Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

July 2026

Committee on the Environment

AIA Knowledge Community









Acknowledgements

IN MEMORY OF GANESH NAYAK, AIA (1967–2024)

COTE Leadership Member & Climate Justice Co-Chair, 2022–2024

Read full dedication to Ganesh here.

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- ZGF

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- *Please see individual case studies for additional acknowledgements*

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About this report

Climate Justice in Architecture highlights 10 exemplary projects that center both the environmental and social aspects of climate change in their design process, community engagement, and final design. It includes strategies impacting the building, neighborhood, regional, and global scales that align with the AIA Framework for Design Excellence.

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Introduction

Integrating climate justice into design

Climate justice in architecture is a design approach that centers both the environmental and social aspects of climate change. It encompasses engagement, advocacy, planning, and design that reduce emissions, build resilience and capacity, support human, cultural, and ecological health, and protect all communities in the face of climate change.

The building sector is fundamental to any effort addressing the root causes and harms associated with climate change. Buildings are responsible for roughly 40% of global greenhouse gas (GHG) emissions. They are society's primary place of refuge during and after disasters, and they are one of the most visible and lasting indicators of socioeconomic and health disparities in communities with a history of discriminatory land use policies.

Climate change creates new—and amplifies existing—environmental and social challenges across seven categories: social determinants of health, cultural connection to place, economic development without causing displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization.

> "Climate justice refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change."
> —AIA COTE Climate Justice Working Group

AIA Climate Justice in Architecture Taxonomy

The AIA Climate Justice in Architecture Taxonomy synthesizes the results of a three-part research project:

1. A review of the literature defining the use of climate justice within architectural research and practice.
2. Interviews with 17 subject matter experts and 10 project teams.
3. Compilation of 10 case studies, including a health situation analysis of the neighborhood surrounding each project.

The resulting taxonomy helps architecture firms and design teams respond to the challenges posed by climate change by centering both the environmental and social aspects of climate change and identifying design opportunities to create environmental and social benefits across three scales of impact: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy spans seven impact categories and aligns with the AIA Framework for Design Excellence.



Seven categories of climate justice

Social determinants of health Social factors that cause, are associated with, or induce a health outcome. (Adapted from Last JM, ed. A Dictionary of Public Health. First Edition. Oxford University Press; 2007.)

Cultural connection to place Design that engages with the natural and cultural environment of a place, including its history, climate, and people. (Adapted from the AIA Framework for Design Excellence—Design for Integration.)

Economic development without causing displacement Design that supports a vibrant local economy, maintains diverse populations, and supports local resources and trades. (Adapted from the AIA Framework for Design Excellence—Design for Economy.)

Environmental justice Design that reduces exposure to environmental hazards, particularly in neighborhoods with a history of industrial pollution. (Adapted from the EPA definition.)

Ecosystem health Design that supports ecological health and thriving ecosystems at a multitude of scales. (Adapted from the AIA Framework for Design Excellence—Design for Ecosystems.)

Climate change health and resilience Design that supports infrastructure and society to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvements of its essential basic structures and functions. (Adapted from the AIA Resilience Design Toolkit.)

Decarbonization Design that reduces a building's use of fossil fuels for electricity and its carbon impact across its lifecycle. (Adapted from AIA Framework for Design Excellence—Design for Energy & Resources.)

Advancing design excellence

The taxonomy aligns with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The framework is comprised of 10 principles and informs progress toward four outcomes: a zero-carbon, healthy, resilient, and equitable built environment.

The following diagram shows an example of how the framework principles align across the climate justice taxonomy of spatial scale and impact categories. Each case study will have a corresponding diagram that highlights how that project addresses climate justice, with a particular emphasis on the three scales and the 10 framework principles.



Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Sealaska Heritage Institute. Source: Biositu, LLC

Action

The following section summarizes the design process, community engagement, and design strategies in the 10 individual climate justice case studies. They are not intended to be comprehensive. Instead, they offer a model for how to approach the climate justice design process, so that the resulting project generates measurable environmental and social benefits that are tailored to its unique combination of people, place, and program.

Firm design process

Five steps for centering the social and environmental aspects of climate change in your firm's design process.

1. **Frame the design team's role as facilitators of a community-led co-design process:** Architects bring artistic and technical expertise to their work. They rely on environmental and population-level datasets to develop a rough understanding of the site and surrounding neighborhoods. Projects that center climate justice present that data as a conversation starter to community members and other interested parties. Creating an atmosphere of mutual learning and collaborative decision-making results in a more successful design and builds community and political support for the project—thereby speeding the entitlement process and facilitating fundraising.

