1 Continuing Education Credit

Integrating Health Equity in the Design Process: Let's PRECEDE
A Holistic Approach for Healthy Buildings

Perkins&Will

Presenters

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MPH, ScD

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Course Description

The PRECEDE framework equips architects and design professionals with a **proactive methodology to integrate public health, safety, and welfare** (HSW) principles into every phase of the design process. By positioning the designer as a strategic partner in community resilience, PRECEDE strengthens the connection between a **building's design and the physical, emotional, and social well-being** of its users. This approach expands the traditional scope of programming and analysis to identify upstream health determinants—such as air quality, physical activity, and access to nature—and connects these to project-specific goals, client missions, and site conditions. For instance, designing the same building typology in a Southwestern suburb versus a Northeastern urban neighborhood demands different public health responses due to variations in climate, mobility patterns, and community health data.

By **embedding health-focused strategies** like **enhanced air filtration, thermal comfort, active design, and material health** early in project planning and design, architects can mitigate risks, address population-specific health needs, and avoid late-stage compromises during value engineering. PRECEDE thus supports **project development** and **documentation** processes that explicitly prioritize health-promoting, risk-reducing, and equitable design decisions—clearly communicating these choices to clients and ensuring they are integrated into specifications, QA/QC, and final construction. This ensures that buildings serve not only their occupants, but also the broader communities they impact—advancing health, protecting safety, and enhancing welfare at every scale.

1 HSW Continuing Education Credit

Learning Objectives

Integrate publicly available resources for health, well-being, and equity in early design phases.

Prioritize public health metrics that most directly impact occupant health outcomes for a specific community.

Perform community health centered visioning and programming with clients.

Evaluate design strategies and performance themes through a health equity lens.

1 HSW Continuing Education Credit per Session

Three sessions curated as a sequel but can stand alone.

Session 1

Advancing Health Equity and Environmental Performance through Design: A Holistic Framework for Healthy Buildings

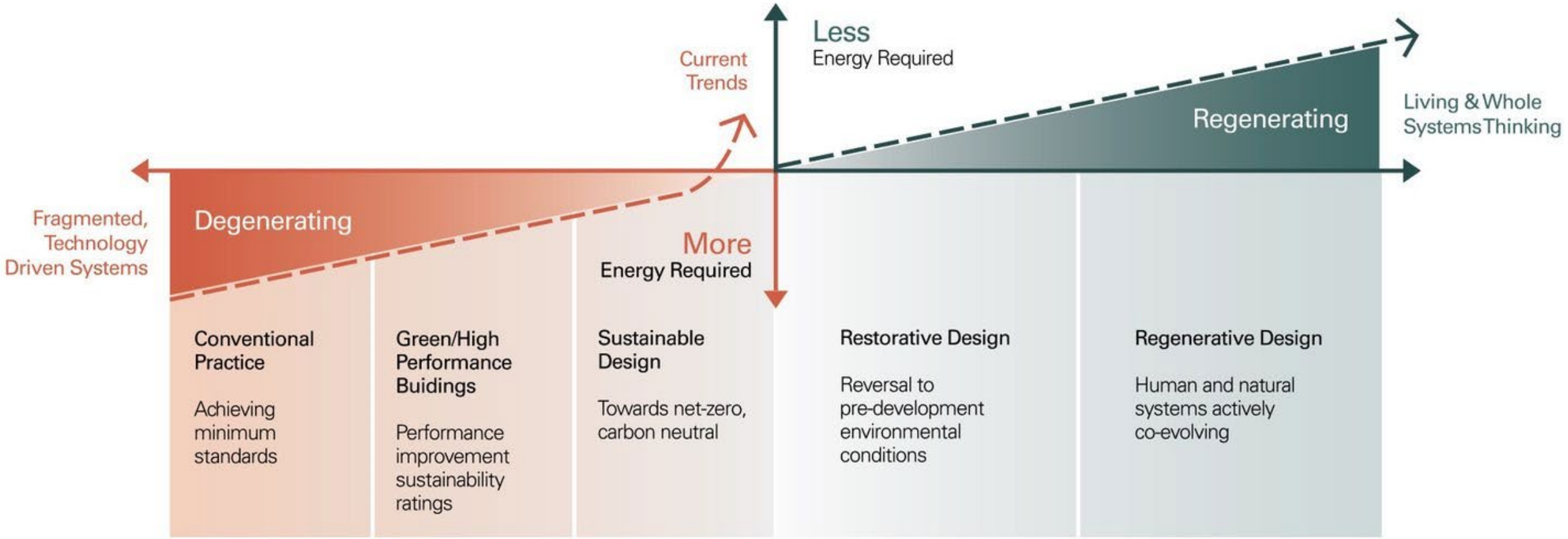
Session 2

Integrating Health Equity in the Design Process: Let's PRECEDE

Session 3

Achieving High Performance in Public Buildings: Design for Zero Net Energy, Low Carbon, and Material Health

Industry Shift



"Range of sustainability approaches" (Developed from Bill Reed, 2007)

The Design Process

Regenerative Design Process: A Framework

MACRO

MICRO

Discovery:
Research, Explore, Integrate

Scale Jumping:
Listen to Communities
- *Flora*
- *Fauna*
- Human

Listen to Context
- Ecology (habitat and species)
- Climate/Environment
- Cultural
- Social
- Economic
- Policy

Define Project Purpose
- Vision
- Function
- Drivers
- Aspirations

Traditional Project Start

Concept Design:
Engage, Embed, Invent

Engagement
Occupants / Users

Inspiration
Parti Idea Creation

Concept
Big Picture
Program / Plan

Systems Thinking, Synergies & Early Modeling:
Passive Strategies
- Daylight
- Ventilation / Air Quality
- Biophilia

Active Strategies
- Energy
- Carbon
- Water

Schematic Design:
Define, Coordinate

Integrate Systems
Define Strategies
Calibrate Performance
Reiterative Modeling
Micro Design Reiterations

Assemblies
Healthy Materials
Embodied Carbon
De-mountability

Follow thru on big decisions!

DD:
Maintain, Deepen

Lock-in Systems
Coordination
Resolution
Confirmation
Details

CD

Docs
Tight

CA

Build
Quality

Occupancy

Experience & Outcomes
Purposeful
Healthy
Inspirational
Inclusive
Equitable
Contextual
Resilient

Project Completion

Regenerative Design Process: A Framework

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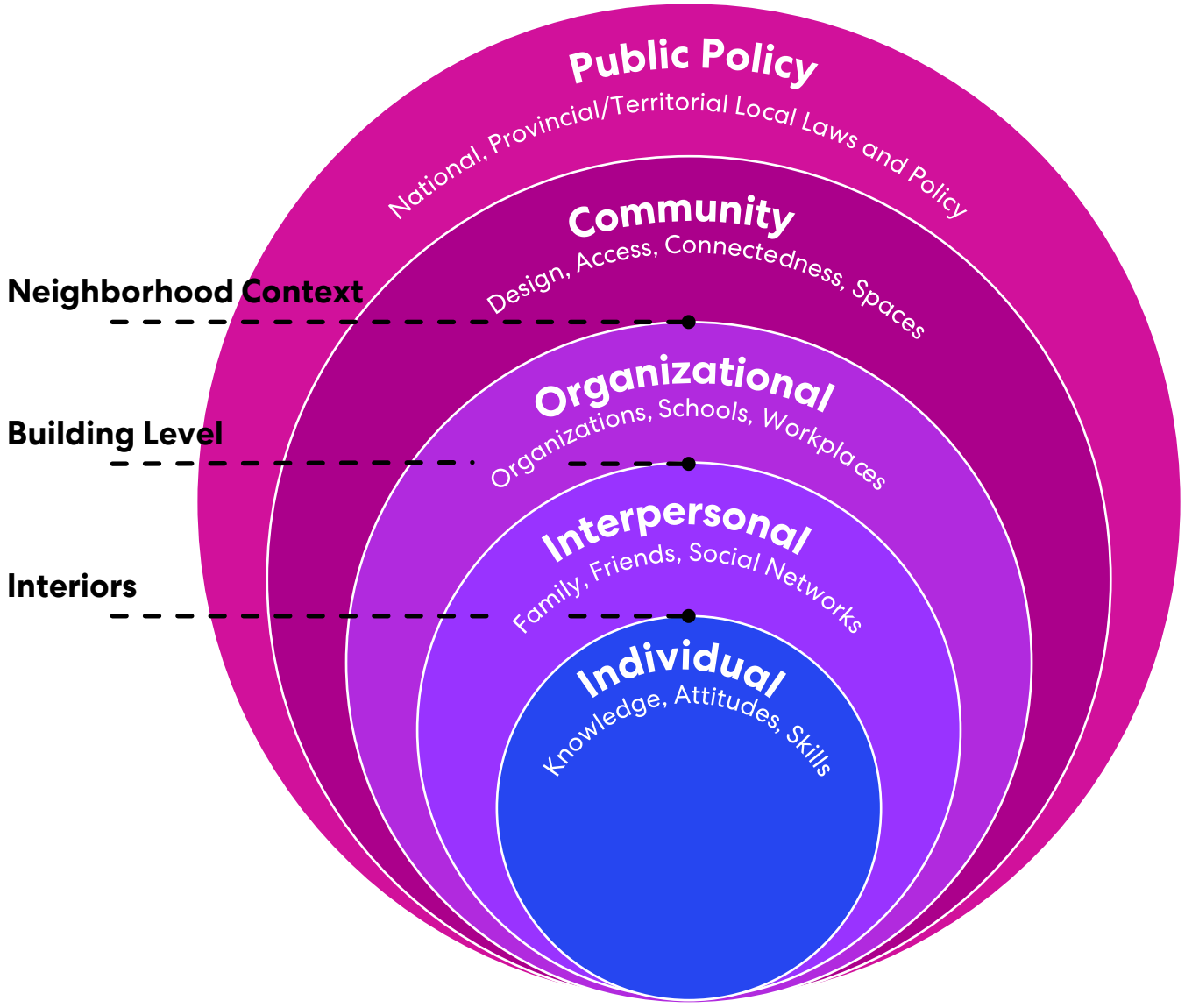
Project Completion

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity

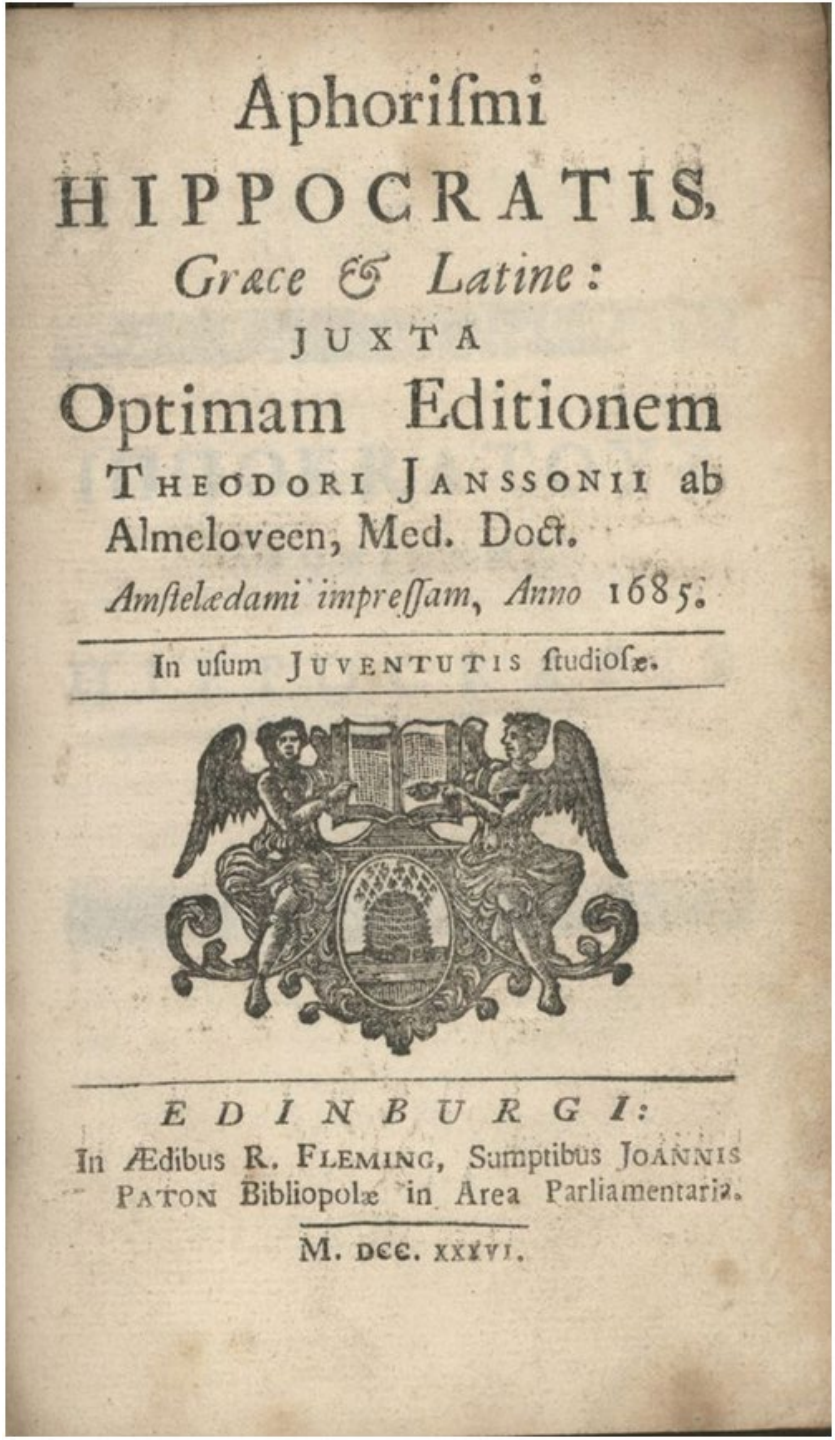


A Social-Ecological Model for Physical Activity
Adapted from Heise, L., Ellsberg, M., & Gottemoeller, M. (1999)

Macro:

"The physician must be able to tell the antecedents, know the present, and foretell the future — must mediate these things, and have two special objects in view with regard to disease, namely, to do good or to do no harm.“

- Of The Epidemics, Hippocrates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Græce & Latine:
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Almeloveen, Med. Doct.
Amſtelædami impreſſam, Anno 1685.
In uſum JUVENTUTIS ſtudioſæ.
EDINBURGI:
In Ædibus R. FLEMING, Sumptibus JOANNIS
PATON Bibliopolæ in Area Parliamentaria.
M. DCC. XXXVI.

Macro:

"The designer must be able to learn from precedents, know the present, and foretell the future — must mediate these things, and have two special objects in view with regard to people, namely, to do good or to do no harm.“

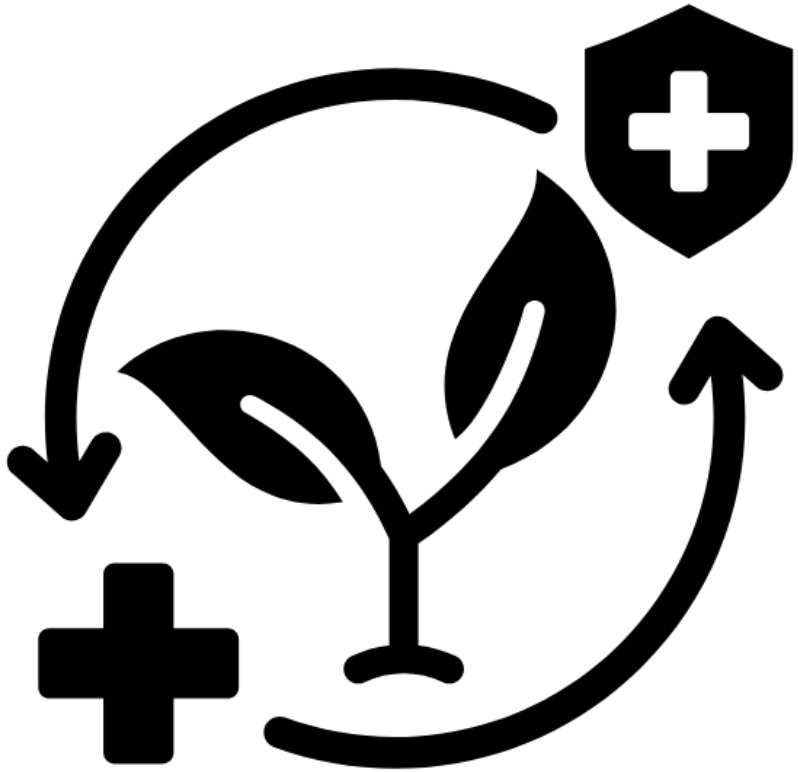
- Of The Epidemics, Hippocrates (REVISED)

Agenda

Understanding the Need

Navigating the PRECEDE Tool

Applying PRECEDE to Projects



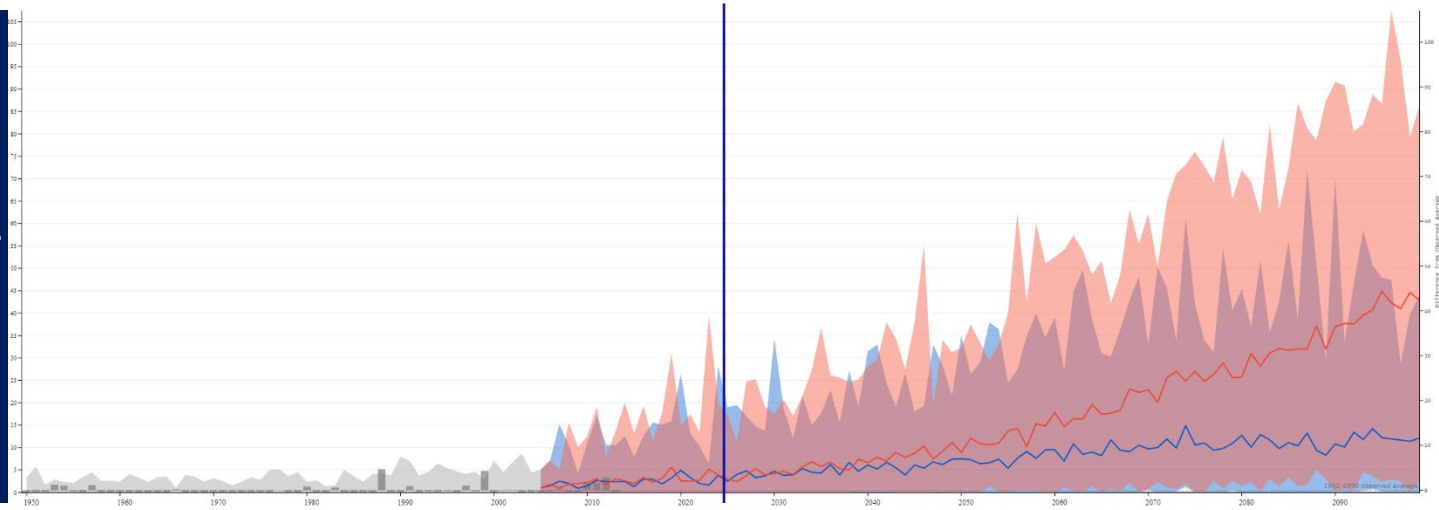
Greenpeace

- National Non-profit
- Focused on reducing impacts from climate change
- Promote inclusive workplace

