A photograph of four children hiking through a dense forest. They are holding hands and walking along a path. The children are wearing backpacks and casual clothing. The forest is lush with green foliage and trees. A dark semi-transparent banner is overlaid on the bottom half of the image, containing text.

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# Biophilia – A Foundation for Trauma-Informed Design





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## AGENDA

- > Understanding Trauma  
SOCIAL EMOTIONAL LEARNING AT LACAMAS LAKE ES
- > Understanding Biophilia
- > Addressing Common Triggers
- > Applying Biophilic Design Strategies  
CASE STUDY: LACAMAS LAKE ELEMENTARY SCHOOL
- > Questions





# Understanding Trauma



# Understanding Trauma

Definition Based on 2021 Architectural Principles in the Service of Trauma-Informed Design:

We like to define trauma as the **permanent haunting** of an individual by an **initial crisis** — which becomes an **overwhelming stressor** that prevents the individual from **coping with the daily demands** of life and results in **lasting adverse affects** on the individual's social, physiological, physical, and emotional well-being.

# Trauma-Informed Design Goals

Definition Based on 2021 Architectural Principles in the Service of Trauma-Informed Design:

1. **Avoiding triggers:** What can the built environment do to preempt and limit a triggering encounter?
2. **Recovering from triggers:** What can the built environment do to compensate / address the activated response?

# Trigger Responses

Definition Based on 2021 Architectural Principles in the Service of Trauma-Informed Design:

1. The **Fight** Mode
2. The **Flight** Mode
3. The **Freeze** Mode
4. The **Fawn** Mode

# TRAUMA

## Understanding Trauma-Informed Design

Additional Strategies

**Baseline  
Design & Process**

Additional Strategies

**Advanced Design  
& Process**

Additional Strategies

**Comprehensive  
Design & Process**



# TRAUMA

## Criteria to Address Triggers/Re-living Trauma

| Safety                | Wellness  | Health                  |
|-----------------------|-----------|-------------------------|
| External Threats      | Emotional | Healthy Diet            |
| Internal Threats      | Social    | Reduce Intake of Toxins |
| Self Harm             | Mental    | Physical Exercise       |
| Threats to Property   | Spiritual | Healthy Sleep Pattern   |
| Environmental Threats | Physical  | Bodily Hygiene          |

# TRAUMA

## Criteria to Address Triggers/Re-living Trauma

### Safety

External Threats

Internal Threats

Self Harm

Threats to Property

Environmental Threats

### Wellness

Emotional

Social

Mental

Spiritual

Physical

### Health

Healthy Diet

Reduce Intake of Toxins

Physical Exercise

Healthy Sleep Pattern

Bodily Hygiene

Biophilia



# TRAUMA

**Social/emotional Learning at Lacamas Lake Elementary School**

## **Safety**

Creating a safe,  
welcoming and  
comfortable  
environment

## **Relationships**

Building relationships  
amongst students and  
between students,  
educators, and staff

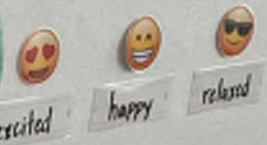
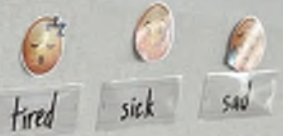
## **Regulation**

Supporting and  
teaching emotional  
regulation every day

# CALM CORNER



## Which zone are you in?





A photograph of a large, open park with many mature trees and a grassy field. The trees are mostly deciduous with green leaves, though some show early autumn colors. The ground is covered in grass and dappled with sunlight and shadows from the trees. In the background, a few cars are parked on a road. A green horizontal band with white text is overlaid across the middle of the image.

# Understanding Biophilia





*bios* = “life” + *philia* = “love of”



# Biophilic Design

Definition Based on 2014 Terrapin Bright Green LLC:

Biophilic design is about designing for **people as a biological organism** and respecting the mind-body systems as indicators of health and well-being.

Applied in the context of people's **health conditions, socio-cultural norms and expectations, past experiences (trauma)**, all of which are impacting the user perception and processing of the experience and depend on frequency and duration of the experience.

# Biophilic Design

## GOAL:

**Inspirational, restorative, and healthy** spaces.

## PREREQUISITE:

Biophilic strategies are **integrated into the functionality** of the place and the ecosystem to which they are applied and nurture a **love of place!**



