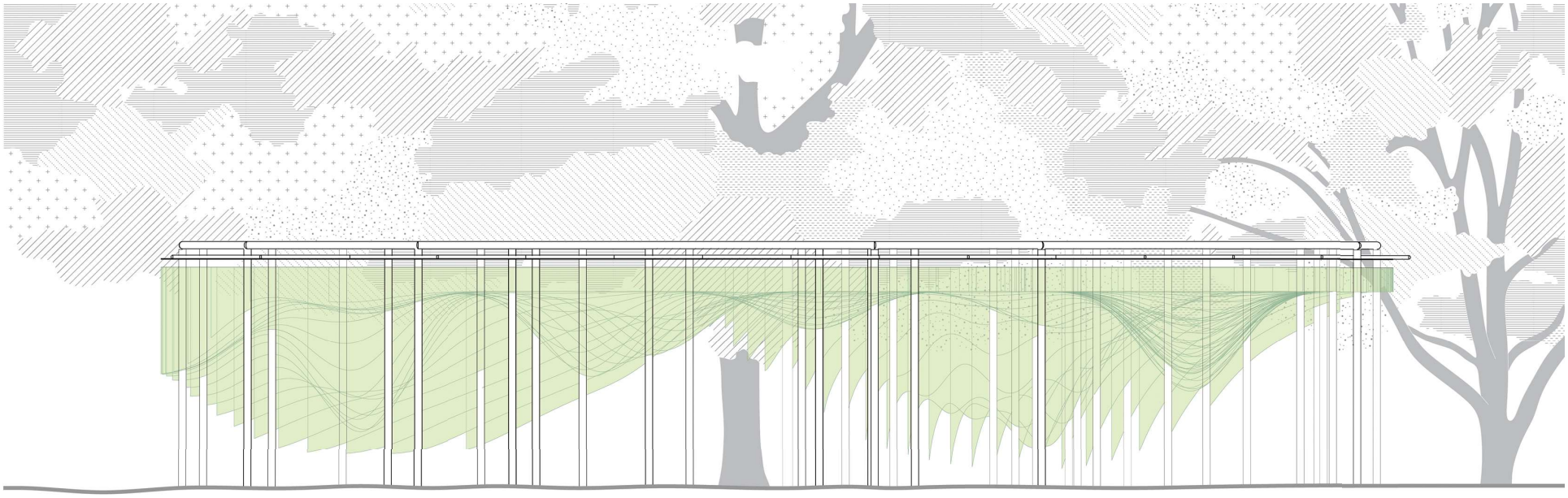
architecture PORTFOLIO

SONAKSHI SHARMA
B.Arch'22 | M-EBD'24



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contents

COLORADO MOUNTAIN SCHOOL 01

GUIDE

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ROLE

Design Development
Building Simulations
Renders
Research & Analysis

SOFTWARE

OpenStudio
RhinoCFD
Ladybug
Lumion

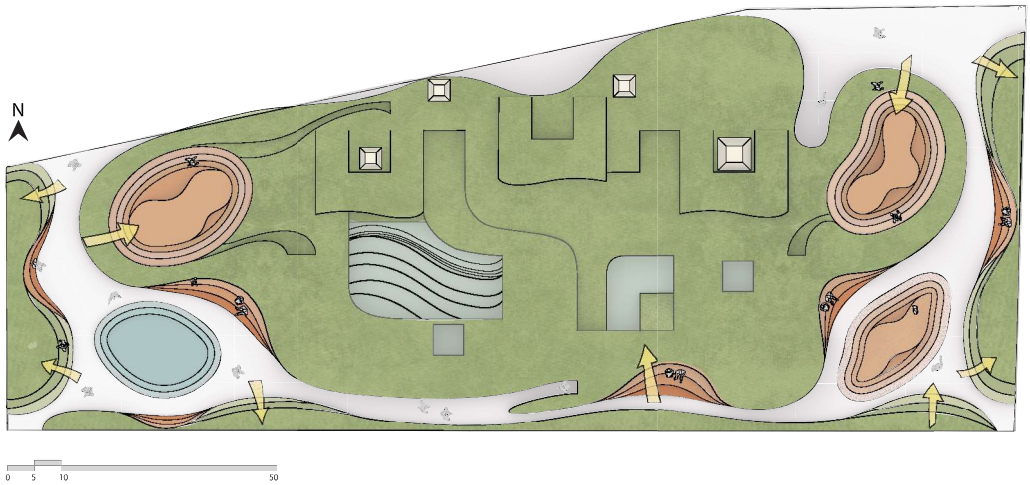
CO-CONTRIBUTORS

Gabriela Toscano
Yudi Dong
Simeng Li

In the heart of Denver, Colorado's Sun Valley neighborhood is the proposed Colorado Mountain School, a beacon of learning and community nestled amidst an area historically under served by education initiatives. This institution embodies inclusivity and comfort, offering a safe haven for students to thrive in a climate-responsive environment.

The project is committed to fostering sustained change within the Sun Valley community and its environment. In an area where access to higher education remains limited, the mission is to empower the younger population with the resources they need to excel. Beyond traditional classroom settings, our flexible design encourages a stronger connection with Denver's local ecosystem and cultural institutions. By nurturing this holistic approach to education, we aim to leave a lasting positive impact on both individuals and the broader community.

