

# **AESTHETICS AND FUNCTIONALITY THROUGH GLASS**

**USHA BATRA, SDG (WR), CPWD, MUMBAI  
DR K M SONI, Retd. ADG,CPWD**

# **USE OF GLASS IS UNAVOIDABLE**

- THERE IS NO SUBSTITUTE OF GLASS FOR TRANSPARENCY
- TRANSPARENCY IS BASIC REQUIREMENT FOR A HABITAT HENCE;  
USE OF GLASS IS UNAVOIDABLE AND NO HABITAT CAN BE THOUGHT OF WITHOUT GLASS

# Imagine Buildings without Glass

Or  
**very little glass**



**Dull and blind**  
**Glass is important**  
**for**  
**light and ventilation**

- Glass allows natural light to enter the building and thus saves energy and lowers the electricity bills, brightens up the room and brings out the beauty and most importantly boosts the mood of occupant.
- Glass provides an ideal way to showcase a product.





- Glass is 100% recyclable and it does not degrade during the recycling process, hence it can be recycled again and again without loss of quality or purity.
- When used in the interiors, glass saves space.
- it provides flexibility and aesthetics to the structure.



- Glass is tailor-made to provide specific functionalities to the space they are utilized in such as security, privacy, noise insulation, energy efficiency, aesthetics, pollution control, etc.
- Sand blasting and acid etching used for reducing transparency but not light transmission.
- Tinted glass gives a striking visual effect.
- Textures or patterns on one face of the glass are used for diffusing light and obstructing visibility from the outside.





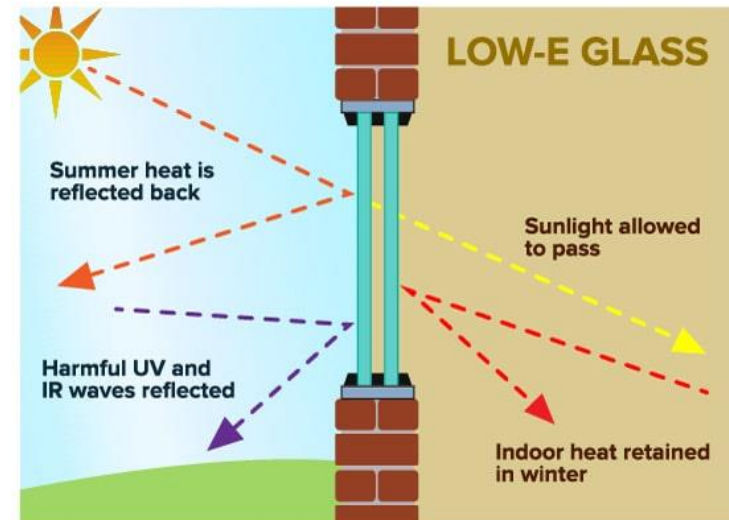
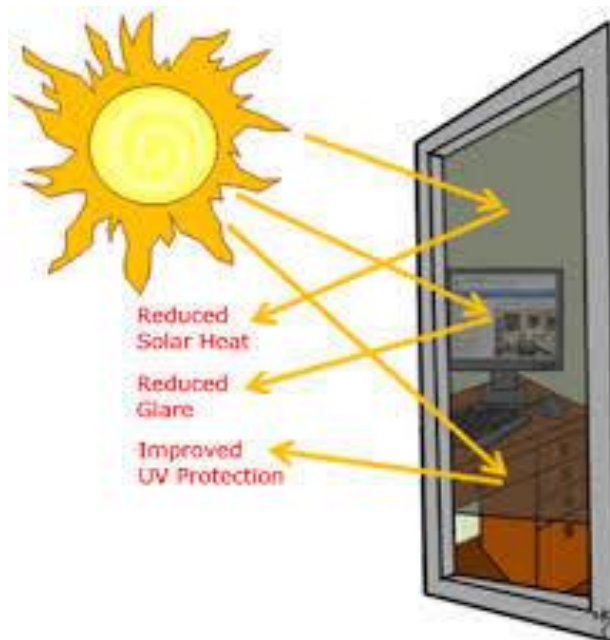
## **BULLET PROOF GLASS ON INDEPENDENCE DAY**



- Switchable glass changes its properties with passage of current and hence changes from transparent to translucent and vice versa within seconds.
- Ceramic printed glass is used for privacy or hiding the background.
- Lacquered glass is used in architectural spandrels, cupboards, furniture, kitchen countertops, etc.



# ENERGY EFFICIENCY AND NOISE INSULATION





# Use of Waste glass powder for special effects



Xeriscaping enhances the beauty with recycled glass rock .





**TRANSPARENT PROPERTY**

# LOOKING BEYOND CLOUDS



# LIVELIER INTERIORS CONNECTING SPACES AND OUTSIDE



For confined spaces,  
glass is the preferred  
solution.