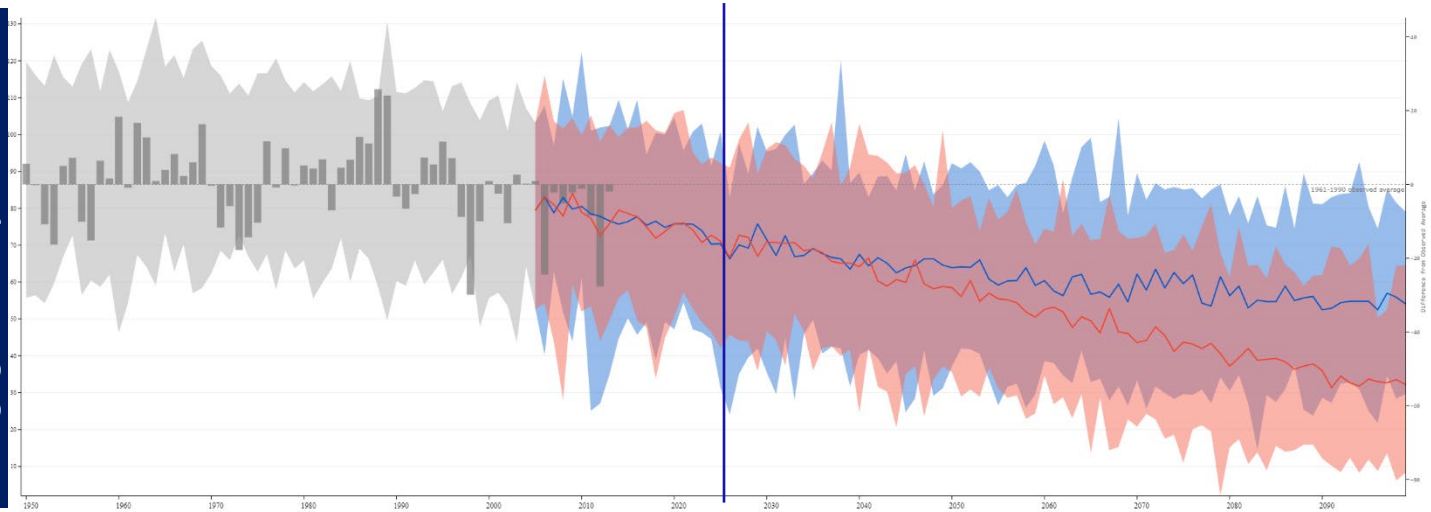
Photo: Halkin-Mason

Greenpeace – Regional Climate Vulnerability Assessment

Extreme Heat – Days over 100

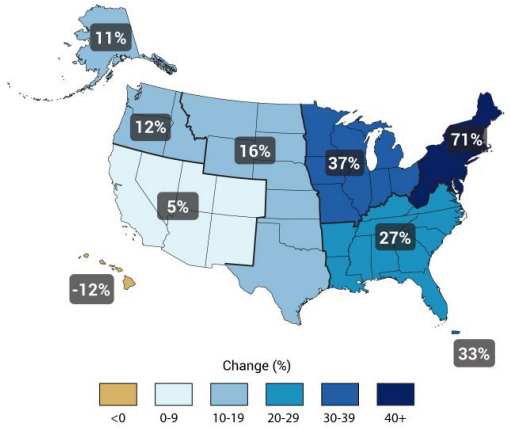


Damaging Cold – Days Below 32



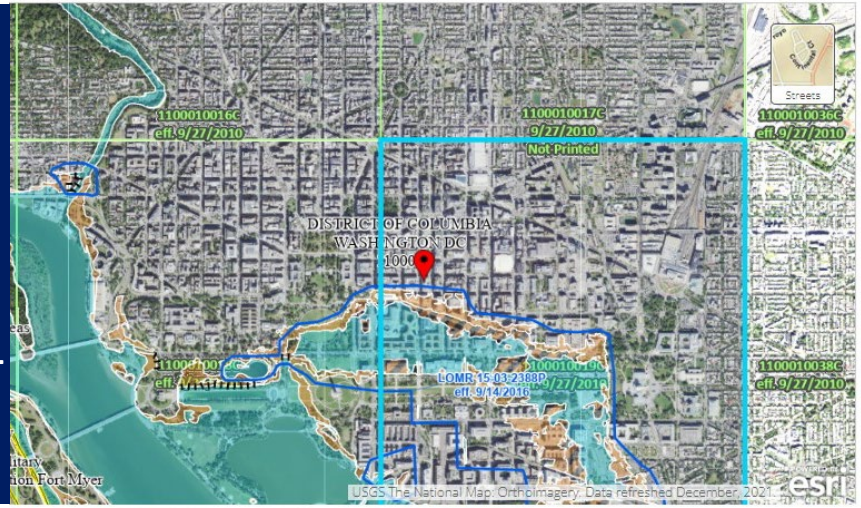
Source: The Climate Explorer

Increase in Heavy Precipitation



Source: Globalchange.gov

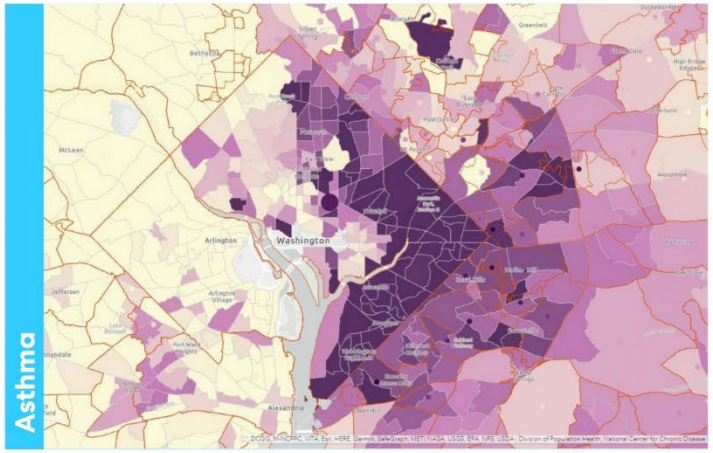
Flood Map

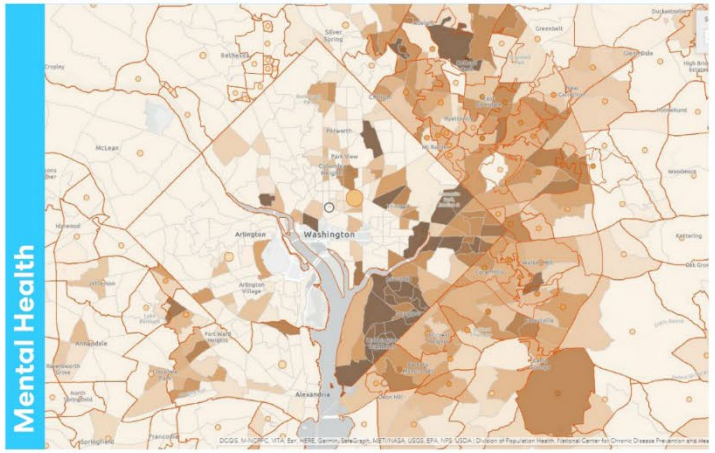


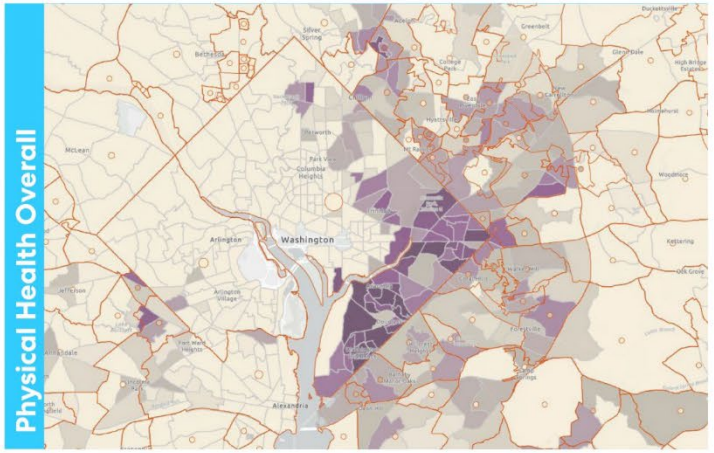
Source: FEMA

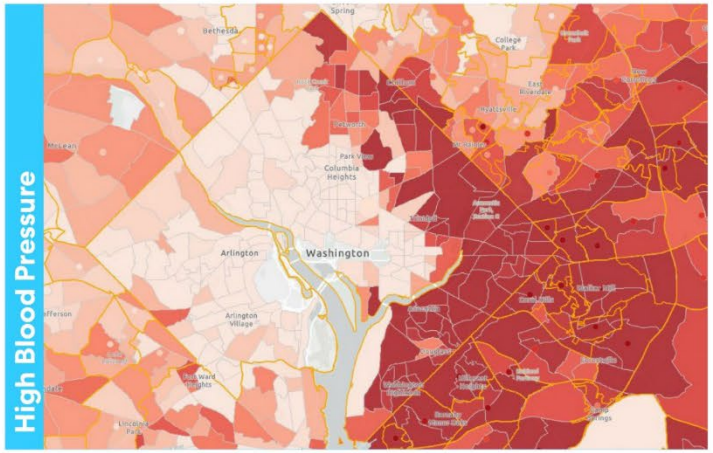
Greenpeace – Public Health Characteristics

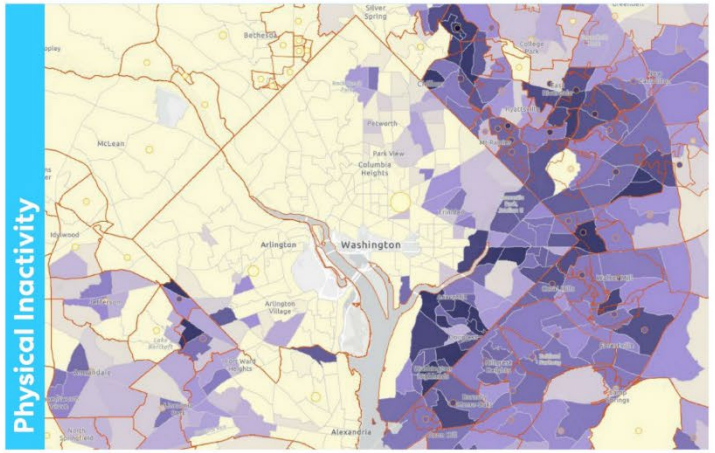
Regional Health Indicators – Darker colors indicate higher prevalence

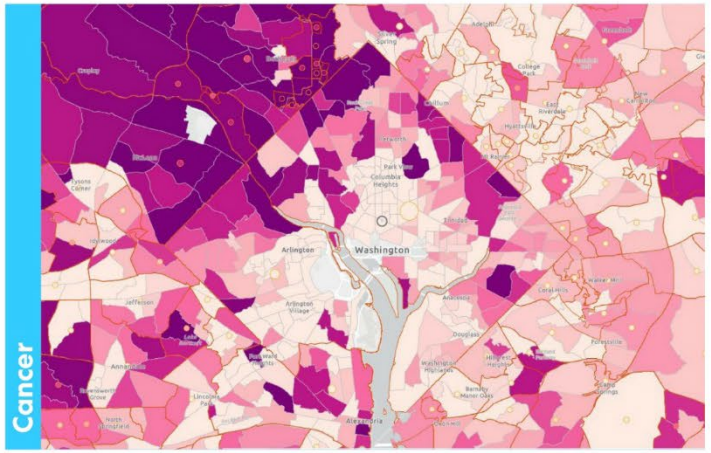








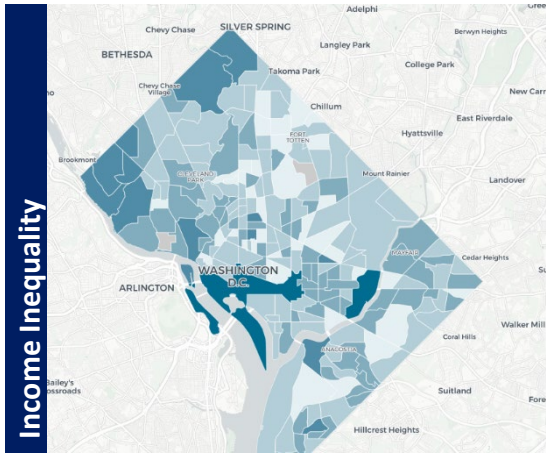


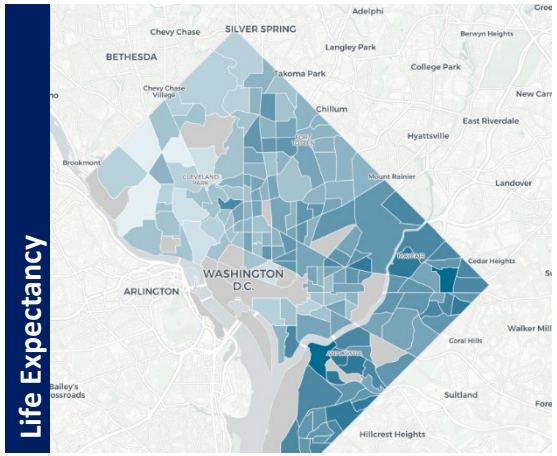


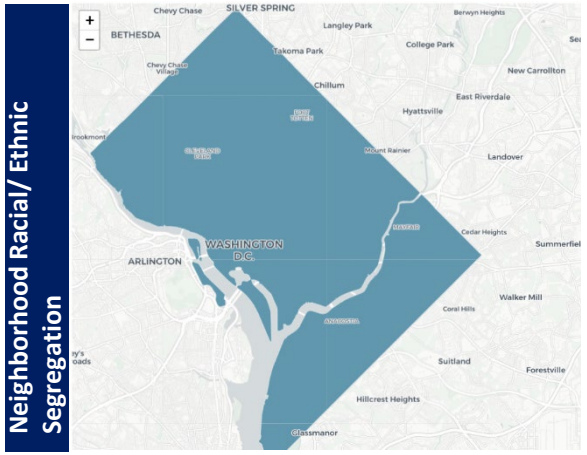
Source: CDC Places Database

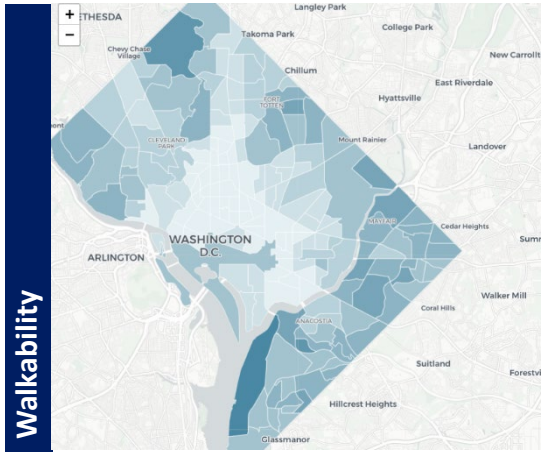
Greenpeace – Public Health Characteristics

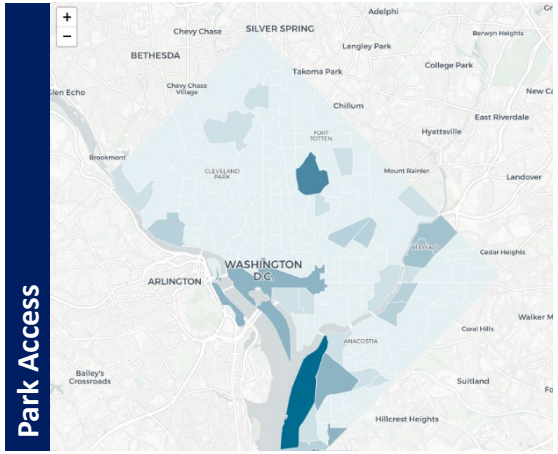
Regional Social and Economic Indicators – Darker colors indicate higher prevalence