Scan QR code for full report

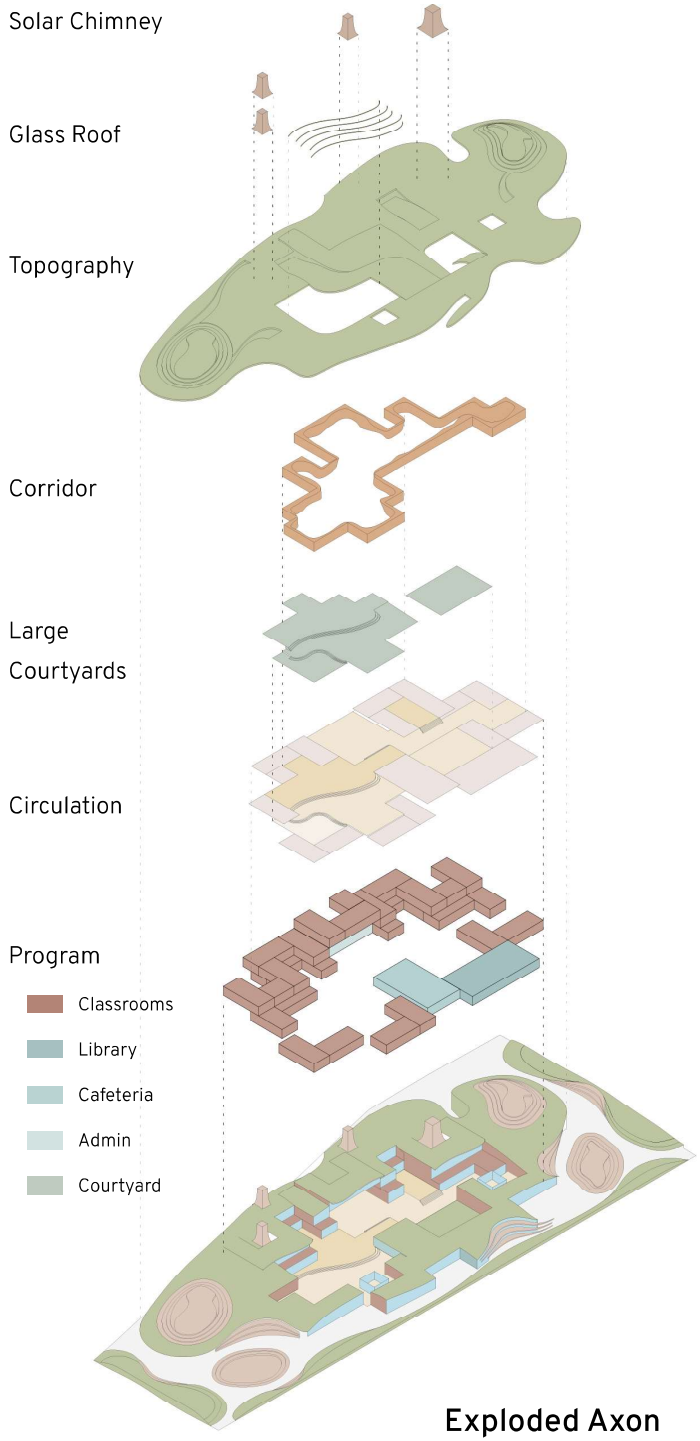


Connecting Community and Culture

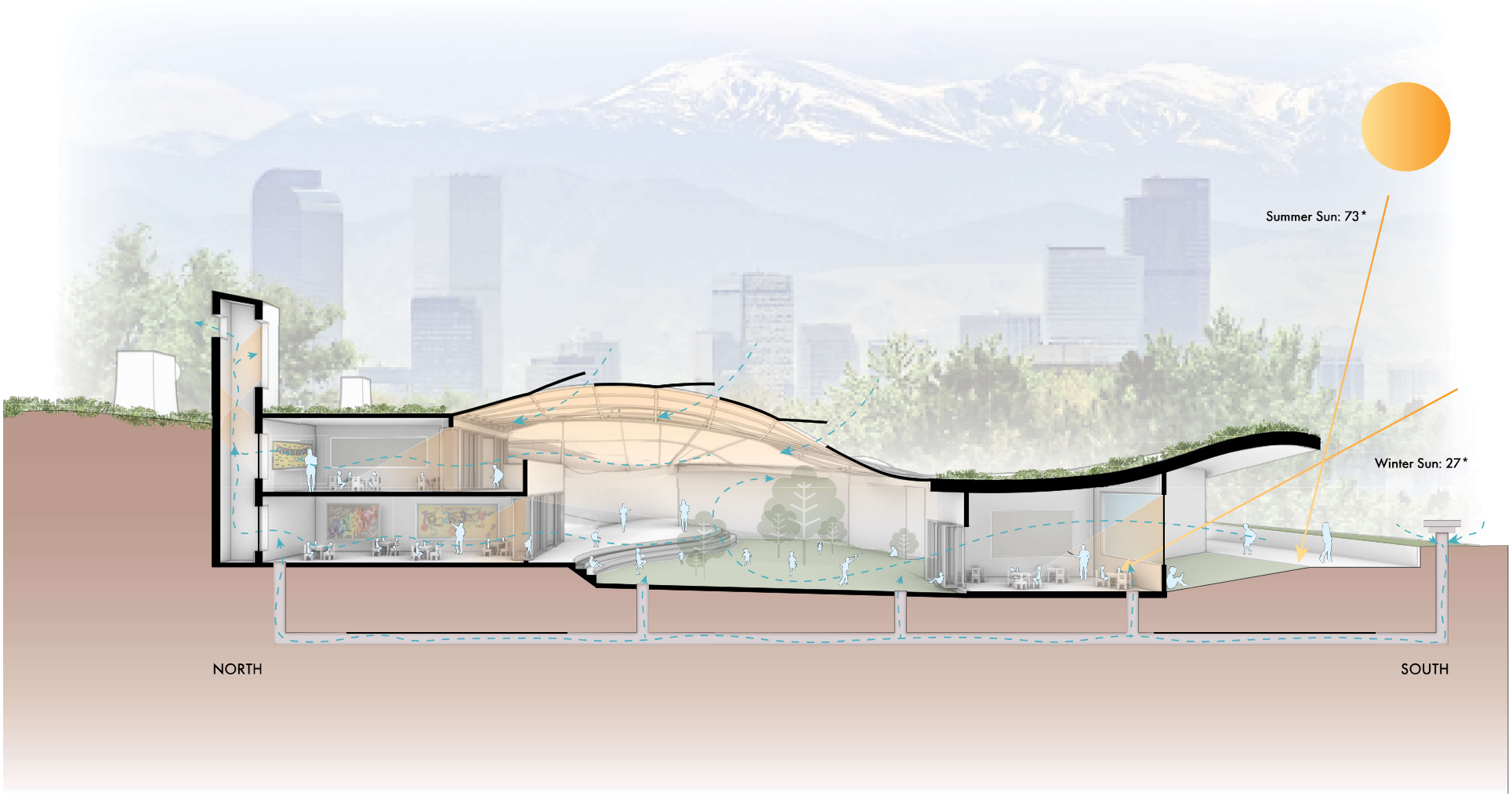
Situated along a vibrant green belt, the school serves as a vital link between the neighborhood and Denver's culturally diverse fabric.

Beyond its physical boundaries, the school fosters connectivity and engagement. With a walk score of 70 and a transit score of 59, the site acts as a conduit connecting downtown Denver to Sun Valley.

The school's entrances, thoughtfully positioned on all four corners, provide public access to the landscaped areas, which include playgrounds, water features, walking paths, seating, and even a public library.



Exploded Axon



Harnessing Earth's Natural Insulation and Daylighting

Responding adeptly to Colorado's chilly, dry climate, the school's architecture harnesses the stable ground temperature for warmth. Delving twelve feet beneath the surface, the building ingeniously utilizes the earth's natural insulation, capitalizing on the 6°C ground temperature during winter when external temperatures plummet to –20°C.

Its North-to-South slope not only optimizes natural daylighting but also provides panoramic vistas of the city. A southern corridor, designed to accentuate the greenhouse effect, serves both as a conduit for circulation and passive heating.

During Summers

During Winters

Central Atrium: Blend between indoor and outdoor

Outdoor Library: Interaction with the community

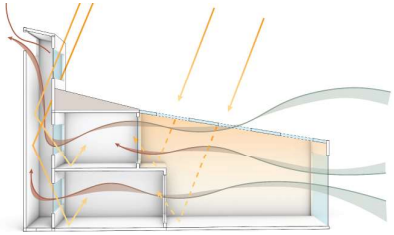
Pond: Improving the micro-climate

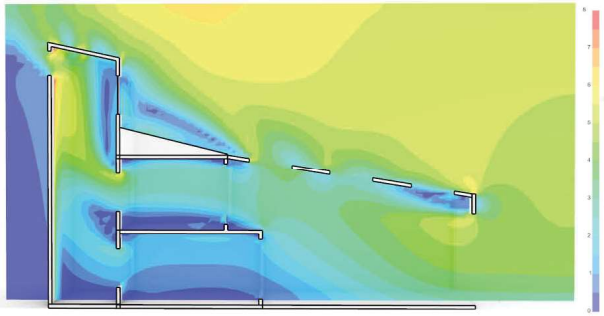
Air Flow Analysis

To design for the solar chimney, computational fluid dynamics was utilised. It helped optimise the size of the chimney for the most efficient air flow throughout the year.

Summer

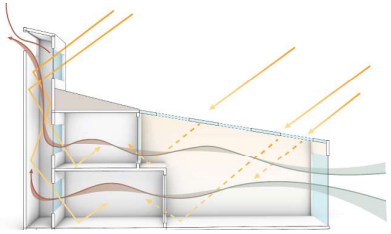
Courtyard vents are open to avoid overheating and facilitate ventilation

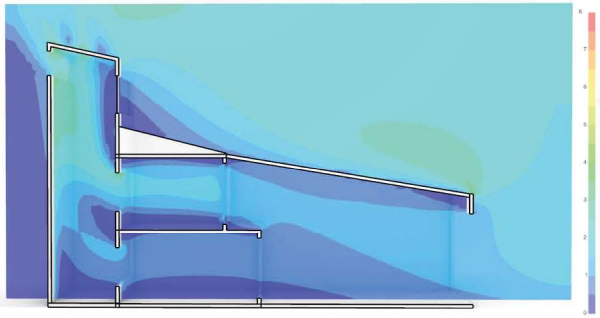




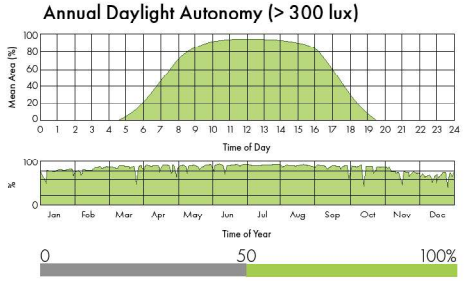
Winter

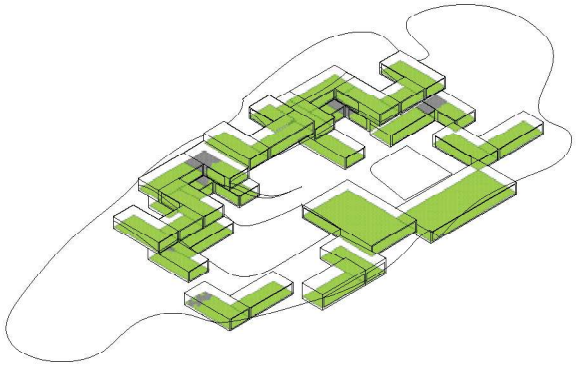
Courtyard vents are closed due to snow and to facilitate the greenhouse effect

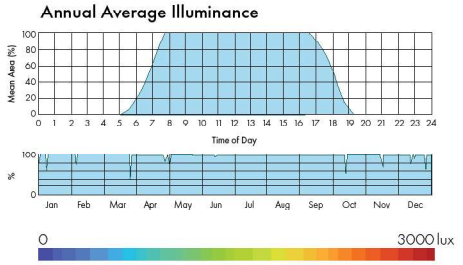


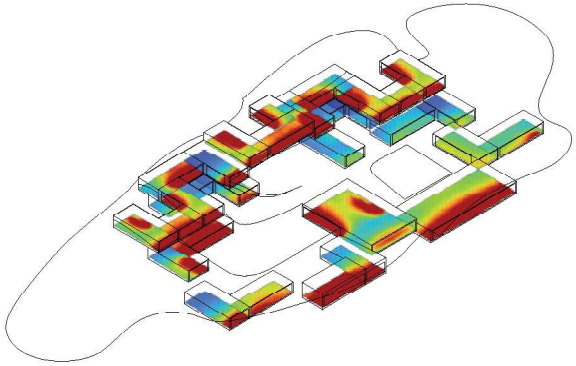


Daylighting

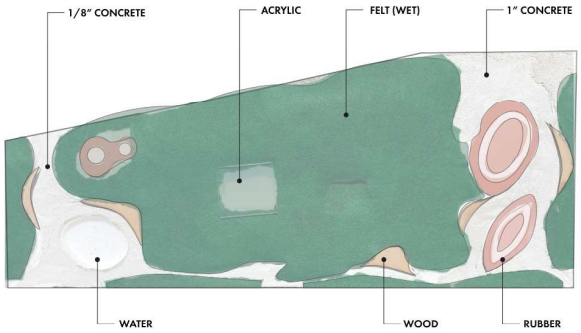




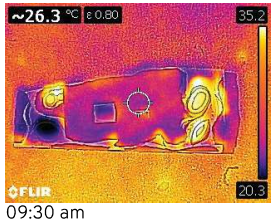




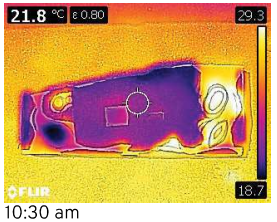
Physical Testing



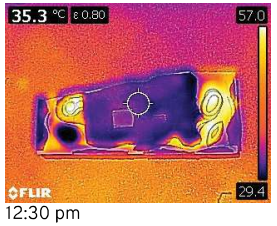
Using a thermal camera and a scaled site model, various materials were tested for their thermal response. Monitoring was done over a period of time, keeping the model in direct sunlight.