**LOOKING THE STREET**



**ENJOY GREENERY WHILE IN OFFICE**





**ENJOY FOOD WITH OUTSIDE VIEW**





**INSPECTION IN NATURAL LIGHT**



**AUDITORIUM DURING CLOUDY DAY**





**SEE THROUGH VIEW**

# **STUNNING EFFECT DUE TO GLASS IN LIGHTING**

- **GLASS PROVIDES STUNNING EFFECT  
ON LIGHTING**
- **AND THIS PRPOERTY WILL FORCE  
ARCHITECTS TO ADOPT GLASS EVER  
AND EVER**

**Glass: look the effect**



**Canara Bank, Mumbai**



# DINING HALL NISM MUMBAI, DURING NIGHT



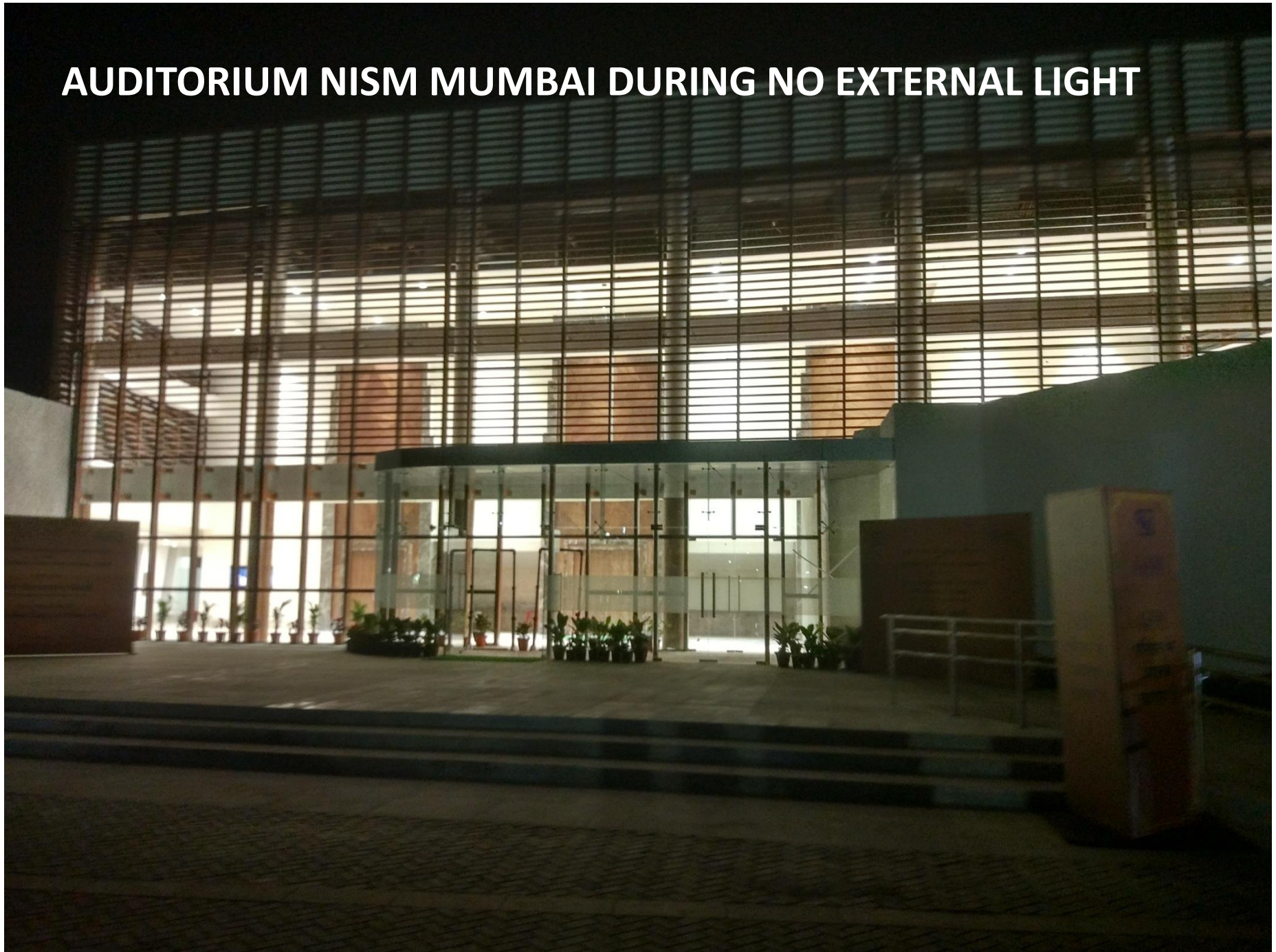


# LIBRARY NISM MUMBAI DURING NIGHT





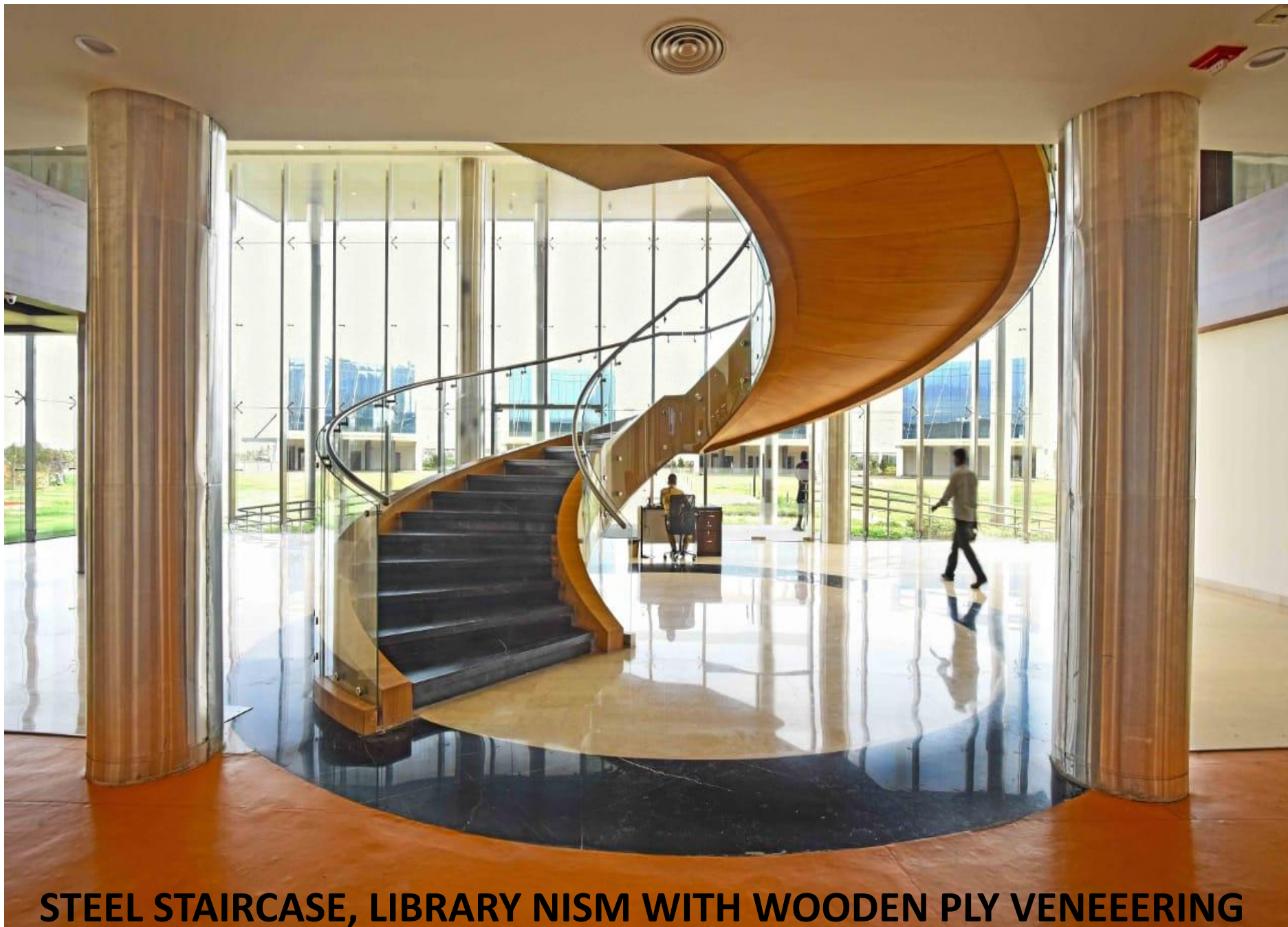
# AUDITORIUM NISM MUMBAI DURING NO EXTERNAL LIGHT



# **GLASS IS COMPATIBLE TO OTHER MATERIALS AND ENHANCES THEIR BEAUTY**

- **TIMBER**
- **STEEL**
- **ALUMINIUM**
- **PLASTIC**
- **AND ANY OTHER MATERIAL**





**STEEL STAIRCASE, LIBRARY NISM WITH WOODEN PLY VENEERING**



# IN RCC FACADE, ECGC HEADQUARTER BUILDING, MUMBAI

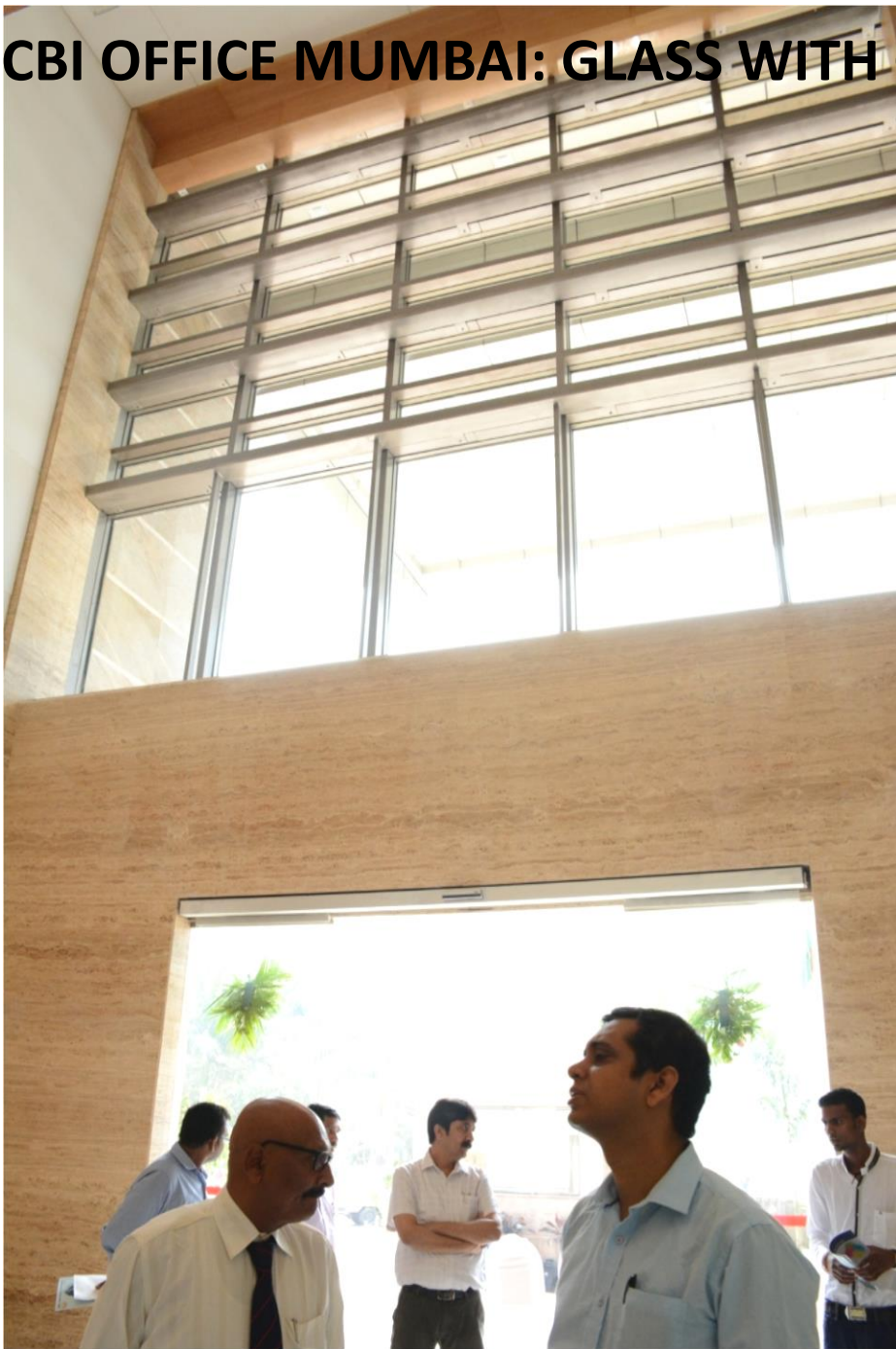


