

GLASS AS SMART BUILDING MATERIAL- CPWD SCENARIO

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Smart Building

- **A smart building controls the building's operations including heating, ventilation, air conditioning, lighting, security and other systems.**
- **Smart building reduces energy use, optimizes space usage and minimizes the environmental impact.**

Objectives of Smart Building

- **Better efficiency**
- **Higher productivity**
- **Enhanced quality of life**



"what glass can do for you", Greater Noida
- Usha Batra & Dr K M Soni



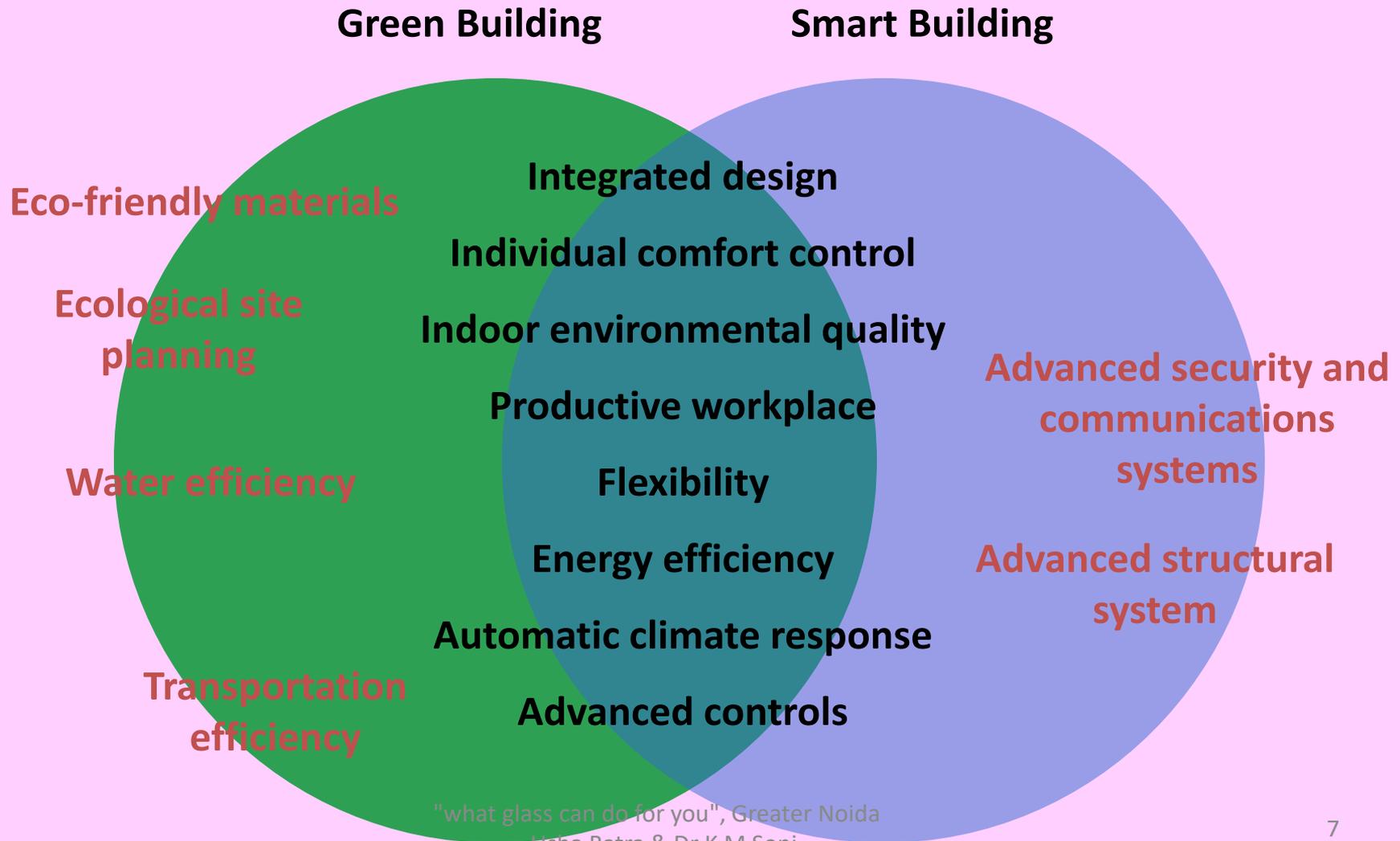
"what glass can do for you", Greater Noida

- Usha Batra & Dr K M Soni

What glass can do for buildings?

