



BIOPHILIC DESIGN: NATURE-INSPIRED INNOVATION FOR THE BUILT ENVIRONMENT

DC Sustainability Summit 2025

Hosts



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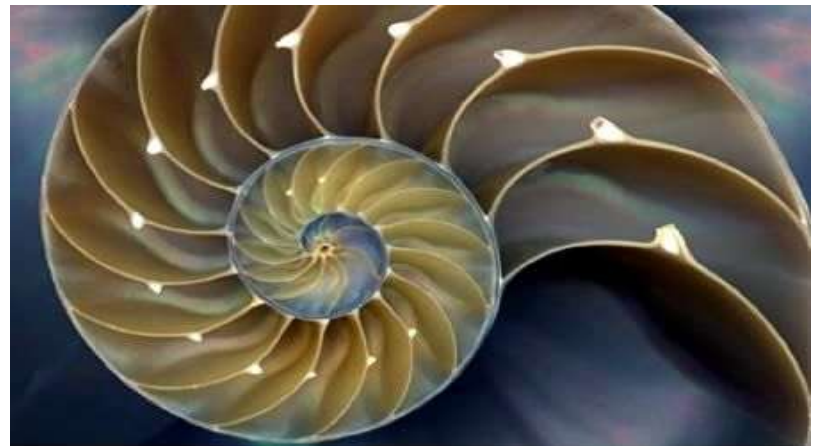


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Agenda

What is Biophilia Design?
Research and Benefits
WELL/LEED Synergies
Design Strategies
Case Studies
Best Practices



Introduction

What if you didn't need to
leave the office to
experience nature?



What is Biophilia?

Biophilic design = intentional connection to nature indoors & outdoors



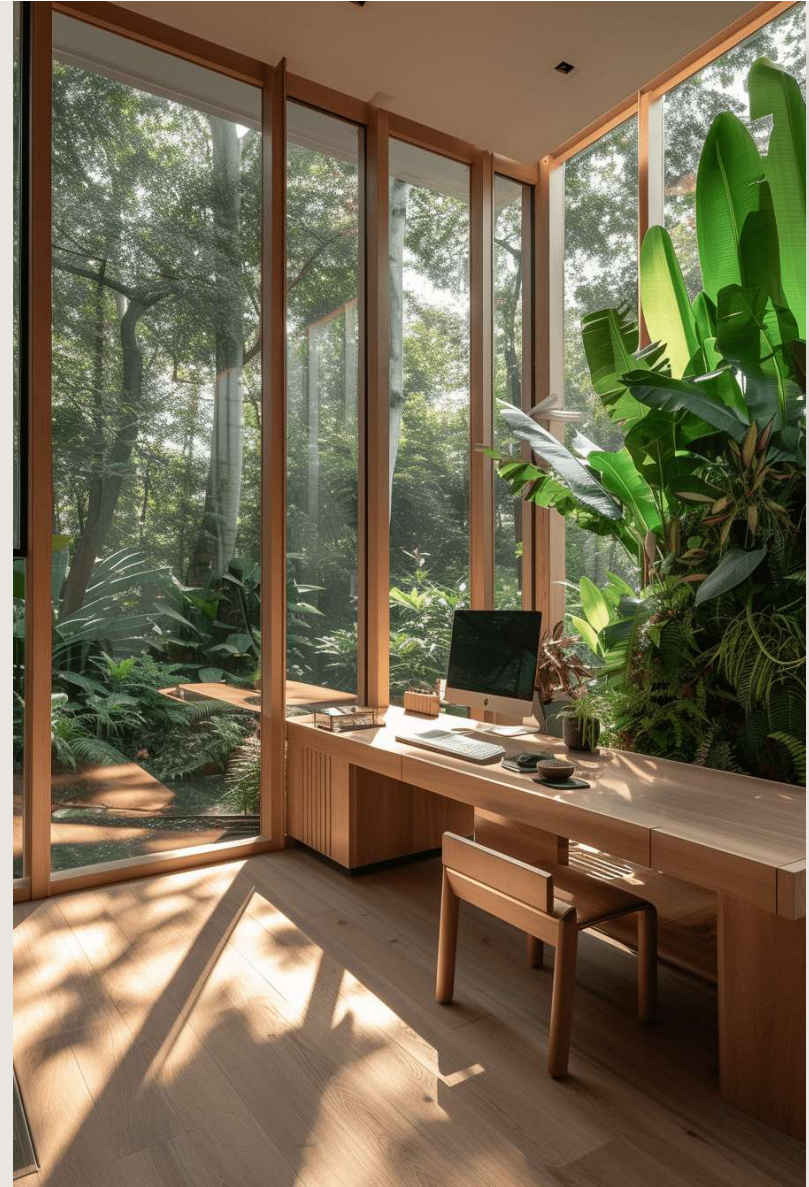
What is Biophilia?