# Impact of Biophilia

## STRESS REDUCTION

Lower Blood Pressure/Heart Rate

Reduced Stress Hormones

Sympathetic Nervous System Activity

Comfort/Wellbeing/Productivity

Increased Feeling of Tranquility

Positive Circadian System Function

Perceptual and Physiological Stress Responses

# Impact of Biophilia

## COGNITIVE PERFORMANCE

Mental Engagement/Attentiveness

Improved Cognitive Performance

Attention and Exploration Stimuli

Improved Concentration

Memory

Restoration/Psychological

Responsiveness

Increased Creative Performance

Reduced Boredom, Irritation,  
Fatigue

Improved Attention,  
Concentration, Perception of  
Safety



# Impact of Biophilia

## EMOTION, MOOD, PREFERENCE

Attitude/Overall Happiness

Mental Health/Tranquility

Temporal & Spatial Pleasure

Positive Emotional Responses

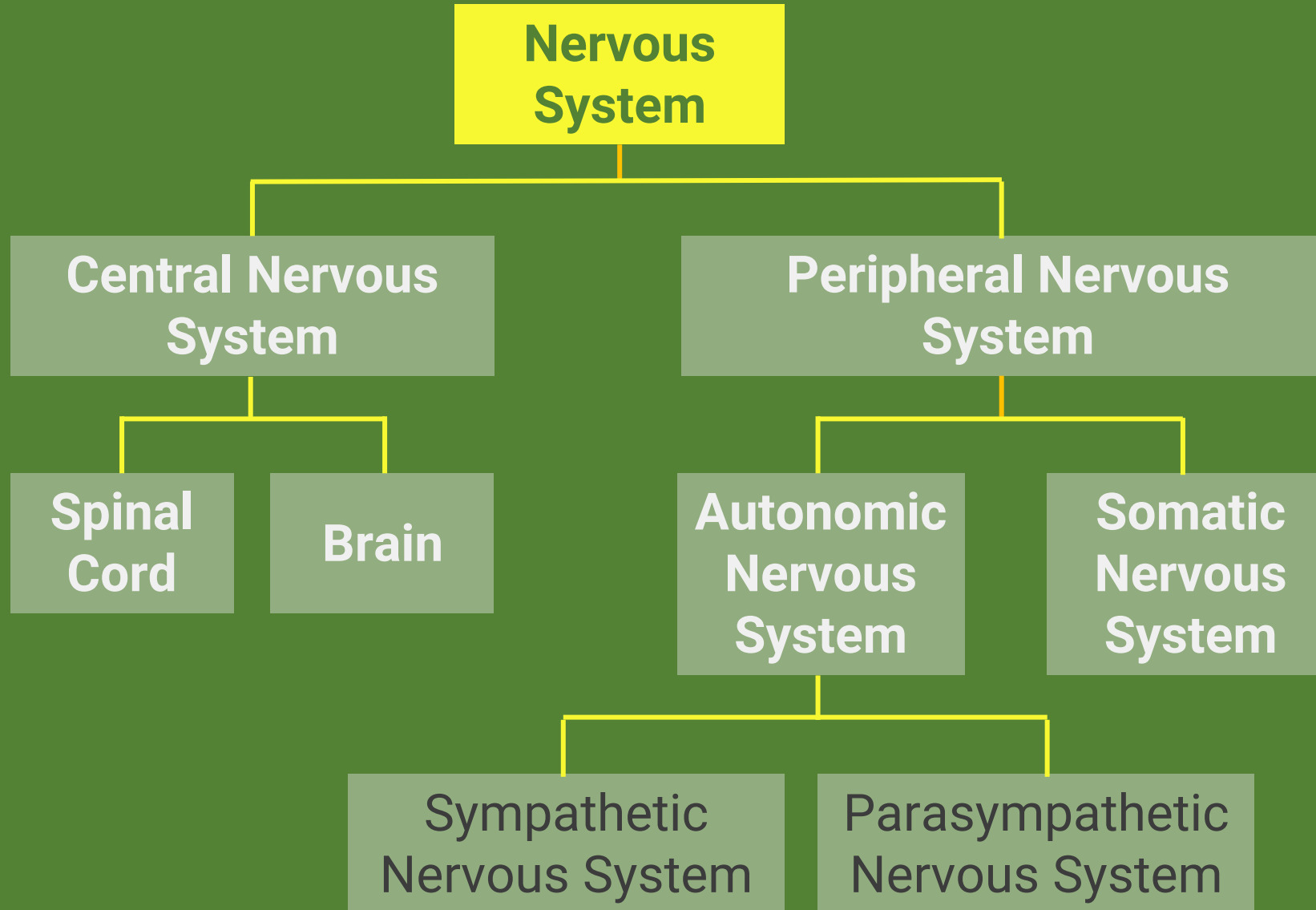
Shifted Perception of Environment

Improved Comfort

Comfort & Perceived Safety

Strong Pleasure Response

# Nervous System



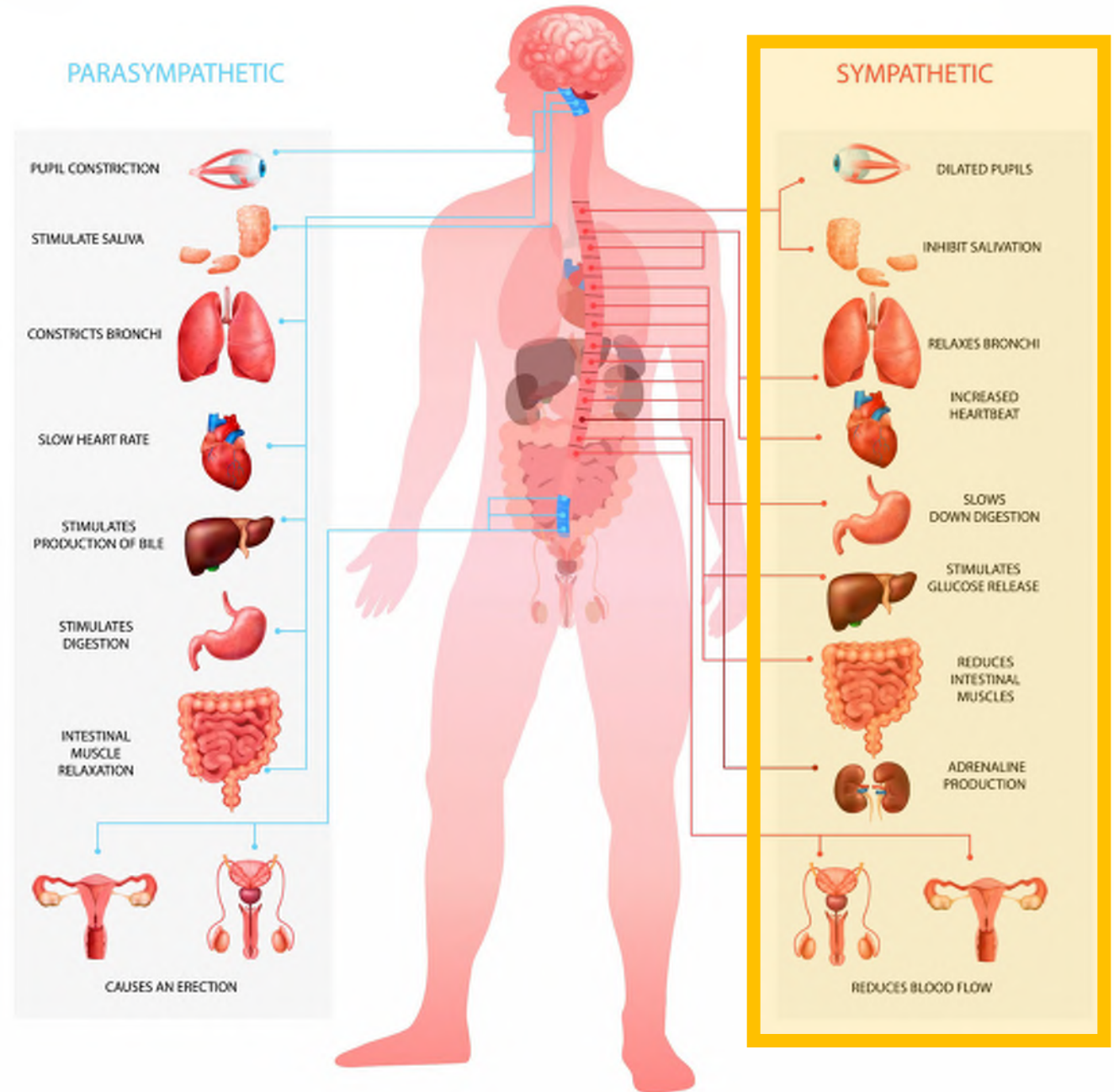


# Human Nervous System

## Sympathetic Nervous System (SNS)

Fight or flight

Prepares body for stressful activities  
(THINK STRESS!)