- From the photographs, it is imperative that glass is the main element of “Smart” buildings. Thus glass can help in making buildings
 - **smart.**
 - **green**
 - **energy efficient**

Commonalities



Imagine Buildings without Glass



Or
very little glass



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Dull and blind
Not habitable

**Glass is important for
light and ventilation**



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Glass –smart and sustainable material

- **Glass being a completely recyclable and sustainable material, helps achieve great design in eco-friendly way.**
- **A varied range of high-performance and energy-efficient glasses, that reflect or absorb heat but allow light inside a building**
 - **enable green architecture**
 - **maximise daylight**
 - **offer higher standards of living**
 - **Enable use of glass facades where glass is a structural component of the building.**



Use of high performance glass SEBI Building, BKC Mumbai

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Regional Passport Office Building, Mumbai

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Canara Bank Building at BKC

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Glass facade.....structural component of building

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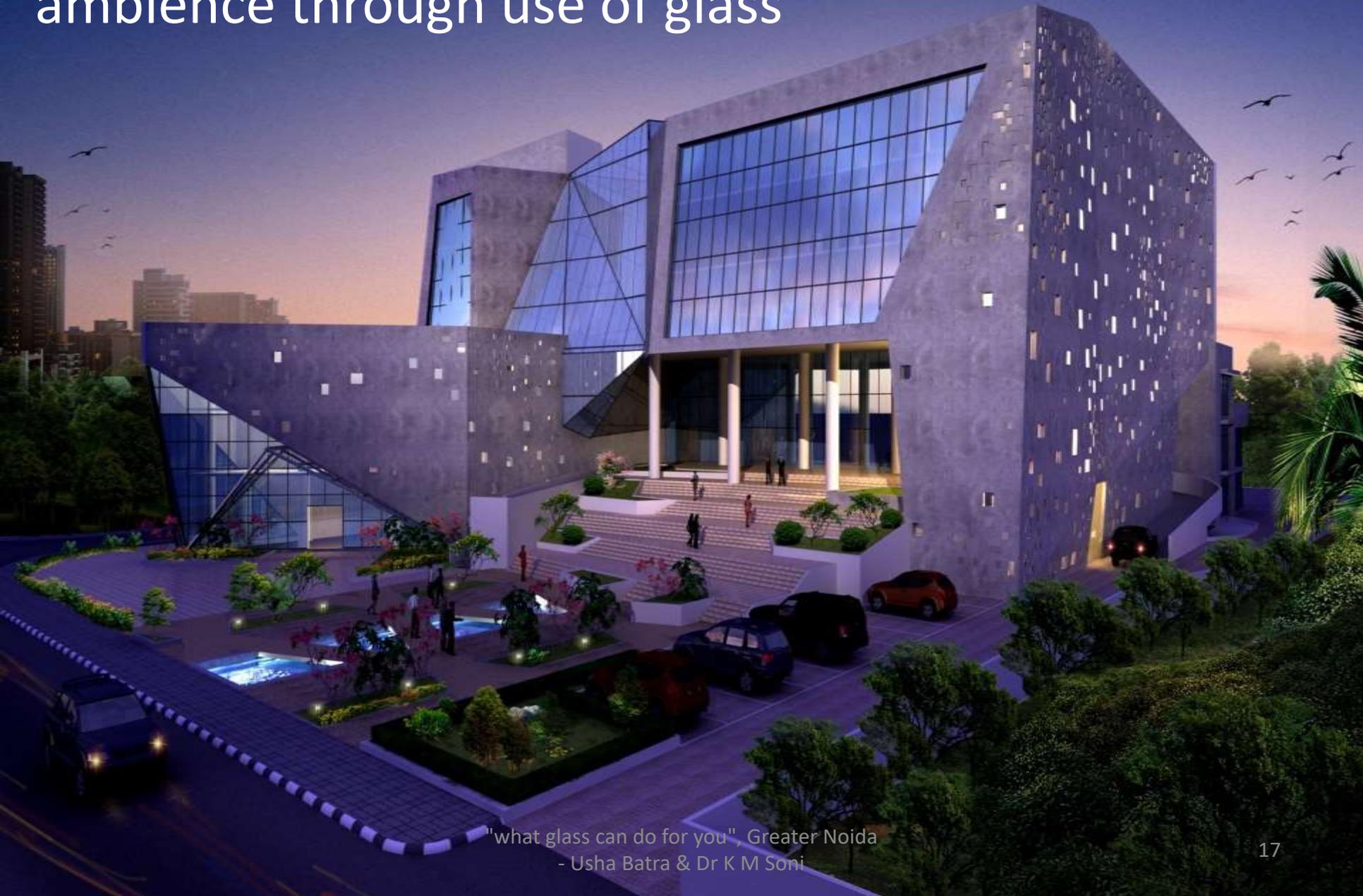
Glass creates stylish ambience

Glass is available in a stupendous variety of styles, colours, designs and textures.

Whether it is used for facades, doors and windows or in interiors, glass is the perfect material for creating a stunning effect and stylish ambience.