**SEBI, MUMBAI WITH ACP**





# CBI OFFICE MUMBAI: GLASS WITH GRANITE, ITALIAN MARBLE AND ACP



# **AESTHETICS OF GLASS**

- TRANSPARENCY WILL MAKE GLASS UNAVOIDABLE
- COMPATIBILITY OF GLASS WITH STONES, PVC, STEEL, ALUMINIUM ETC WILL FORCE TO ADOPT GLASS IN BUILDINGS
- TRANSMISSION OF LIGHT IN GLASS WILL MAKE IT FAVOURABLE MATERIAL FOR ARCHITECTS

# **FUNCTIONS OF GLASS**

- **GLASS IN EXTERNAL FACE**
  - **STRUCTURAL GLAZING, CLADDINGS, FACADE, SOLAR SYSTEM**
  - **DOORS/WINDOWS**
- **GLASS IN INTERIOR**
  - **DOORS**
  - **STAIRCASE**
  - **RAILINGS**
  - **FLOORINGS**
  - **MURALS**
  - **PARTITIONS**
  - **FURNITURE**





# **FUNCTIONAL REQUIREMENTS**

- **STRUCTURAL GLAZING**
- **FENESTRATION/WINDOWS**
- **DOORS**
- **PARTITIONS**
- **SOLAR SYSTEM**
- **SECURITY BARRIERS**

# **STRUCTURAL GLAZING**

- **AESTHETICALLY: MOST OF THE PEOPLE MAY AGREE THAT IT LOOKS BEAUTIFUL THOUGH MAY HAVE LITTLE VARIED THOUGHTS IN MAKING TOTAL OR PARTIAL USE OF STRUCTURAL GLAZING**