09:30 am



10:30 am



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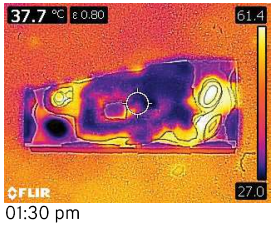

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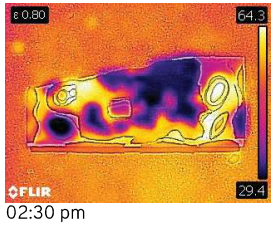
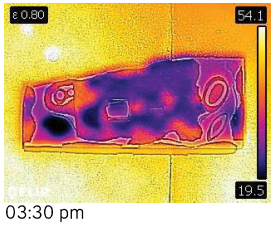


02:30 pm



03:30 pm

OPPIDAN: AN URBAN RESORT 02

GUIDE

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ROLE

Individual

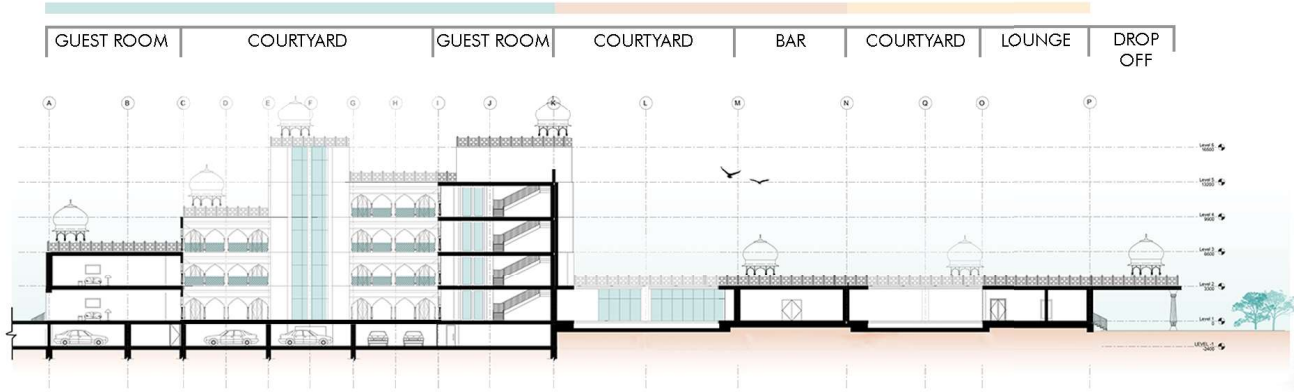
SOFTWARE

Revit
AutoCAD
Sketchup
Adobe Creative Suite
Lumion

Harmonizing Urban Convenience with Natural Tranquility

An Urban Resort is a haven located within a bustling city, designed to serve both tourists and local residents seeking a respite from their daily routines. Despite its metropolitan setting, the resort boasts a strong connection to nature, offering extensive health and wellness amenities alongside sustainable features. This project has been meticulously developed based on an actual site and specific client requirements. Spanning 64,500 square meters, the resort integrates a city hotel with individual cottages, a wellness center, a banquet hall, and a sprawling lawn.

Sustainability is a cornerstone of this project, underscored by accompanying research titled “Energy Efficiency in the Hospitality Sector.” This research highlights the importance of eco-friendly practices in 24/7 operational establishments and proposes strategies to mitigate their environmental impact.



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SITE AREA

64,000 sqm

GROUND COVERAGE

8,770 sqm - 14%

NO. OF KEYS

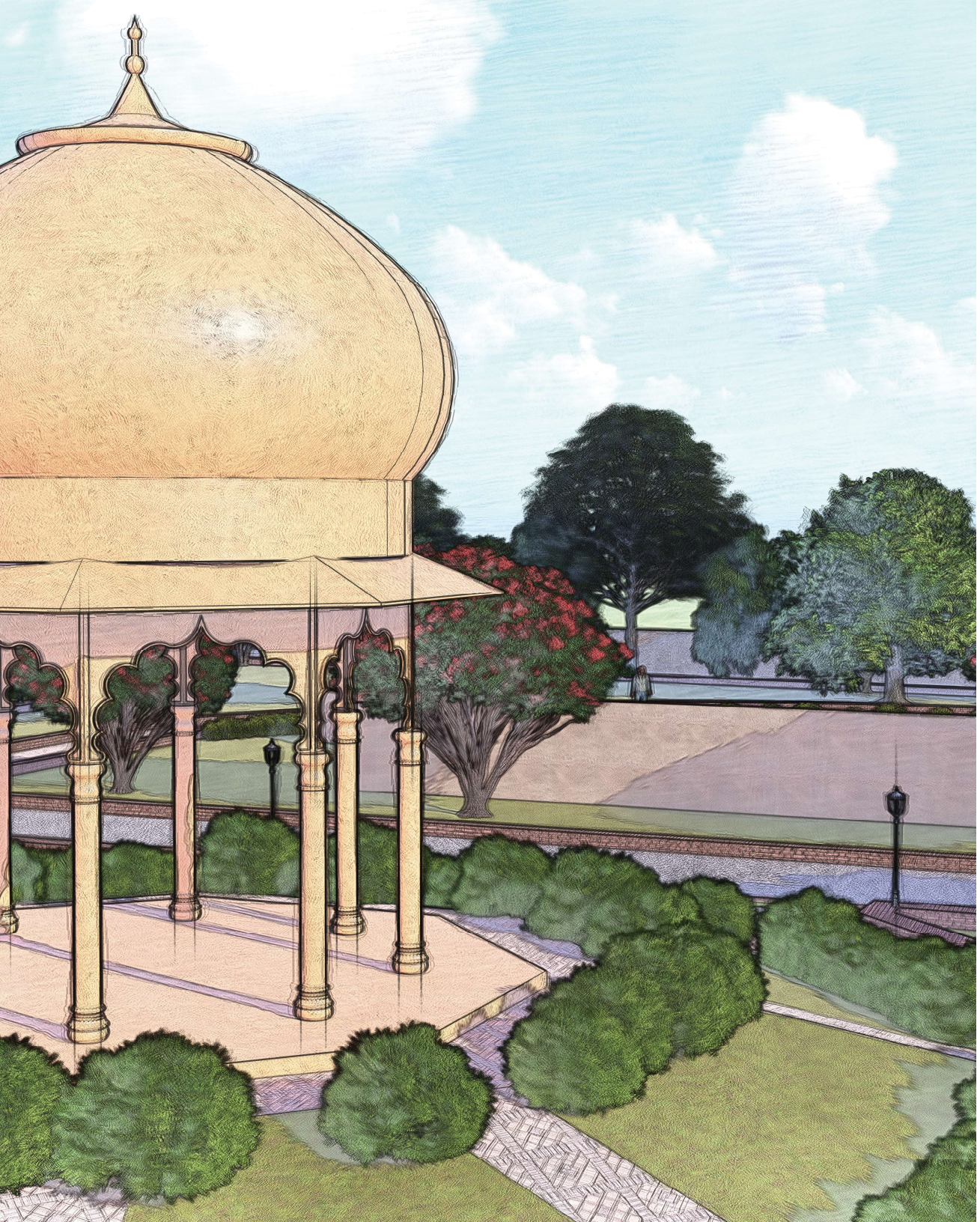
130

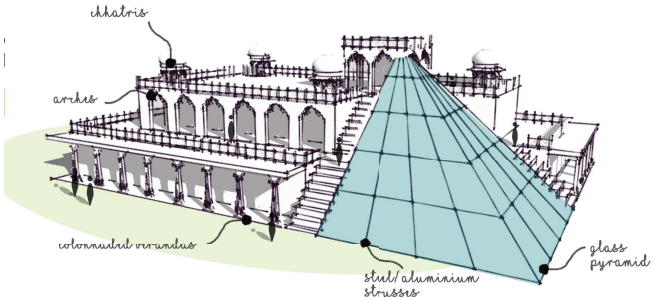
NO. OF BAYS

153

The site is thoughtfully designed to accommodate different types of users with well-planned entries.

The cottages are shielded by a natural buffer for privacy, while the wellness block is strategically placed for convenience.

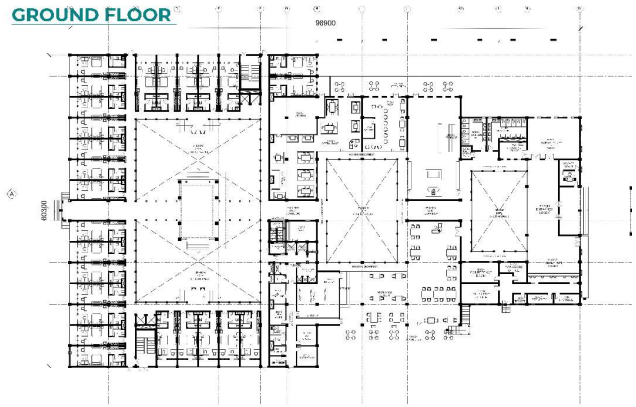




JUXTAposition: Blend of times

A stark contrast is evident in the concept of an urban resort wherein the attempt is to amalgamate the two contrasting facets of human life: work and leisure

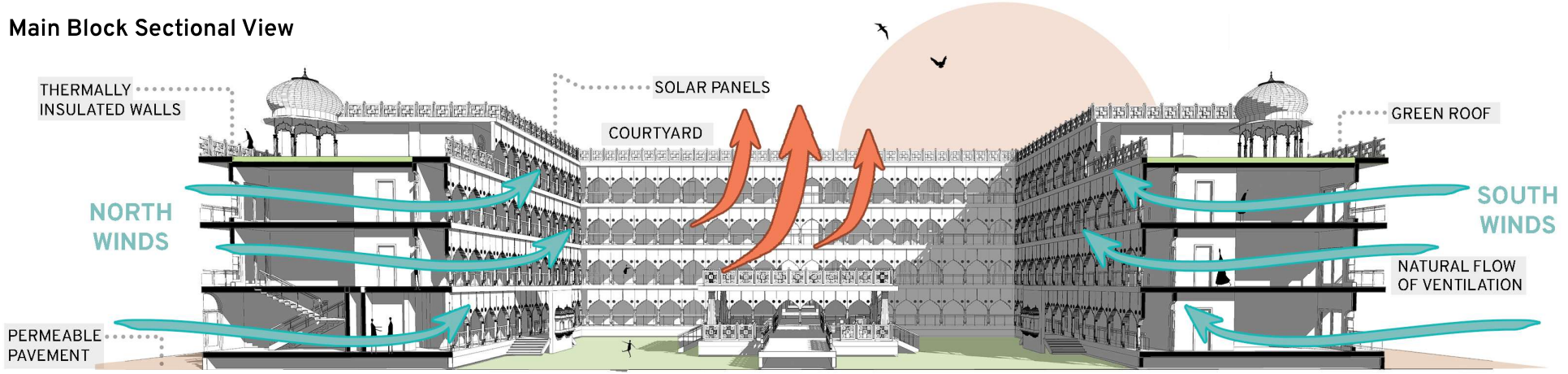
Here, it is used to bring about the marriage of design elements, materials, spaces and cultures of both traditional and modern times.