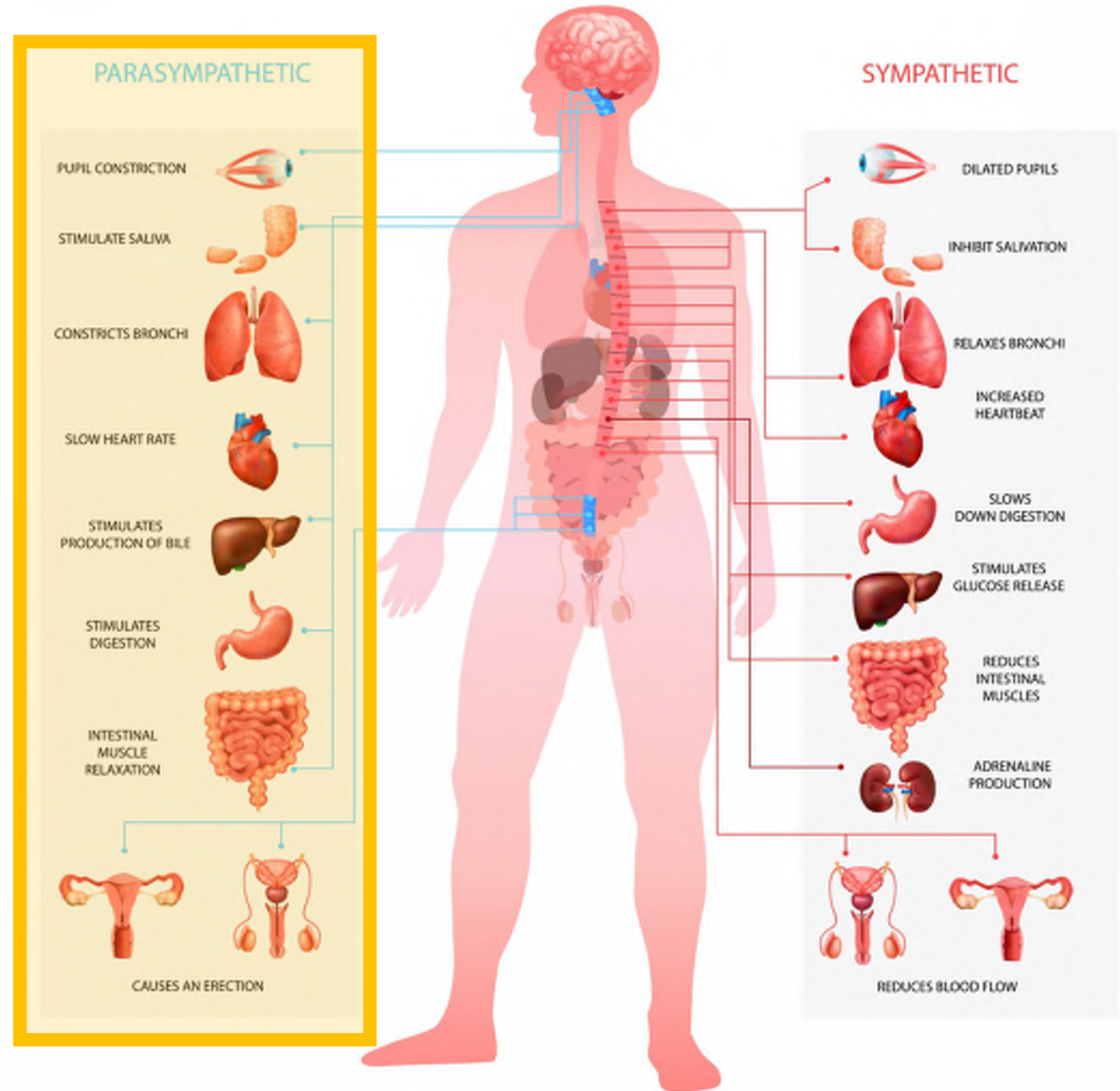


# Human Nervous System

## Parasympathetic Nervous System (PSNS)

Return to homeostasis

Slows bodily processes down



**When we're constantly confronted with psychological threats that we can neither fight nor flee, and our Sympathetic Nervous System is continually activated, we face negative health consequences.**



Based on Terrapin Bright Green, 2014

14 PATTERNS

Visual Connections w/Nature

Non-Visual Connections w/Nature

Non-Rhythmic Sensory Stimuli

Thermal & Airflow Variability

Presence of Water

Dynamic & Diffuse Light

Connection with Natural Systems

STRESS REDUCTION

Lower Blood Pressure / Heart Rate

Reduced Stress Hormones

Sympathetic Nervous System Activity

Comfort / Wellbeing / Productivity

Increased Feeling of Tranquility

Positive Circadian System Function

COGNITIVE PERFORMANCE

Mental Engagement / Attentiveness

Improved Cognitive Performance

Attention & Exploration stimuli

Improved Concentration

Memory Restoration /Psychological  
Responsiveness

EMOTION, MOOD, PREFERENCE

Attitude/Overall Happiness

Mental Health / Tranquility

Temporal & Spatial Pleasure

Positive Emotional Responses

Shifted Perception of Environment

Biomorphic Form & Patterns

Material Connection with Nature

Complexity & Order

Perceptual & Physiological Stress  
Responses

Increased Creative Performance

Observed View Preference

Improved Comfort

Observed View Preference

Prospect

Reduced Stress

Reduced Boredom, Irritation, Fatigue

Comfort & Perceived Safety

Refuge

Improved Attention, Concentration,  
Perception of Safety

Mystery

Strong Pleasure Response

Risk / Peril

Strong Pleasure Response



A photograph of a large, open park with many mature trees and a green lawn. The trees have dense green foliage, and their shadows are cast on the grass. In the background, a few cars are parked on a road. A green horizontal band with white text is overlaid across the middle of the image.

# Addressing Common Triggers



# Institutional Settings

## Trauma Trigger #1

### 1. Fluorescent Lights

- a. Stark, harsh, flickering (visual noise)
- b. Buzzing (disruptive sound)

### 2. Ceiling Tiles

### 3. Wall Color

- a. Bright white, gray, beige
- b. Neon intensity or deeply saturated

### 4. Generic Furniture



# Institutional Settings

## Fluorescent Lights

- a. Stark, harsh, flickering (visual noise)
- b. Buzzing (disruptive sound)