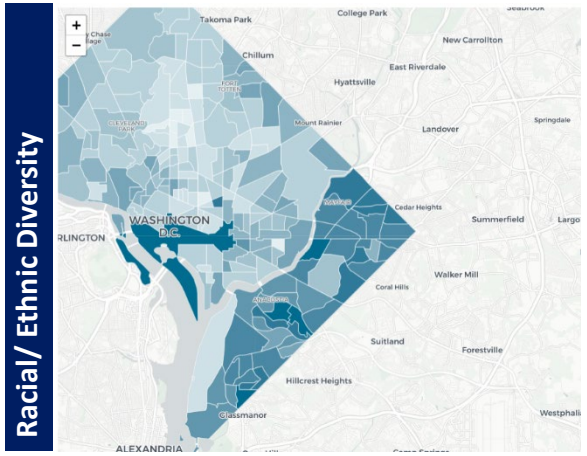










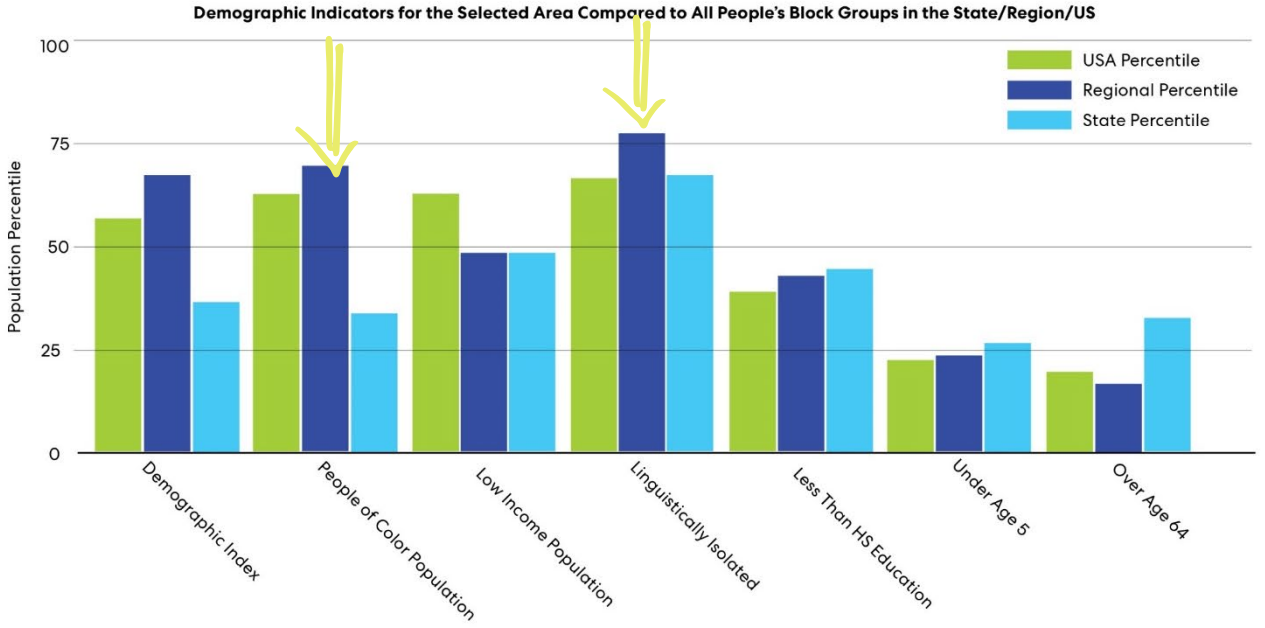


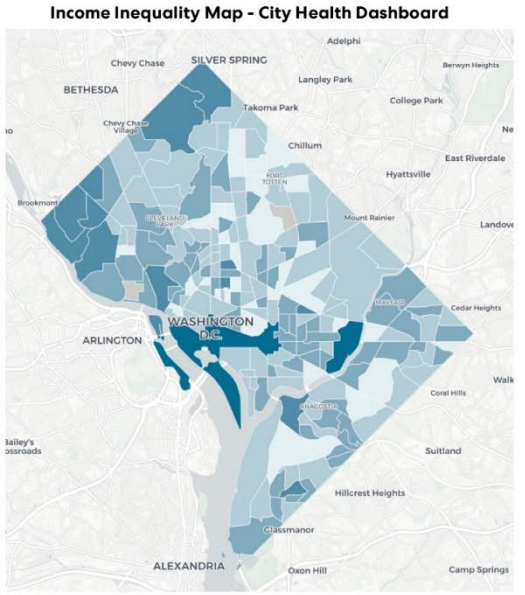
Source: City Health Dashboard

Greenpeace – Public Health Characteristics

Social Health Characteristics

Source: EPA EJScreen Dashboard





Higher than average

- population of People of Color
- population that is Linguistically Isolated

Below average:

- Low Income Population
- Population under 5 and over 65
- Population with less than a high school education

Higher than average:

- Absenteeism
- Unemployment
- Neighborhood Racial Segregation
- Violent Crime
- Income Inequality

Source: City Health Dashboard

What is PRECEDE?

Where did **PRECEDE** come from?

V.1 Released
December 2023

PRECEDE

Public Repository to Engage Community & Enhance Design Equity

AMERICAN SOCIETY OF INTERIOR DESIGNERS

We were awarded the Transform Grant at the end of 2022 for $30,000

Matched by:

Perkins&Will

Our Team is Unique

Scale

Urban Design

Architecture

Interior Design

Research

Expertise

Design

Environmental and Social/Behavioral Health

Data Analytics

Partnership

Geographic

Academic (HSPH, GSD)

Every Perkins&Will Career Level

When should I use PRECEDE?

Pursuit

PRECEDE can provide critical context about the site before we submit proposal responses. It demonstrates to clients that we have the depth and rigor to shape these projects, and we are in tune with the community

Schematic Design

Once you know what hazards and indicators you are responding to, you can start to thread tailored engagement and design strategies into the project.

Ongoing

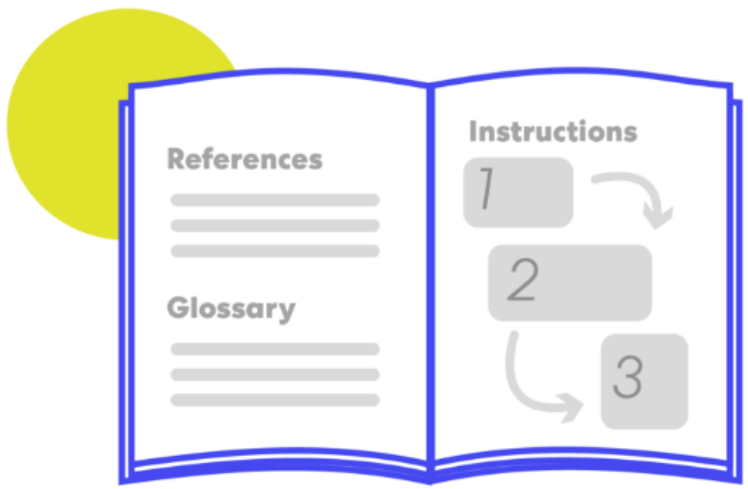
As the project progresses, PRECEDE can help deepen and hone the chosen design strategies to respond to the specific contextual needs.

How do I navigate PRECEDE?

PRECEDE

Public Repository to Engage Community and Enhance Design Equity

User Guide

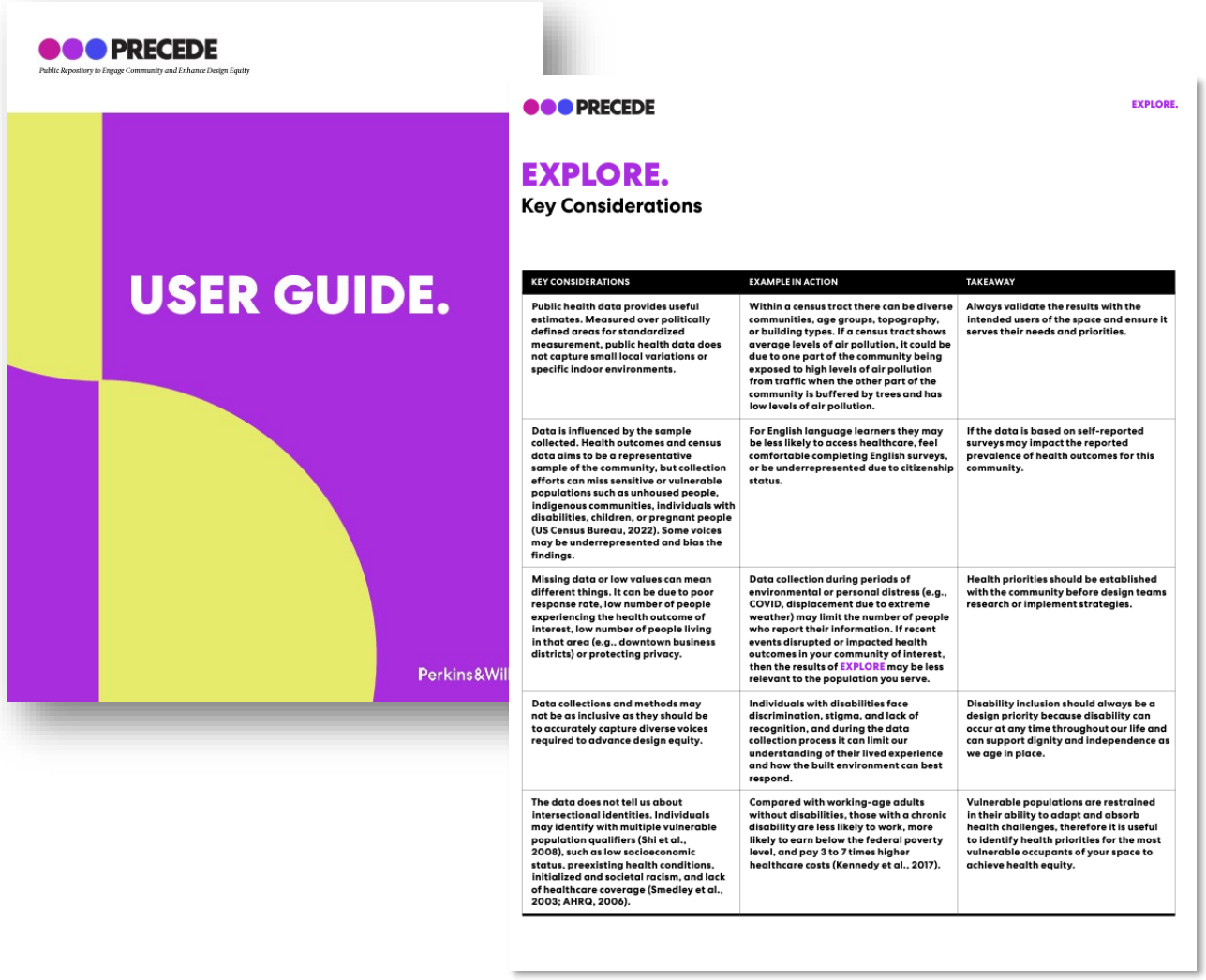


First time using **PRECEDE**? Need step-by-step instructions? This User Guide is designed to help first-time users and **PRECEDE** enthusiasts alike navigate the tool and get the most out of the information presented on this website.

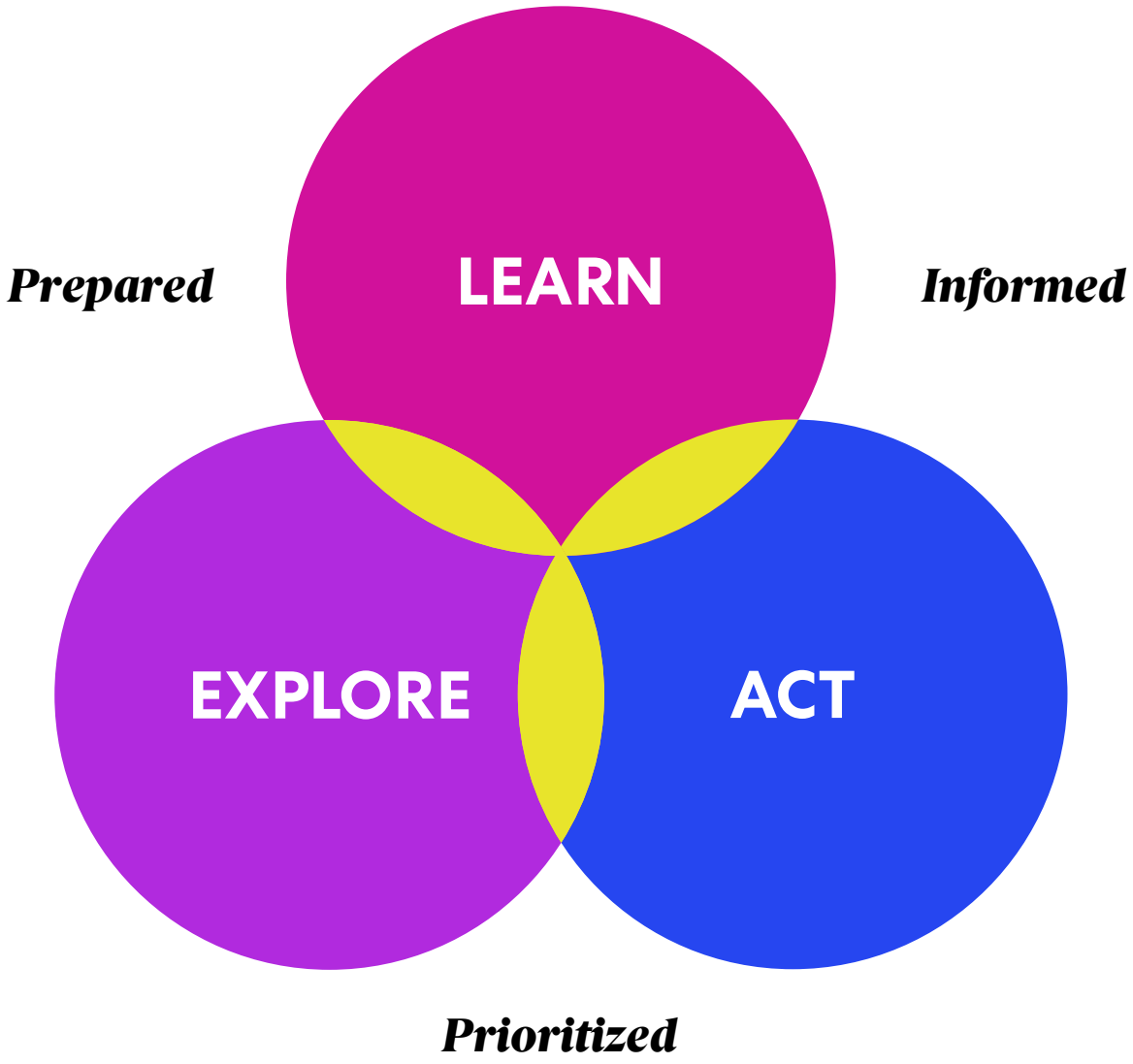
Download the User Guide

PRECEDE is a conversation starter.

- PRECEDE cannot replace authentic engagement.
- **PRECEDE does not collect data.**
- Data is limited to what is regularly collected and publicly available.
- Location-specific data is limited to the United States, with the goal to expand.
- **PRECEDE incorporates a subset of data and built environment factors from vetted databases.**



PRECEDE



LEARN.

Educate **designers, clients, students, and community stakeholders** on the role of public health in design

EXPLORE.

Summarize and quantify **demographic and health indicators** for any location in the United States

ACT.

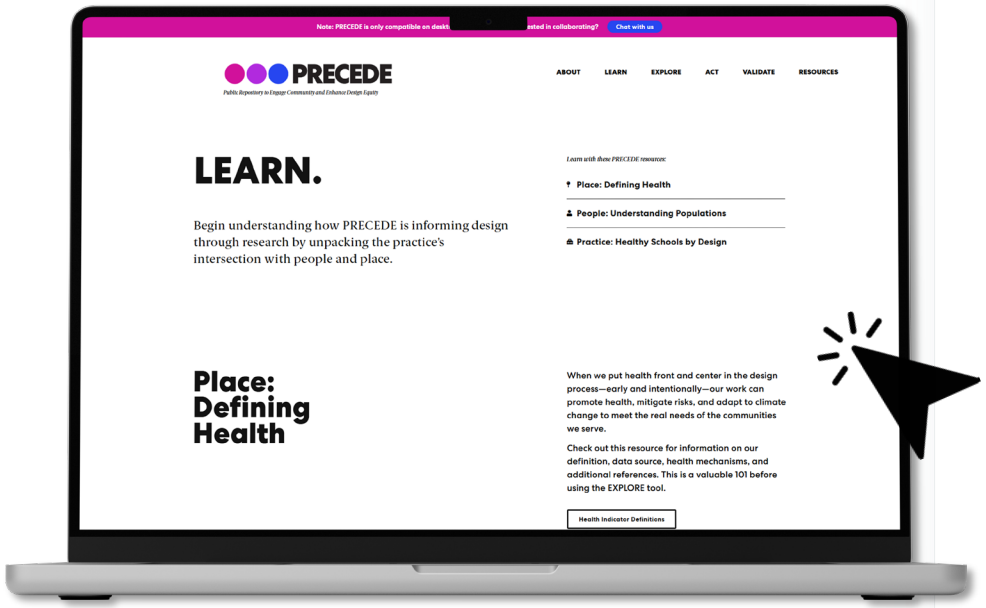
Provide **design recommendations** that respond to public health priorities

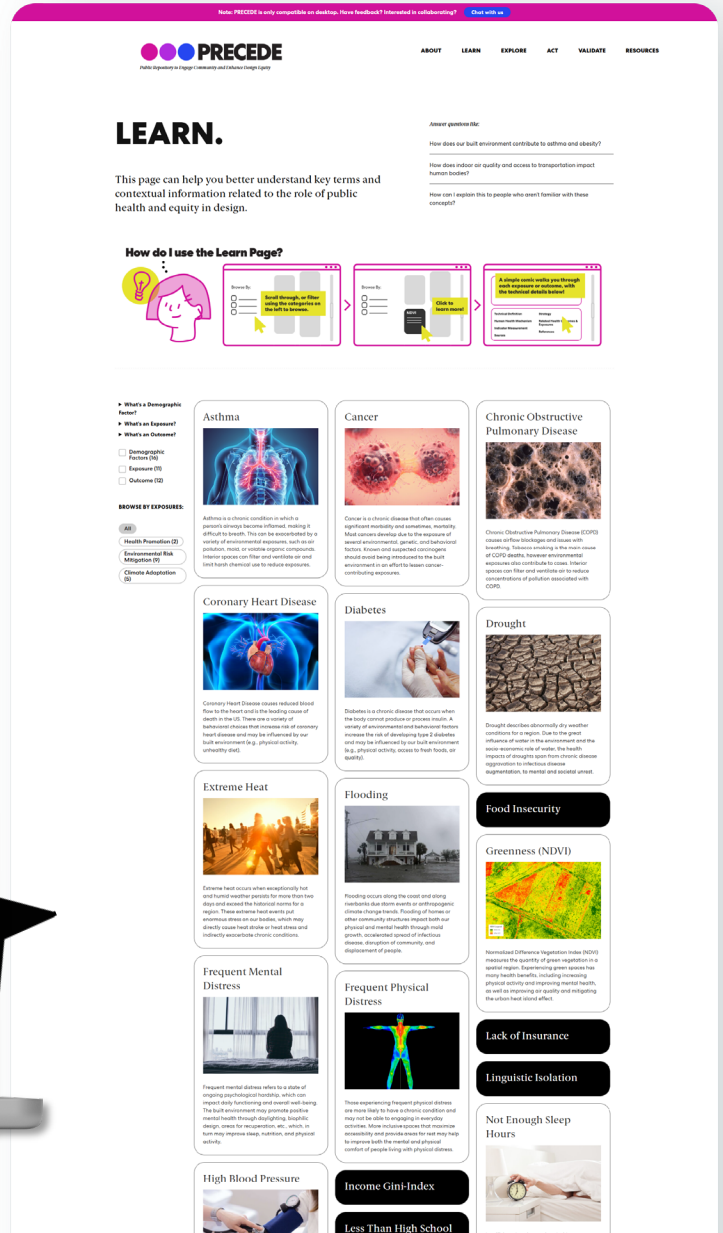
PRECEDE allows designers to holistically evaluate the setting of a project to determine the community's magnitude of exposure, the burden of disease outcomes, and vulnerable populations.