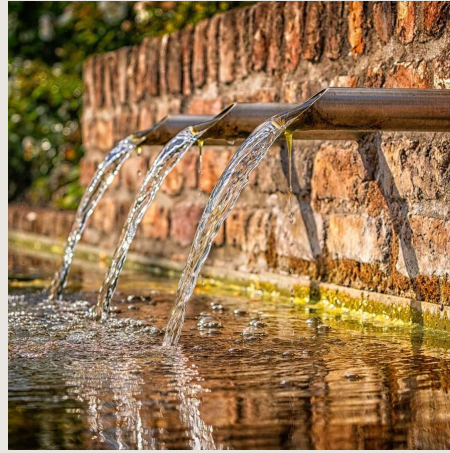
Goal: improve well-being, cognition, and user experience



What is Biophilia?

- Direct Experience of Nature
- Natural Patterns
- Place and Culture



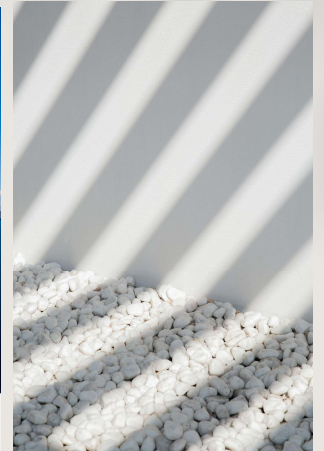
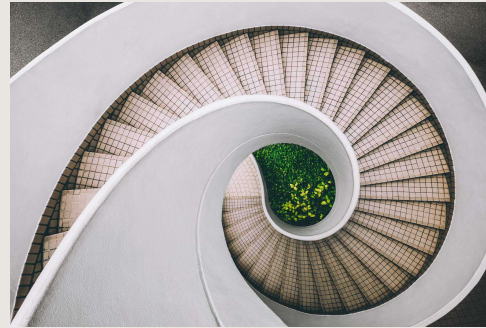


Direct Experience of Nature

- Plants & Animals
- Water
- Dynamic Light
- Airflow & Thermal Properties

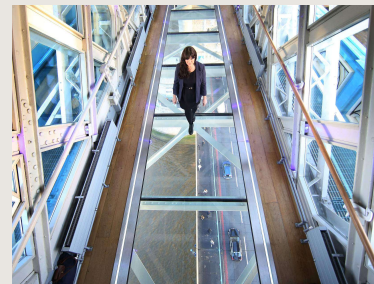
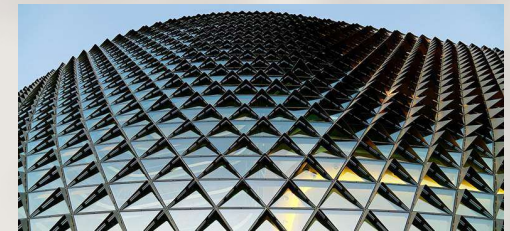
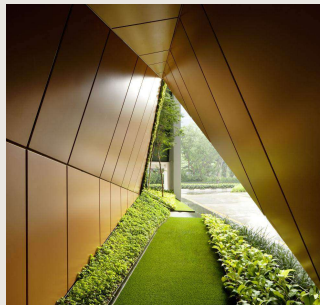
Natural Patterns