  - **BUILDING MAY HAVE COMPLETE GLASS FACADE**
  - **IT MAY HAVE COMBINATION OF STONE, ALUMINIUM OR/AND SOME OTHER MATERIALS**

# PARTIAL USE OF STRUCTURAL GLAZING WITH SANDSTONE







**PARTIAL USE OF STRUCTURAL GLAZING**



**USE OF STRUCTURAL GLAZING ALONG WITH GFRC PANELS**





**PARTIAL USE OF STRUCTURAL GLAZING IN RCC FRAMED BUILDING**



# SUBSTANTIAL USE OF STRUCTURAL GLAZING



# EXTENSIVE USE OF GLAZING







**EXTENSIVE USE OF GLAZING**



# COMPLETE USE OF GLAZING





**EXTENSIVE USE OF GLAZING**





**EXTENSIVE USE OF GLAZING**





**EXTENSIVE USE OF GLAZING WITH ACP**



# EXTENSIVE USE OF GLAZING





**PARTIAL/EXTENSIVE USE OF GLAZING**





**PARTIAL USE OF GLAZING**



**PARTIAL USE OF GLAZING**

# **FUNCTIONS OF GLASS**

- **STRUCTURAL MEMBERS- NO**
- **NON STRUCTURAL MEMBERS: REPLACING BRICKWORK/BLOCKWORK MAKING STRUCTURE LIGHT WEIGHT**
- **FENESTRATION : YES**
- **FIRE: ?**
- **FRESH AIR: ?**
- **AESTHETICS: YES/NO**
- **FEELING GOOD: ?**