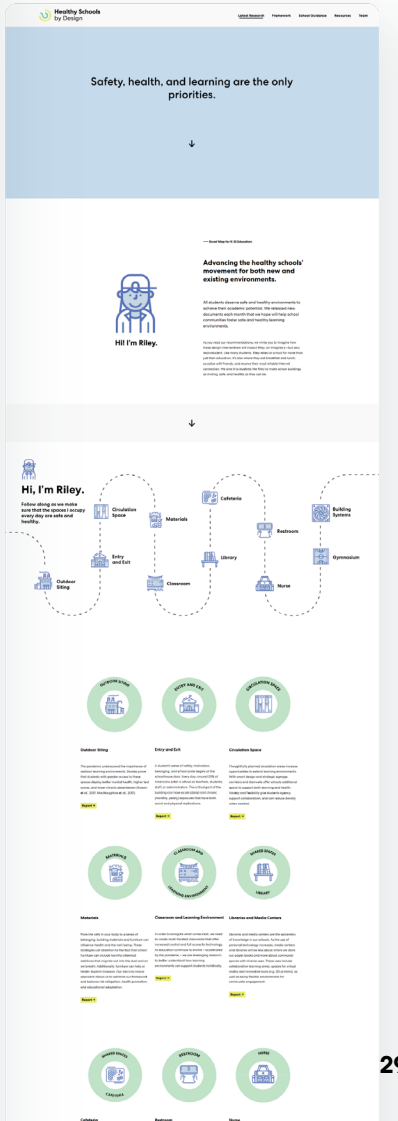
Educate **designers, clients, students, and community stakeholders** on the role of public health in design

LEARN.

A **living** resource dedicated to uncovering the **impactful** ways design intersects with: **Place**, **People** & **Practice**







Place

PRECEDE

Public Repository to Engage Community and Enhance Design Equity

ABOUT LEARN EXPLORE ACT RESOURCES

▶ What's a Demographic Factor?

▶ What's an Exposure?

▶ What's an Outcome?

- [ ] Demographic Factors (16)
- [ ] Exposure (11)
- [ ] Outcome (12)

BROWSE BY EXPOSURES:

All

Health Promotion (2)

Environmental Risk Mitigation (9)

Climate Adaptation (5)

Wildfire and Wildfire Smoke

Wildfire is an unplanned, uncontrolled fire burning in a natural area. Wildfires can directly cause immediate human casualties and displacement of affected communities, and indirectly produce high levels of air pollution, which can influence the respiratory and cardiovascular health of the immediate community and distant regions, alike.

Waste Proximity

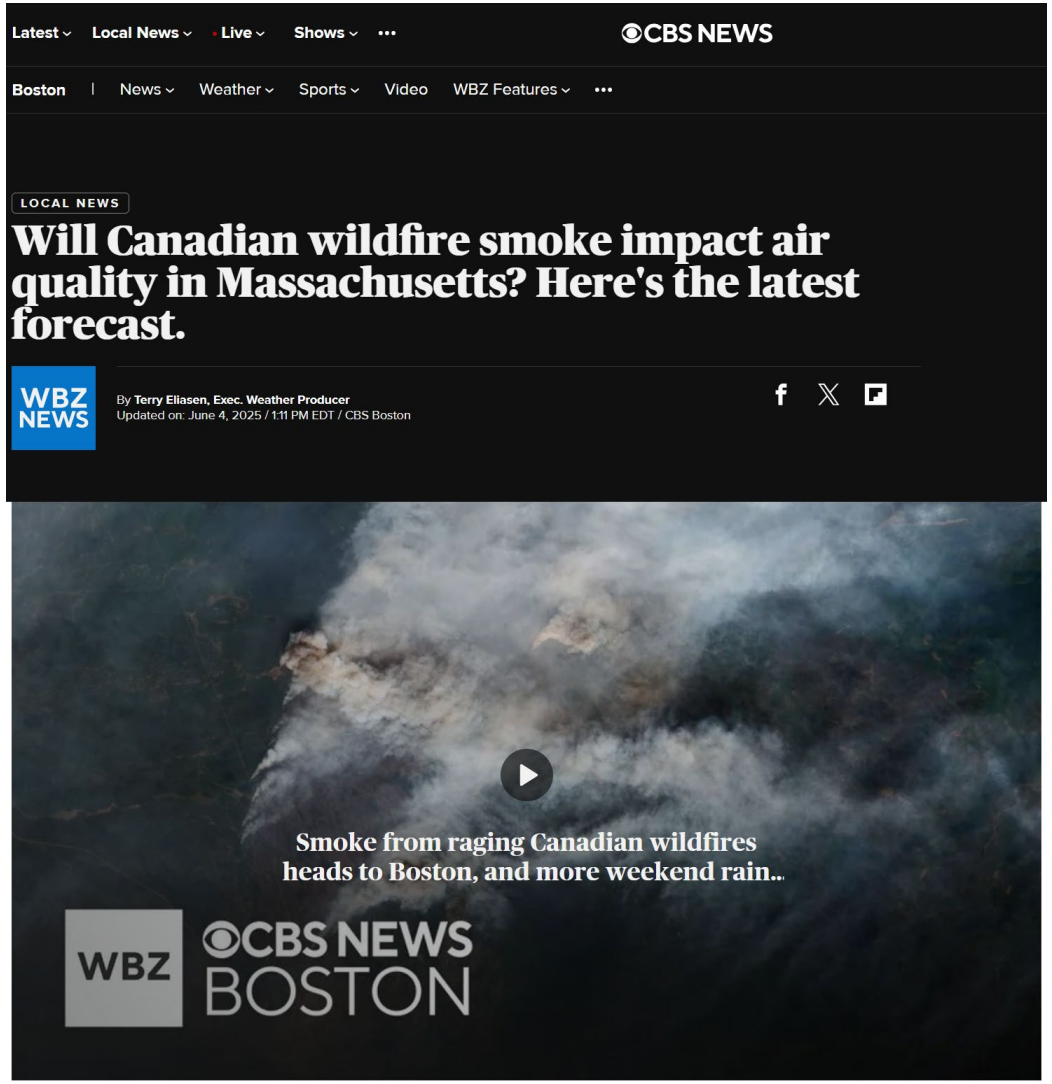
Waste proximity indicates the distance and density of facilities managing chemicals that pose risk to our health and ecosystems. Such facilities may introduce pollutants beyond their fence line, meaning that nearby communities breathe more contaminated air, contact more contaminated soil and surface water, and drink compromised water.

Walkability

Walkability measures how well the design of a neighborhood enables pedestrian mobility. When daily errands (e.g., school, work, transit) are walkable, it encourages us to be physically active and reduces our reliance on cars; thereby improving our physical health and reducing air pollution and carbon emissions.

Total Number of

Place



WILDFIRE AND WILDFIRE SMOKE

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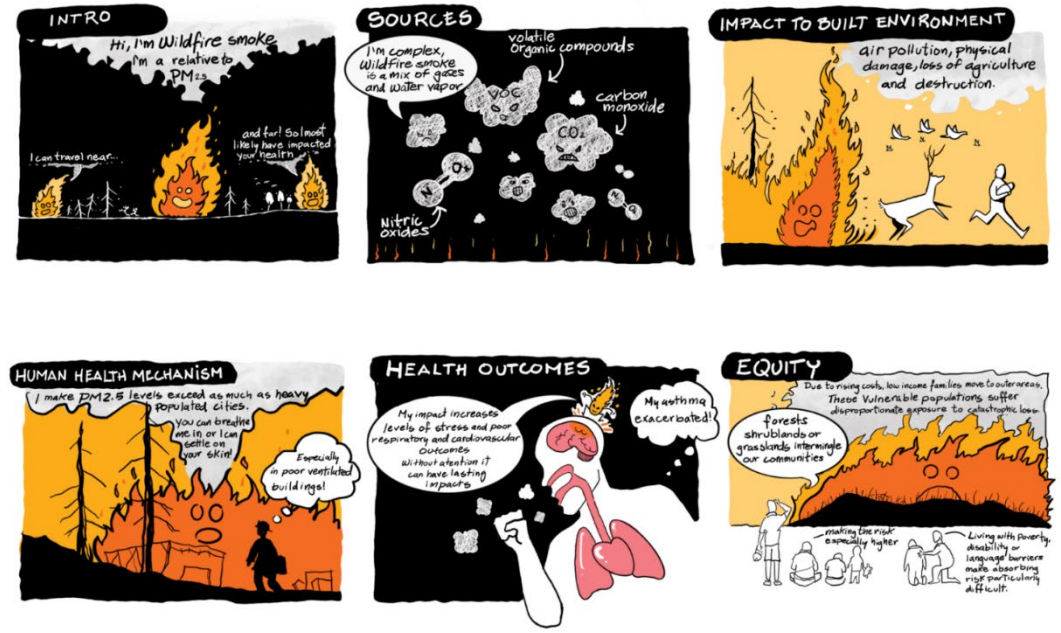


▶ Click here for caption

Definition

Areas deemed susceptible to wildfires are defined by US Federal Emergency Management Agency (FEMA) as having burn potential and possibility of fires reaching greater intensity. This can be unplanned and uncontrolled fire in natural or wildland areas.

Human Health Mechanism

Wildfires, characterized by their rapid spread and intense heat, not only lead to immediate human casualties and the displacement of affected communities but can also produce extraordinarily high levels of air pollution that surpass those found in some of the world's most heavily polluted urban areas, posing severe health risks to both the immediate and surrounding regions.

Indicator Measurement

The US FEMA National Risk Index calculates a Wildfire Risk Index score to represent a community's relative risk for wildfires when compared to the rest of the US. A Wildfire Risk Index score is based on the sum of expected building and population loss each year due to wildfires and is derived by identifying census blocks with developed or agricultural areas with elevated potential for ignition and/or elevated possibility of high intensity fires.

Source of Exposures

Wildfire smoke is a complex mix of particles, gasses (e.g. carbon monoxide, nitric oxides, and volatile organic compounds) and water vapor.

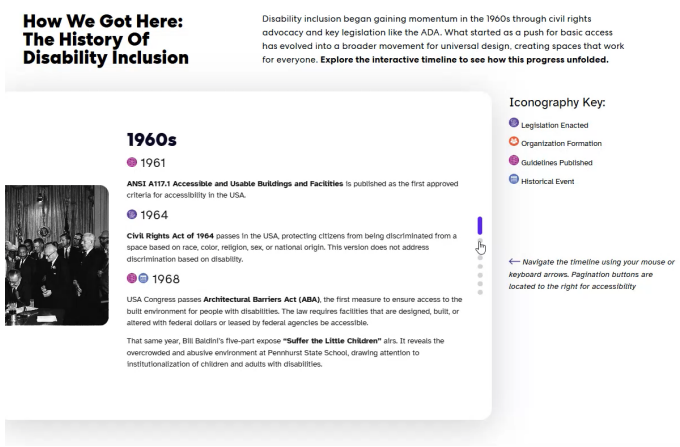
Related Health Outcomes & Exposures

Stress, Respiratory Health, Cardiovascular Health, Displacement

References

▶ Click here for References

People



Disability Inclusion

Women's Health

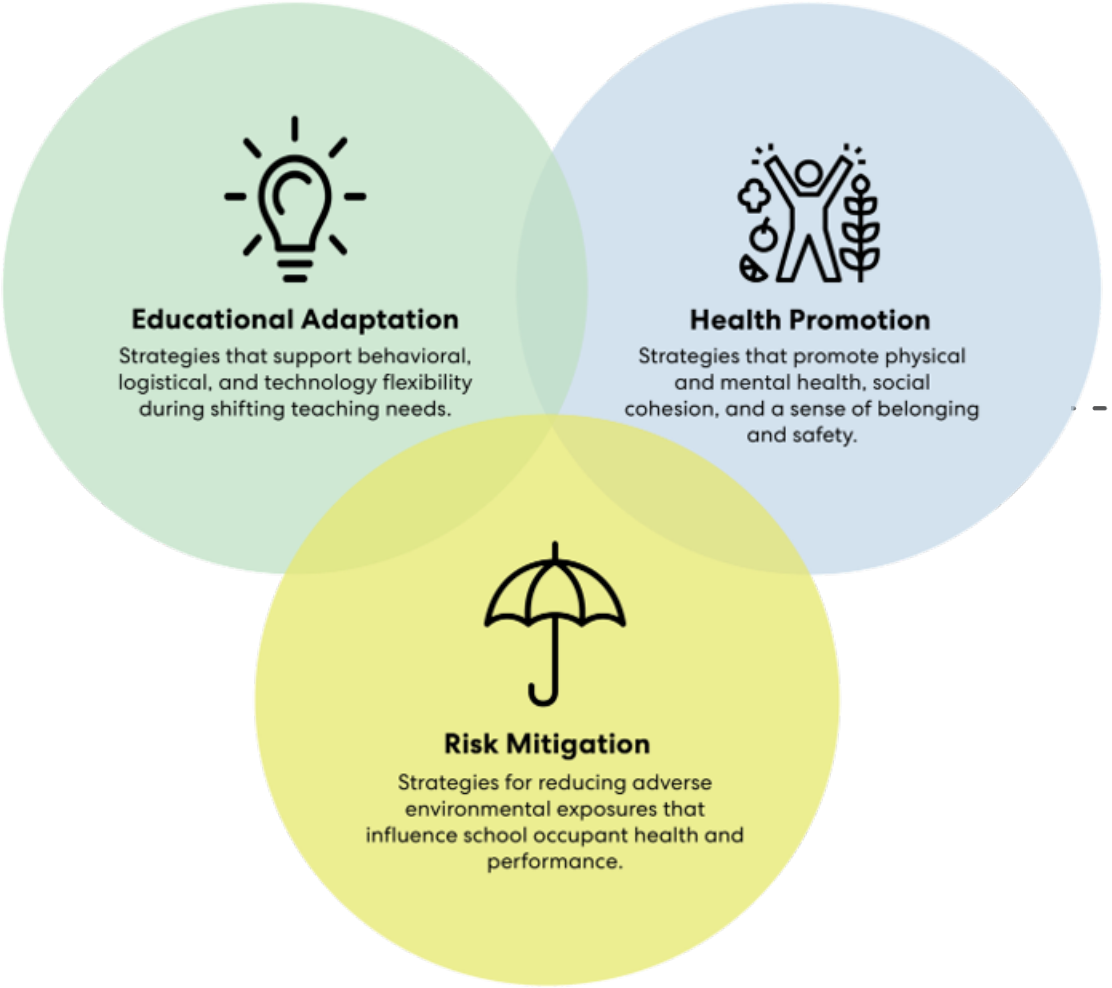
Neuro Inclusion

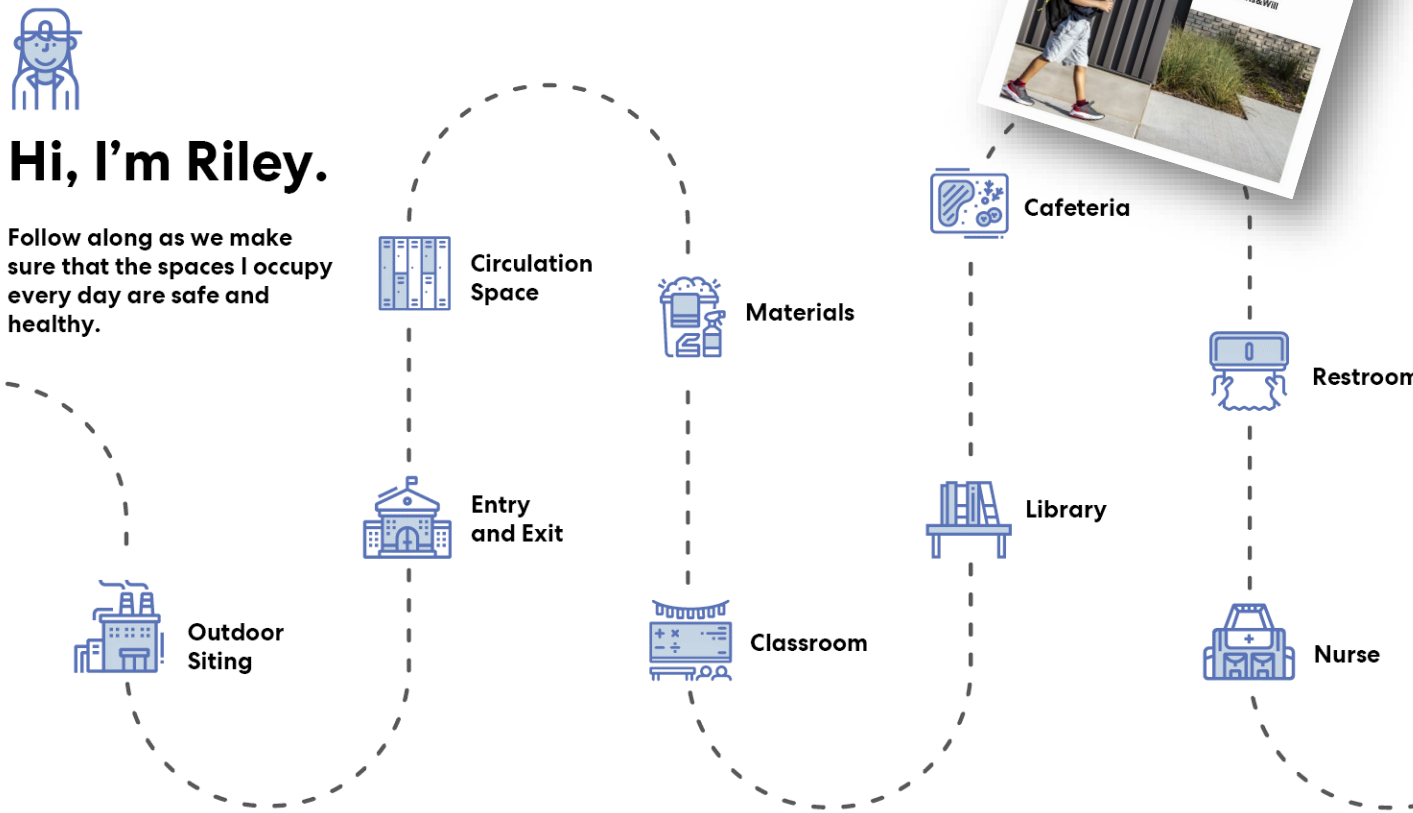
Every Section Includes:

- *Why Should You Care?*
- *Why it Matters to Design?*
- *Key Definitions*
- *Design Examples & Strategies*
- *Case Studies, Takeaways, Resources*

Practice: Every Space Should be Considered a Healthy Place

healthyk12.perkinswill.com





Perkins&Will

EXPLORE.