Stunning effect of glass and stylish ambience through use of glass



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**Stylish ambience created by green view
through glass
and reflection of other buildings in glass facade**



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**Stunning effect of glass
fascinating, inviting, as if green brought indoor**



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Fascinating effect of glass, complete connection of indoor and outdoor

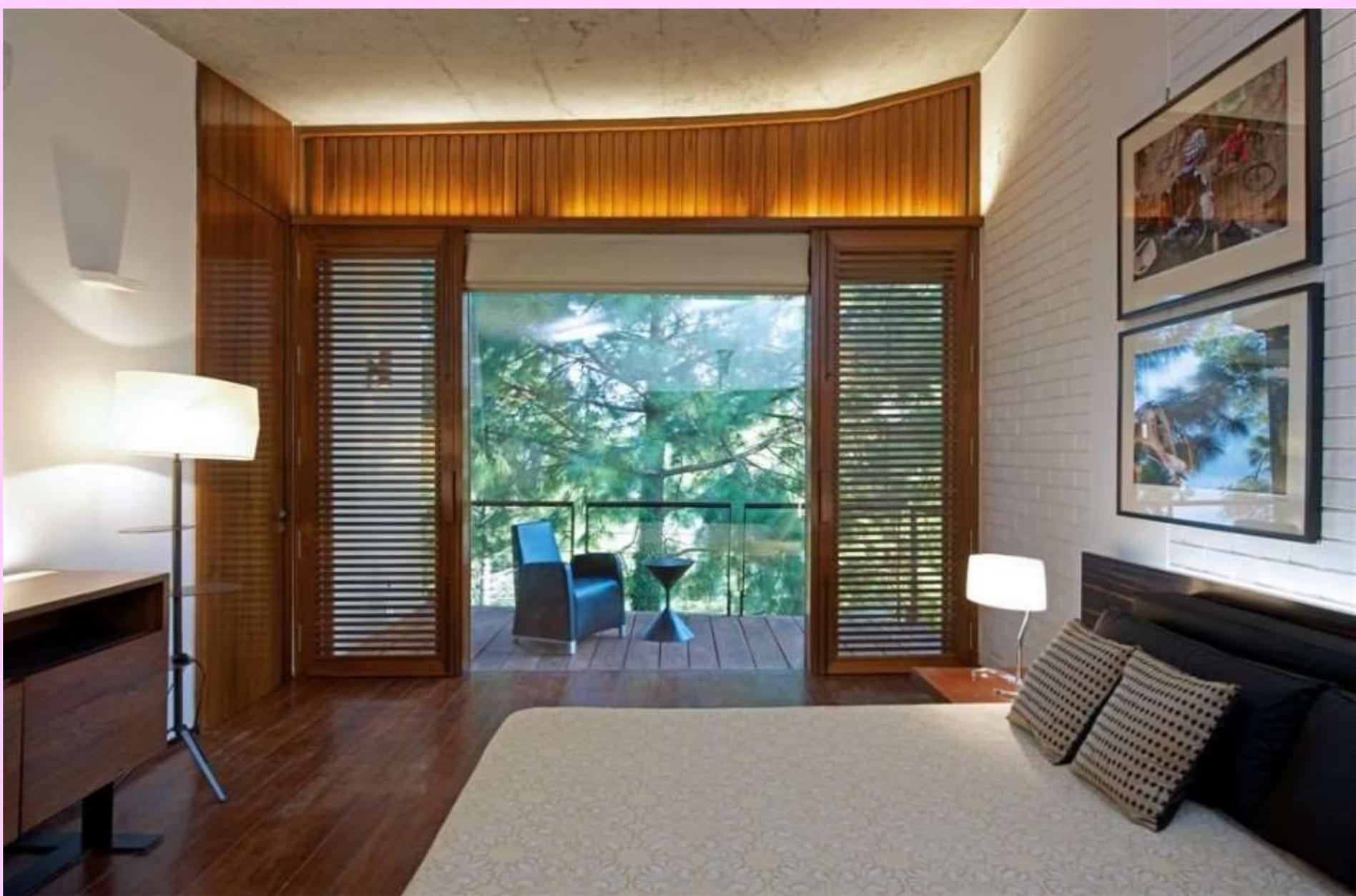


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**Stunning effect of glass.....light, ventilation, and view
makes the building attractive and lively**

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Luxurious effect of glass Door

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Inviting, pleasing, and connecting indoor with outdoor



Glass windows .. well lit, persuasive and lively

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Stunning Effect of single glass window.....

Pleasing, bringing light & liveliness to long corridor

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**Effect of glass windows....
well ventilated , persuasive and lively**

Glass connects indoor to outdoor



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Glass connecting indoor to outdoor



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Glass connecting indoor to outdoor



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Stunning outdoor brought insight



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Glass connecting indoor to outdoor

View controlled manually.. can be done electronically as well

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Glass compatible to almost every building material



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Compatibility of glass to GFRC



Compatibility of glass to stone and ACP

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Compatibility of glass to brick and RCC structure

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Compatibility of glass to RCC/aluminium