# **SOME SERIOUS CONCERNS ON USE OF STRUCTURAL GLAZING**







**ANI**

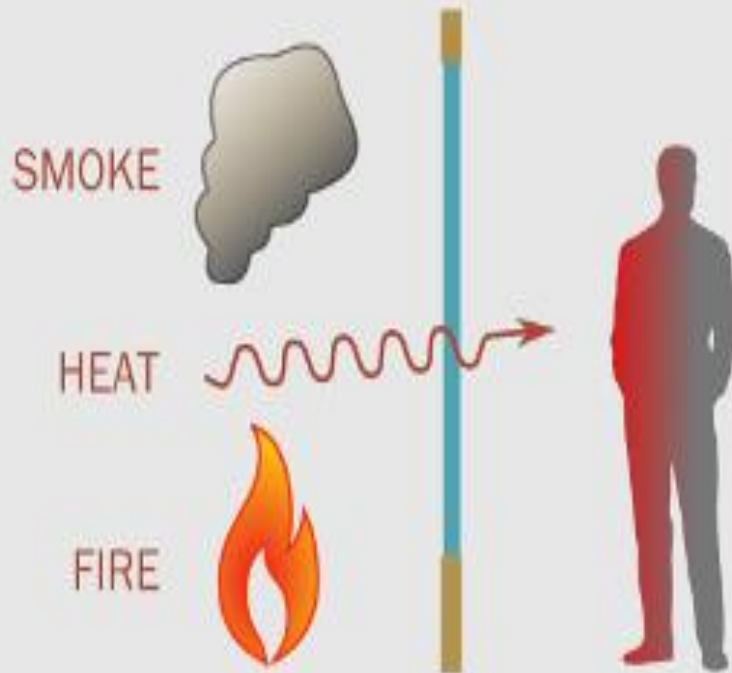




# FIRE PROTECTIVE AND FIRE RESISTIVE GLASS

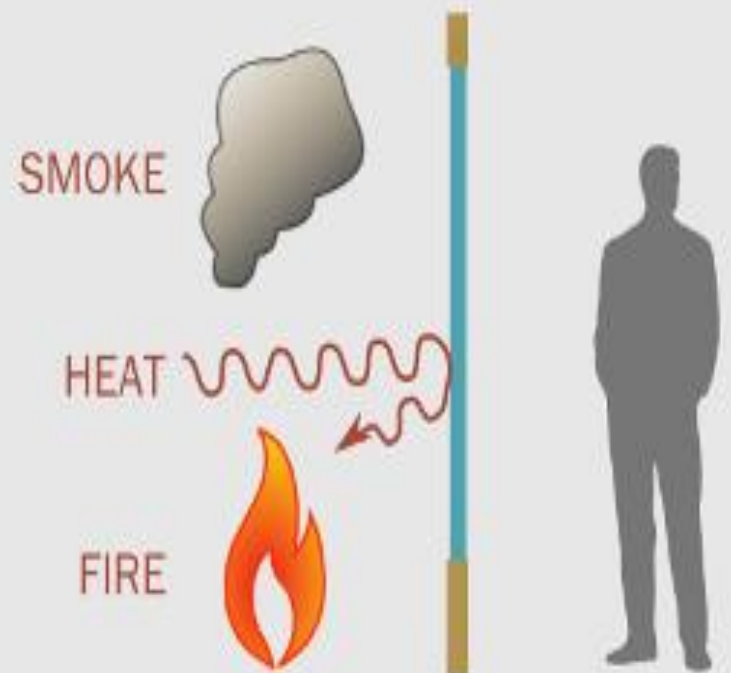
## FIRE-PROTECTIVE RATED GLASS

blocks smoke and fire



## FIRE-RESISTIVE RATED GLASS

blocks smoke, fire, and radiant heat



# **STRUCTURAL GLAZING DURING FIRE**

- **HAVE SHOWN SOME SERIOUS CONCERNS DUE TO MANY CASUALTIES**
- **INADEQUATE OR NO OPENINGS**
- **FIRE EVACUATION DIFFICULT**
- **SMOKE EXHAUST DIFFICULT**
- **DAMAGE OF PROPERTY**
- **FUNCTIONS SHOULD HAVE PREFERENCE OVER EVERYTHING ELSE**



# STRUCTURAL GLAZING

- ADEQUATE AND OF REQUIRED SIZE OPENINGS ARE TO BE PROVIDED
- GLASS EXPERTS SHOULD COME FORWARD AND SUGGEST THE REQUIREMENTS OF SAFE GLASS, OPENING SIZES, THEIR FIXING ARRANGEMENT TO NATIONAL BODIES FRAMING CODE OF PRACTICES
- SPECIFICATIONS OF SAFE GLASS SHOULD BE FRAMED AND SENT TO LOCAL BODIES, ENGINEERING ORGANISATIONS AND ACADEMECIANS
- EFFORTS SHOULD BE MADE TO INCLUDE STRUCTURAL GLAZING IN CURRICULUM OF ARCHITECTS AND ENGINEERS