Summarize and quantify **demographic and health indicators** for any location in the United States

Data Integration

United States® Census Bureau

EPA

CDC

USDA

USGS science for a changing world

City Health DASHBOARD
Empowering cities to create thriving communities

Climate Mapping for Resilience and Adaptation

Contains **39** indicators
with **three levels** of granularity
(State / County / Census Tract)

PRECEDE **brings together a vast network of existing data platforms** designed to visualize socioeconomic factors, environmental quality, and health outcomes within time and place.

PRECEDE **increases the accessibility** of these health-related metrics and **helps designers to make decisions** to improve the health and well-being of occupants, and the community at large.

PRECEDE

Public Repository to Engage Community and Enhance Design Equity

ABOUT LEARN EXPLORE ACT RESOURCES

EXPLORE.

This section can help you identify public health data for a specific site. You can refine your search by state, county, or census tract level and filter by a variety of health factors.

Want to track down the original data?

The data is organized into three categories of "indicators":

Demography: Social metrics about income, education, employment, and age

Exposure: Environmental metrics about the quality of the surrounding conditions

Outcomes: Health metrics about the prevalence of specific human impacts

User Tip: Select 'Census Tract' and the state your site is in. Enter the site address into the search bar at the top of the map, and click through the Indicators on the left to see results. Need step-by-step instructions? Check out our User Guide under our **Resources** page.

Download the Metadata

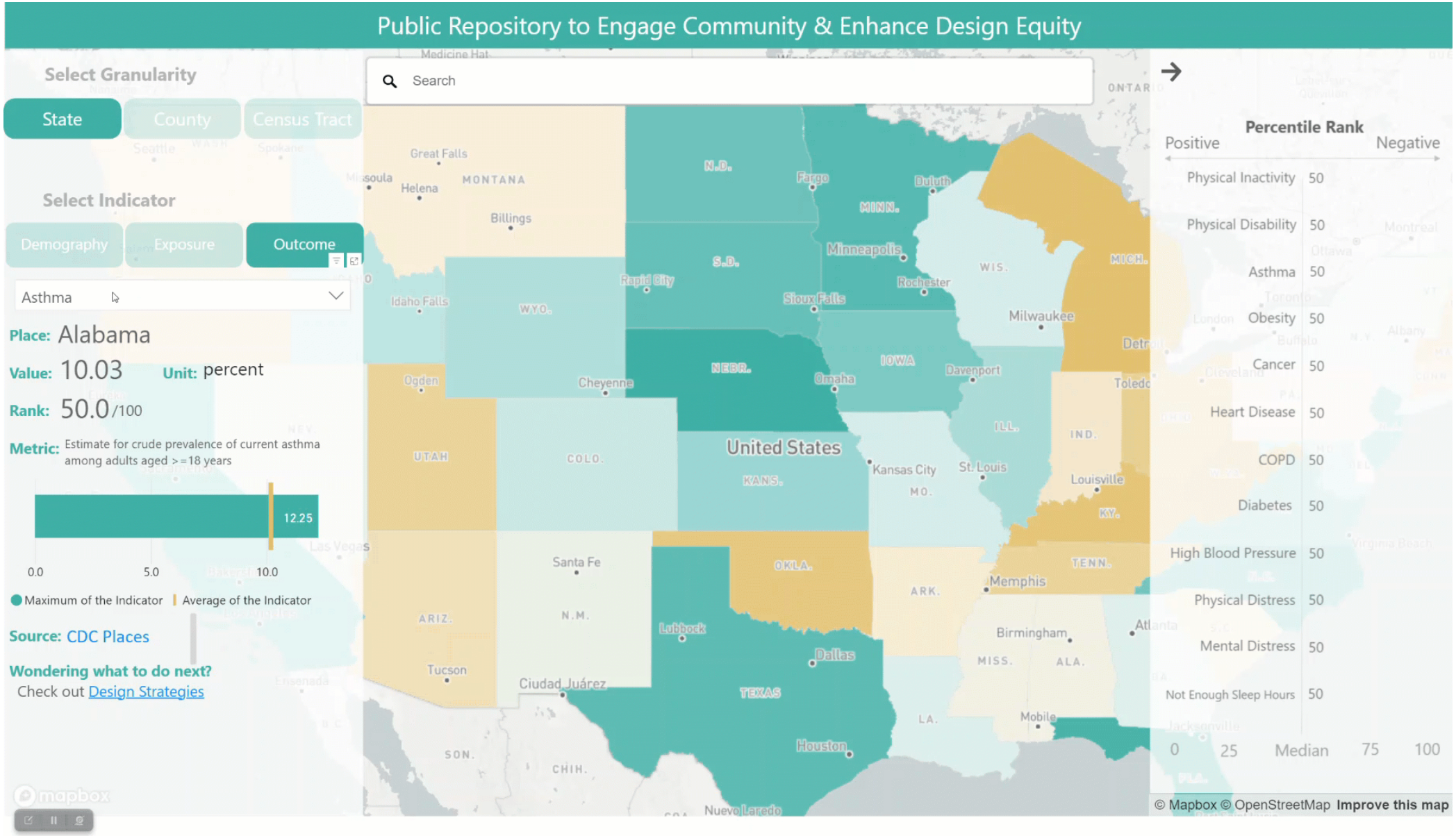
Metadata

PRECEDE Explore Dashboard – Metadata

PRECEDE

Attribute	Category	Year	Metric	Unit	Data Source	URL
Traffic proximity	Exposure	2020	Count of vehicles (annual average daily traffic) at major roads within 500 meters, divided by distance in meters	AADT/meter	EJ Screen	https://www.epa.gov/ejscreen/download-ejscreen-data
Lack of insurance	Exposure	2020	Respondents aged 18–64 years who report having no current health insurance coverage divided by respondents aged 18–64 years	percent	CDC Places	https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Census-Tract-Data-GIS-Friendly-Format-2022-/yjkw-uj5s
PM2.5	Exposure	2019	PM 2.5 levels in air measured using an annual average	$\mu g/m^3$	EJ Screen	https://www.epa.gov/ejscreen/download-ejscreen-data
Ozone	Exposure	2019	Ozone summer seasonal average of daily maximum 8-hour concentration in air	g/m^3	EJ Screen	https://www.epa.gov/ejscreen/download-ejscreen-data
Waste proximity	Exposure	2021	Count of hazardous waste management facilities (TSDFs and LQGs) within 5 km (or nearest one beyond 5 km), each divided by distance in km	facilities/km	EJ Screen	https://www.epa.gov/ejscreen/download-ejscreen-data
Lack of walkability	Exposure	2019	Weighted score of intersection density, proximity to transit stops, employment mix, and employment and household mix scores (1 most walkable and 20 least walkable)	-	Environmental Protection Agency	https://www.epa.gov/
Noise	Exposure	2018	Average 24-hour noise decibel caused by combination of proximity to roadway vehicular traffic, freight and passenger rail, and aviation/airport	decibel	National Transportation Noise Map	https://maps.dot.gov/BTS/NationalTransportationNoiseMap/
NDVI	Exposure	2022	Normalized Difference Vegetation Index (NDVI), which quantifies vegetation by measuring the difference between near-infrared and red light	-	USGS (Earth Explorer)	https://earthexplorer.usgs.gov/
Lack of park access	Exposure	2015	Percent of population living outside 1/2 mile of a park (%)	percent	CDC Data Explorer	https://ephtracking.cdc.gov/DataExplorer/
Food insecurity	Exposure	2019	Percent of population living outside 1/2 mile of a supermarket (%)	percent	Economic Research Service	https://www.ers.usda.gov/data-products/food-access-research-atlas/download-the-data/
Drought	Exposure	2021	Summed dollar value of all crop agriculture areas exposed to drought for each census tract from 2000 - 2021	dollar	CRMA	https://resilience.climate.gov/datasets/FEMA::national-risk-index-census-tracts/about

EXPLORE. Demonstration



0-25th percentile
Dark Green
Least health concern

50th-75th percentile
Pale yellow
Moderate to high concern

25th-50th percentile
Light green
Low to moderate concern

75th-100th percentile
Dark yellow
Greatest health concern or priority

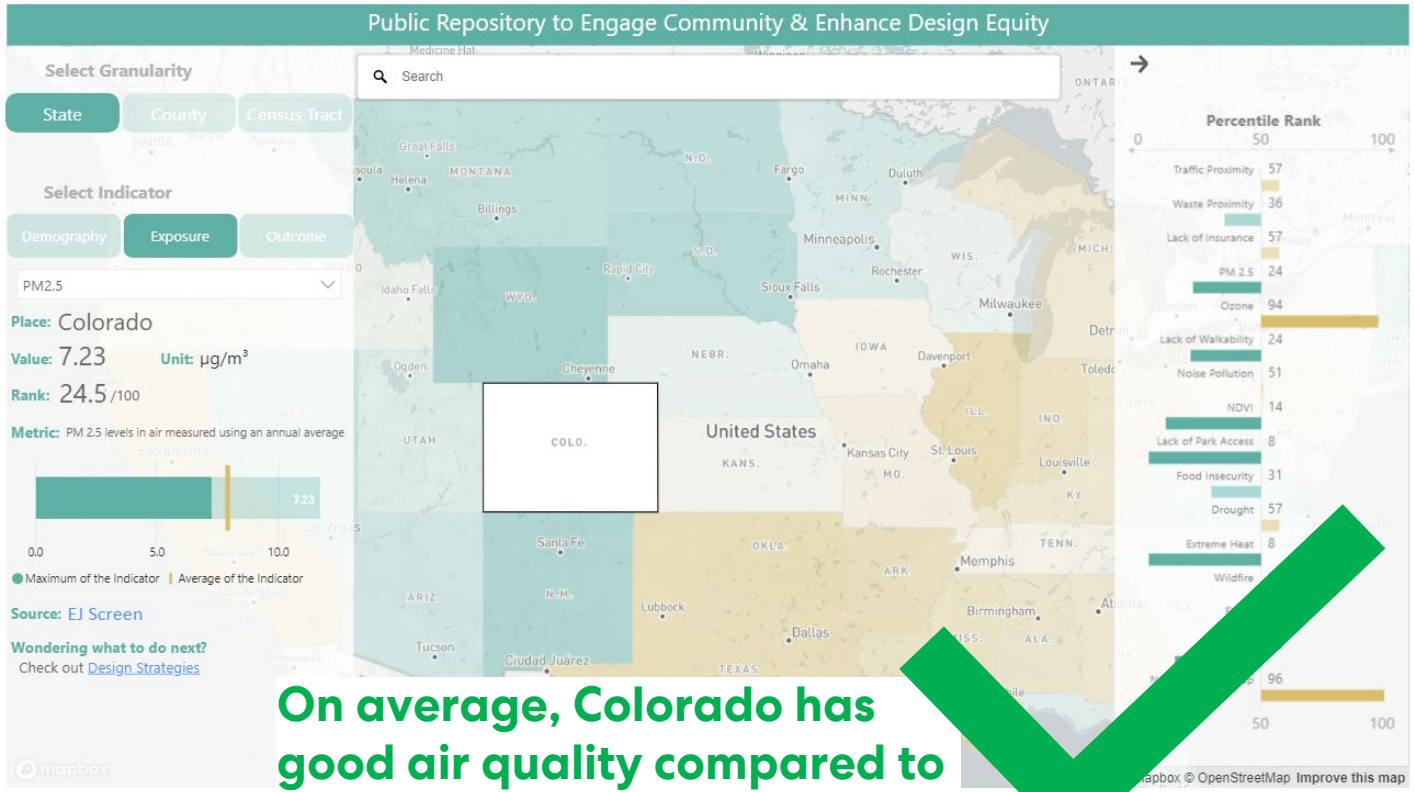
Interpreting Percentile Example

The annual average concentration of $PM_{2.5}$ in Colorado is in the 25th percentile compared to other U.S. States.

So,
25% of US states' annual average $PM_{2.5}$ concentrations are below Colorado's concentration.

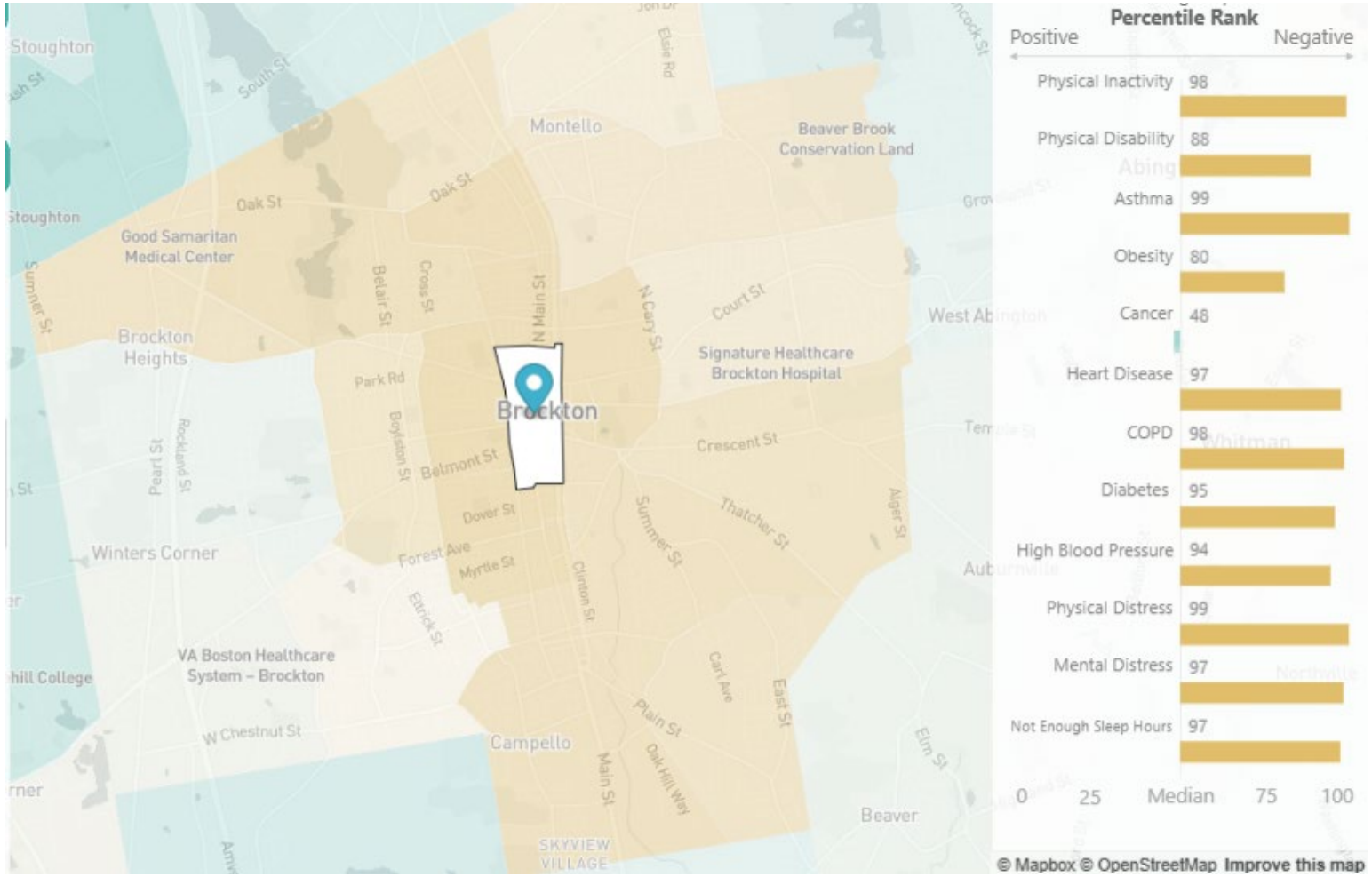
75% of US states' annual average PM2.5 concentrations are above Colorado's concentration.

(US EPA, 2014a)



On average, Colorado has good air quality compared to other states.

EXPLORE Specific Communities



Health Outcomes: Health is a priority from physical activity to asthma and sleep.

Environmental Exposures: Increased risk of climate disasters (Extreme heat, Flooding) require long term solutions

Provide **design recommendations** that respond to public health priorities

Public Repository to Engage Community and Enhance Design Equity

1. Pick Exposures & Outcomes from the "Explore" Phase

- [ ] Air Quality & Pollutants
- [ ] Cancer
- [ ] Cardiovasular Health (Coronary Heart Disease)
- [ ] Diabetes
- [ ] Drought
- [ ] Extreme Heat
- [ ] Flooding (Coastal or River)
- [ ] Frequent Mental Distress
- [ ] Frequent Physical Distress
- [ ] Greenness (NDVI, Park Access)
- [ ] High Blood Pressure
- [ ] Noise Pollution
- [ ] Not Enough Sleep Hours
- [ ] Obesity
- [ ] Physical Inactivity
- [ ] Respiratory Health (Asthma, COPD)
- [ ] Traffic Proximity

2. Select the Project Scale

- [ ] Building
- [ ] Interior
- [ ] Operations
- [ ] Policy
- [ ] Site
- [ ] Urban Realm

3. Determine Design Recommendations

4. Get More Information

For viewing of the PRECEDE Strategies and Design recommendations, please start with Step 1 and make your selection(s)

Perkins&Will

Ongoing Research for Action

Each strategy listed is validated with relevant research studies, white papers, or best practices. Preference is given to peer-reviewed articles.