- Organic forms & patterns
- Natural materials & textures
- Natural systems & cycles
- Color
- Perceptions of time & movement



Place and Culture

- Refuge spaces
- Prospect views
- Complexity & order
- Perceptions of mystery
- Perceptions of risk
- Gathering spaces



The Evidence (At a Glance)

Healthcare: window views → faster recovery & less pain medication

Offices: ventilation + plants/views → higher productivity & satisfaction

Schools: better daylight/views = improved performance

Retail: higher sales



Research Highlights: Healthcare



- Patients with window views of trees recovered faster post-surgery
 - Shorter length of stay (~8.0 vs. 8.7 days)¹
- Spine surgery patients in brighter, windowed rooms
 - 22% less analgesic per hour
 - Lower reported stress levels²
- Study of 85,000+ adult inpatients
 - Beds near windows linked to shorter hospital stays³
- Patients on ventilators with access to window views
 - Shorter ICU stays (~16.8 hours less)⁴

¹ Ulrich study, *Science*, 1984. <https://www.science.org/doi/10.1126/science.6143402?utm>

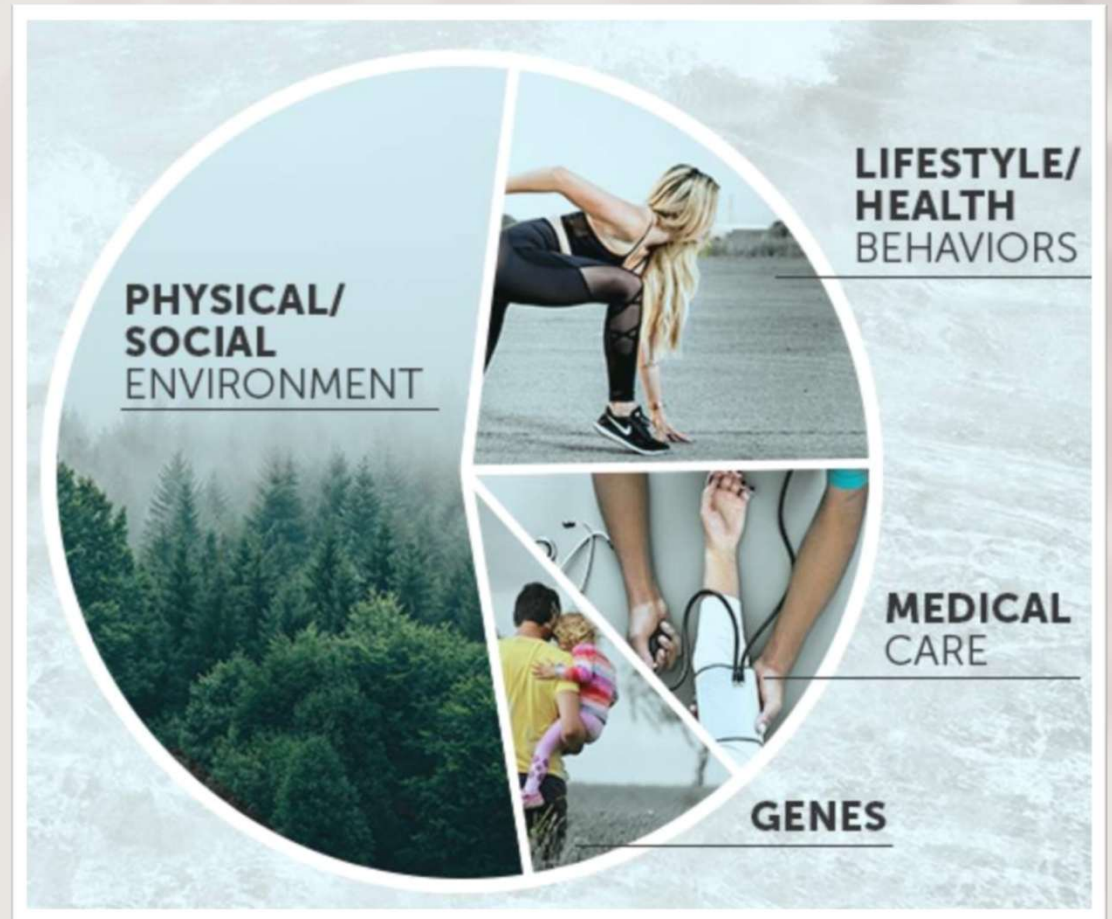
² Walch et al, *Pain*, 2005. <https://pubmed.ncbi.nlm.nih.gov/15673638/>