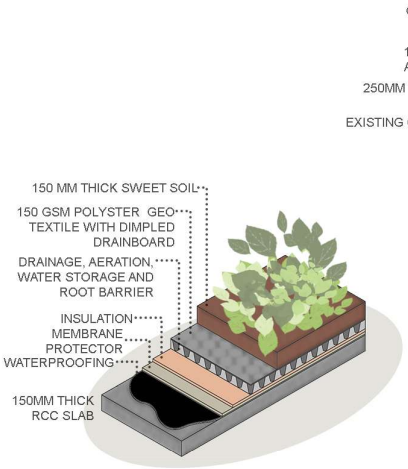
Planning and Drawings

The hierarchy of the spaces has been maintained to ensure guest's privacy without hindering with the flow of services in the hotel

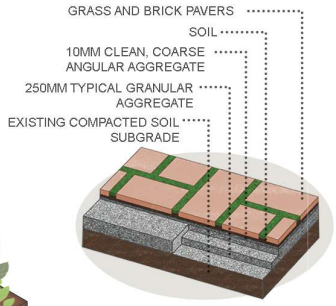
Main Block Sectional View



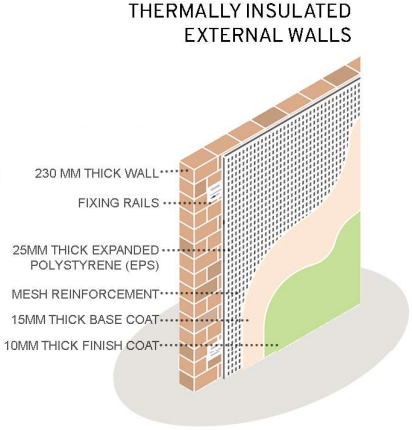
Constructional Details



GREEN ROOF



PERMEABLE PAVEMENT DETAIL



Rooftop Solar Panel

ACCORDING TO THE MINISTRY OF NEW AND RENEWABLE ENERGY, GOI'S SOLAR ROOFTOP CALCULATOR

Solar Rooftop Calculator

Average solar irradiation in RAJASTHAN state is 1266.52 W / sq.m
1kWp solar rooftop plant will generate on an average over the year 5.0 kWh of electricity per day (considering 5.5 sunshine hours)

1. Size of Power Plant	
Feasible Plant size as per your Roof Top Area :	474.3kW
2. Cost of the Plant :	
MNRE current Benchmark Cost :	Rs. 36000 Rs. / kW
Without subsidy (Based on current MNRE benchmark) :	Rs. 17074800
With subsidy 0 (Based on current MNRE benchmark) :	Rs. 17074800
3. Total Electricity Generation from Solar Plant :	
Annual :	711450kWh
Life-Time (25 years):	17786250kWh
4) Financial Savings :	
a) Tariff @ Rs.8/ kWh (for top slab of traffic) - No increase assumed over 25 years :	
Monthly :	Rs. 474300
Annually :	Rs. 5691600
Life-Time (25 years) :	Rs. 142290000

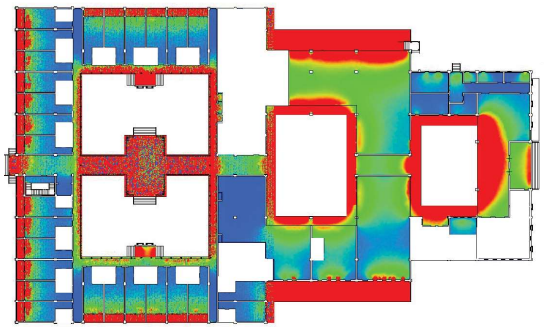
Carbon dioxide emissions mitigated is	14585 tonnes.
This installation will be equivalent to planting	23336 Teak trees over the life time. (Data from IISc)

Disclaimer: The calculation is indicative in nature. Generation may vary from location to location.

Daylighting Optimization

85.3%

(13481/15810) of ground floor occupied spaces achieve lux levels between 110 to 2200 lux.



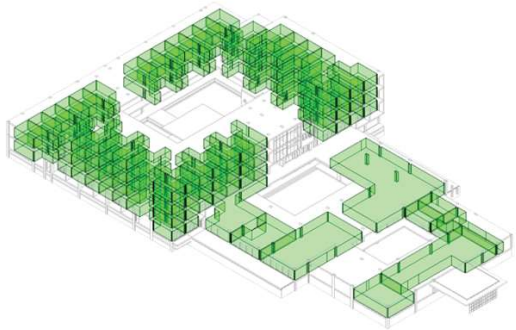
HVAC Load Reduction

Peak Cooling Load

29.4% reduction

Peak Heating Load

40.3% reduction



UNIVERSITY CAMPUS DESIGN 03

GUIDE

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ROLE

Masterplan
Renders
Site Services
Landscape & Details

SOFTWARE

AutoCAD
Sketchup
Lumion
Adobe Creative Suite

CONTRIBUTORS

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Gulrukh Izhar
Sameer Sultan

An impeccably designed university campus that not only offers top-notch amenities but also fosters social inclusion.

Throughout the design process, crucial factors like Built-Unbuilt ratio, enclosure ratio, connectivity, and meticulous design and facade controls were meticulously considered, ensuring a harmonious and enriching environment for all.

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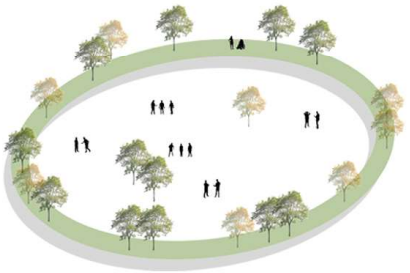
Morphological Layers

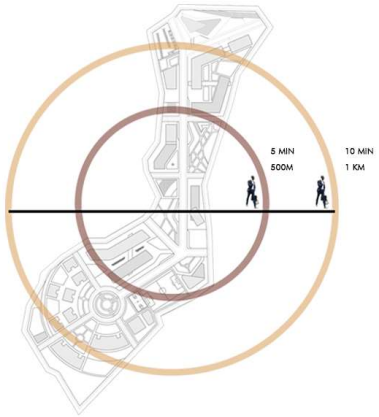
UBRAN ORCHIDS

Community orchards are a creative, sustainable solution offering access to fresh fruit, benefiting city environments, and creating much-needed habitats for wildlife. The most important aspect of the project is the opportunity to facilitate connections.



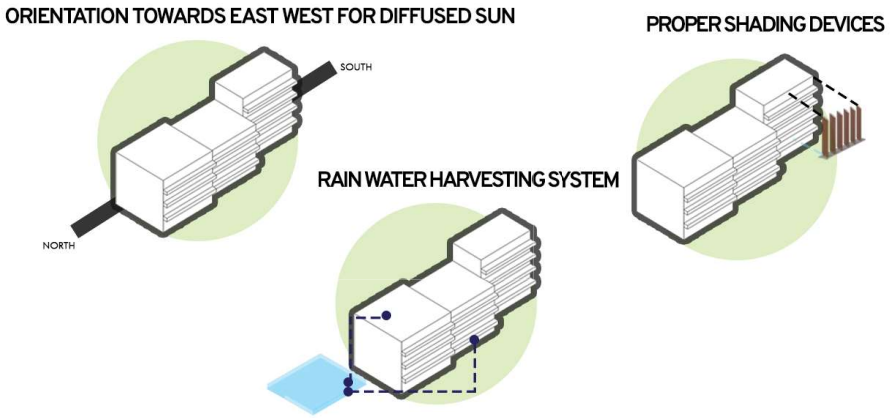
WALK-ABILITY

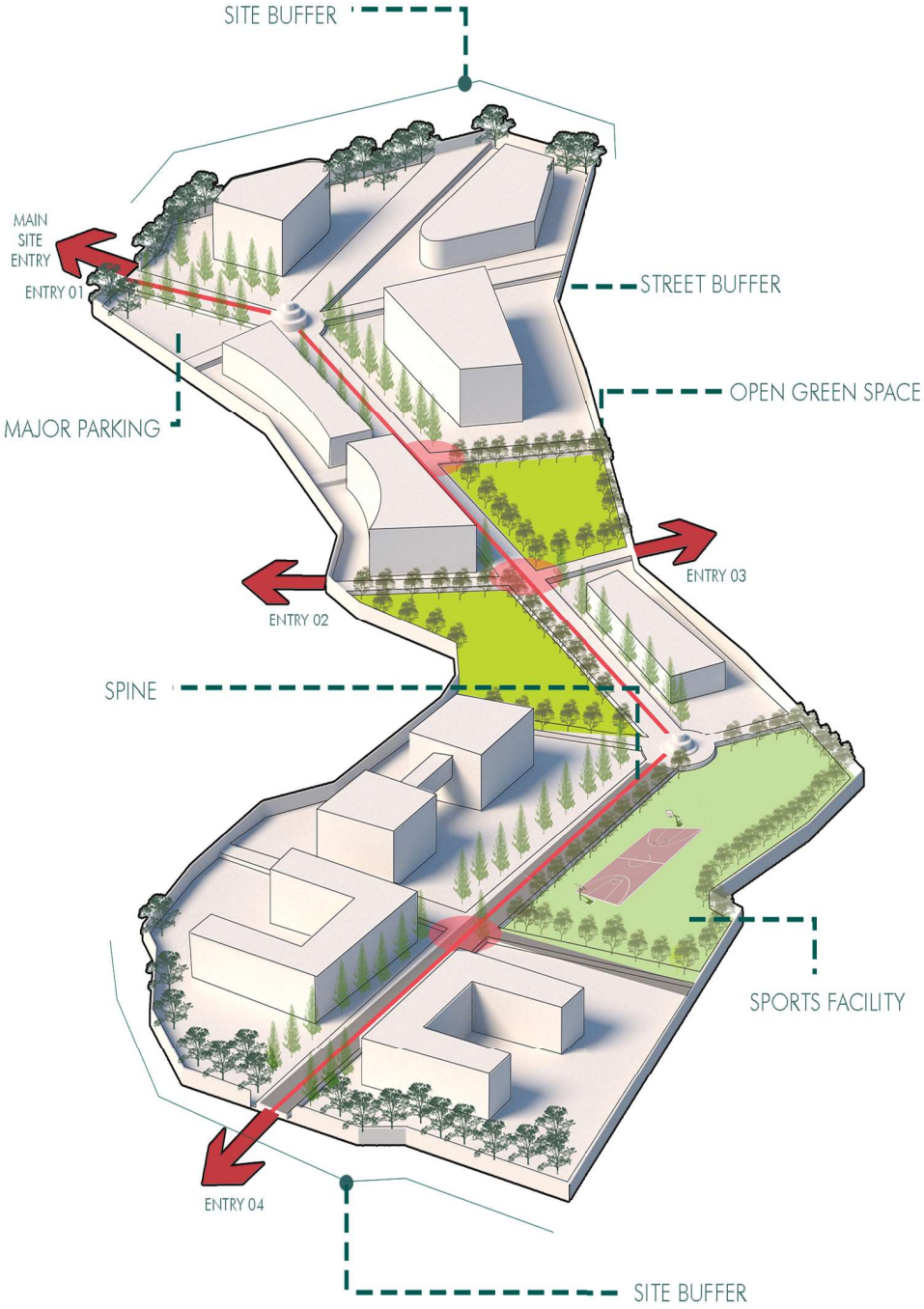
The paths on the site are kept as long and direct as possible to avoid confusion for the users and also allow a clear visual access to the landmarks as well as the nodes.