PRECEDE V.1, focuses on strategies at the interior scale. It is evolving to include other design scales.

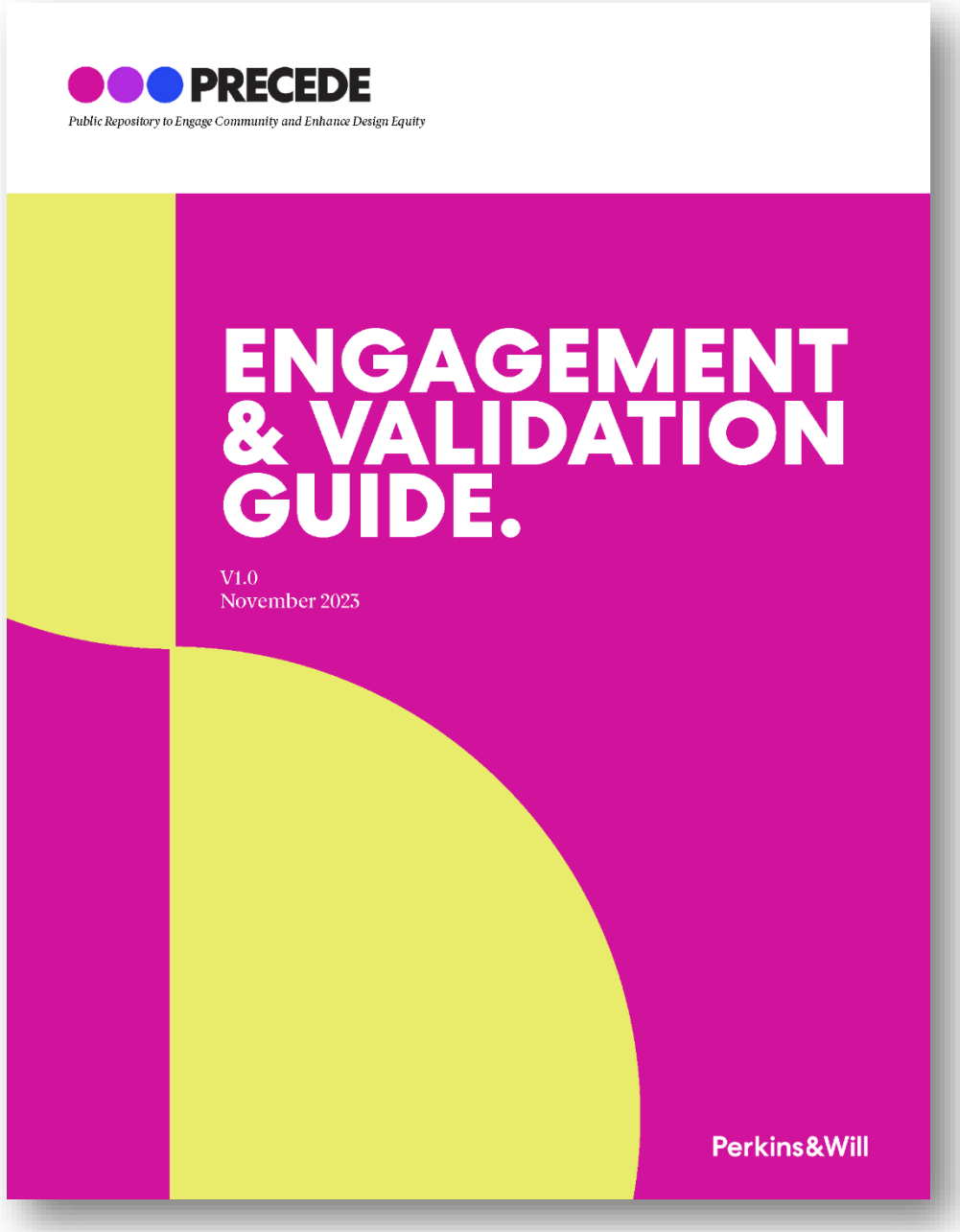
100+ Design recommendations to optimize occupant and community health (and growing!)

So, am I done now?

Did you validate your findings?

Validation is the process of presenting research findings to community stakeholders in the interest of achieving consensus toward action. Until we share our data with the individuals impacted or represented by it, we cannot assume that it is valid.

This guide will provide you with resources to facilitate successful community engagement.



Evolving Work

Tools for a tailored validation response

Stay tuned!

Analog

Tools	Features	Equity Considerations
Regular Mail	Postcards or utility bill inserts with clear project information and a call to action such as a worksheet or survey. Provides return address.	+ May be easier for older adults to participate – Does not account for the unhoused or housing-unstable
Phone	Phone banking / Phone-based teleconferences.	+ May be easier for older adults to participate – Does not account for those with no access to a phone connection
Pop-Up Station	Signage and posters with key project information and instructions of how to provide feedback. Project team can be present. Drop-off box for comments and survey responses.	+ Located in publicly accessible spaces or venues (sidewalk, park, library, community centre) – Restricted to specific time and date, feedback period is not accessible 24/7
Survey	Physical or digital survey; wide variety of question types (multiple choice, open ended, etc.) *E.g. Survey Monkey, Mentimeter, physical questionnaire*	+ Interface can be in multiple languages + Works on desktop and mobile devices, with paper alternatives – Content cannot be automatically translated
Workshop / Focus Group	Targeted workshops with stakeholders to discuss specific issues and opportunities. Can split up into smaller groups with focused themes. Ability to draw, write text, add sticky notes, and so forth. *E.g. Design charrettes, Whiteboard, Miro, Sharepoint, storytelling*	+ Can be held in person or digitally + High interactivity which fosters discussion + Captures more voices + Restricted to specific time and date, feedback period is not accessible 24/7
One on One Interviews	Identify specific stakeholders that require a deep-dive and comprehensive conversation.	+ Can be held in person or digitally + More in-depth account with the opportunity for follow-up – Time-intensive and smaller sample size
Video Conference	Conferencing platforms allow audio and video conferencing, with presentation through share-screen options. Some allow for breakout rooms, polling, or whiteboarding features.	+ Accessible features such as live captions + Provides flexibility to participant location and schedule by reducing commutes. – Only some platforms have phone call-in options, unless, it is fully digital and requires internet connection
Map Based Survey / Data Walk	Geo-located survey platform; specific answers from community are assigned to a specific spatial datapoint. Data visualization with map display. *E.g. Streetwyze, Maptionnaire, Social Pinpoint, etc.*	+ Accessible features such as translation options and screen-readers – Fully digital, requires internet connection
Social Media	Broad surveys or forums integrated on social media platforms, such as polling, voting, or live Q&As.	+ Accessible features such as translation options and screen-readers – Fully digital, requires internet connection and sign-up on social media platform

Digital

Case Examples

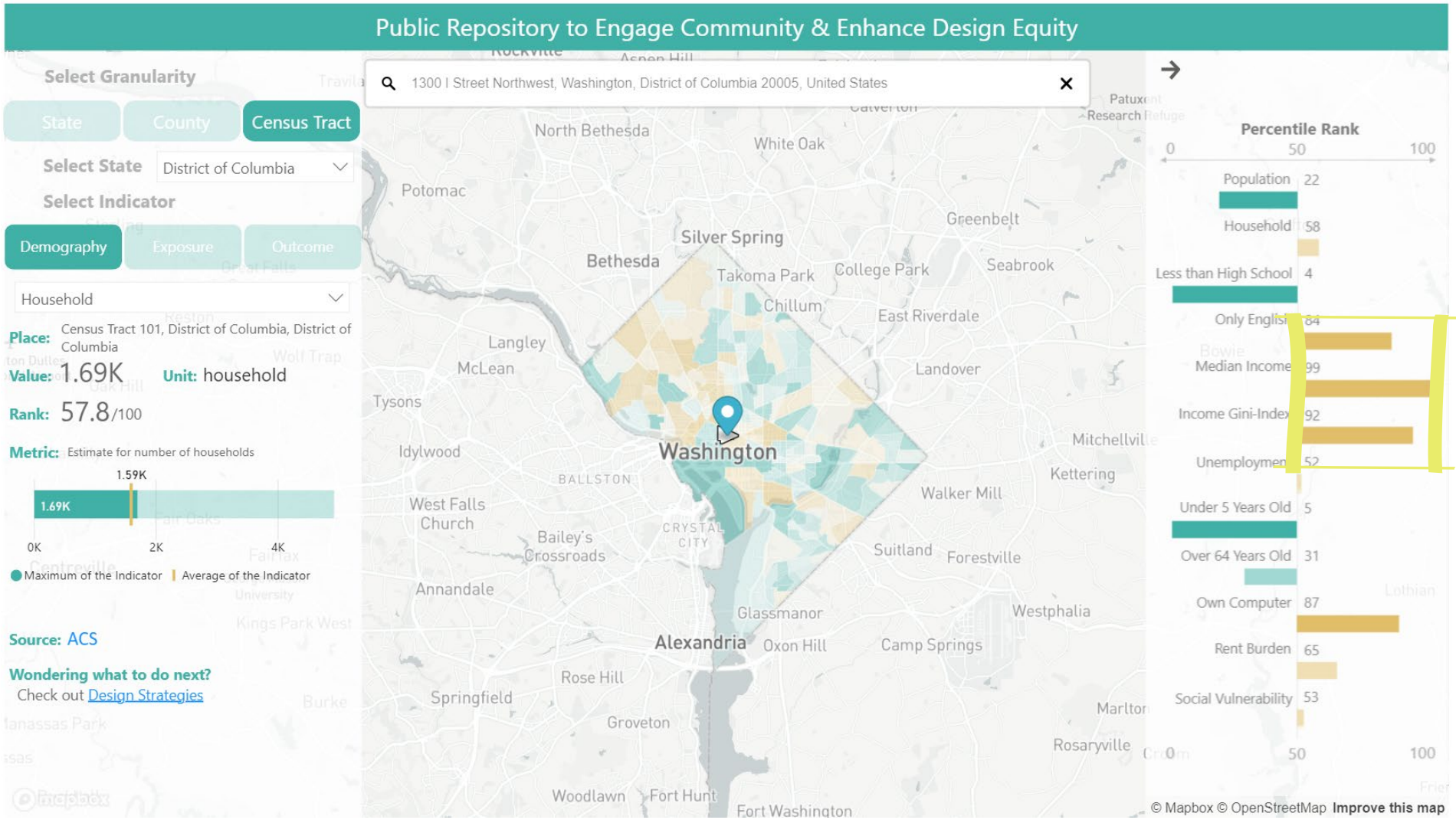
Greenpeace Headquarters

South Division Fire House

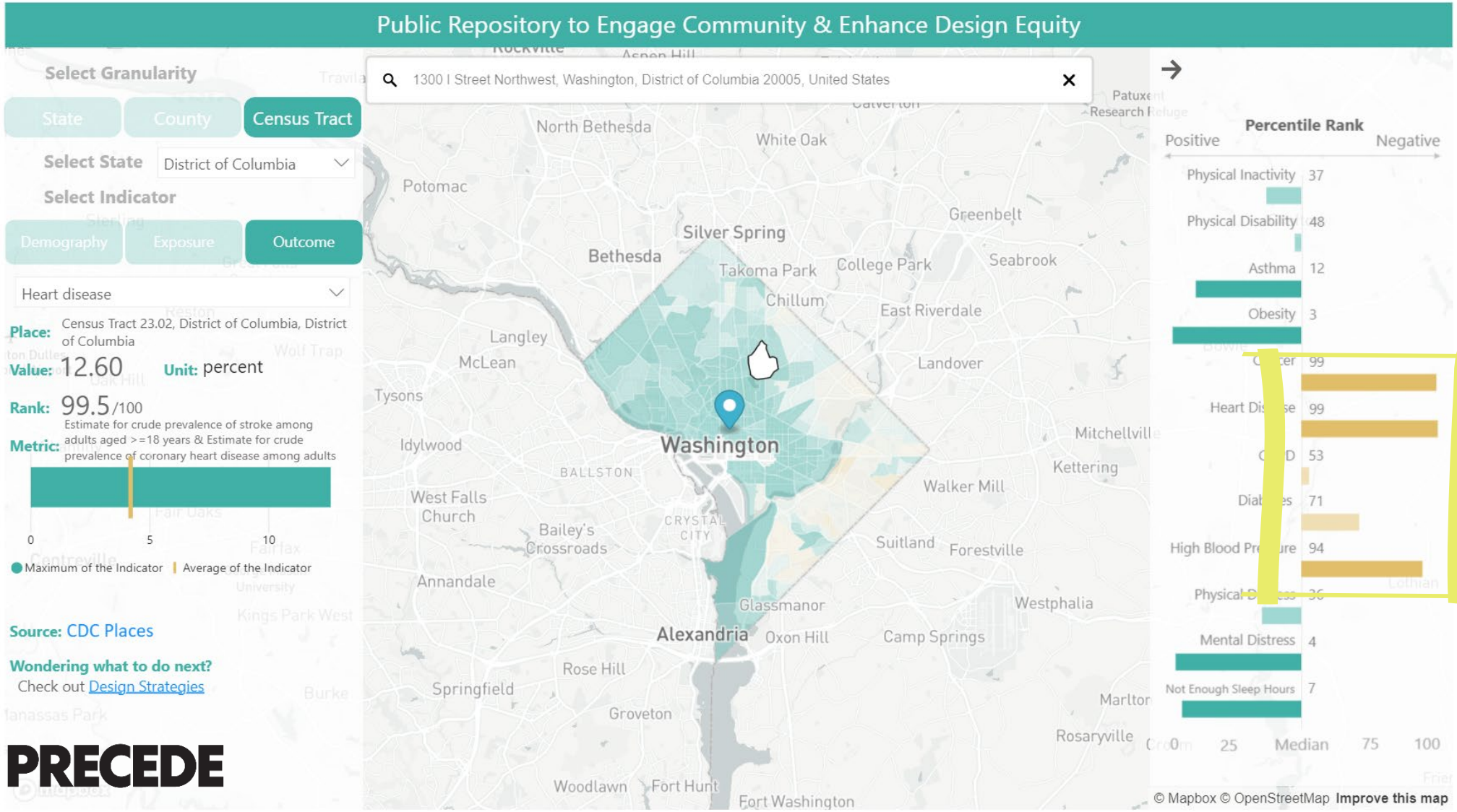
Greenpeace Headquarters

Washington, D.C.

Greenpeace – PRECEDE Demographics



Greenpeace – PRECEDE Vulnerability Assessment

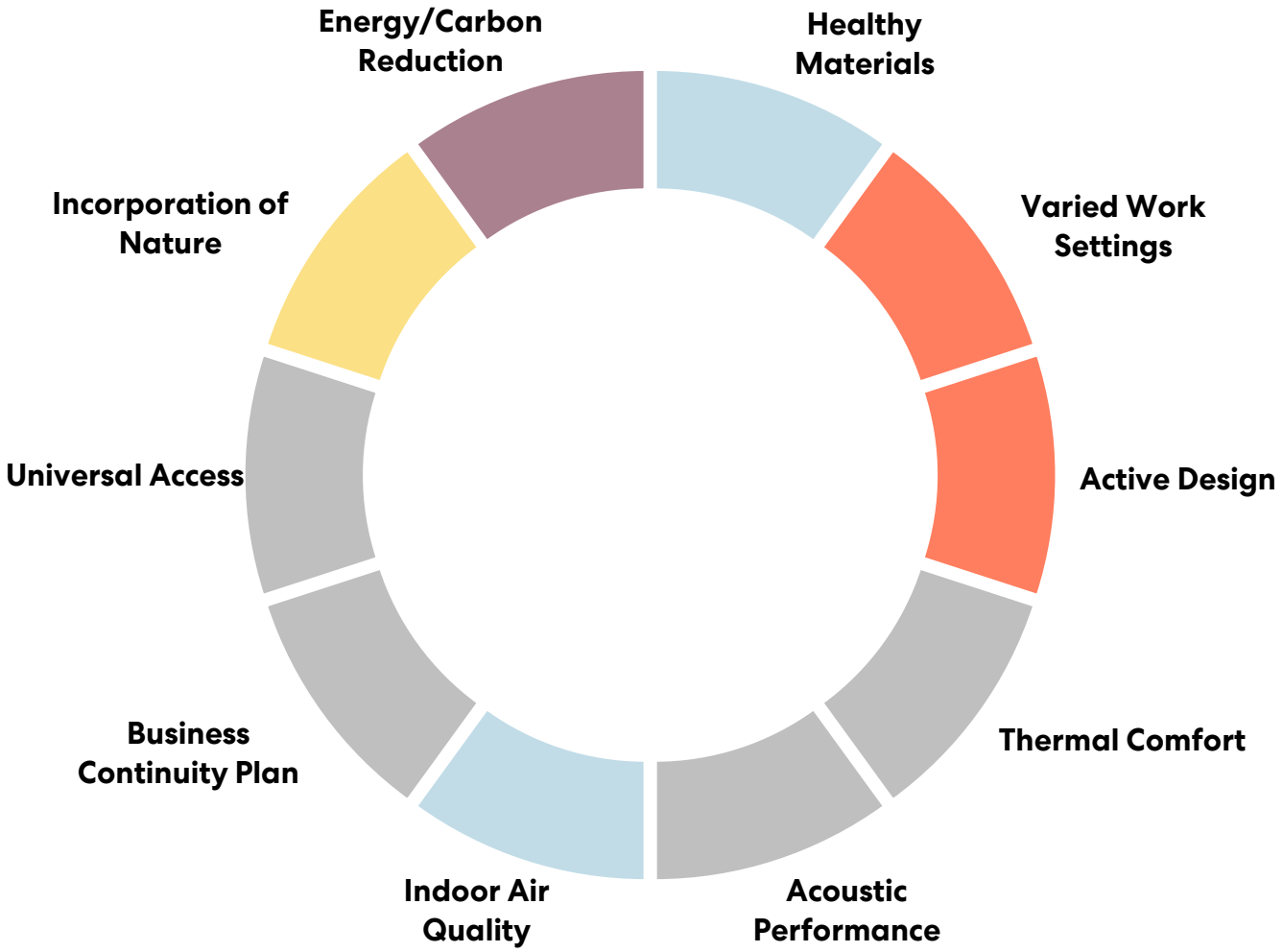


PRECEDE

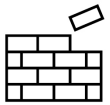
Greenpeace – Aligning Strategies

Asthma
Cancer
Cardiovascular Disease
High Blood Pressure
Physical Inactivity
Mental Health
Income Inequality
Linguistically Isolated
Violent Crime
Extreme Heat
Severe Storms

Greenpeace Mission



Greenpeace – Case Study



1 Existing Elements, Fixtures, and Finishes

Approximately 90% of three of the existing divisible conference rooms from the previous APTA build out are being reused, including glass partitions/ doors/ hardware, wood wall paneling, millwork credenzas, ceiling systems and lighting, operable partitions, mechanical and AV systems.