# Institutional Settings

## Ceiling Tiles

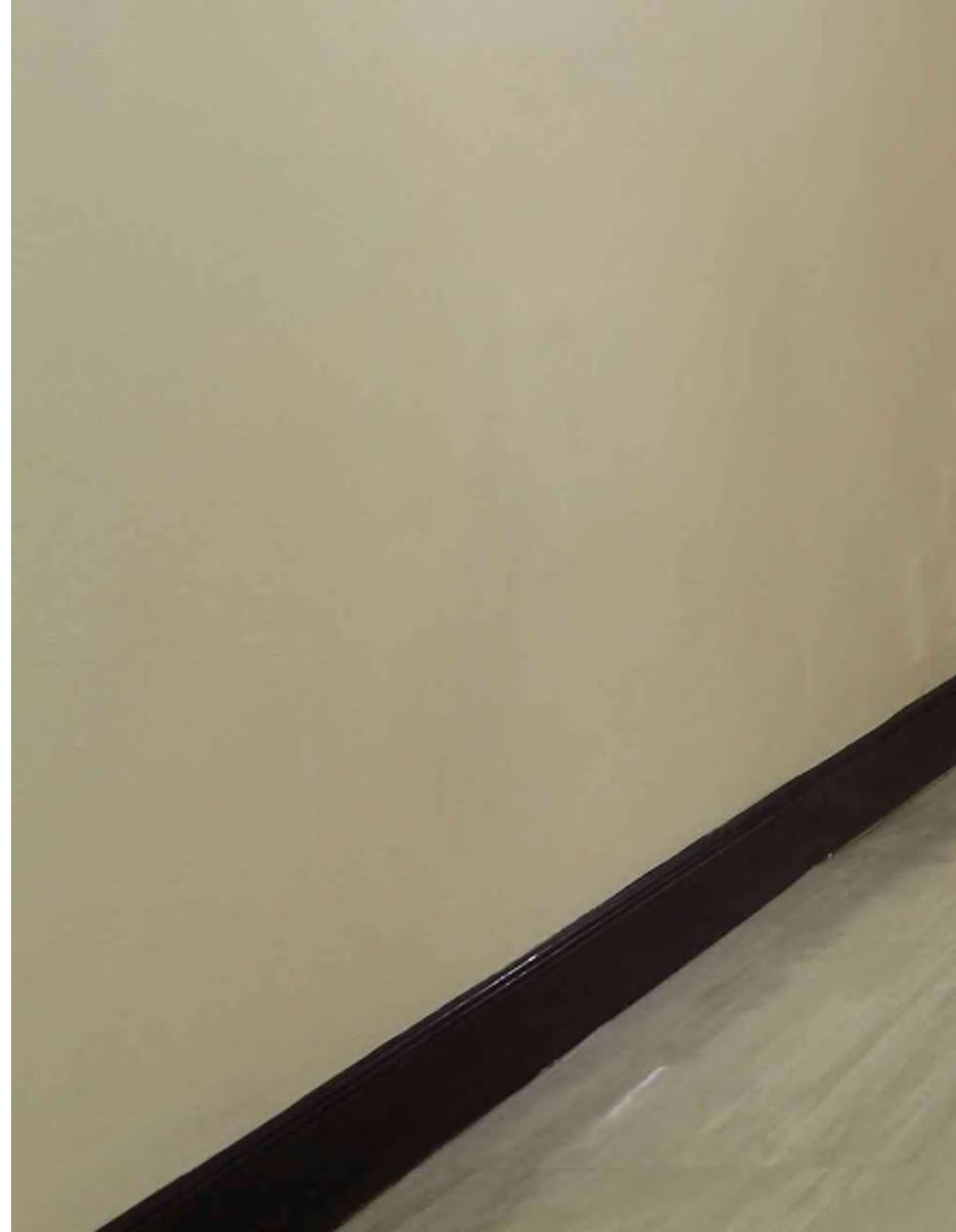




# Institutional Settings

## Wall and Floor Color

- a. Gray, Beige Colors
- b. Monotone Palette





# Institutional Settings

## Generic Furniture





# Natural Settings

## Biophilic Response to Avoid and Recover from a Trigger

### 1. Fluorescent Lights

- a. Dynamic and Diffuse Light

### 2. Ceiling Tiles

- a. Material Connection to Nature
- b. Biomorphic Forms and Patterns

### 3. Wall Color

- a. Material Connection to Nature
- b. Non-visual Connection to Nature
- c. Visual Connection to Nature

### 4. Generic Furniture

- a. Material Connection to Nature
- b. Non-visual Connection to Nature

**(Consider... How can we break through a homogenous, constantly-controlled environment?)**

# Natural Settings

## Biophilic Response

### \*Material Connection to Nature

Materials and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.

### Non-Generic Furniture

Allow users to choose furniture that meets their individual needs and desires.



# Natural Settings

## Biophilic Response

### **\*Visual Connection to Nature**

A view to elements of nature, living systems, and natural processes.

### **\*Non-Rhythmic Sensory Stimuli**

Feels as if one is momentarily privy to something special, something fresh, interesting, stimulating and energizing. It is a brief but welcome distraction.





# Natural Settings

## Biophilic Response

### \*Dynamic & Diffuse Light

Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.

### \*Biomorphic Forms & Patterns

Symbolic references to contoured, patterned, textured, or numerical arrangements that persist in nature.





# Natural Settings

## Biophilic Response

### \*Dynamic & Diffuse Light

Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.

### \*Biomorphic Forms & Patterns

Symbolic references to contoured, patterned, textured, or numerical arrangements that persist in nature.



# Natural Settings: Shared Stories



# Visual Discomfort

## Trauma Trigger #2

1. Lack of Visible Exits
2. Unclear Wayfinding
3. Blind Turns
4. Indistinguishable Repeating Doors & Long Corridors
5. Stains on Floors and Walls



# Visual Discomfort

## Wall and Floor Color

- a. Bright White Walls
- b. Neon Intensity or Deeply Saturated





# Visual Discomfort

Unclear Wayfinding and Blind Turns



# Visual Discomfort

## Lack of Visible Exits



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# Visual Discomfort

Indistinguishable Repeating Doors  
and Long Corridors





# Visual Discomfort

Stains on Floors and Walls





# Visual Connections

Biophilic Response to Avoid and Recover from a Trigger

- 1. Lack of Visible Exits**
- 2. Unclear Wayfinding**
  - a. Prospect
  - b. Visual Connection with Nature
  - c. Dynamic and Diffuse Light
- 3. Blind Turns**
  - a. Prospect
- 4. Indistinguishable Repeating Doors and Long Corridors**
  - a. Complexity and Order
- 5. Stains on Floors and Walls**
  - a. Material Connection to Nature

# Visual Connections

## Biophilic Response

### \*Prospect

An unimpeded view over a distance for surveillance and planning.

### \*Visual Connection to Nature

A view to elements of nature, living systems, and natural processes.

### Clear Wayfinding

To make circulation & egress intuitive.





# Visual Connections

## Biophilic Response

### Visible Exits

Clear wayfinding that make circulation and egress intuitive.



# Visual Connections

## Biophilic Response

### \*Prospect

An unimpeded view over a distance for surveillance and planning.

### \*Dynamic & Diffuse Light

Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.

### \*Complexity and Order

Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature.





# Visual Connections: Shared Stories



# Uncomfortable Sensations

## Trauma Trigger #3

- 1. No Adjustable Thermometer**
- 2. Narrow Hallways / Extreme Perspective**
- 3. Buckling Floors**
- 4. No Fresh Air**