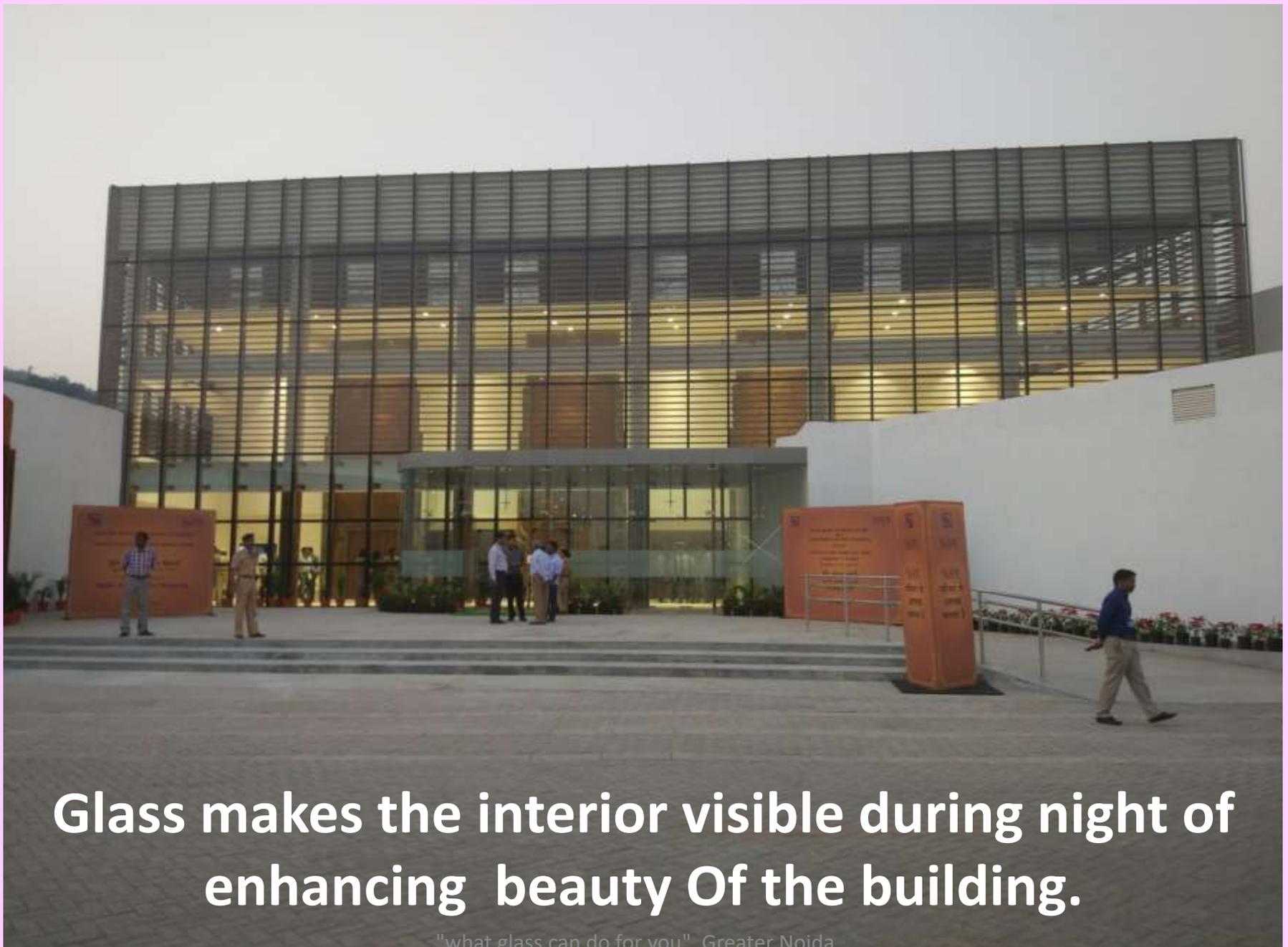
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Compatibility of glass to sandstone