SUSTAINABILITY

Simple passive techniques have been adopted for the betterment of the urban experience in the university campus. These have been incorporated at the planning level while laying out the design vocabulary for the project and reflect in the facade elevations and massing.





GLAZED GLASS

BRONZE FINS

BRONZE MESH INSERT PANELS

SUSTAINABLE WOOD LOUVRES

CONCRETE

GLAZED GLASS

MASONRY VENEER

TEMPERED GLASS

TERRA COTTA LOUVRES

TOTAL SITE AREA ..... 1,07,000 sqm
SETBACKS ..... 15M FRONT
SIDES 12M 12M 12M
TOTAL PARKING 304
RESIDENTIAL UNITS 6
TOTAL POPULATION 4600

AREAS	% OF TOTAL LAND AREA	GROUND COVERAGE	FAR	MAX. HEIGHT
ACADEMIC INCLUDING ADMIN	45% =48249 sqm	30% =14474sqm	120	37m
RESIDENTIAL	25% =26805 sqm	33.3%	200	-
SPORTS AND CULTURAL ACTIVITIES	15% =16083 sqm	10%	15	26m
PARKS AND LANDSCAPES	15%	-	-	

PARKING
AREA (sqm) = 2300
CAPACITY = 108

LIBRARY
FOOTPRINT AREA= 870 (sqm)
BUILT UP AREA = 210 (sqm)
HEIGHT = 0 (m)
NO. OF FLOORS 12

FACULTY OF ASTRONAUTICS
FOOTPRINT AREA(sqm) = 1900
BUILT UP AREA (sqm) = 10700
HEIGHT (m) = 21
NO. OF FLOORS = 6

ADMINISTRATION
FOOTPRINT AREA(sqm) = 530
BUILT UP AREA (sqm) = 900
HEIGHT (m) = 8
NO. OF FLOORS = 2

FACULTY OF ENERGY SCIENCES
FOOTPRINT AREA(sqm) = 1400
BUILT UP AREA (sqm) = 9200
HEIGHT (m) = 21
NO. OF FLOORS = 7

KIOSK
FOOTPRINT AREA (sqm) = 50
BUILT UP AREA (sqm) = 50
HEIGHT (m) = 4
NO. OF FLOORS = 1

FACULTY OF AERONAUTICAL ENGINEERING
FOOTPRINT AREA(sqm) = 1100
BUILT UP AREA (sqm) = 7600
HEIGHT (m) = 21
NO. OF FLOORS = 7

COMMERCIAL COMPLEX
FOOTPRINT AREA(sqm) = 650
BUILT UP AREA (sqm) = 1300
HEIGHT (m) = 8
NO. OF FLOORS = 2

FACULTY OF ROBOTICS & MECHATRONICS ENGINEERING
FOOTPRINT AREA (sqm) = 2500
BUILT UP AREA (sqm) = 10700
HEIGHT (m) = 16
NO. OF FLOORS = 4

PARKING
AREA(sqm) = 780
CAPACITY = 65

TEACHERS ACCOMMODATION
NO. OF UNITS = 6
FOOTPRINT AREA = 1620
BUILT UP AREA = 4860
HEIGHT = 9
NO. OF FLOORS = 3

CULTURAL BLOCK
FOOTPRINT AREA(sqm) = 600
BUILT UP AREA (sqm) = 600
HEIGHT (m) = 10
NO. OF FLOORS = 2

PARKING
AREA(sqm) = 650
CAPACITY = 51

SPORTS
FOOTPRINT AREA(sqm) = 600
BUILT UP AREA (sqm) = 600
HEIGHT (m) = 16
NO. OF FLOORS = 2

KIOSK
FOOTPRINT AREA(sqm) = 190
BUILT UP AREA (sqm) = 190
HEIGHT (m) = 3
NO. OF FLOORS = 1

COMMUNITY CENTER
FOOTPRINT AREA (sqm) = 190
BUILT UP AREA (sqm) = 190
HEIGHT (m) = 4
NO. OF FLOORS = 1

PARKING
AREA (sqm) = 300
CAPACITY = 20

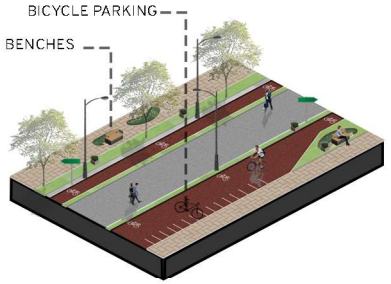
GIRLS HOSTEL
FOOTPRINT AREA(sqm) = 970
BUILT UP AREA (sqm) = 3100
HEIGHT (m) = 12
NO. OF FLOORS = 4

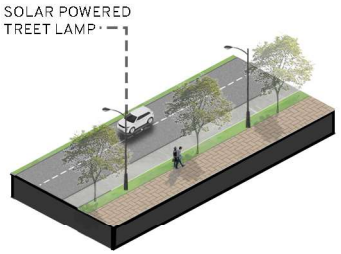
BOYS HOSTEL
FOOTPRINT AREA(sqm) = 950
BUILT UP AREA (sqm) = 4100
HEIGHT (m) = 15
NO. OF FLOORS = 5

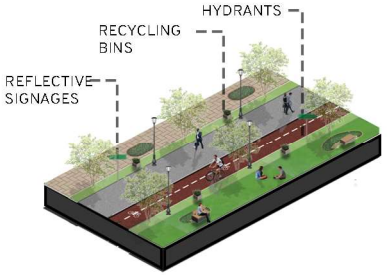
PARKING
AREA(sqm) = 860
CAPACITY = 60

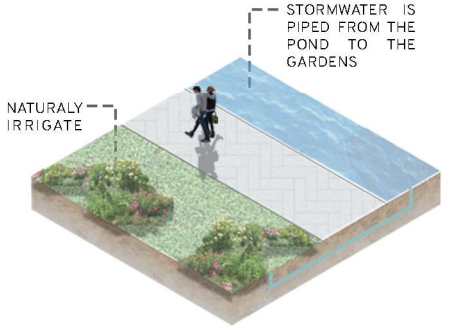
Masterplan

Landscaping & Street Details









MIXED INCOME GROUP HOUSING 04

GUIDE

Dr. Nisar Khan
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ROLE

Planning & Drawings
Renders

SOFTWARE

Revit
AutoCAD
Adobe Creative Suite
Lumion

CONTRIBUTORS

Faraz Zafar
Gulrukh Izhar
Sameer Sultan

Scan QR code for full report

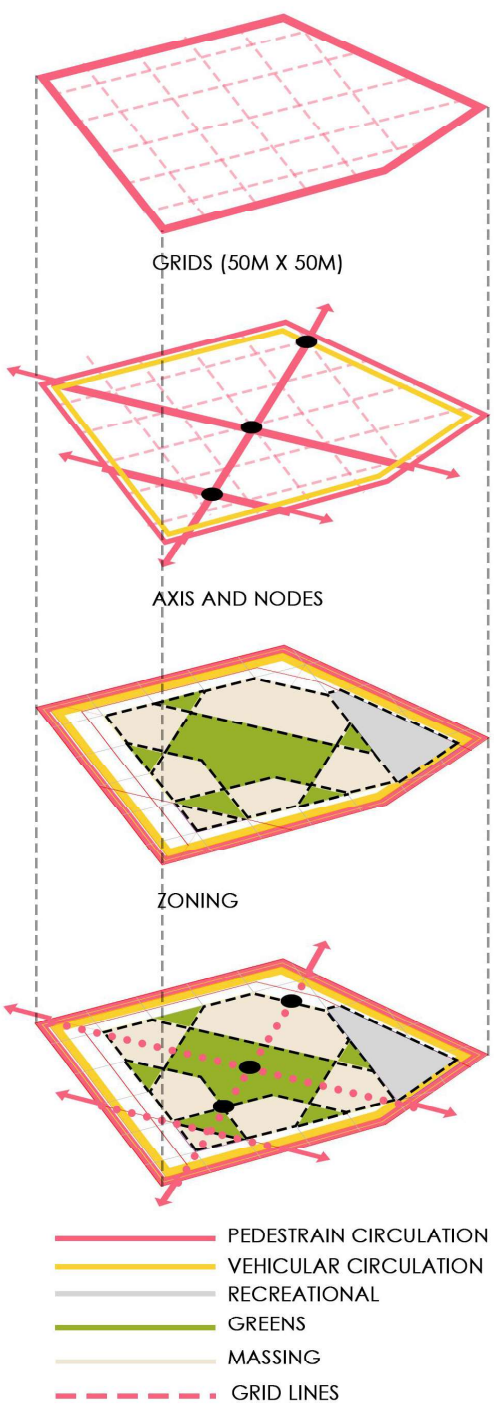
Reviewing the scenario of Delhi, very limited green field land is available for housing and other development projects. In the context of housing strategy, it is essential to optimize utilization of land and space with a view to increasing net residential density.