# FENESTRATION

- FENESTRATION AFFECTS HEAT AND SUNLIGHT THAT ENTERS THE BUILDING, CONTRIBUTING TO ENERGY EFFICIENCY HENCE IS A FUNCTION OF GREEN BUILDING CONCEPT
- FENESTRATION HAS TO BE DESIGNED AS PER THE REQUIREMENT OF SUNLIGHT INSIDE THE BUILDING
- FENESTRATION AFFECTS SEISMIC BEHAVIOUR AND WIND PRESSURE DURING CYCLONES AND
- WATER TIGHTNESS

HENCE FENESTRATION NEEDS TO BE DESIGNED ACCORDING TO AESTHETICS, FUNCTIONAL, GREEN BUILDING AND DISASTER RESISTANCE REQUIREMENTS











# **GLASS FACADES IN CYCLONE PRONE AREAS**

- **MAY BE AVOIDED IN CYCLONE PRONE AREAS**
- **ELSE PROPER TYPE OF GLASS SHOULD BE USED**
- **CONNECTIONS SHOULD BE DEVELOPED AND PROVIDED FOR FIXING**



# DOORS

- **EXTERNAL DOORS**
- **INTERNAL DOORS**
- **IN ADDITION TO AESTHETIC, SAFETY (HUMAN, FIRE, DISASTERS) REQUIREMENTS TO BE MET**
- **MAINTENANCE ISSUES TO BE EXAMINED FOR FUNCTIONAL REQUIREMENTS**
  - **AIR CONDITIONED AREAS**
  - **NON AC AREAS**
  - **PUBLIC AREAS**
  - **DUSTY AREAS**

# DOORS

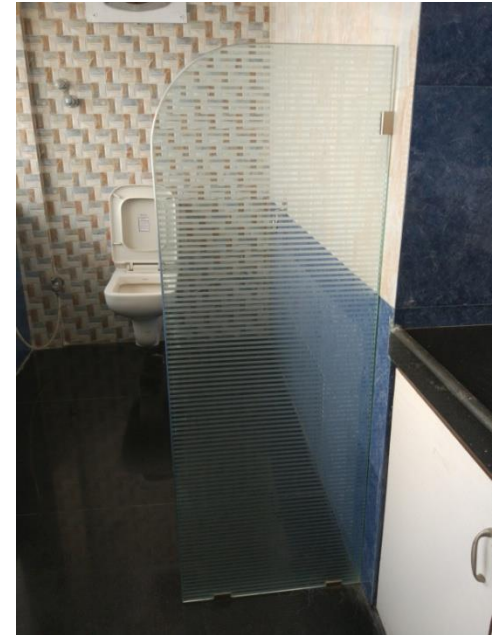
- IN INDIA, COMBINATION OF CONVENTIONAL DOORS AND GLASS DOORS WILL PREVAIL.
- EXTERNAL AUTOMATIC GLASS DOORS MAY BE AC HOTELS/RESTAURANTS, AND INTERNAL DOORS IN FULLY AC AREAS BUT NOT SUITABLE IN DUSTY AREAS AND LARGE CONGESTED PUBLIC AREAS
- DOORS/WINDOWS NEED TO INCORPORATE SAFETY FEATURES FOR HUMAN SAFETY