> "We had an incredible opportunity to design by community and with this new home that had once been a community center and bring it back online for not one organization but for seven organizations and all the people who would walk by or would want to engage."
> —Douglas Bothner,
> Partner in Charge, Ziger|Snead Architect
> BALTIMORE UNITY HALL CASE STUDY

2. **Align seemingly conflicting environmental and social priorities to find innovative solutions:** Using decarbonization and climate resilience design strategies to achieve social goals—such as access to affordable housing, fresh and healthy food, social services, and nature—can create unexpected opportunities for elegant designs to emerge.

> "I came … from a background in building science and sustainable design. So, … I was really committed to this idea that all porches [should] face south. I remember the moment when [the local associate architect, Eddie Bello, said that it would be] so much better for the porches to face each other. … It was the first time I realized [that] when you talk about climate justice, it really is a merging of social and environmental considerations."
> —Katie Ackerly, AIA, CPHC, Principal/Sustainable Design Director, David Baker Architects
> WILLIAMS TERRACE CASE STUDY

3. **Respond to community needs, even when it requires major project changes:** Centering both the social and environmental aspects of climate change in the design process can lead to the realization that a project should change location (Louisiana Children's Museum), scope (I-5 Rose Quarter), or treatment of existing buildings and vegetation (Frost Terrace) to secure long-term success.

> "To see [the development and design team] say to community members, 'You all tell us what you need' and actually listen to that—not come in with a plan already crafted, and say, 'Here's what we think you need.' But no, 'You guys lead the conversation, and we're here to support.' That is very rare, and I don't know how you bottle that. It really takes a mindset shift."
> —Ash Esposito, Executive Director of Baltimore Unity Hall
> BALTIMORE UNITY HALL CASE STUDY

4. **Get creative with funding sources to bridge funding gaps and position the building as necessary to support programming that is a high priority for the funder:** Developing a coherent design concept explaining how decarbonization and climate resilience strategies will advance social, economic, and health priorities in the community can open up opportunities for financing from unconventional sources.

> "When we are applying for funding, we do talk about the indoor-outdoor space. We talk about how the building was designed, how the landscaping was designed, and how all of that goes together, and why we're a prime location for this kind of experience to happen. That gives credibility to the application, because you have the optimal environment that helps to make that programming happen."
> —Louisiana Children's Museum
> LOUISIANA CHILDREN'S MUSEUM CASE STUDY

5. **Develop success metrics meaningful to all stakeholders (e.g., the development team, community members, and local regulators):** The climate justice taxonomy makes visible how key success metrics for different groups reinforce each other. It offers a powerful communication and accountability tool for setting mutually beneficial priorities and metrics to track progress through design, construction, and operations.

> "In the community engagement meetings, we talked about how we would measure wealth building. For example, how many street frontages have we created that are on nice, walkable, low-traffic streets where businesses will thrive? Or how much land is on the highway cover versus off the highway cover? …Over the course of the engagement, the community told us what was important, we determined how to measure those things together, and then we reported how different design options performed according to what the community cared about."
> —Morgan Maiolie, Project Designer, ZGF
> I-5 ROSE QUARTER CASE STUDY

Project design strategies

Design Strategies to integrate into your projects—seven impact categories across three scales.



SOCIAL DETERMINANTS OF HEALTH

Social factors that cause, are associated with, or induce a health outcome.

Relationship with climate justice design Centering social determinants of health in the climate justice design process reminds us to leverage sustainable design to support the resilience of all populations impacted by the project—including future occupants, the surrounding community, construction workers, and populations connected to the global supply chain.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities	Ecosystems	Water	Economy
Energy	Well-being	Resources	Change	Discovery

> "To me, [the BUH project] was a social impact project that integrated environmental sustainability. When you think about these two elements together, they add up to climate justice: Addressing the unequal impacts of climate change on underserved populations. This building was vacant and is now a sustainable community hub – a solution that addresses both the climate crisis and the underlying inequalities that exacerbate its effects. To me, that is climate justice."
> —Kelly Danz, Project Architect/Manager, Ziger|Snead Architects
> BALTIMORE UNITY HALL CASE STUDY

BUILDING

- Creating a trauma-informed, inclusive, safe, and inviting space for people of all abilities and cultures
- Creating an environment that promotes both physical and mental health through materials selection, indoor environmental quality, and biophilia
- Leveraging the building program to address disparities in economic opportunities and social and health services for building occupants and the surrounding community
- Integrating access to outdoor space and opportunities for physical activity and social connection into the building and site design
- Tailoring the design to support the physical and mental health of specific occupant groups—such as children, older adults, residents, office staff, etc.