2 Carbon Neutral Carpet Tile

Shaw Contract has developed a carbon neutral manufacturing through optimized process to reduce energy, on-site renewable energy sources and investing in renewable energy and carbon offset credits to offset the balance of their emissions. They also support the circular economy by using recycled carpet and post-consumer PET bottles, (each square yard of carpet backing = 56 bottles) and a material take-back program to reclaim their used carpet.

3 Reclaimed Wood

Wood feature walls and ceiling elements showcasing reclaimed and sustainable wood. Wood also acts as a carbon sink, drawing down GHG emissions from the atmosphere and sequestering them for the duration of the wood's existence, helping to reduce the impacts of climate change.

4 Carbon Neutral Quartz

Cosentino engineered quartz solid surface counter uses 20% recycled glass and manufactured entirely with renewable power and recycled water, contributing to carbon neutral manufacturing. Cosentino collaborated with Equilibrio Marino, a non-profit that works to restore and preserve marine ecosystems, on different projects to recover coral reefs.

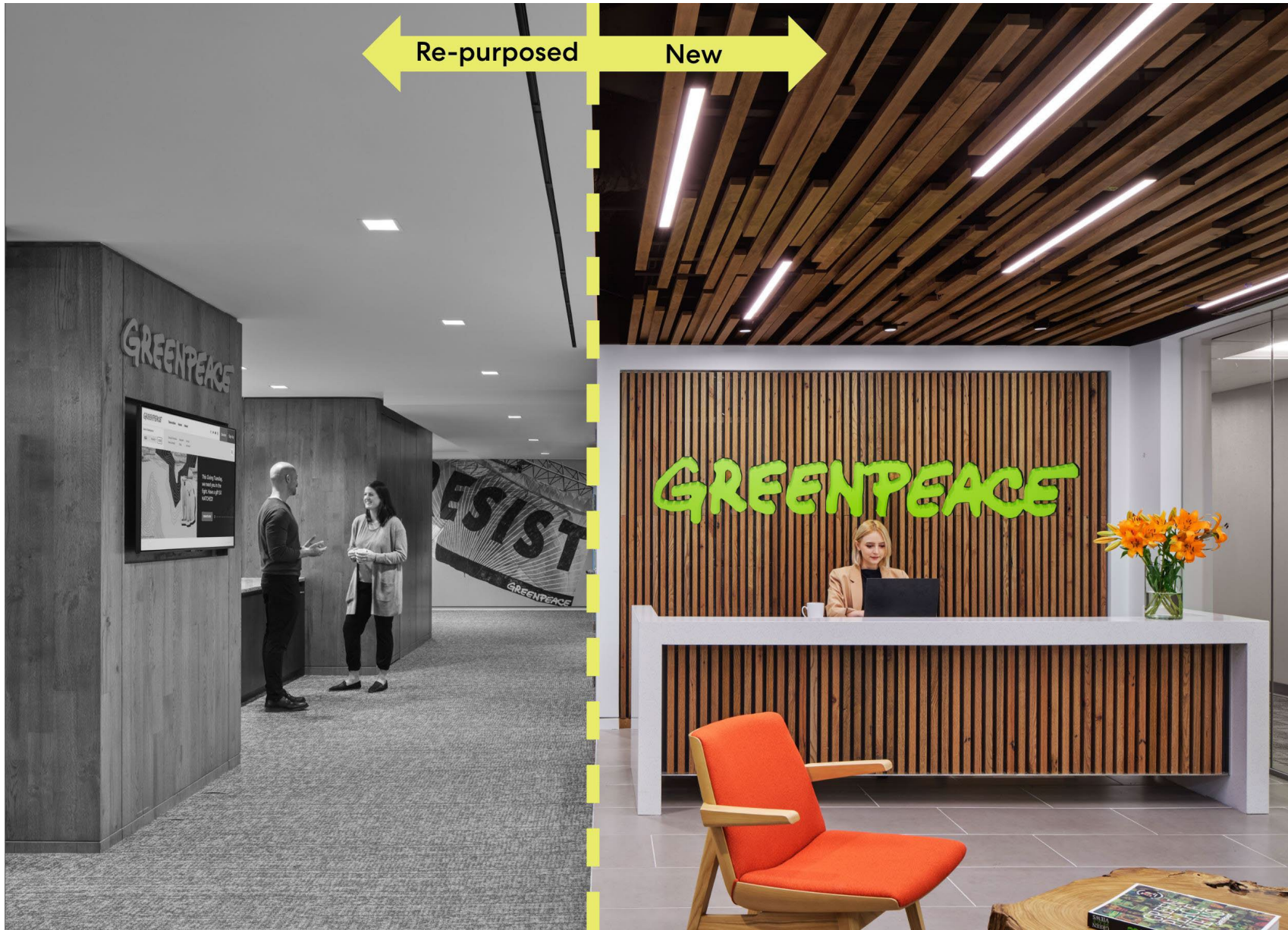
5 Designing for End of Life Dissasembly and Reuse

The design team is utilizing architectural details to facilitate future changes and dismantlement of products and assemblies to ensure that materials can be recycled as efficiently as possible at the end of the project lifespan. This includes connection details minimizing adhesives and fasteners as much as possible and not overbuilding, to allow easier access for removal and replacement of MEP systems, resulting in less waste.

6 Salvaged Materials

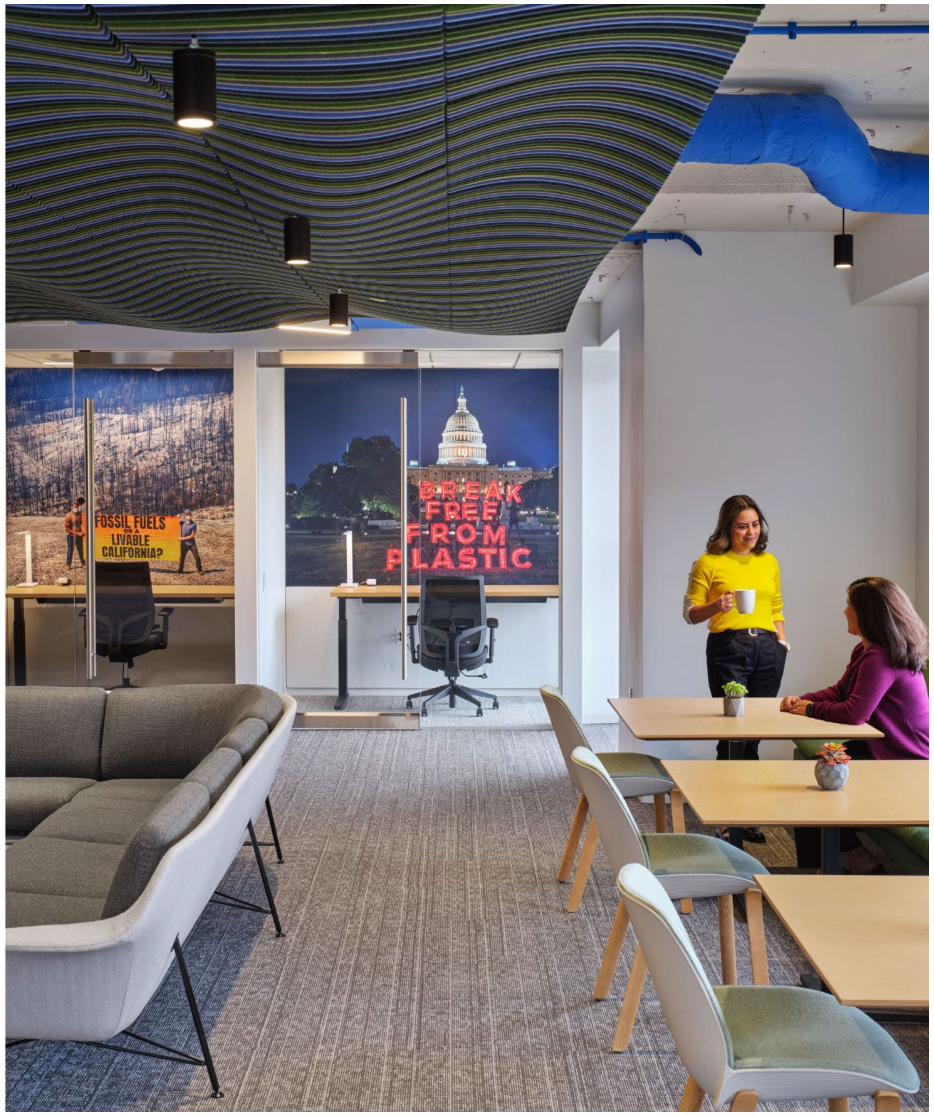
In addition to salvaging materials from the selective demolition of the current APTA space, the design team is working with DAVIS Construction to identify opportunities to salvage materials from other local demolition sites. Salvaging materials like metal studs, metal conduit and MC cable, ceiling grids, insulation and fire treated plywood blocking will reduce associated carbon and greenhouse gas emissions for the project.

Greenpeace – Case Study



Greenpeace – Case Study

Greenpeace – Case Study



Greenpeace – Case Study

Preliminary Life Cycle Assessment

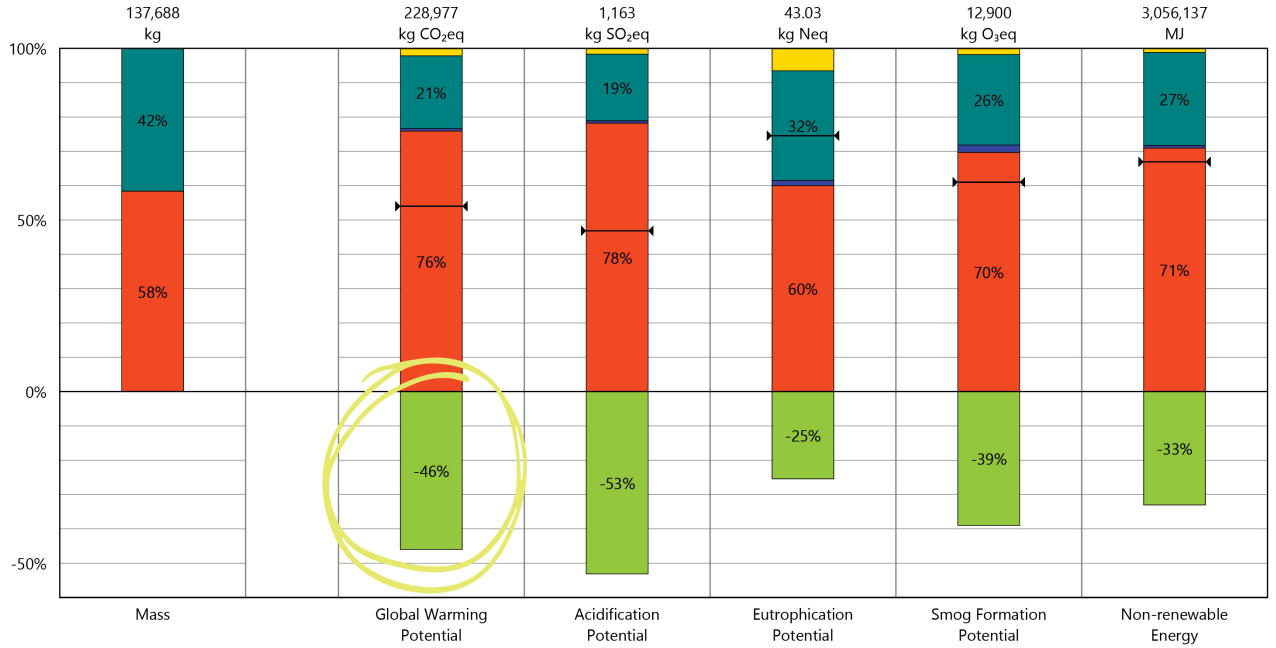
Results by Life Cycle Phase

Legend

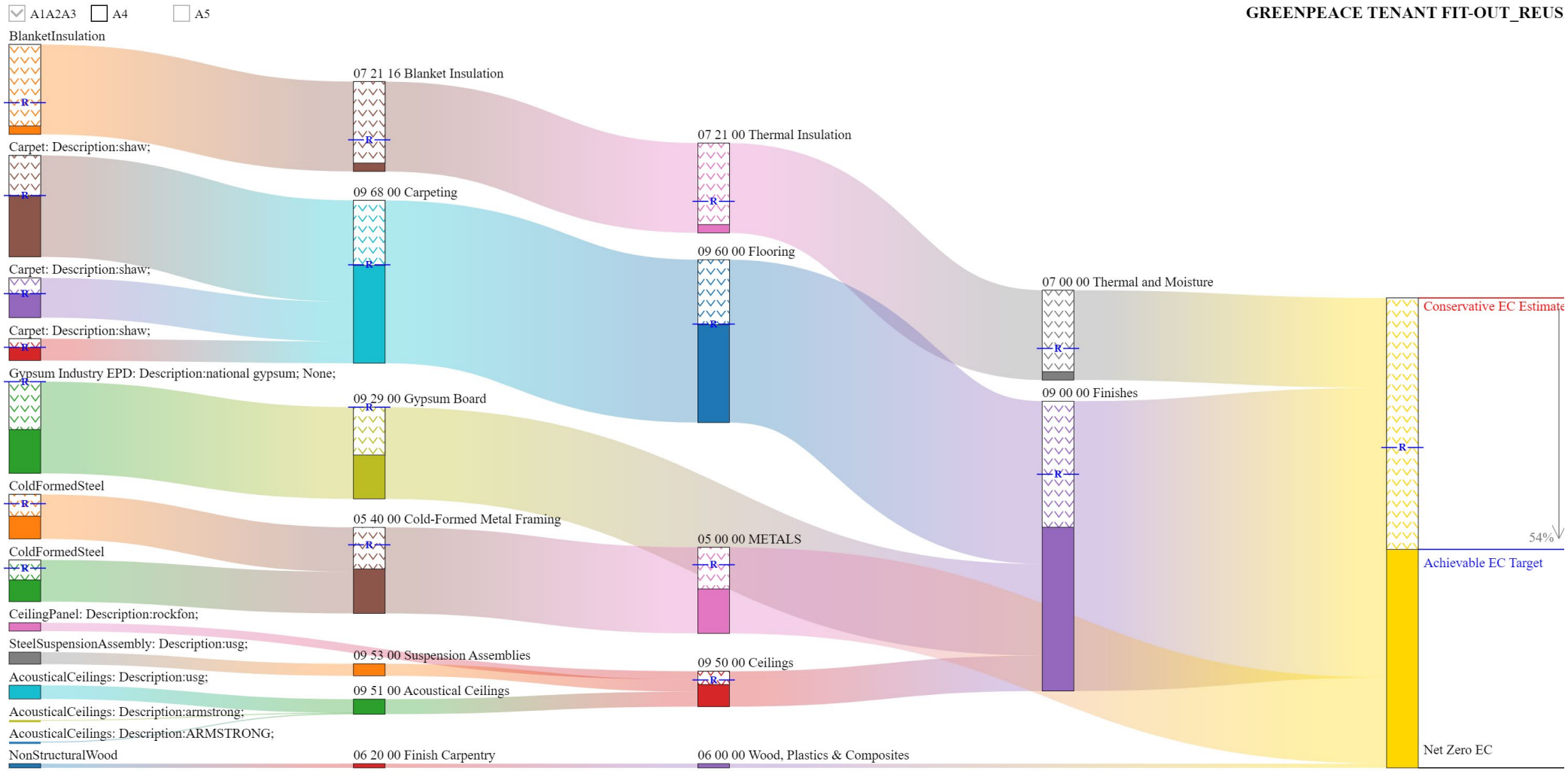
- Product [A1 - A3]
- Transportation [A4]
- Maintenance and Replacement [B2-B5]
- End of Life [C2-C4]
- Module D / Reuse [D]

Highlights

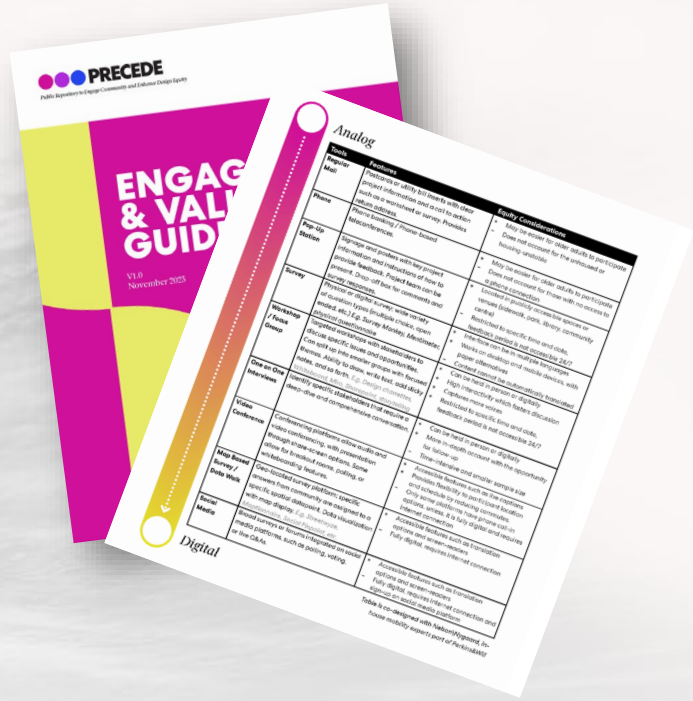
1. Greatest embodied carbon impact associated with Product Stage [A1-A3] which includes the full manufacturing stage (raw ingredient extraction and processing, intermediate transportation, and final manufacturing and assembly)
2. Prioritizing materials with 3rd party environmental reporting to optimize material selection and minimize embodied carbon impact
3. Module D indicates embodied carbon offset due to material reuse and recycling strategies, and energy recovery opportunity.