# OTHER USAGE OF GLASS

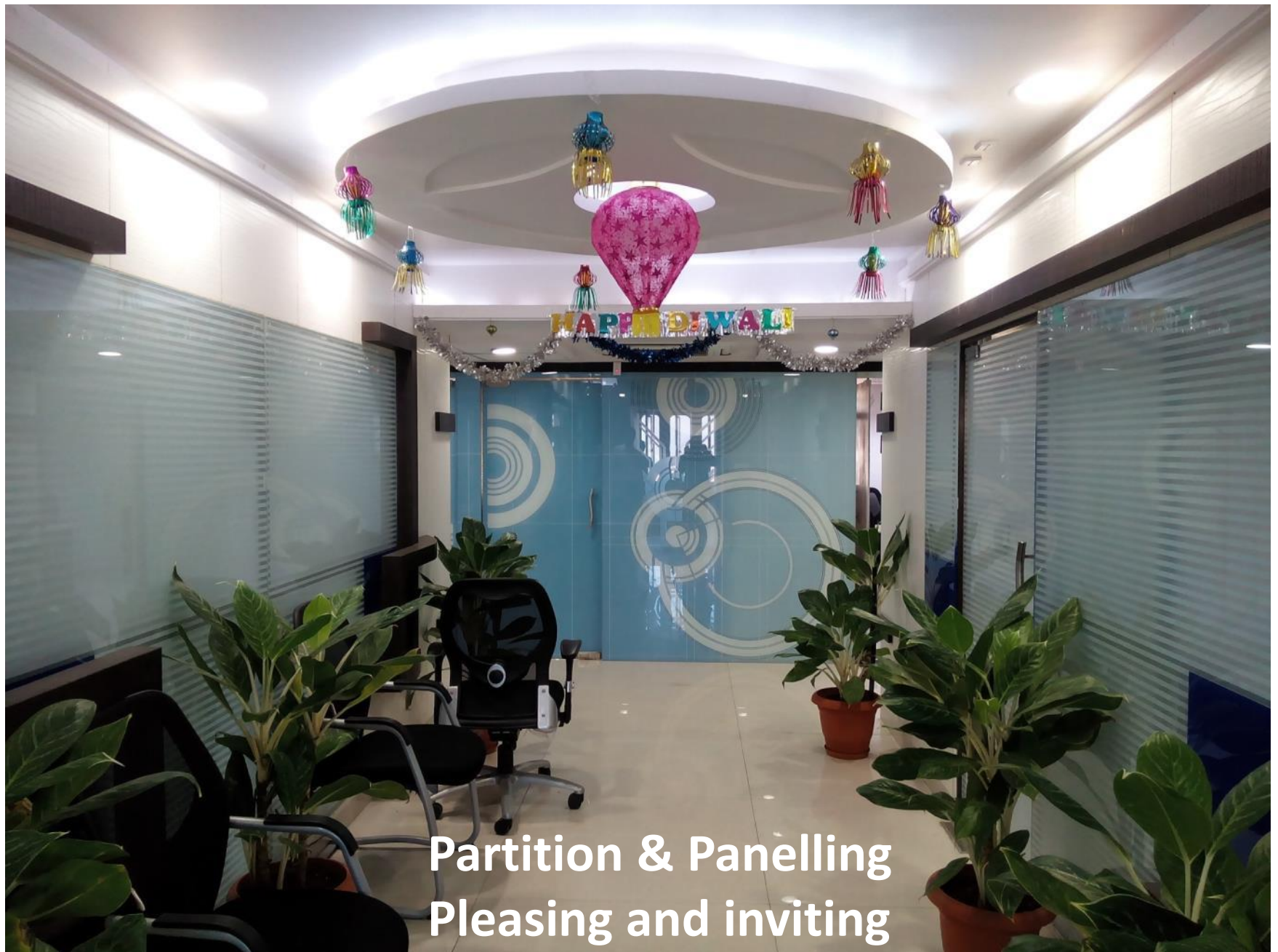
- **STAIRCASES**
- **RAILINGS**
- **FLOORINGS**
- **PARTITIONS**
- **MURALS**
- **FURNITURE**
- **THESE USES ARE SITE SPECIFIC AND DECIDED BY THE ARCHITECT. HERE ALSO AESTHETIC, FUNCTIONAL AND DISASTER RESISTANT PROPERTIES ARE TO BE CONSIDERED**