NEIGHBORHOOD

- Catalyzing neighborhood public safety, walkability, bikeability, and transit access in the surrounding neighborhood
- Reducing exposure to traffic-related air pollution and vehicle-related injuries in the neighborhood
- Supporting financial stability through economic development, access to fresh and healthy food, and access to affordable and mixed-income housing
- Supporting mental health and well-being through biophilic landscape design

REGIONAL AND GLOBAL

- Designing with off-the-shelf building systems and materials to increase access for low- and fixed-income homeowners
- Designing the program to meet regional cultural, educational, social, and environmental needs
- Creating an equitable development model for promoting the health and well-being of at-risk populations
- Supporting population mental health through community-facing programs and co-located services
- Demonstrating transparent and welcoming governance through building design and operations



CULTURAL CONNECTION TO PLACE

Design that engages with the natural and cultural environment of a place, including its history, climate, and people.

Relationship with climate justice design Design that centers and reflects the cultural values of the place is more likely to result in innovative solutions that reuse existing structures (thereby reducing embodied carbon) and repurpose traditional materials and construction techniques in the interest of climate mitigation and resilience goals.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities	Ecosystems	Water	Economy
Energy	Well-being	Resources	Change	Discovery

"I think the Walter Soboleff building and the larger campus project have changed the mindset of the preservationists in Juneau. In fact, the recent cultural preservation plan has some cover images of the SHI project, presenting it as the gold standard of how indigenous design fits into historic preservation. So, [the debate in the Historic Review Commission] had a tremendous ripple effect. It has created a cultural identity that is recognized alongside other identities in Juneau."
—Zane Jones, AIA, Partner & Senior Architect, Principal-in-Charge, MRV Architects

SEALASKA HERITAGE INSTITUTE CASE STUDY

BUILDING

- Adaptively reusing structures with a rich architectural and/or cultural history in the community
- Incubating neighborhood artists, local businesses, and community-based organizations to foster cultural vibrancy
- Mending discontinuities in the urban fabric
- Applying trauma-informed and inclusive design principles to respond to the range of occupants' cultural needs
- Balancing modern aesthetics and building performance requirements with historic architectural typologies, materials, and building science considerations

NEIGHBORHOOD

- Designing the height and massing to echo the massing of the historic urban fabric
- Using finish materials and design elements that both reinterpret and harmonize with the surrounding neighborhood
- Designing to last 100+ years to support community resilience
- Returning previously displaced residents to their historic neighborhood
- Setting a precedent for acknowledging the diversity of a neighborhood's historic architecture

REGIONAL AND GLOBAL

- Contributing to a citywide effort to revitalize and build resilience in historically underinvested neighborhoods
- Installing native vegetation and signage to build awareness of the historic and cultural links between the community and natural ecosystems
- Using public art and architecture to start conversations about how to bridge the gap between words and action in repairing historic harms
- Raising the visibility of local history, culture, and artwork in the region

ECONOMIC DEVELOPMENT WITHOUT CAUSING DISPLACEMENT

Design that supports a vibrant local economy, maintains diverse populations, and supports local resources and trades.

Relationship with climate justice design Decarbonization strategies can be tailored to support financial security and build resilience among populations who are at highest risk of exposure to climate change-related events.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities	Ecosystems	Water	Economy
Energy	Well-being		Change	Discovery

> "For our client, a retired homeowner on a fixed income, this house isn't just a place to live—it's a key to financial stability. Its energy efficiency and resilience keep money in her pocket with lower operating costs, reduced energy bills, and lower insurance premiums. A well-built home isn't just about protection; it's about long-term affordability and peace of mind."
> —Illya Azaroff, FAIA, Architect, +lab Architect PLLC
> HURRICANE STRONG HOME CASE STUDY

BUILDING

- Structuring building efficiency and renewable energy measures to benefit low-income tenants through lower rents or reduced utility bills
- Allocating space for co-located services supporting at-risk occupants and/or community members
- Creating a demonstration project for people of all income levels