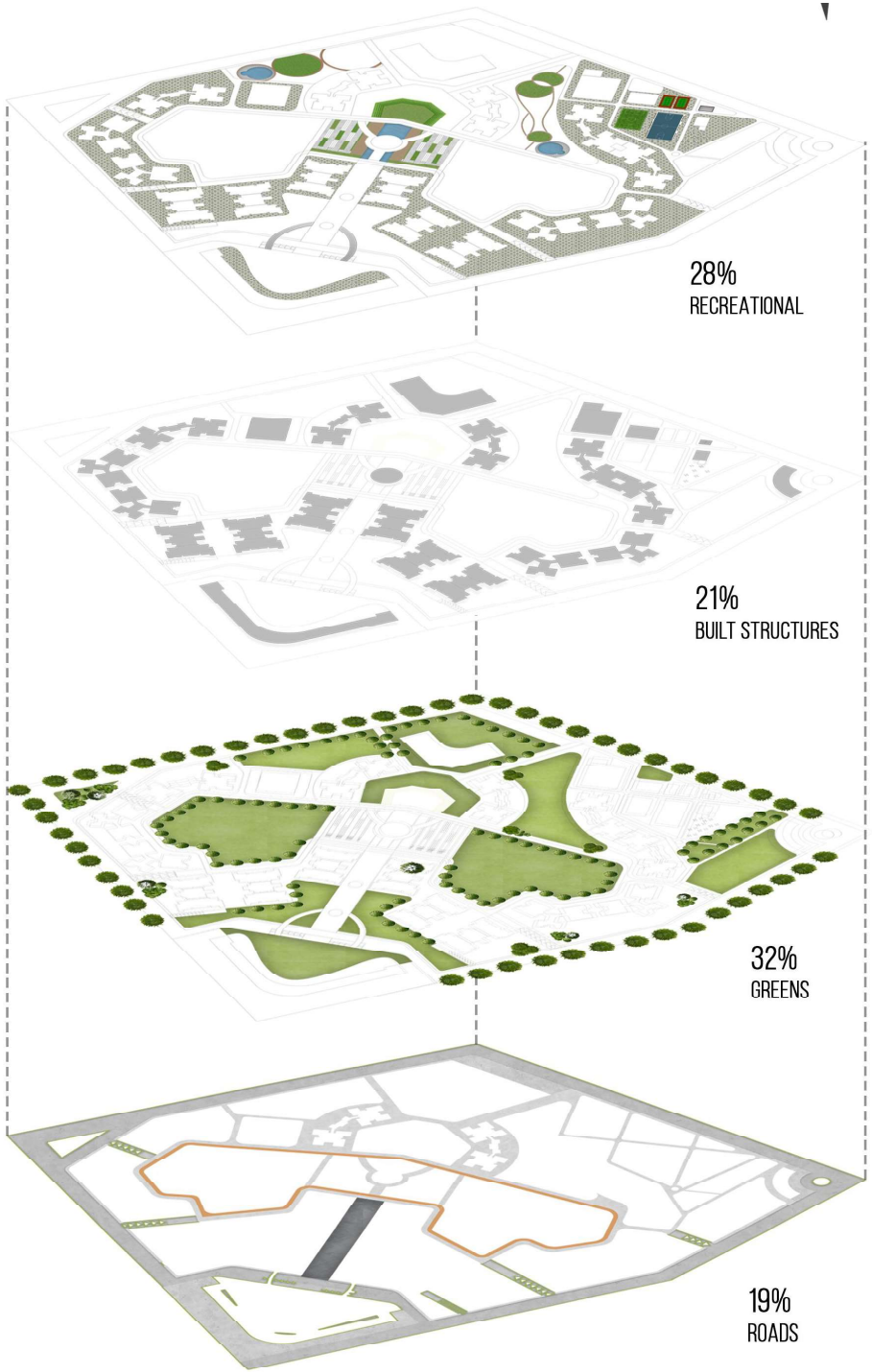
To promote inclusivity and maintain societal balance amongst the housing complex, housing units have been provided for every class of the economic strata.

Balancing with Design: Structure Plan and Land Use Ratios

The structure plan for the mixed income housing serves as a comprehensive blueprint guiding the sustainable development and transformation of the area. It articulates the vision for the locality, detailing the spatial organization, land use distribution, and key infrastructure elements to foster a vibrant, resilient, and connected urban community.

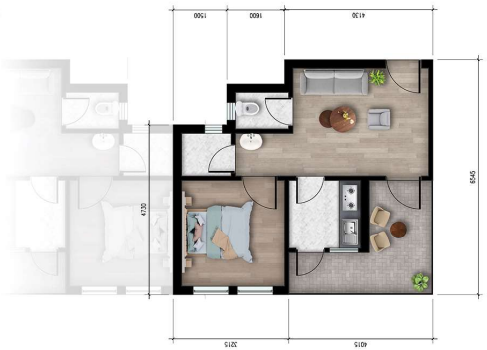
The project aims to create a cohesive, functional, and aesthetically pleasing urban environment that meets the needs of its residents today and in the future.





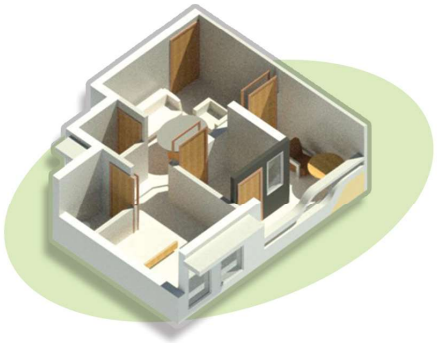
Unit Typologies

The housing project features a diverse range of unit typologies designed to cater to various lifestyles and family structures. Each typology is thoughtfully planned to maximize comfort, functionality, and aesthetic appeal, ensuring that residents find a home that perfectly suits their needs.



ECONOMICALLY WEAKER SECTION

E.W.S.		
DRAWING + DINING	11.6	sqm
BEDROOM	10	sqm
BALCONY	3	sqm
BATH	2	sqm
TOILET	2	sqm
KITCHEN	3.8	sqm
WASHING AREA	2.1	sqm
CARPET AREA	34	sqm

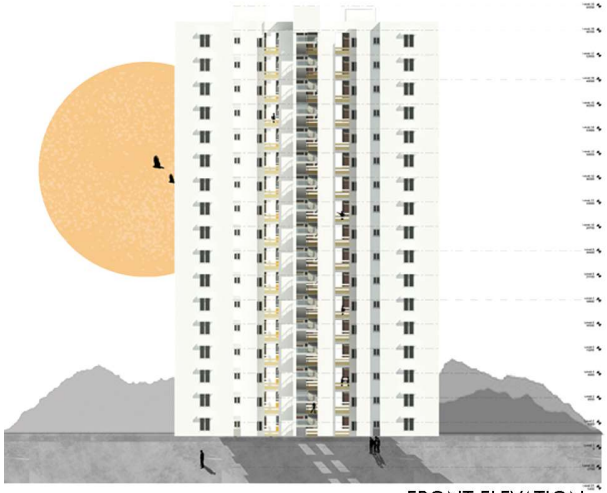


2 BEDROOM HOUSING UNITS

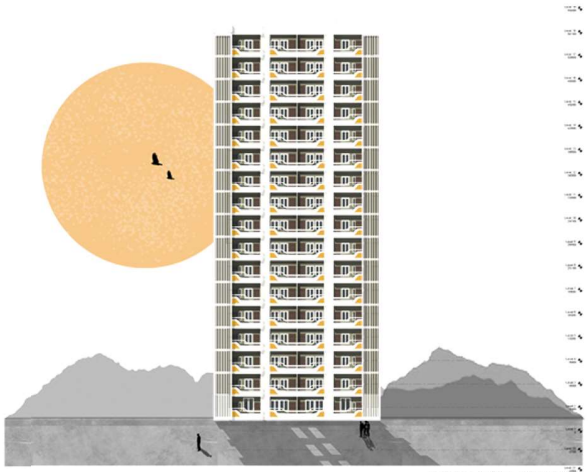
2BHK		
DRAWING + DINING	11.7	sqm
BEDROOM 01	15	sqm
BEDROOM 02	20	sqm
BALCONIES	3	sqm
TOILET 01	3.8	sqm
TOILET 02	3.8	sqm
KITCHEN	10	sqm
CARPET AREA	88.6	sqm

3 BEDROOM HOUSING UNITS

3BHK		
DRAWING + DINING	23	sqm
LIVING ROOM	14	sqm
BEDROOM 01	20	sqm
BEDROOM 02	15	sqm
BEDROOM 03	15	sqm
KITCHEN	12	sqm
BALCONIES	12	sqm
CARPET AREA	116.8	sqm

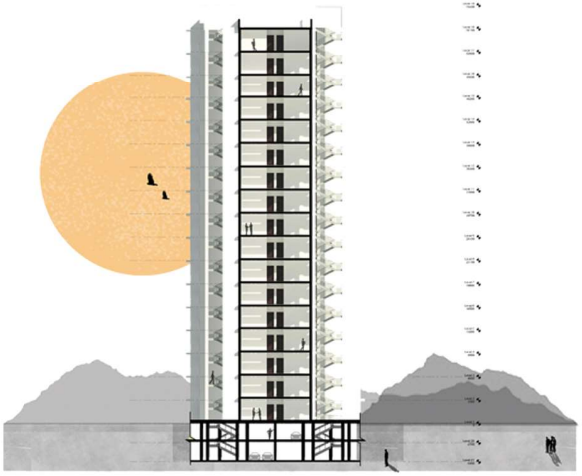


FRONT ELEVATION

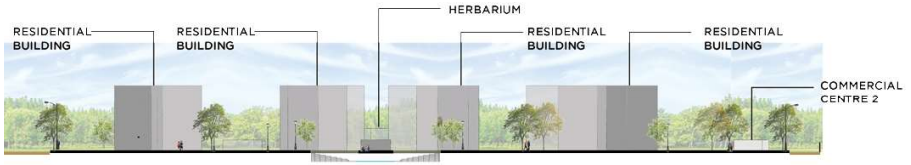


SIDE ELEVATION

SECTION XX

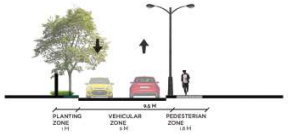


SECTION YY



East Elevation

Central Axis



Vehicular

Pedestrian

TAJ VIVANTA HOTEL 05

GUIDE

Anil Sharma
mail@asharma.com

ROLE

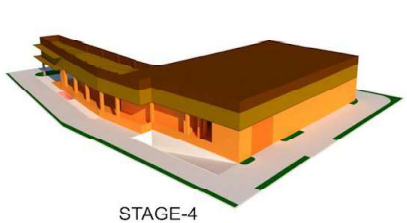
Design Development
Modeling
Client & Consultant Coordination

SOFTWARE

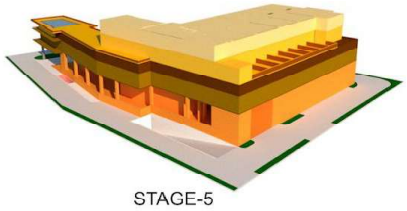
Revit
Adobe Creative Suite
Lumion
AutoCAD

Taj Vivanta is an under construction hotel in Lucknow, Uttar Pradesh in India.