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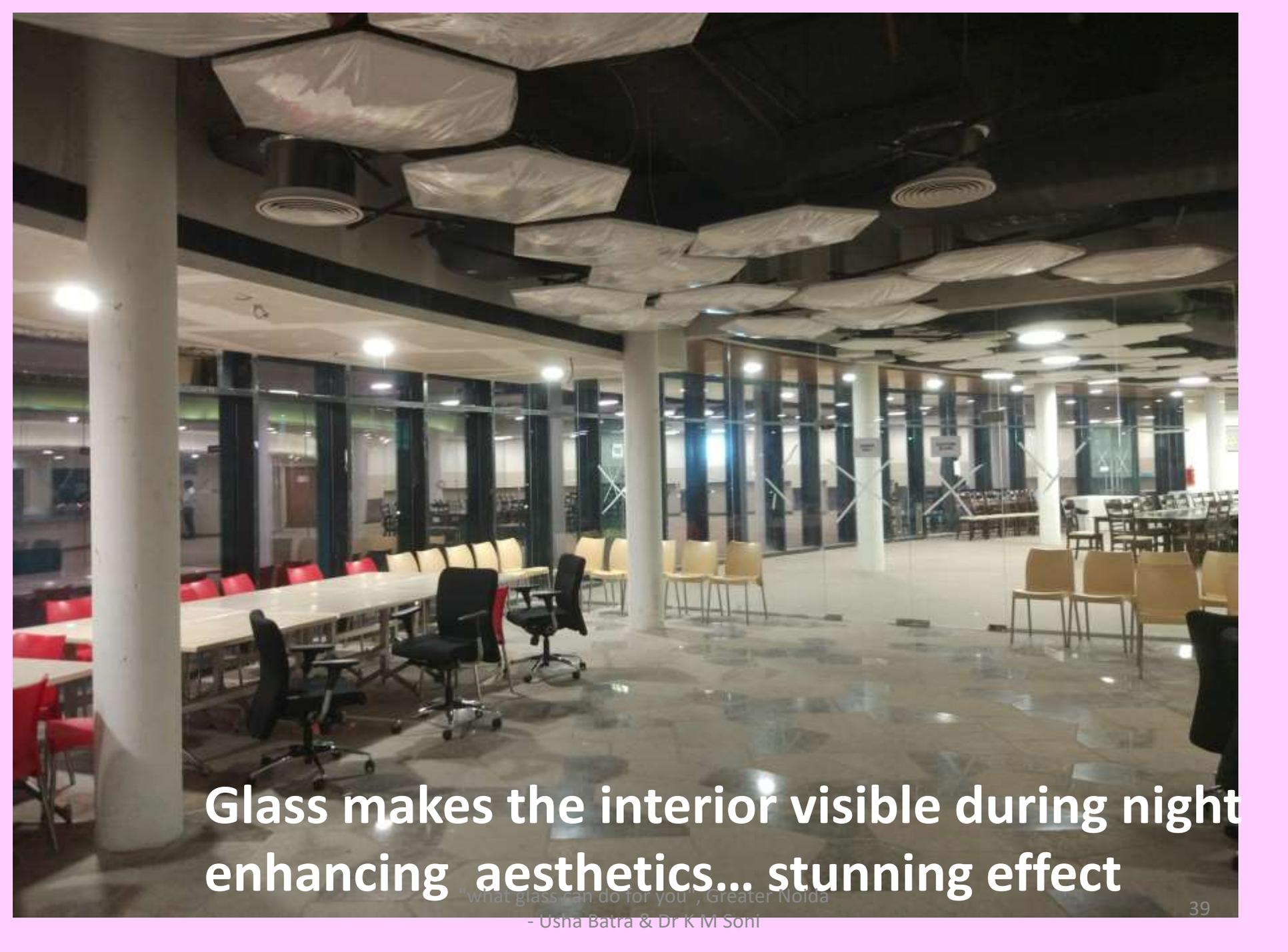
*Glass enhances the beauty
of the building during
daytime as well as during
night*



Glass makes the interior visible during night of enhancing beauty Of the building.

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A photograph of a modern office interior at night. The room features a long white conference table with black and red chairs. The ceiling is dark with several large, white, hexagonal light fixtures. The walls are made of glass, providing a view into another room with tables and chairs. The floor is polished and reflects the lights.

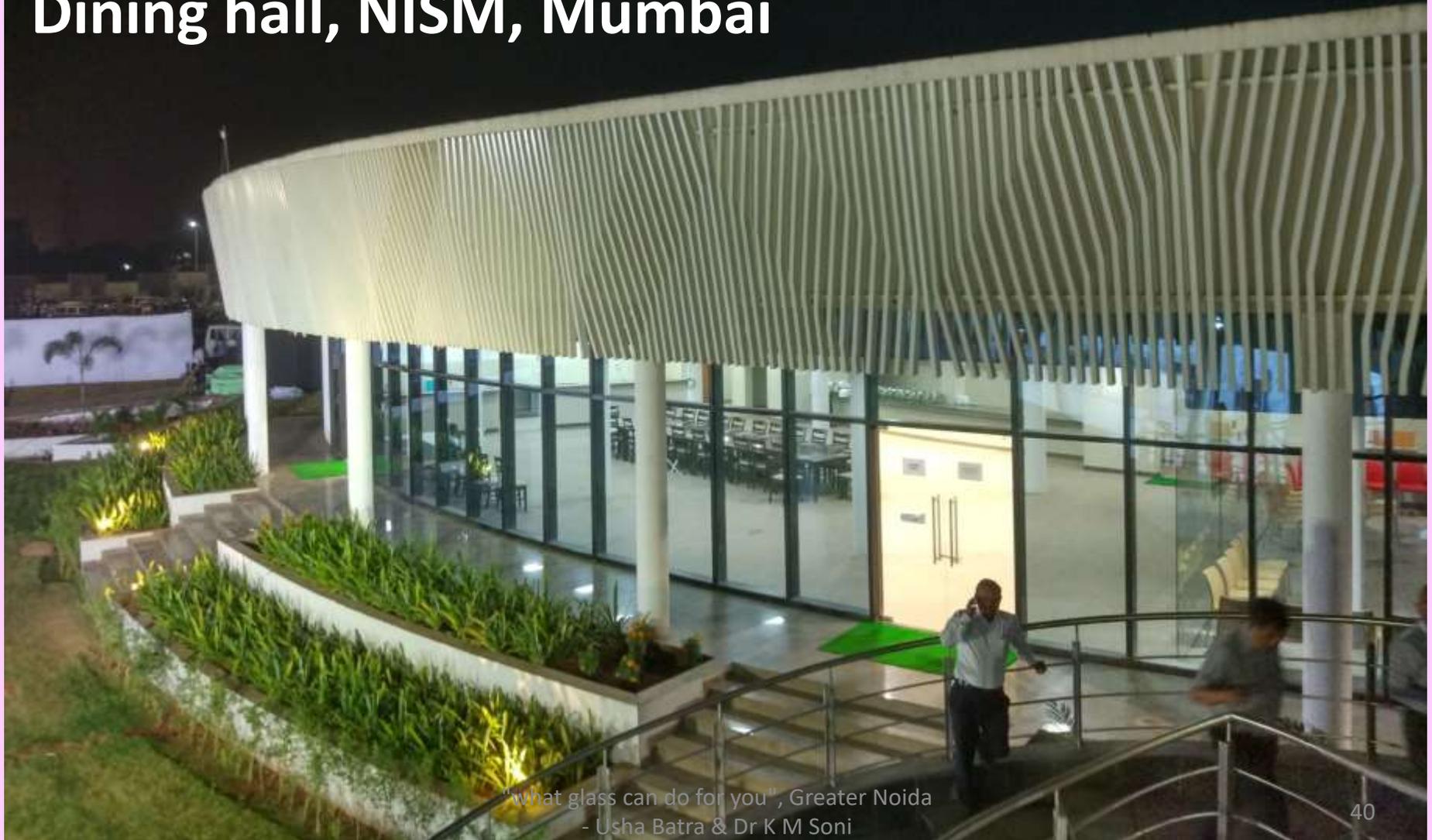
**Glass makes the interior visible during night
enhancing aesthetics... stunning effect**