# Uncomfortable Sensations

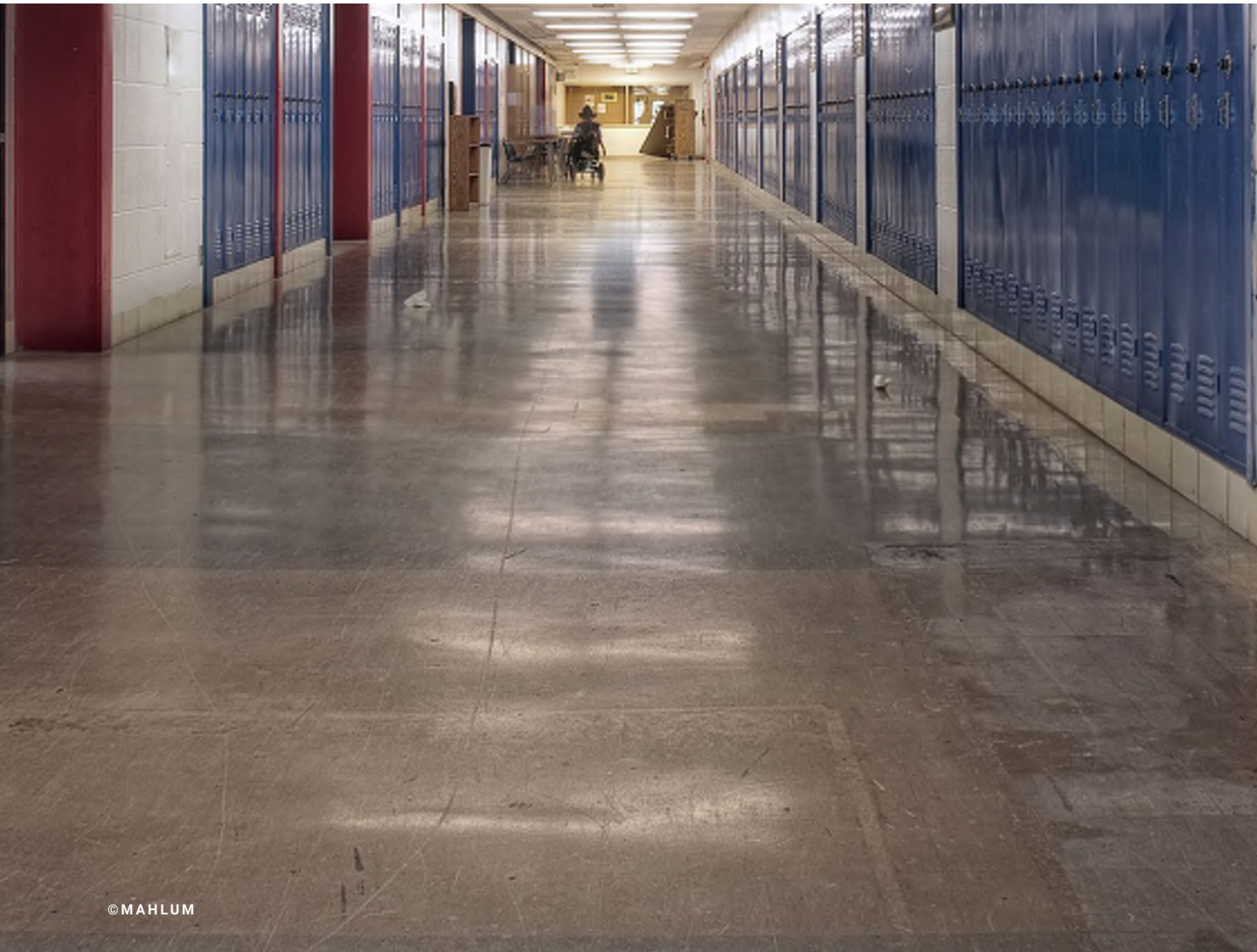
## No Adjustable Thermometer





# Uncomfortable Sensations

## Buckling Floors





# Uncomfortable Sensations

Narrow Hallways/Extreme Perspective





# Uncomfortable Sensations

## No Fresh Air





# Comfortable Sensations

Biophilic Response to Avoid and Recover from a Trigger

## 1. No Adjustable Thermometer

- a. Thermal and Airflow variability

## 2. Narrow Hallways

- a. Prospect
- b. Visual connection with nature
- c. Dynamic & diffuse light

## 3. Buckling Floors

## 4. No Fresh Air

- a. Thermal & airflow variability



# Comfortable Sensations

## Biophilic Response

### \*Thermal & Airflow Variability

Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.



# Comfortable Sensations

## Biophilic Response

### \*Prospect

An unimpeded view over a distance for surveillance and planning.

### \*Visual Connection to Nature

A view to elements of nature, living systems, and natural processes.

### \*Dynamic & Diffuse Light

Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.







# Comfortable Sensations: Shared Stories





# Lack of Security

## Trauma Trigger #4

1. (Open) Windows at Ground Level
2. Hyper-openness / No Place to Retreat
3. Excessive security measures
  - a. Gates / Fences / Cameras
4. Disabled Security Measures
  - a. Gates / Fences / Cameras
5. Marginalized Stairwells
6. Dead End
7. Lack of Maintenance / Vandalism