³ Park et al, *Health Environments Research & Design*, 2018. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6287302/?utm>

⁴ Zheng, *Journal of Intensive Medicine*, 2023. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10175739/?utm>

90% of our time is
indoors

Our environment is the
largest determinate of
our overall health.



Research Highlights: Office



- Office workers with better indoor environment, including views and daylight:
 - Call Center: processed calls 6-12% faster
 - Office: 10-25% improvement on brain tests¹
- Biophilic office design
 - Reduces stress response²
- Plants in the workplace
 - Improve productivity and wellbeing
 - 12% visible greenery is ideal³
- Combining daylight + plants + views is most effective⁴

¹ Hescong Mahone Group, Inc. "Windows and Offices", 2003. https://www.researchgate.net/publication/292731859_Windows_and_offices_a_study_of_office_worker_performance_and_the_indoor_environment

² Goncalves et al., *Environmental Research and Public Health*, 2023. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10650875/2utm>

³ Qinghua et al., *Journal of Cleaner Production*, 2021. https://www.researchgate.net/publication/355018567_A_quantitative_study_for_indoor_workplace_biophilic_design_to_improve_health_and_productivity_performance

⁴ Jude et al., "Economic Benefits of Biophilic Design", 2024. https://www.researchgate.net/publication/377983567_ECONOMIC_BENEFITS_OF_BIOPHILIC_DESIGN_A_HOLISTIC_APPROACH_TO_ENHANCING_PRODUCTIVITY_AND_WELL-BEING_IN_THE_WORKPLACE

Research Highlights: Schools

- Classrooms with most daylighting
 - 20-26% faster learning rate¹
- Physical design of classrooms accounts for 16% of learning variation
 - “Naturalness” is 50% of the effect²
- Tree/Grass views
 - Improved attention test scores
 - Faster recovery from stress
 - Higher course grades³
- Improved ventilation and IAQ
 - Lower absenteeism⁴



¹ Heschong, "Daylighting in Schools...", 1999.

https://www.researchgate.net/publication/328416721_Daylighting_in_Schools_An_Investigation_into_the_Relationship_Between_Daylighting_and_Human_Performance_Condensed_Report

² Barrett et al, "Clever Classrooms", 2015. <https://salford-repository.worktribe.com/preview/1495871/120515%20Clever%20Classrooms.pdf?utm>

³ Jimenez, *Geohealth*, 2023. <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2023GH000830?utm>

⁴ MacNaughton et al, "Impact of PM Exposure and Surrounding "Greenness"...", 2017. <https://pmc.ncbi.nlm.nih.gov/articles/PMC5334761/2utm>

Research Highlights: Other Sectors



- Daylight without glare and responsive controls:
 - 5% increase in factory worker productivity
 - 40% reduced absenteeism¹
- Lockheed Martin building utilizing daylight had:
 - 15% increase in productivity
 - 15% drop in absenteeism²
- Walmart store with skylights on one side:
 - 40% increase in sales²

¹ Center for Building Performance at Carnegie Mellon University <https://faculty.washington.edu/scottcs/NSF/2014/CBPD.pdf>

² Heschong, et al. "Daylighting and Productivity in the Retail Sector", 2004. https://www.aceee.org/files/proceedings/2004/data/papers/SS04_Panel7_Paper24.pdf?utm

Measure What Matters

- Post Occupancy Evaluations: stress, satisfaction, restoration surveys
- Metrics: CO₂, VOCs, acoustics, view quality
- Certifications: WELL, LEED



WELL Building Standard

- leading healthy building and wellness real estate standard used in the world today.
- guidelines backed by the latest scientific research and industry best practices.
- supports our mental health across 10 core concepts.