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Wow effect of the glass at night

Dining hall, NISM, Mumbai



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Glass: look the effect



Canara Bank, Mumbai

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*Glass reduces the dead load
of
the structures*



RTI, CAG, Mumbai

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- Usha Bhatnagar



CBI office building, Mumbai

IDBI Bank, Mumbai



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One material, many uses

Applications and uses of glass are as breathtaking as its effects.

From entire facade to doors and windows, floors to walkways, staircases to domes, canopies to skylights, partitions to enclosures, shelves to table tops and counter-tops....



Myths or Facts about glass ?

ENERGY EFFICIENCY

- Although energy losses through windows and doors account for approx. 50% of the total energy consumption in buildings
- It can be controlled through
 - better designs
 - use of solar reflective / low e-glass/single/ DGU /TGU as the case may be

SAFETY

Although glass is brittle, it is safe from Fire, Earthquakes and Blast

IF ONE CHOOSES RIGHT TYPE OF GLASS

AND USES IT APPROPRIATELY



FIRE RATED DOOR FOR FIRE SAFETY

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Fire resistant glass

Glass can actually substitute a brick wall in terms of fire-rating property while maintaining transparency.

- **Wired Glass**
- **Borosilicate Glass**
- **Toughened Glass with flame retardant coating**
- **Toughened Glass with Intumescent gel**
- **Laminated Glass with Intumescent layers.**

Energy Efficient Glass

- In hot climates, advanced solar control glass allows the sun's light into buildings, while blocking much of its heat to reduce load on HVAC.
- In cold climates, low-e glass reduces heat loss.
- **CO₂ reduction targets have led to increased use of energy-efficient glass.**





Use of solar reflective / energy efficient glass in green

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Net Zero building: Indira Paryavaran Bhawan using energy efficient glass and solar PV rooftop



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Solar PV Rooftop on existing buildings

