disposal of pending cases:**

From the date of final publication of this notification the Environment Impact Assessment (EIA; notification number S.0.60 (E) dated 27th January, 1994 is hereby superseded, except

in suppression of the things done or omitted to be done before such suppression to the extent that in case of all or some types of applications made for prior environmental clearance and pending on the date of final publication of this notification, the Central Government may relax anyone or all provisions of this notification except the list of the projects or activities requiring prior environmental clearance in Schedule I , or continue operation of some or all provisions of the said notification, for a period not exceeding one year from the date of issue of this notification.

[No. J-11 013/56/2004-IA-II (I)]

(R.CHANDRAMOHAN)

JOINT SECRETARY TO THE GOVERNMENT OF INDIA

## List of Projects or Activities Requiring Prior Environmental Clearance

Project or Activity		Category with threshold limit		Conditions if any
1	2	3	4	5
8		Building / construction projects / area development project & township		
8a	Building & Construction Projects		> 20000 sqm < 1,50,000 Sqm of built up area	Built up area for covered construction in the case of facilities open to the sky it will be the activity area
8b	Townships and area development projects		Covering an area > 50 ha and or built up area > 1,50,000 sqm	All projects under item 8(b) shall be appraised as category B1

**Condition (GC)**

Any project or activity specified in Category, (B) will be treated as Category A if located in hole or impart within 10 Km from the boundary of;

- (i) Protected Areas notified under the Wild Life (Protection) Act, 1972,
- (ii) Critically polluted areas as notified by the central pollution control board from time to time
- (iii) Notified Eco-sensitive areas,
- (iv) Inter-State boundaries and international boundaries.



# Bibliography

1. National Building Code 2005 published by BIS New Delhi.
2. Master Plan of Delhi 2021.
3. Delhi Building Bye laws 1983 amended time to time.
4. Barrier Free Guidelines by CPWD.
5. Rain Water Harvesting source : Central Ground Water Authority.
6. Time saver standards by Neufert.
7. Green Building Materials Source Indira Paryavaran Bhawan, Project New Delhi.
8. Climatology by Koinsberger.



# Going Green to Save Energy

# Central Public Works Department (CPWD)

*In the service of the nation since 158 years*

Under the Ministry of Urban Development, Government of India, CPWD provides single window services for all facets of government built environment in India and abroad.

With its huge resource of skilled and competent engineers, architects and horticulturists, CPWD's strength is its country-wide presence, with proven ability to undertake a whole range of complex constructions under difficult terrains. The department has the capacity to undertake construction varying from the smallest works in the remotest of places to mega projects in metro cities. These works include the construction and maintenance of government structures such as residential complexes, offices, schools, laboratories, hospitals, sport facilities, stadia, gymnasia, auditoria, storages, highways, flyovers, tunnels, bridges, jetties, airports, runways and border fencing. Intra-campus facilities such as water and electric supply, sewerage and treatment plants are also provided.

CPWD also performs other functions such as the custody of estates, valuation, rent assessment, technical advice to government, consultancy services, standardization and benchmarking, State Ceremonies (Republic Day, Samadhi, etc.) processing of DPRs for development of urban infrastructure under JNNURM and works of other Ministries for centrally funded works. CPWD also assists in organizing public and ceremonial functions, and upkeep of historical and important monuments and structures.

## **A Handbook of Planning of Office Buildings**

CPWD also publishes various documents to help the construction industry. This publication is a further step forward in the department's commitment towards more promoting barrier-free and energy efficient buildings with productive work environment. Policy makers and practitioners will find this publication useful.



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