MIND

- Views of nature
- Integration of plants-air purifying (air)
- Water features or sounds
- Wellness rooms
- Access to outdoor terraces, courtyards and feature areas.



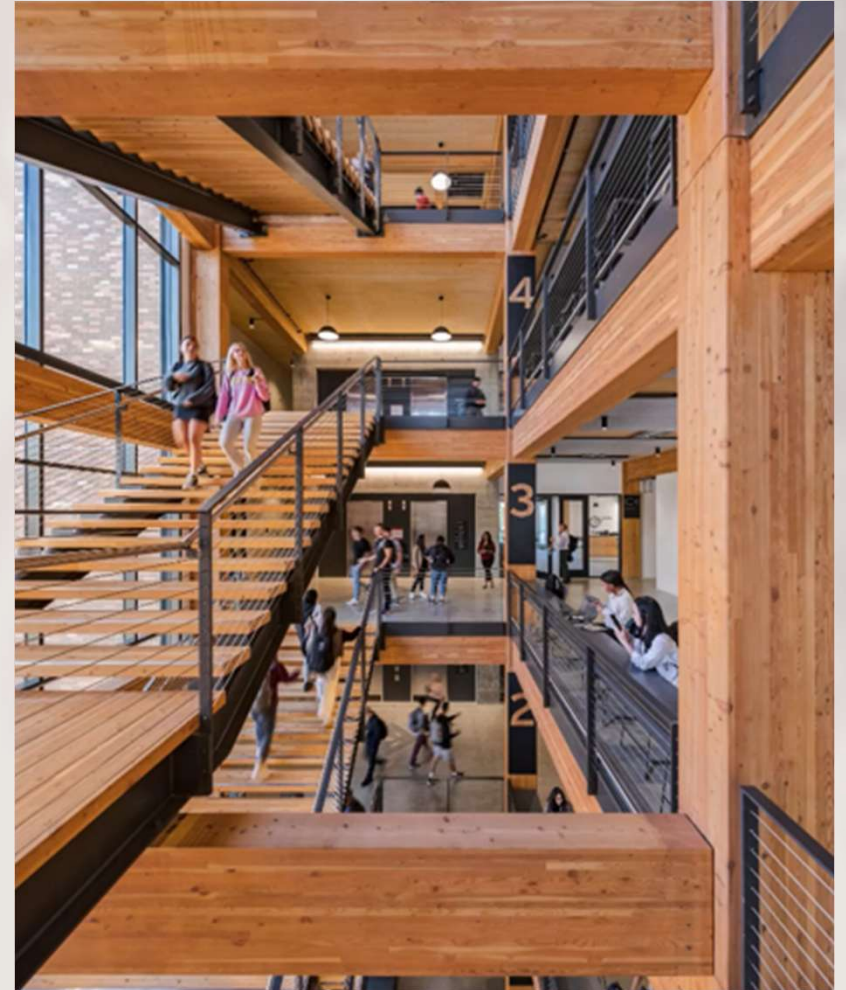
LIGHT

- Maximizing exposure to natural light
- Circadian lighting is a foundation of biophilic design as the key aim is to align our body's clocks with the regular cycle of dawn and dusk.



MOVEMENT

- Stairs with access to light and views
- Restorative Spaces
- Fitness facilities using biophilic design



MATERIALS

- Natural materials such as stone, wood, bamboo, cork
- Patterns and textures that mimic nature: fabric, carpets, wallcoverings