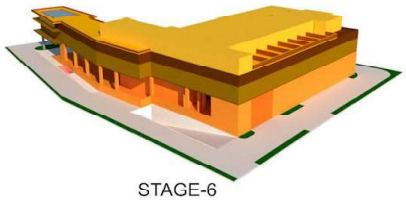
The 152 bay hotel is efficiently planned on a site of an interesting form. After market research and considering the clients' constraints, the hotel complies with the municipality code and the brand IHCL guidelines.
Hotels are special projects that require that a balance be struck between Developer's vision, Operator's brand and ultimately Client's expectations.



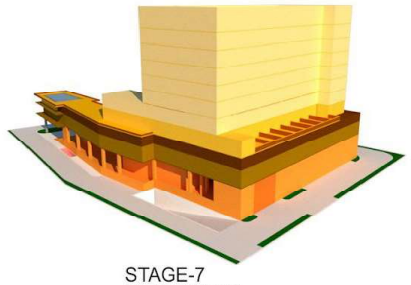
STAGE-4



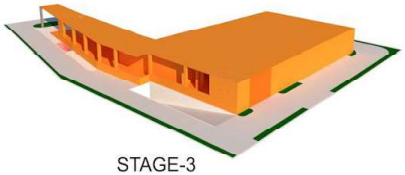
STAGE-5



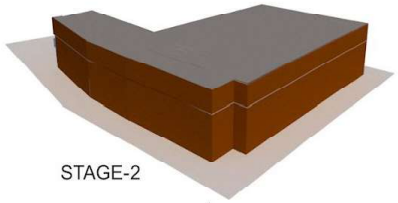
STAGE-6



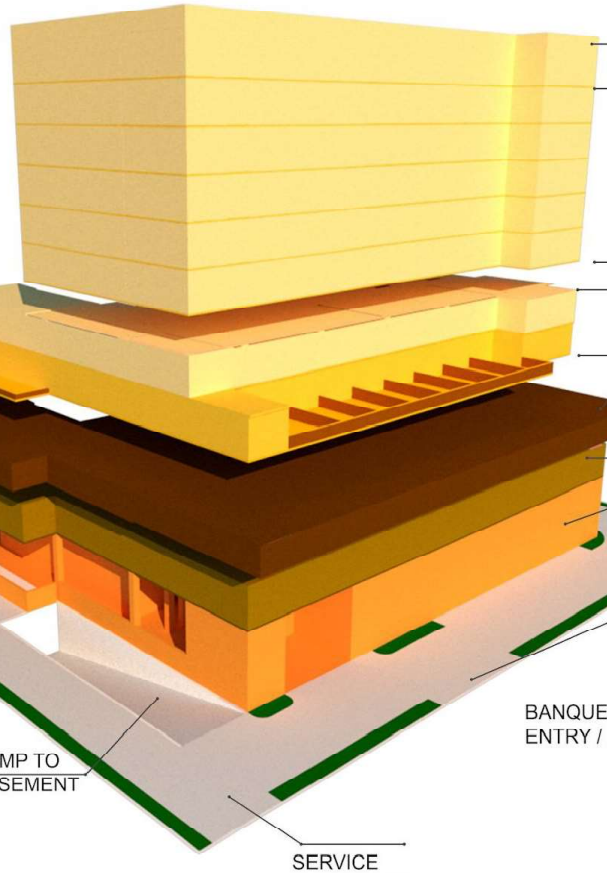
STAGE-7
FINAL FORM

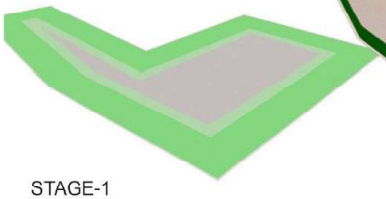


STAGE-3



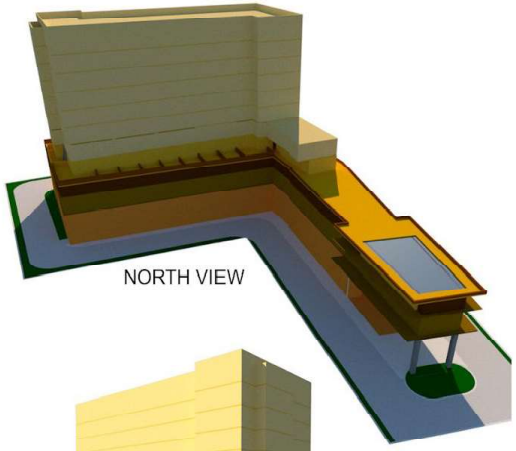
STAGE-2



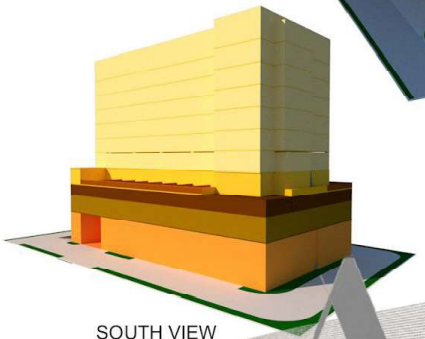


STAGE-1

WEST VIEW



NORTH VIEW



SOUTH VIEW

TAJ VIVANTA, LUCKNOW, UP

FINAL STAGE FORM ANALYSIS

N

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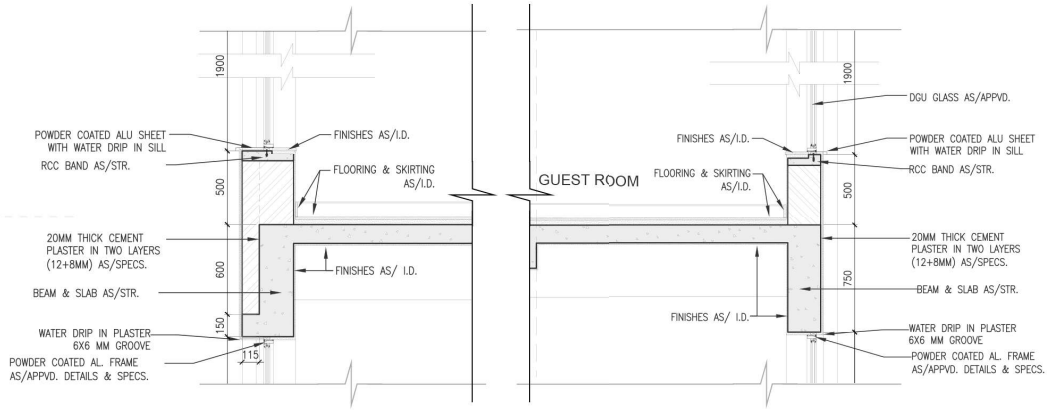
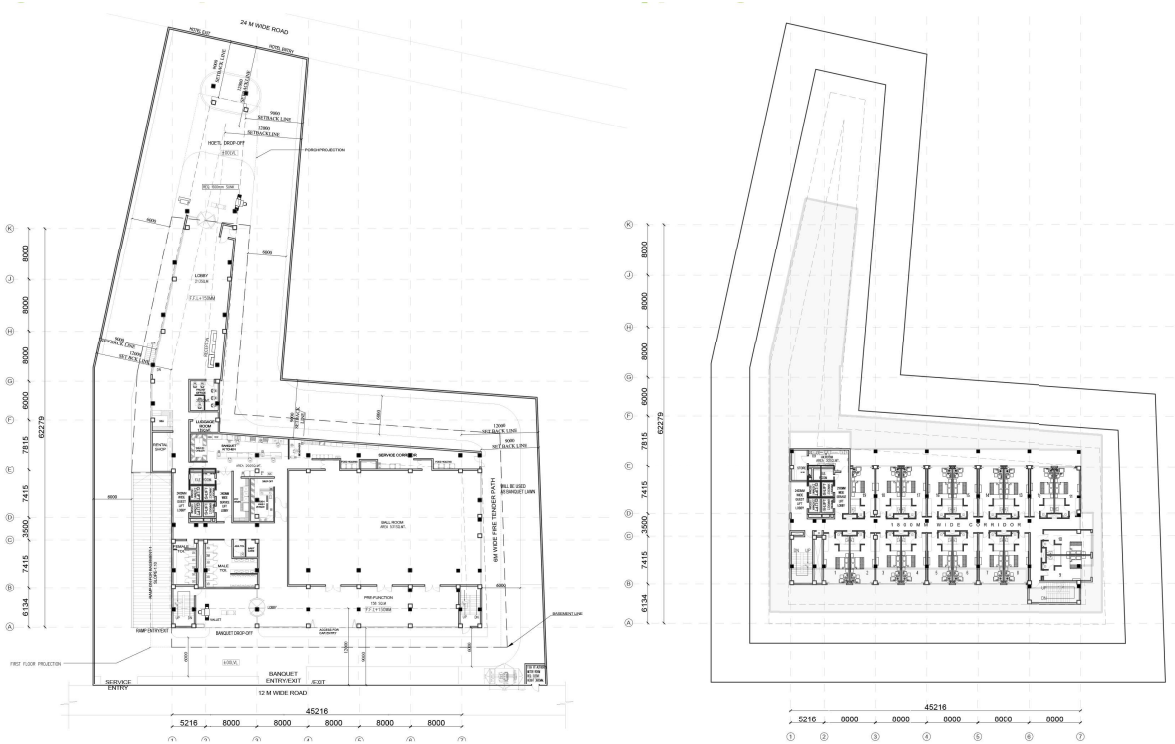
NEW DELHI-65
PH: +91-11 26401700, fax:
91-11-26478413