Greenpeace – Case Study



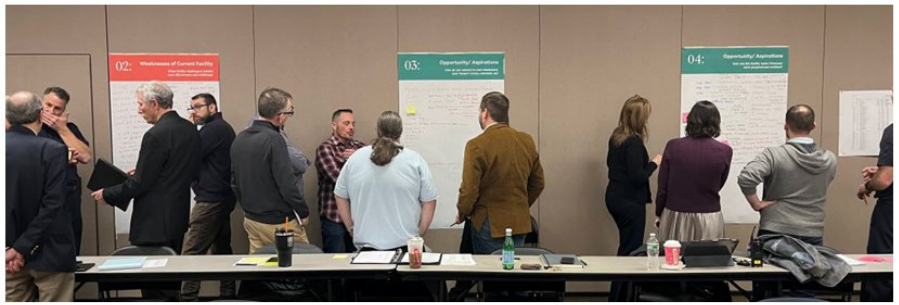
South Division Firehouse



Worcester, MA

The Value of Client Validation

Outward



- In-Person Workshops
- Community Meetings

Observational & Conversational → **Literature Review** → **Surveys & In-depth Interviews** → **Community Engagement & Validation** → **Healthy, Productive Firehouse**

Inward

- Firehouse Tours with Chiefs
- Programming
- City Leadership Meetings
- Site Analysis

- Indoor Air Quality
- Mental Health
- Sleep
- City Wide Reports

- Firefighter Survey
- Female Firefighter Interviews

Understanding Contaminants

9%

Firefighters **higher risk of developing cancer.** Diesel exhaust and contaminants on gear are carcinogenic and can migrate from the bay into living quarters.

(Daniels et al., 2014).

14%

Higher risk of **dying from cancer** than the general population.

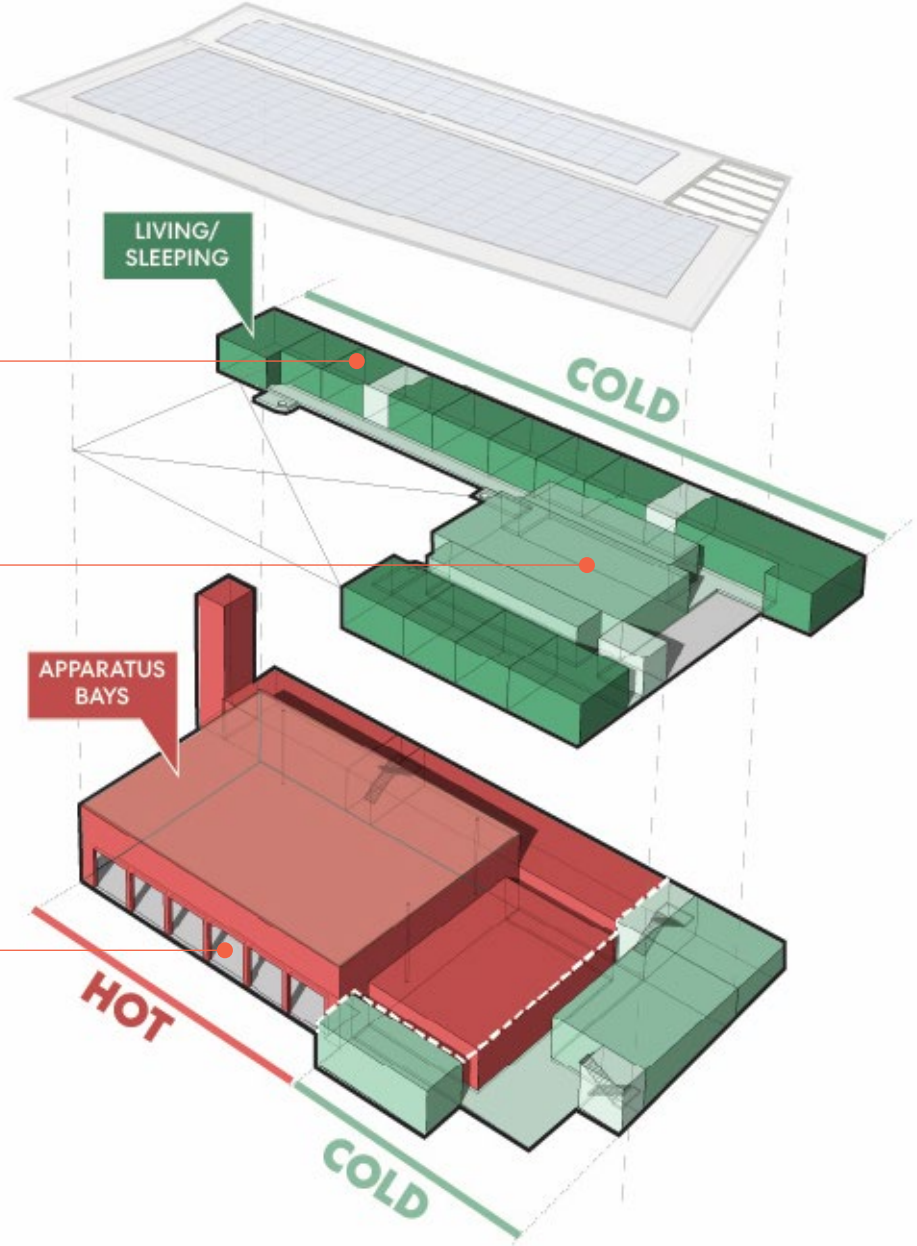
(ACS, 2024)

44%

Survey respondents were **not or slightly familiar** with the concept of hot zone and cold zones in a fire station.

(Survey Findings)

Design Response: Air Quality



Serving all firefighters to increase recruitment and retention

Literature Review

Women firefighters had a 40% greater risk of having a pregnancy resulting in preterm birth compared to the general public (Jung et al, 2023).

Literature Review

Even compared to other workforces that were historically male dominated, the growth and inclusion of women in the fire service continues to lag despite more women entering the service (CDC, 2024).

Literature Review

Of the 1,773 women surveyed in the fire service:

- 37.5% verbal harassment
- 12.9% written harassment
- 16.9% hazing
- 37.4% sexual advances
- 5.1% assaults

(Jahnke et al., 2019)

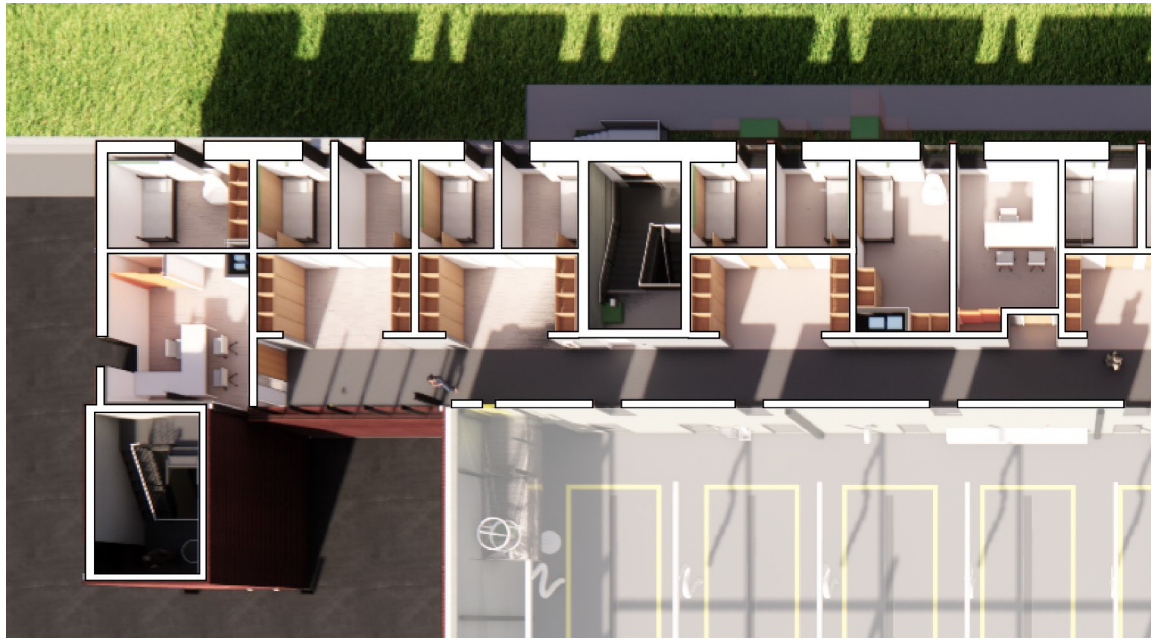
Interview Findings

“When I was pregnant, there was no place to pump. I would do it in the bathroom...There are more of us now and we need a mother's room.”

Female Firefighter, 20 years in the department

Design Response: Gender Equity

↓ *Existing South Division Shared Bunk Room*



↑ *Floorplan of Separate Bunks*

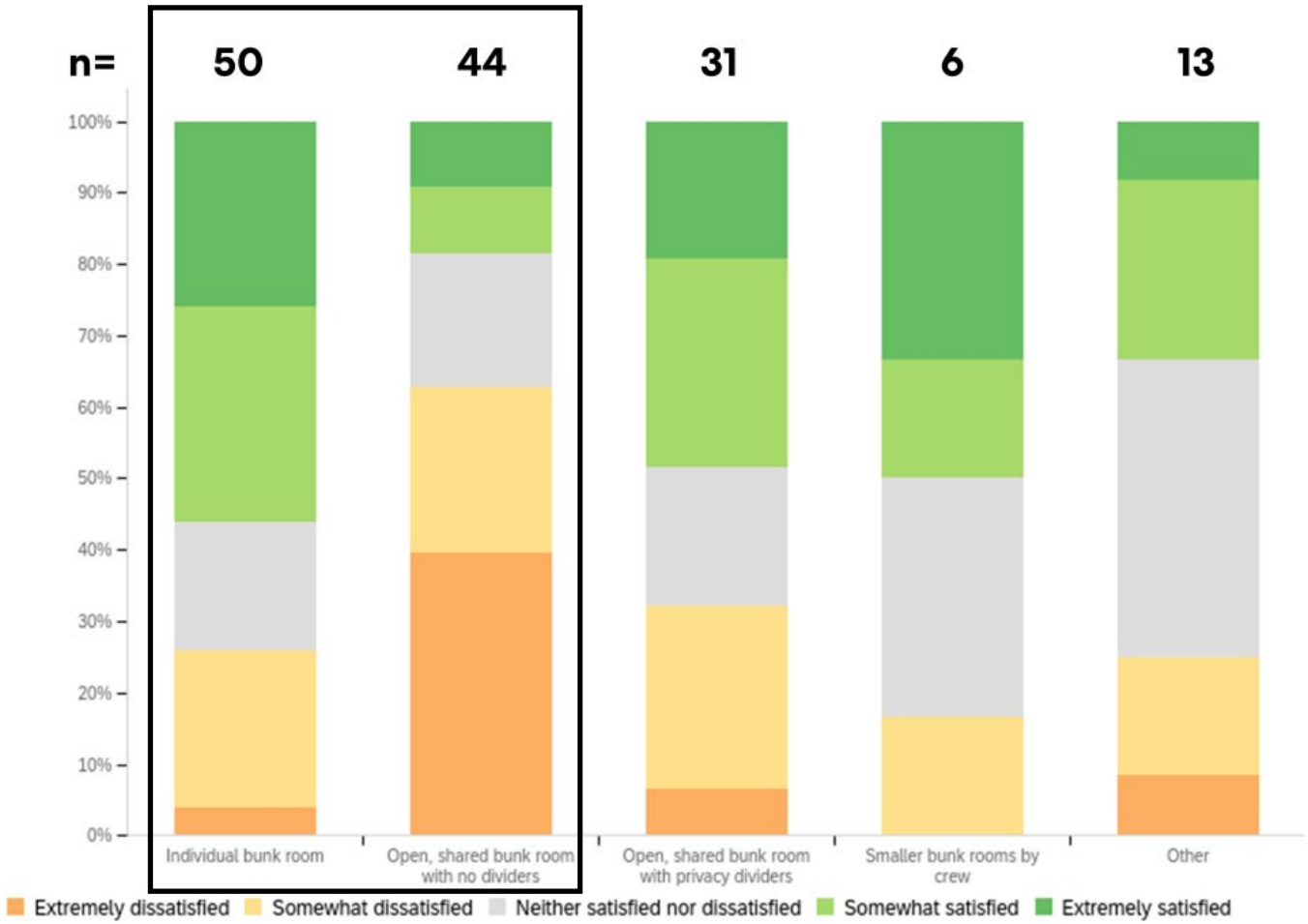
Survey Findings

The average number of disturbances from any cause reported was ~9. With an average of 3 disturbances being non-call related. This means **33% of the time, disturbances in sleep are unnecessary and impacting the quality and quantity of sleep firefighters receive.**

27% of those in **individual bunks** were extremely or somewhat dissatisfied, compared to 56% who are somewhat or extremely satisfied.

Compared to...

67% of people sleeping in **open, shared bunk rooms with no dividers** were extremely or somewhat dissatisfied, compared to 18% who are somewhat or extremely satisfied.

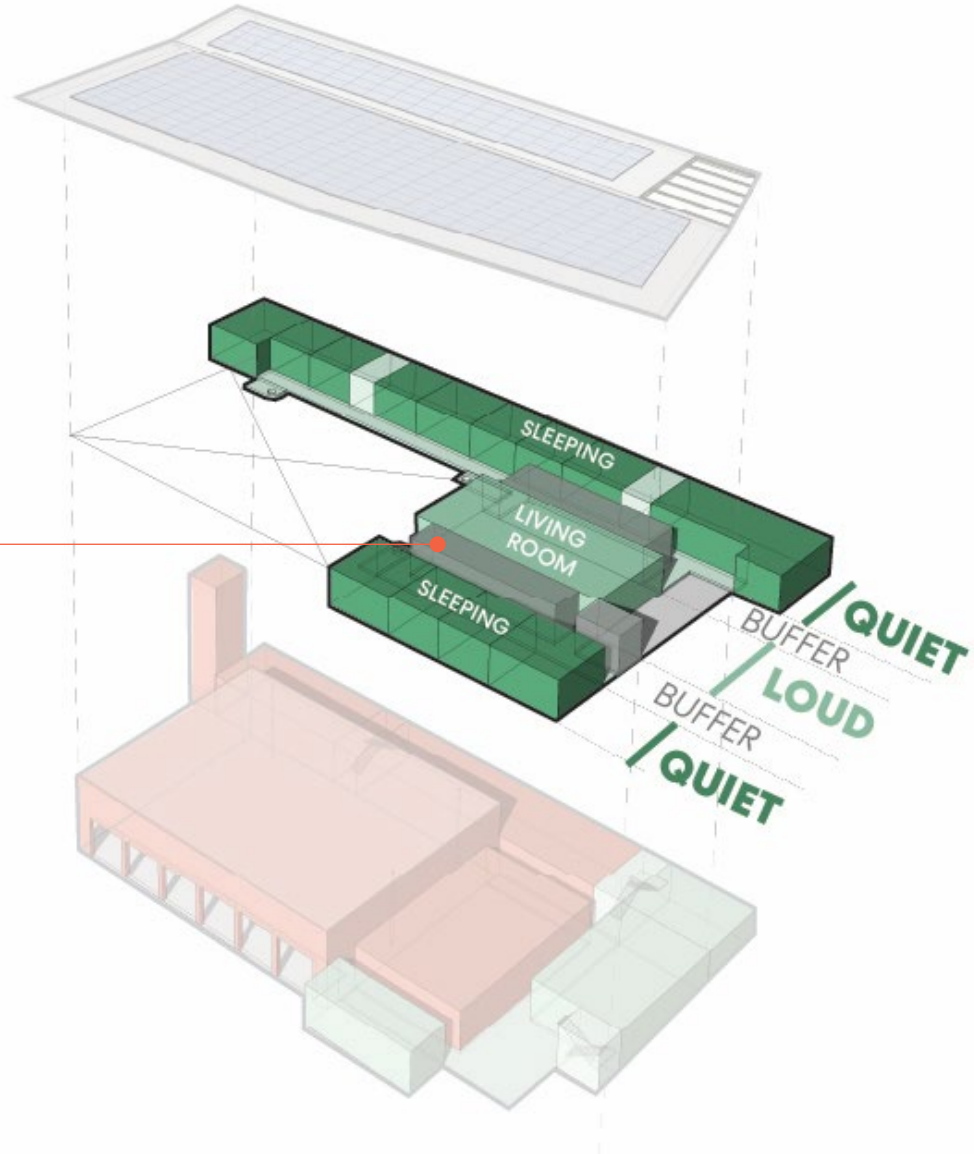


Design Response: Sleep Health

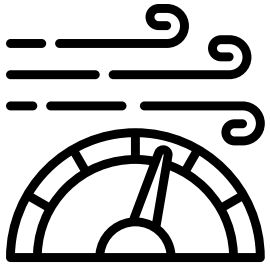
Remove disturbances while not compromising response time for sleep quality.

Lockers & Storage form threshold to bunk rooms

Warm accents and operable windows inside bunk rooms



Supporting Key Health Themes



Air Quality

Contaminants

Chemicals of Concern

Hot vs. Cold Zone

Disease Transmission

Temperature Control

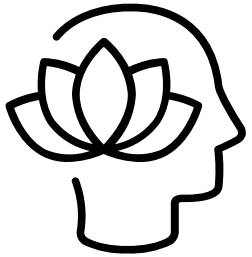
Sleep

Background & Alerting Noise

Thermal Comfort

Presence of Technology

Hypervigilance

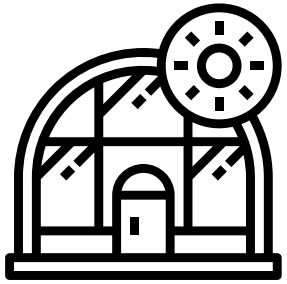


Mental Health

Sense of Community

Respite & Restoration

Gender Equity



Light

Tunable artificial lighting

Alerting & Controllability

Task Lighting

Access to Daylight

1 HSW Continuing Education Credit per Session

See you next week!

Session 1

Advancing Health Equity and Environmental Performance through Design: A Holistic Framework for Healthy Buildings

Session 2

Integrating Health Equity in the Design Process: Let's PRECEDE

Session 3

Achieving High Performance in Public Buildings: Design for Zero Net Energy, Low Carbon, and Material Health