# Lack of Security

Open Windows at Ground Level





# Lack of Security

## Excessive Security Measures

### a. Gates / Fences / Cameras





# Lack of Security

## Disabled Security Measures

### a. Gates / Fences / Cameras



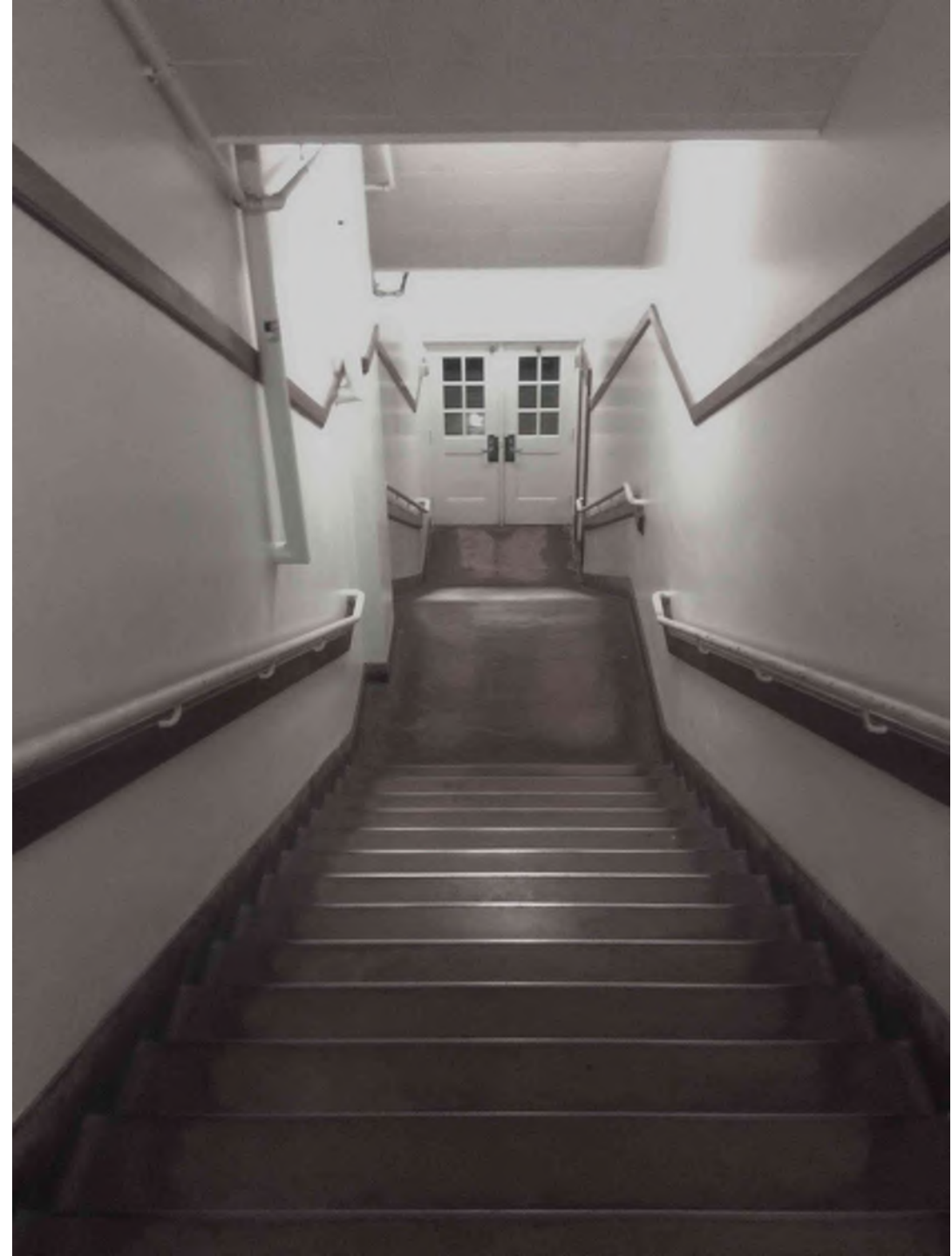


# Lack of Security

## Marginalized Stairwells



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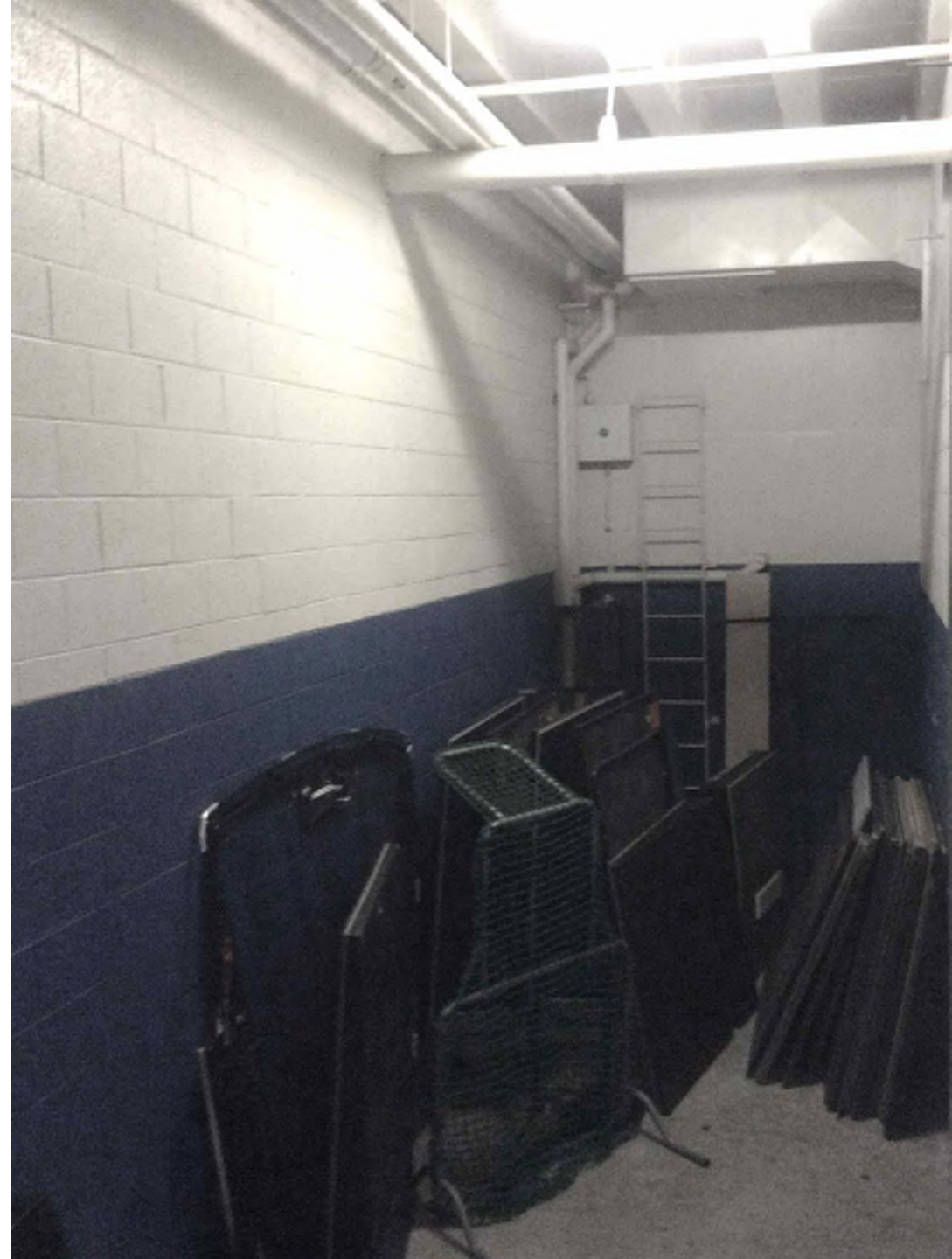


# Lack of Security

Dead Ends



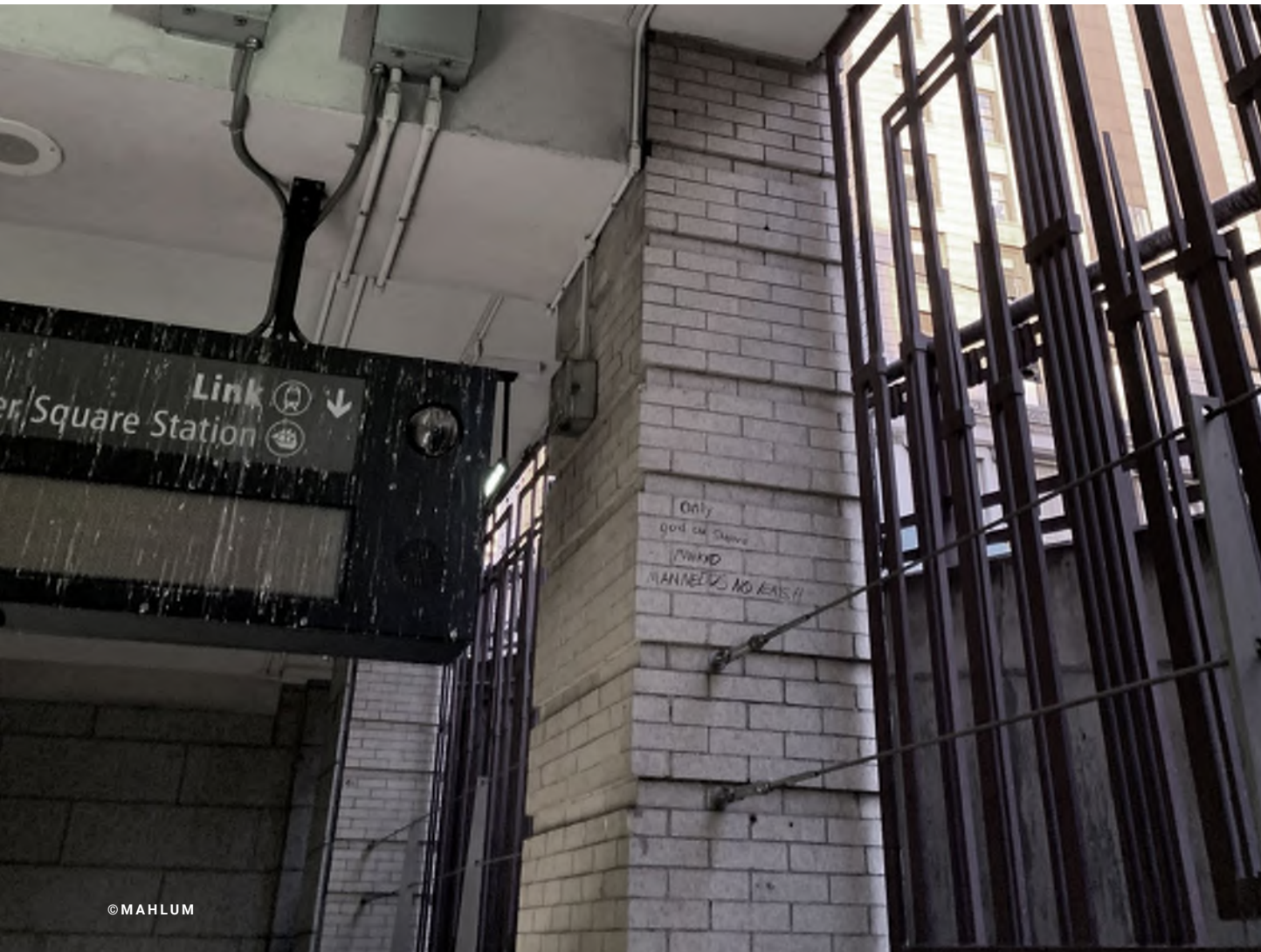
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# Lack of Security