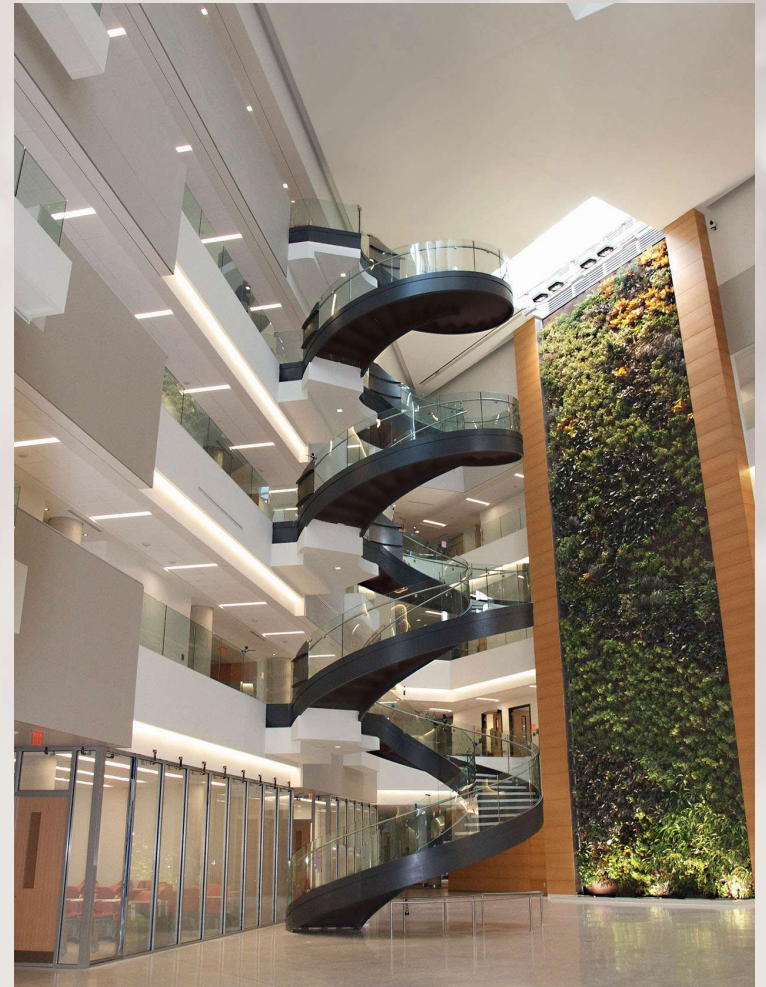
LEED V5

- Updated integration of biophilic design as a core strategy to enhance occupant wellbeing



EQ Credit: Occupant experience

- 5 categories:
- Biophilic environment- 2 pathways
- Adaptable environment
- Thermal environment
- Sound
- Integration within architecture



EQ Credit: Occupant experience

Option1 : Biophilic Environment

Path 1: Integrated Biophilic Design

Address the 5 principals:

- Exposure to nature
- Support for human wellbeing
- Emotional connection to place
- Responsibility to the natural world
- Integration within the building's architecture



DIRECT EXPERIENCE
OF NATURE



INDIRECT EXPERIENCE
OF NATURE



EXPERIENCE OF
SPACE AND PLACE

Exposure to nature and Support for human wellbeing

Human adaptation to the natural world that over evolutionary time have advanced people's health, fitness and wellbeing



Emotional connection to place

Biophilic design encourages an emotional connection to particular places and settings