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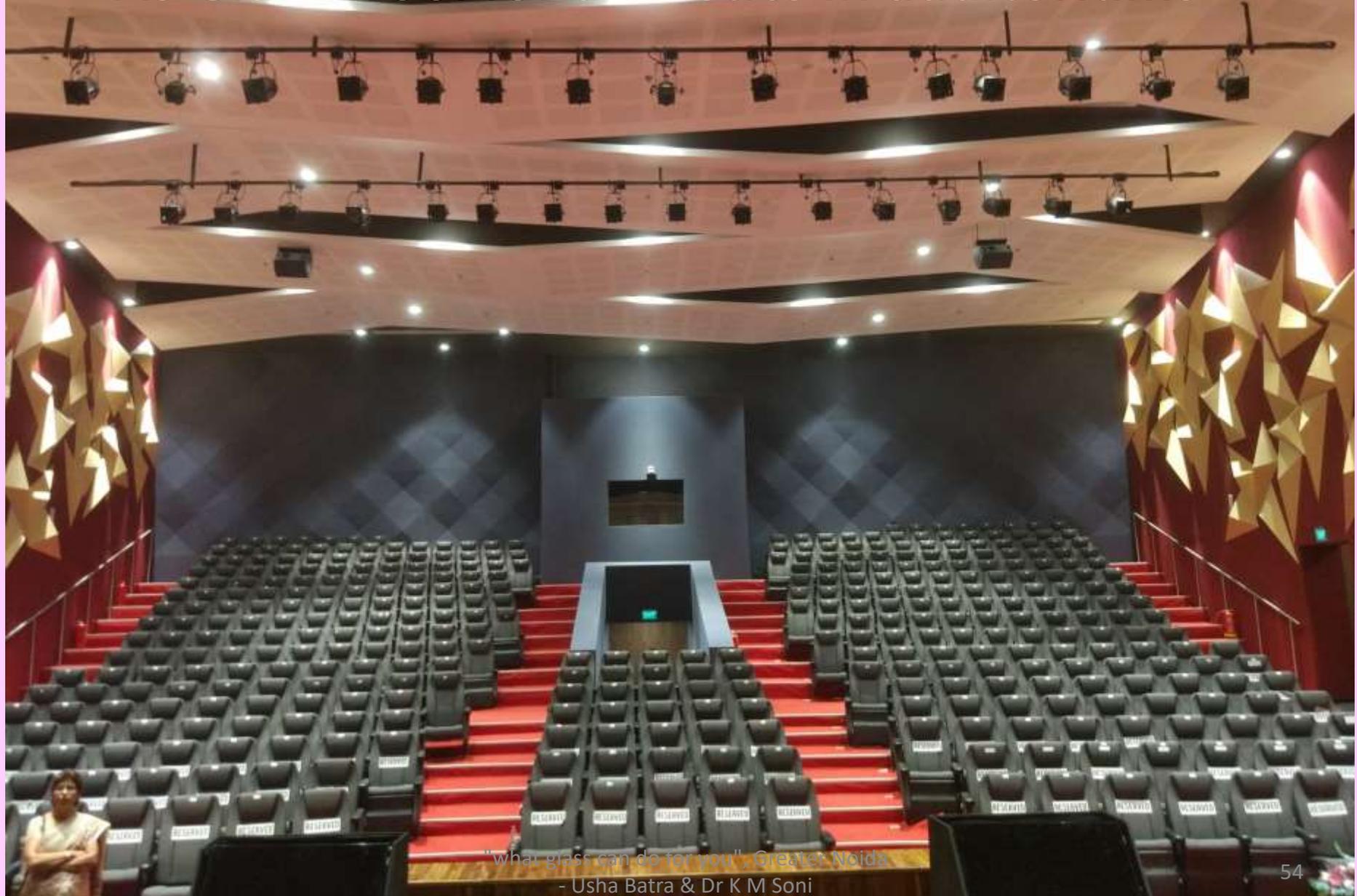
Glass can even be used for special requirements / special effects

Waste glass powder can be used as partial replacement of cement for sustainable concrete practice

In manufacturing other building materials like fibre glass used in cladding, flooring, roofing etc ; glass mosaic tiles and so on..



As Glass wool for acoustics in auditoriums



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Usha Bhatia & Pooja Soni

Special Effect of glass globe

Use of fibre reinforced glass blocks in cladding



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Fibre glass blocks in T2 airport Mumbai

Glass in interior

DOOR

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Glass partitions

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Partition



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Partition



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Partition



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Partition & Panelling

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PANELLING, PARTITION & DOOR

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MURALS



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Pushpa Extra & Co. Pvt. Ltd.