NEIGHBORHOOD

- Offering accessible and affordable office space for community-based organizations, community gatherings, local art exhibitions, etc.
- Increasing affordable housing units and reducing maintenance, utility, and insurance costs in a high-rent neighborhood
- Developing economic opportunities that balance near-, medium-, and long-term benefits for residents and business owners
- Leveraging capital investment to remove impediments to and increase opportunities for economic development in the neighborhood economy

REGIONAL AND GLOBAL

- Creating a replicable approach to community engagement
- Creating a model for reducing the local tax burden and cost of doing business in the region
- Creating construction jobs during an economic downturn

ENVIRONMENTAL JUSTICE

Design that reduces exposure to environmental hazards, particularly in neighborhoods with a history of industrial pollution.

Relationship with climate justice design Populations living and working in environmental justice communities are at higher risk of exposure to both environmental contamination and climate change-related events. Centering climate justice in the design process helps designers prioritize decarbonization and resilience strategies that promote physical and mental health, particularly for the highest-risk populations, such as children and people living with chronic disease.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities	Ecosystems	Water	Economy
		Resources	Change	Discovery

> "The environmental impact of this project needed to provide better outcomes than the status quo. The most important question for us was not whether a lane should be added to the freeway. It was 'What is the environmental impact of reconstituting a neighborhood versus continuing to have this trench exist in the heart of the neighborhood' … One of the struggles was that there was no framework for accounting for historic, present or social impact in the ways that were important to us from the beginning."
> —Winta Yohannes, Albina Vision Trust
> I-5 ROSE QUARTER INDEPENDENT COVER ASSESSMENT CASE STUDY

BUILDING

- Embracing the responsibility of remediating legacy environmental exposures on the property

NEIGHBORHOOD

- Recognizing the environmental injustices of the past as part of the community co-design process
- Collecting baseline environmental exposure metrics and establishing a process for tracking exposure after occupancy

REGIONAL AND GLOBAL

- Building regional awareness of environmental justice concerns and sustainable approaches to addressing them
- Influencing building product manufacturers to protect manufacturing workers from exposure to toxic chemicals by replacing toxic ingredients in their products
- Educating subcontractors about the health benefits to their installers of switching to non-toxic materials

ECOSYSTEM HEALTH

Design that supports ecological health and thriving ecosystems at a multitude of scales.

Relationship with climate justice design Landscape design can center climate justice by prioritizing green infrastructure strategies that reduce the risk of exposure to climate change-related hazards among the most at-risk populations likely to use the future development or be impacted by it in the surrounding community.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities	Ecosystems	Water	Economy
	Well-being	Resources	Change	Discovery

BUILDING

- Preserving, restoring, and enhancing the existing ecosystem with an eye toward reducing exposure to climate change-related hazards such as extreme heat, flooding, drought, wildfire, and hurricanes
- Weaving indoor and outdoor spaces to build awareness and appreciation for the ways in which healthy ecosystems protect human health and well-being, particularly in the face of natural disasters
- Using biophilic design principles to create a healing environment
- Combining building materials, construction techniques, and sound to create sensory connections with local ecosystems that are evocative of the long, intertwined history of nature and people in that place

NEIGHBORHOOD

- Contributing to urban re-greening in historically disinvested neighborhoods
- Balancing neighborhood biodiversity, environmental exposures, and climate mitigation goals
- Protecting nocturnal ecosystems
- Balancing native ecosystem restoration with the neighborhood's cultural heritage
- Converting disused, contaminated properties into ecologically diverse, resilient neighborhood hubs

REGIONAL AND GLOBAL

- Protecting and restoring regional native ecosystems creates co-benefits for greenhouse gas reductions, climate resilience, population mental health, migratory animals, and cultural heritage
- Creating a model for leveraging ecosystem restoration as an opportunity for creating co-benefits across mitigation, resilience, and health

"The exhibit designer, Gyroscope, Mithun, and the Louisiana Children's Museum had a really great collaboration early on, so that when you're up at the Mississippi exhibit, you look out on the lagoon and the water in the exhibit is connecting to the water outside the window. When you're in the Dig into Nature exhibit, you see out into these vines that are growing up the building so that the inside and outside connect."
—Rich Franko, Partner, Mithun

LOUISIANA CHILDREN'S MUSEUM CASE STUDY



CLIMATE CHANGE HEALTH AND RESILIENCE

Design that supports infrastructure and society to anticipate, absorb, accommodate, or recover from the effects of hazardous events in a timely and efficient manner, including through ensuring the preservation, restoration, or improvements of essential structures and functions.