Partition & Panelling  
Pleasing and inviting





**Partition & Panelling**  
**Pleasing and inviting**



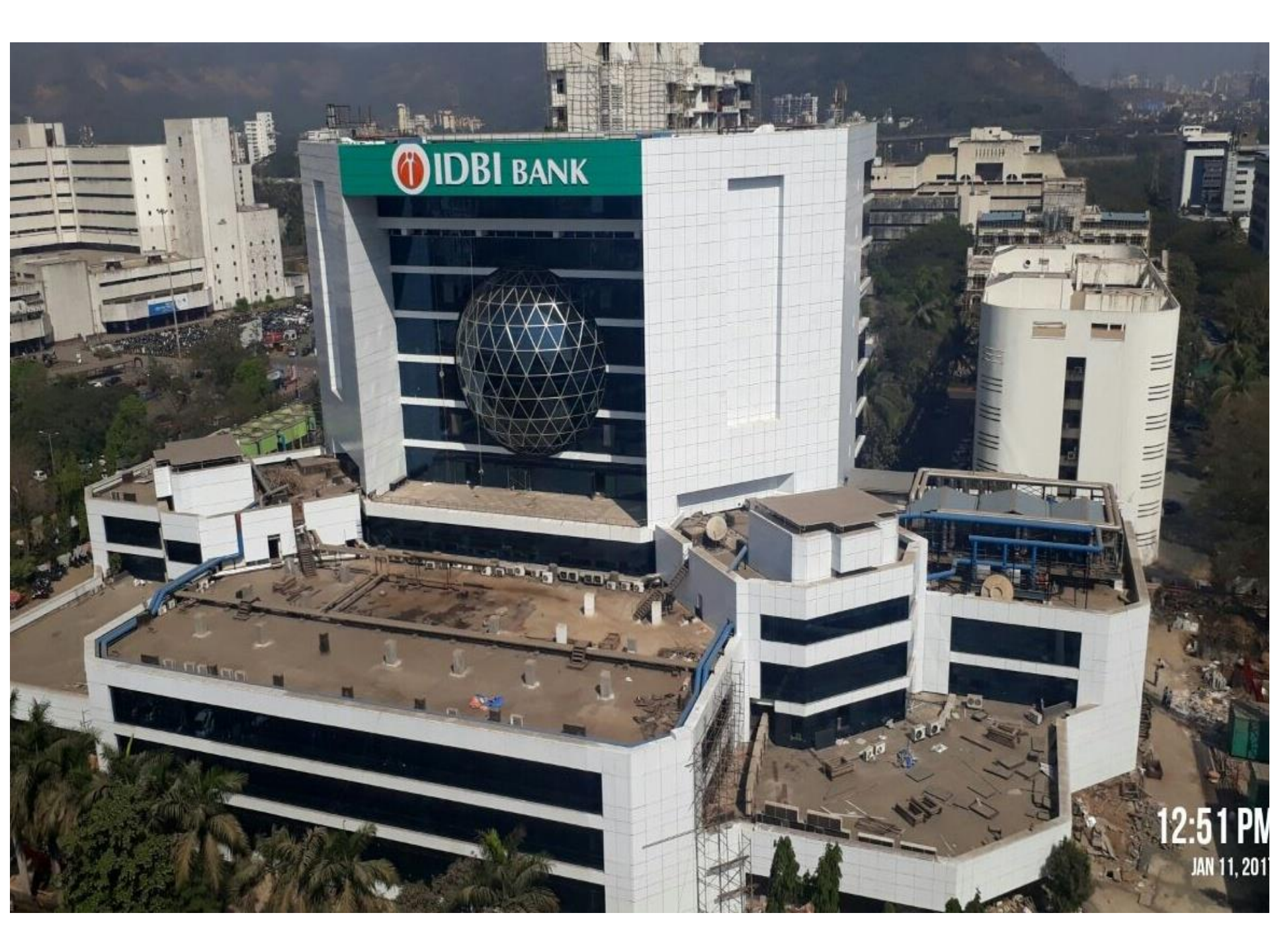












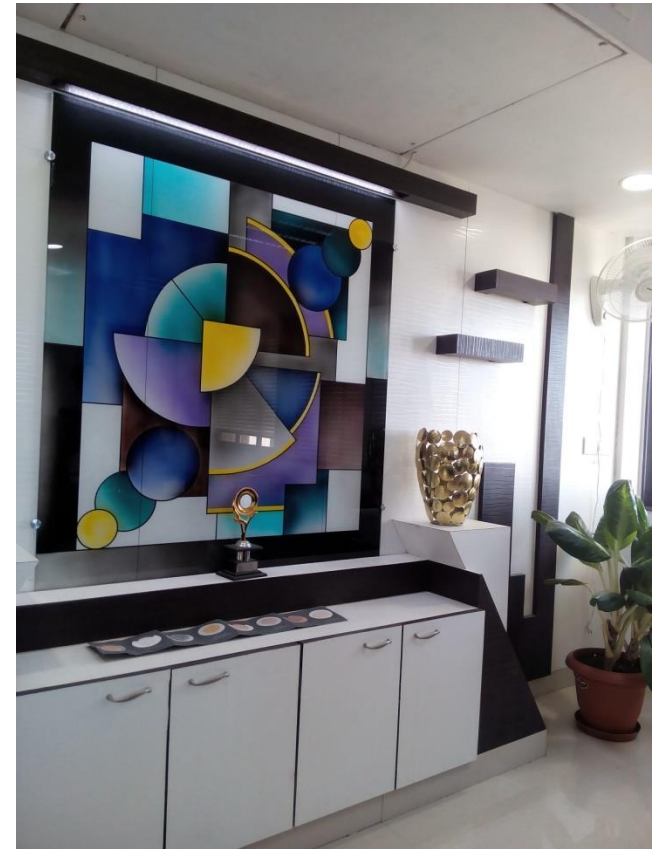
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# AESTHETIC REQUIREMENTS

- **RAILINGS**
- **LIFT INTERIORS**
- **MURALS**
- **FURNITURE**





# OTHER FUNCTIONAL REQUIREMENTS

- **SOLAR PV PANELS**
- **FIBREGLASS PRODUCTS**



# **FIBREGLASS**

- **GLASS IS USED IN SHEET FORM IN GENERAL BUT ALSO HAS LARGE USES IN FIBRES AND OTHER FORMS**

# FIBREGLASS GEOGRIDS





# FIBREGLASS PRODUCTS



Fiberglass Boats



Fiberglass Canopies



Fiberglass Domes



Steel Fabrication



Fiberglass Grating



Fiberglass Washroom



Tanks and scrubbers



Industrial Louvers

# FIBREGLASS PANELS





# CRUSHED GLASS AND FIBRES IN CONSTRUCTION





# GLASS IN BUILDINGS

- EVERY MATERIAL HAS A SPECIFIC PROPERTY BUT SOME MATERIALS HAVE WIDE APPLICATIONS SO ALSO THE GLASS
- APPROPRIATE TYPE OF GLASS NEEDS TO BE USED AND TESTED BEFORE ITS USE SO THAT IT DOES NOT LEAD TO ACCIDENTS
- DURING PLANNING, WE SHOULD BE CAREFUL FOR ITS SUITABILITY FOR AESTHETICS AND FUNCTIONALITY. IF WE OVERLOOK FUNCTIONALITY, IT MAY SEND A WRONG SIGNAL AND IF WE OVERLOOK AESTHETICS, IT MAY LEAD TO CUSTOMER UNSATISFACTION





**SO SELECT, DESIGN, TEST AND  
USE APPROPRIATE GLASS AT  
APPROPRIATE LOCATION AND  
ENJOY ITS BEAUTY AND  
FUNCTIONS.**