Doors & Partitions

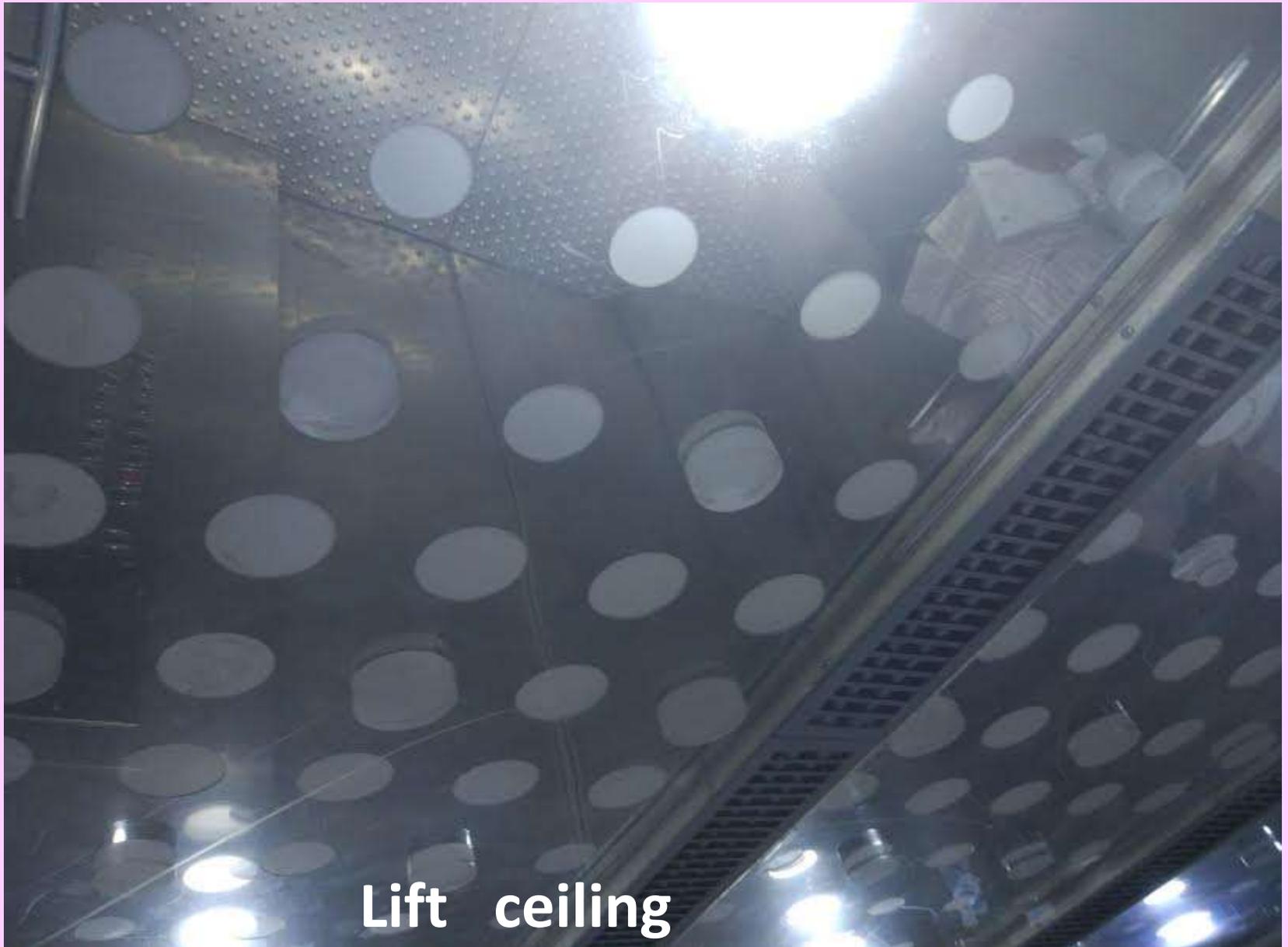


Door & Mural

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Glass railings in hostel "what glass can do for you", Greater Noida
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Lift ceiling

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Light covers on floor

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Stairs



Partition

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Staircase

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Livelier interiors connecting spaces and outside

For confined spaces,
glass is the preferred
solution.

It makes interiors
look larger and
livelier by reflecting
light, illuminating
surfaces, connecting
spaces and
connecting inside to
the outside.



Glass for Customised Value Additions

- Glass is also the right solution for customised requirements to cater for special artistic effects, acoustic, aesthetic, privacy, safety and security connecting interior to exterior that provides a person peace of mind and happiness.



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Glass floor

- Glass flooring looks decorative and sophisticated ,is easy to clean, aesthetically pleasing , resistant to moisture and various kinds of other infestations.



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Light passing through glass floor

- Glass allows light to pass through the floor, creating a very airy and **luxurious look** and a seamless transition between rooms.
- Glass can be used to 'see – through' from one floor to another to add **visual appeal, an artistic touch** and dispersed light with variety of colours.
- **Tempered laminated glass, Heat Strengthened laminated glass and Tempered glass laminated with PVB are preferred choice of glass, for its durability and resistance to breakage.**



Glass with special properties

Reduction in sound transmission

- Laminated glass with a poly-vinyl-butryl (PVB) interlayer dampens the sound and reduces sound transmission thereby increasing efficiency in addition to safety and security.



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Self cleaning glass - minimizing environmental impact

- Keep the glass surface free from dirt, the world's first advanced dual-action self-cleaning glass ensures less manual cleaning, reducing the need for toxic chemicals and hazardous cleaning products, cutting water wastage & reducing maintenance costs and health and safety risks.



Intelligent and smart Glass

- Smart glass consists of glass treated with an electrochromic metal oxide coating, one fiftieth the thickness of a human hair. The glass transforms from transparent to four levels of tint **by passing a low voltage** through intelligent controls into the panels.
- Buildings can automatically react to their environment - if it's sunny and hot, the glass automatically tints, eliminating heat and glare, saving energy, and making occupants more comfortable. The views to the outside are preserved - instead of blocking views with shades and/or blinds, the glass transitions automatically to allow the best view while eliminating heat and glare.

Thus

- Glass is the one material with which you can see more, do more and use more. But remember to choose right type of Glass.
- Please remember Glass can fulfil all your customised requirements thus future is for customised or tailor made glass
- Glass can be used for almost every part of the building, from facades to doors and windows, from floors, walkways and staircases to domes, canopies and skylights, from partitions and enclosures to shelves, table tops to murals, sculptures, art and decoration etc.
- So, glass is really a smart material



Some presentation material/photos are taken from various websites.

Same is gratefully acknowledged.

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