Lack of Maintenance/Vandalism





# Sense of Security

Biophilic Response to Avoid and Recover from a Trigger

1. **(Open) Windows at Ground Level**
  2. **Hyper-Exposure / No Place to Retreat**
    - a. Refuge
  3. **Excessive Security Measures**
  4. **Disabled Security Measures**
  5. **Marginalized Stairwells**
    - a. Dynamic and diffuse light
  6. **Dead End**
    - a. Dynamic and diffuse light
  7. **Lack of Maintenance/Vandalism**
- > **Non-visual connection to nature**
  - > **Visual connection to nature**
  - > **Prospect**
  - > **Material connection to nature**
  - > **Biomorphic forms & patterns**



# Sense of Security

## Biophilic Response

### \*Refuge

Refuge is a place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.

### \*Material Connection to Nature

Materials and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.





# Sense of Security

## Biophilic Response

### \*Prospect

An unimpeded view over a distance for surveillance and planning

### \*Material Connection to Nature

Materials and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.







# Sense of Security Biophilic Response

## **\*Refuge**

Refuge is a place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.

## **\*Dynamic & Diffuse Light**

Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.

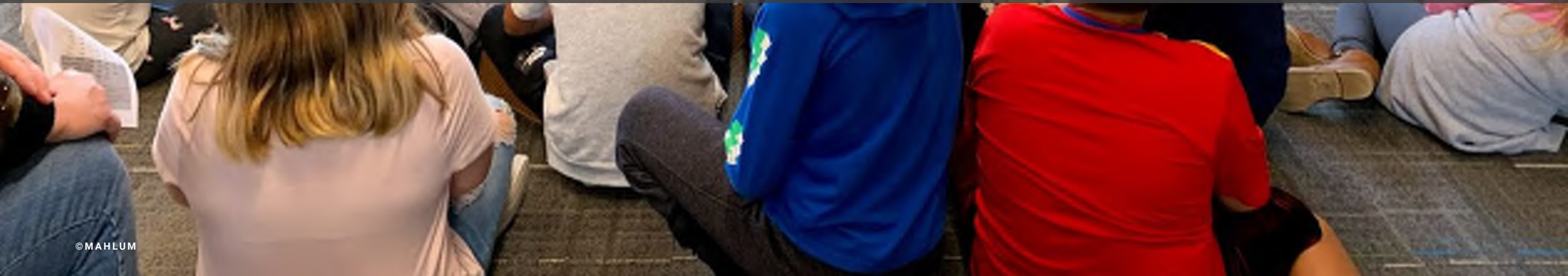
## **Non-Marginalized Stairwells**

Celebrate vertical circulation in the center and allow for gathering.