ASA

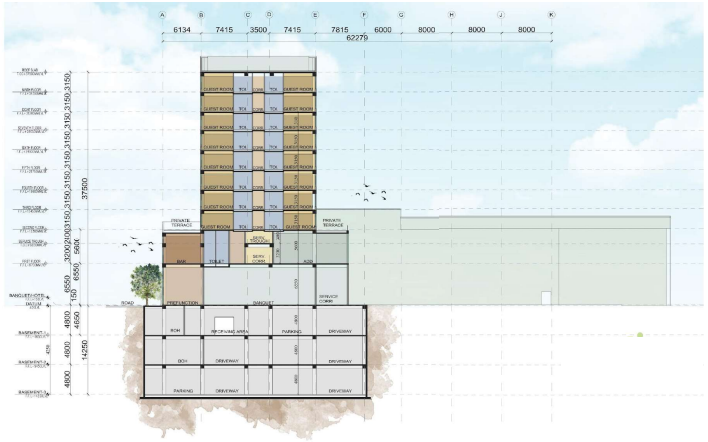
Envelope Details



Floor Plans - Design Development



Section - Illustrated



MISCELLANEOUS

RE-VISIONING WORK CHAIRS 06

GUIDE

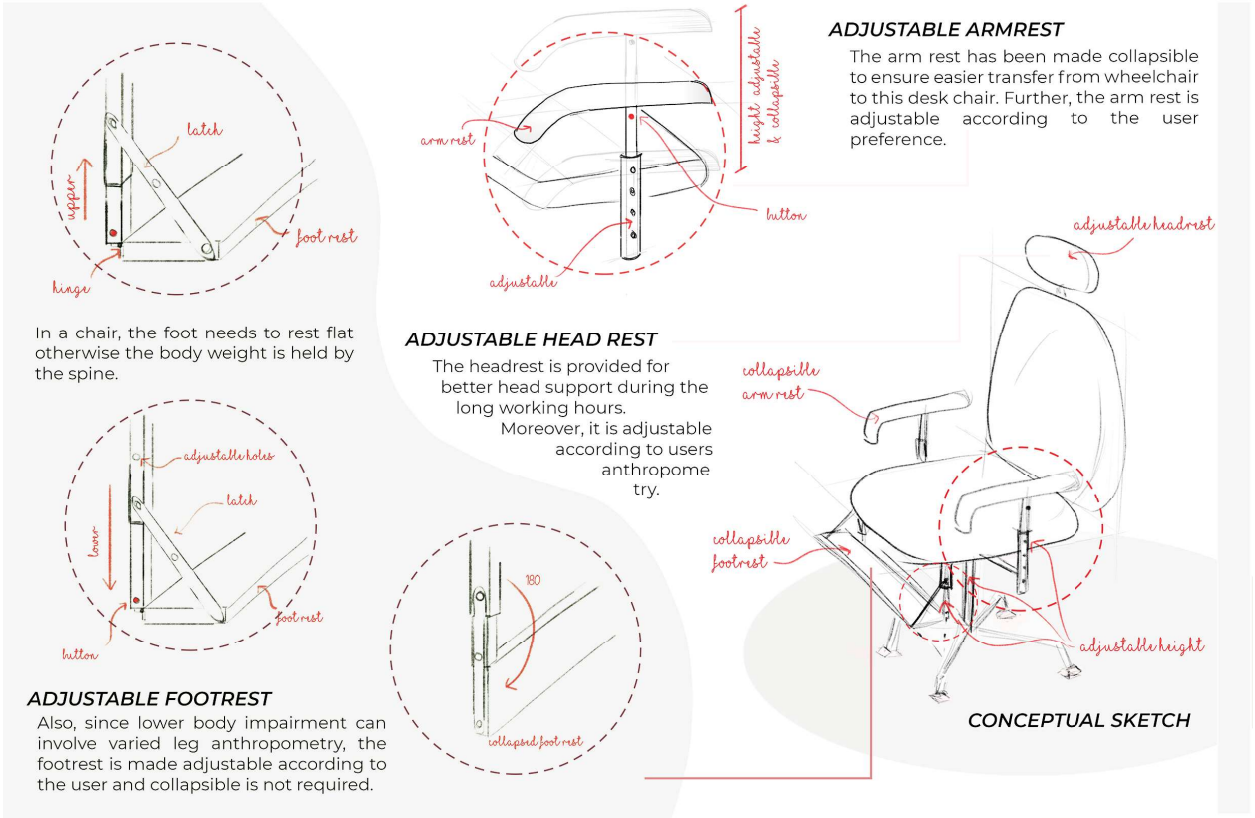
Iqtedar Alam
ialam@jmi.ac.in

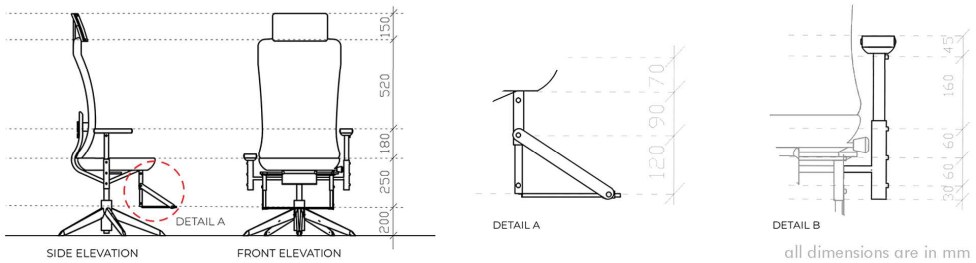
SOFTWARE

Rhino
Lumion

This design proposal explores a specialized work chair for individuals using wheelchairs. While wheelchairs offer mobility, they may not be comfortable for all activities, posing challenges when transitioning to other seating, especially independently.

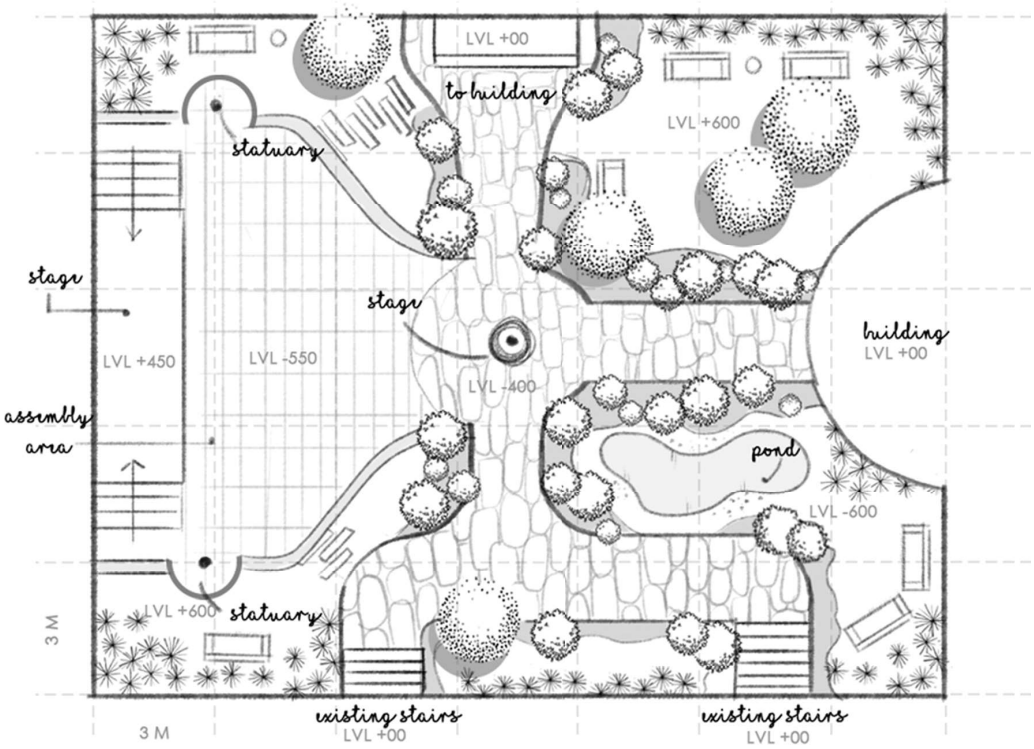
The surge in the work-from-home culture, accelerated by COVID, emphasizes the need for inclusive work chairs tailored to accommodate the unique requirements of wheelchair users.



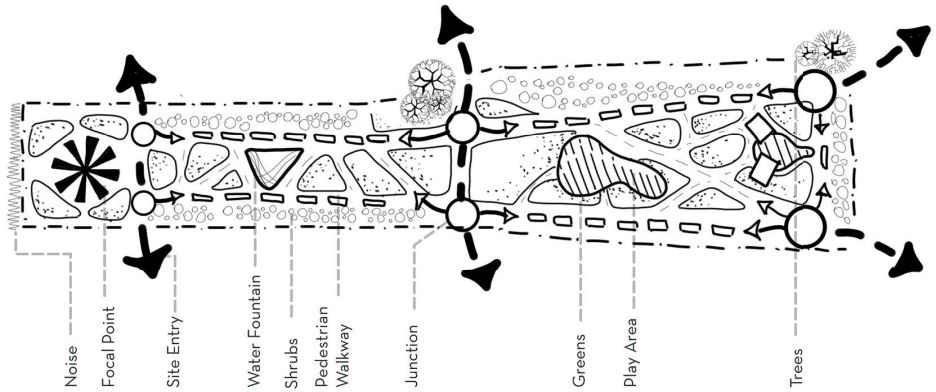


other misc works

Sketches: Landscaping Program



Sketches: Landscaping Graphic



Visualisation: Product Design

Thank you!

Thank you for your time to review my portfolio.

I am a motivated and skilled individual with practical experience and a strong academic background in sustainable architecture. I am eager to leverage my expertise to tackle real-world challenges and make meaningful contributions to the field of built environment.

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Feel free to explore my Building Simulation Portfolio and more by scanning the QR code
or visit https://linktr.ee/thesonakshi