- Connection to history through architecture
- Water feature



Integration within the building's architecture

- Open atrium
- Plants
- Mass timber structure
- Organic exposed stairway



EQ Credit: Occupant experience

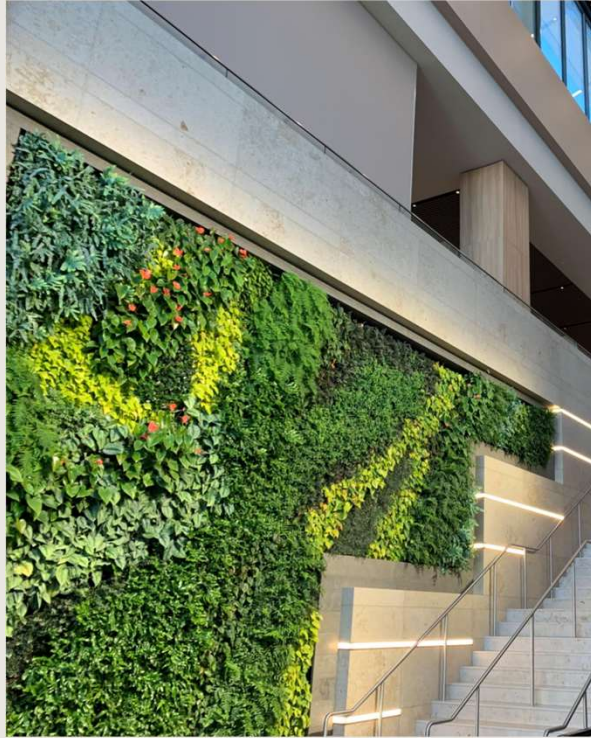
Option1 : Biophilic Environment

Path 2: Quality Views Design

- Meaningful views to natural elements
- Urban landmarks
- 75% of areas
- Greenery
- Water features



Project Case Studies



600 13th Street

Conference Center and Lounge

Before



After



- Wood Tones
- Stone Accents
- Curvilinear Wall
- Simulating natural light

600 13th Street

Yoga Studio / Meditation Space



- Nature Wall Covering
- Moss Pendants
- Wood Flooring
- Mirror Wall

9801 Washingtonian

Main Lobby

- Wood Tones
- Indoor Plants
- Expanded Views

Before



After



9801 Washingtonian

Ground Floor Lounge



- Natural Light/Views
- Curvilinear Walls
- Wood Tones
- Indoor Plants

Hanley Energy

Main Lobby / Reception



- Green Wall
- Wood Tones
- Nature-like Lighting

Hanley Energy

Main Lobby / Reception



- Circadian Lighting
- Acoustic Baffles
- Wood Shutters
- Color

National Landing Center

12th Floor Conference Center and Lounge



- Nanawall
- Trellises
- Wood and Stone Finishes
- Outdoor Views

National Landing Center

12th Floor Conference Center and Lounge



National Landing Center

4th Floor Outdoor Terrace



- Grass Lawns
- Umbrellas
- Trellis
- Gas Fire Pits



REDLAND

LOBBY



- Moss Wall
- Wood
- Stone
- Fireplace
- Outside Views

Ramboll

Lobby



- Indoor plants
- Earth tones
- Wood pergola

Ramboll

Open Office and Pantry



6116 Exec Blvd

Indoor/Outdoor Terrace at 4th Floor



- NanaWall
- Indoor Plants
- Wood Tones

POD Hotel

Rooftop Terrace



- Prospect views
- Natural materials
- Color
- Natural ventilation

The Garden at 55M Street

Rooftop Garden

- Pollinator garden
- Vegetable garden
- Event space
- Apiary



The Sur

Outdoor Terrace



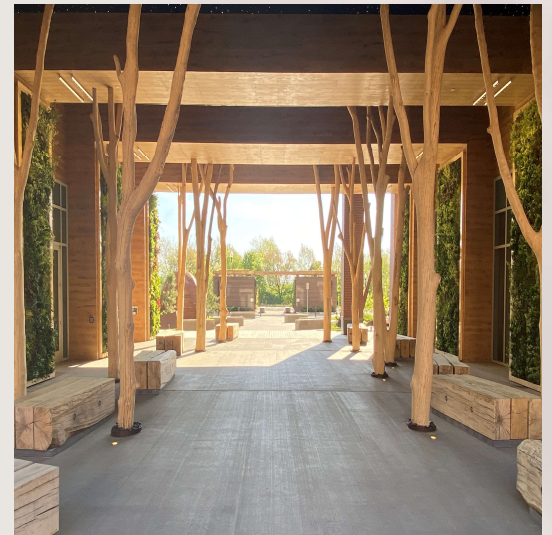
- Wood Trellis
- Outdoor Access
- Greenery
- Gathering Spaces

The Sur

Ground Level



- Green Lawns
- Refuge Spaces
- Organic Swings



BEST PRACTICES

Engage Biophilic
Design Early

Set Measurable
Goals
Strategic planning

Plan for Ongoing
Maintenance



Why It Matters Now...



- Tenant expectations: healthy, high-performing spaces
- Differentiation: leasing/sales premiums via experience & brand
- Risk management: stress, cognitive fatigue, absenteeism
- Synergy with sustainability strategies

Thank you!



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