# Sense of Security: Shared Stories





# Unpleasant Sounds

## Trauma Trigger #5

1. Footsteps
2. Door Slamming
3. Screaming
4. Buzzing Appliance Lights
  - a. In Contrast to a Light Hum



# Unpleasant Sounds

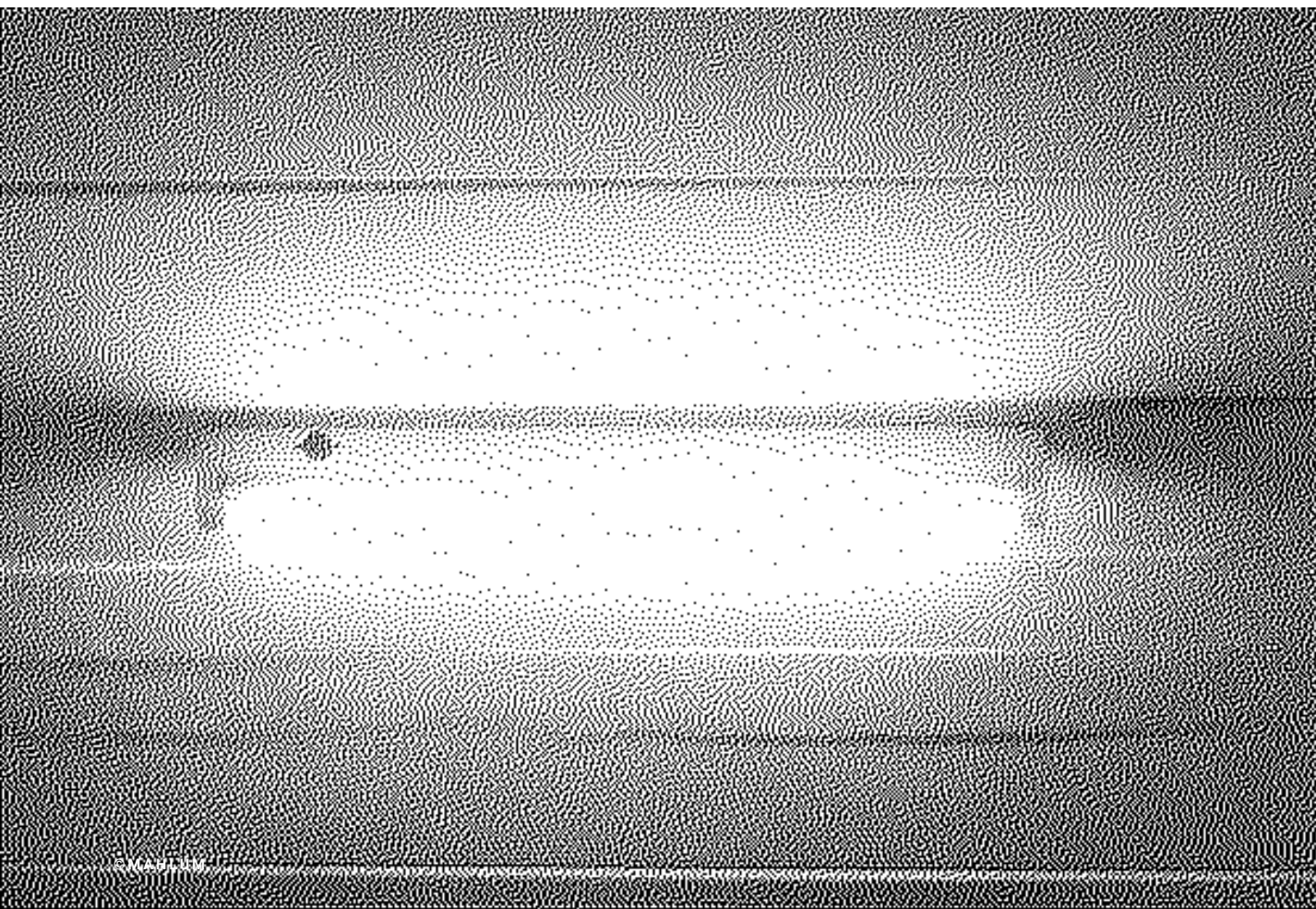
## Key Chain, Footsteps





## Unpleasant Sounds

Buzzing Appliance Lights,  
Screaming





# Unpleasant Scents

## Trauma Trigger #6

1. **Body Odors**
2. **Mildew / Mold**
3. **Cigarette Smoke**
4. **Perfumes**



# Unpleasant Scents

Body Odors, Mildew/Mold





# Unpleasant Scents

Cigarette Smoke, Perfume,  
Cleaning Products





# Calming the Senses

Biophilic Response to Avoid and Recover from a Trigger

## AUDITORY

1. Footsteps
2. Door Slamming
3. Overhearing Someone Have an Episode
4. Buzzing Lights or Appliances

## Solutions

- > **Material Connection to Nature:**  
Acoustics
- > **Non-rhythmic Sensory Stimuli**
- > **Non-visual Connections with Nature**
- > **Connection to Natural Systems**

## OLFACTORY

1. Body Odors
2. Mildew
3. Cigarette smoke
4. Perfumes

## Solutions

- > **Thermal and Airflow Variability:**  
Proper ventilation
- > **Material Connection to Nature**
- > **Non-visual Connection to Nature:**  
Pleasant scents



# Calming the Senses

## Biophilic Response

### \*Connection to Natural Systems

The awareness of natural processes, especially seasonal and temporal changes characteristic of a healthy ecosystem.





# Calming the Senses

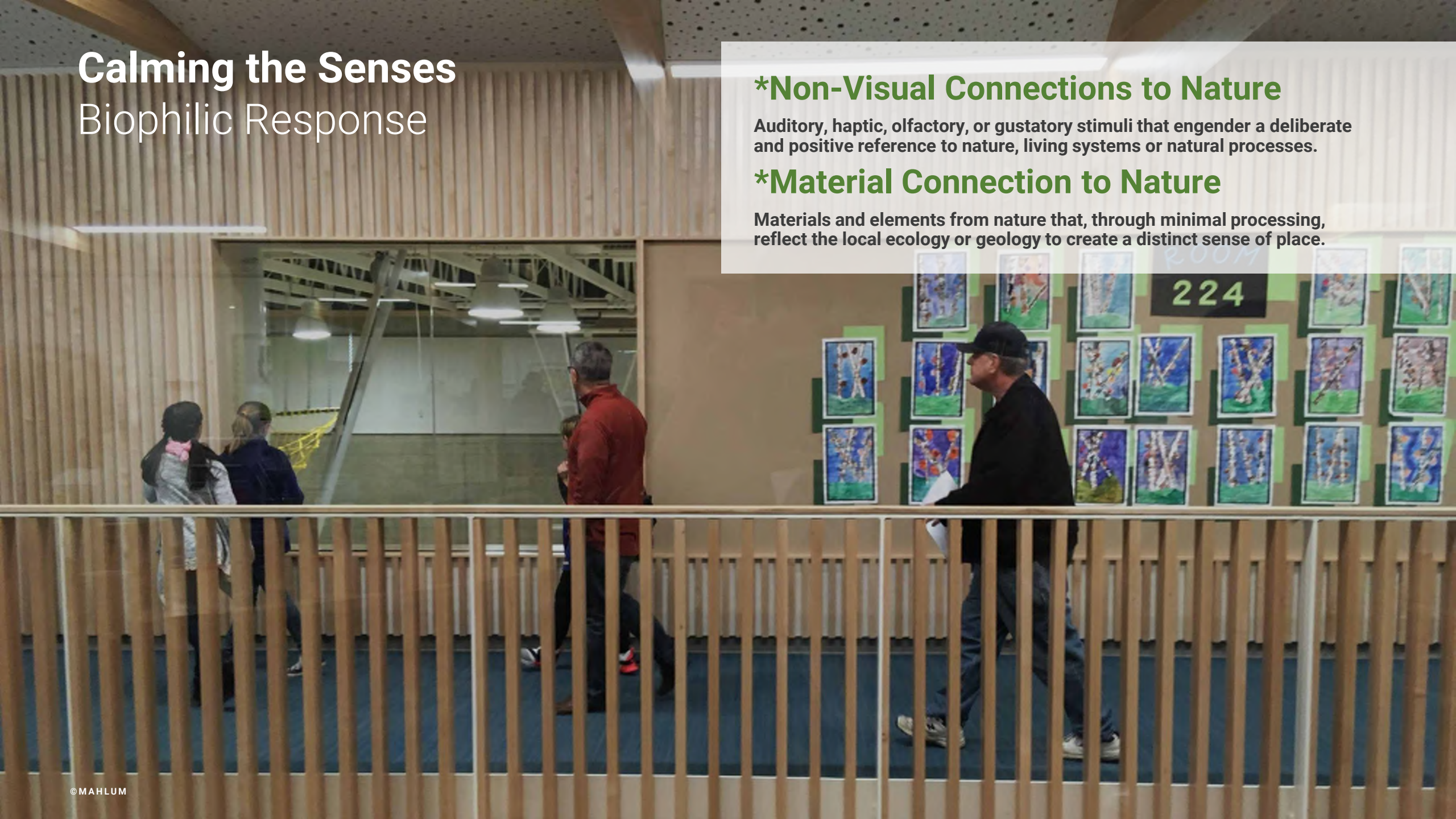
## Biophilic Response

### \*Non-Visual Connections to Nature

Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

### \*Material Connection to Nature

Materials and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.





# Calming the Senses

## Biophilic Response

### \*Thermal & Airflow Variability

Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic And natural environments.







# Calming the Senses: Shared Stories





A young person with dark, curly hair is shown in profile, eyes closed, sitting at a wooden desk. They are wearing a dark grey hoodie. On the desk to their left are two water bottles: a teal one and a red one with a black handle and a circular logo. The background wall is white with several colorful rectangular decorations in shades of green, blue, and purple. A small copyright notice is visible in the bottom left corner.

# Calming the Senses: Shared Stories





# Questions?



# Citations/Recommended Reading

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**Thank You**