Relationship with climate justice design Climate justice design prioritizes strategies that protect the occupants and community members at highest risk of negative health outcomes after exposure to a climate-related event, while also reducing the development's embodied and operational carbon footprint.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities	Ecosystems	Water	Economy
Energy	Well-being	Resources	Change	Discovery

> "The composting toilets work if the power goes out, although they might not smell as good. We have an on-site water treatment plant, so we can process water if there is a water main break. We can adjust the temperature using the operable windows. And the systems furniture could be taken out to convert the building into an emergency shelter."
> —Amber Richane, Principal Design & Planning Manager, City of Santa Monica (Common\Edge)
> SANTA MONICA CITY HALL EAST CASE STUDY

BUILDING

- Integrating indoor air quality features to protect occupants from infectious disease, ozone action days, and wildfire air pollution
- Using weatherization strategies, air conditioning, operable windows, porches, structural and vegetative shading, and on-site renewable power and battery storage to reduce exposure to extreme heat events
- Enhancing social and environmental resilience by creating a building designed to be flooded or exposed to hurricanes, through reinforcing the foundation, raising the ground floor level, placing mechanical equipment on the roof, and installing wind-resistant and non-absorptive finish materials
- Respecting water as a precious resource in a drought- and flood-prone region through water-efficient fixtures; rainwater collection, filtration, and storage; and signage and artwork that make the water cycle visible

NEIGHBORHOOD

- Preserving and expanding the tree canopy and installing green infrastructure to reduce the neighborhood urban heat island and flood risk
- Designating the property as a short-term neighborhood shelter or place of refuge during climate change-related events, and creating a resilience hub to increase resilience to power outages
- Reducing neighborhood exposure to traffic-related air pollution
- Increasing redundancy in the local energy, water, and food supply

REGIONAL AND GLOBAL

- Increasing regional distributed solar power capacity and storage
- Organizing the design process as a demonstration project that leads to numerous guidance documents and case studies, all aimed at making climate-resilient design standard practice
- Aligning success metrics with both neighborhood and city priorities
- Expanding the definition of a resilience hub
- Educating architects, contractors, and regulators on the weatherization properties of traditional building materials and construction techniques

DECARBONIZATION

Design that reduces a building's use of fossil fuels for electricity and its carbon impact across its lifecycle.

Relationship with climate justice design Climate justice design deploys decarbonization strategies to support social goals.

AIA Framework for Design Excellence alignment

Integration	Equitable Communities		Water	Economy
Energy	Well-being	Resources	Change	Discovery

"It seems natural to say … renovating a building that already exists is the most sustainable thing to do. Yet how naturally so many of us unfortunately slip to, 'Oh, it's so much easier to build new.' It's less hassle, and maybe even less effort. Having a client remind us of that, and purposely choose the 'harder' path, opened our eyes and reignited our awareness. In our office, we've talked about it over and over again. How can we help communities take a better look at the existing building stock within their communities and understand the potential?."
—Sally Obernolte, Neumann Monson Architects
STANLEY CENTER CASE STUDY

BUILDING

- Reducing embodied carbon in building materials and supporting cultural connections to place by adaptively reusing historic structures
- Structuring rental agreements to pass the financial benefits of energy/water efficiency and on-site renewable energy generation on to commercial and residential tenants
- Installing a rooftop solar array, daylighting, cross-ventilation, and rainwater collection systems to offset energy and water demand and increase resilience to power outages
- Leveraging flexible spaces and shared amenities to enhance carbon efficiencies and expand tenants' social networks

NEIGHBORHOOD

- Coordinating the project location with surrounding active transportation infrastructure to encourage users to choose low-carbon transportation options
- Reducing neighborhood carbon emissions and exposure to traffic-related air pollution by lowering total vehicle miles traveled
- Contributing to walkability and fossil fuel-free development in the neighborhood

REGIONAL AND GLOBAL

- Modeling the idea that high-quality design is a global method of carbon sequestration, because well-designed buildings are more likely to be renovated rather than demolished
- Meeting local and regional sustainability standards to contribute to regional and global decarbonization efforts
- Positioning the project as a demonstration of innovative decarbonization technologies to lower barriers to widespread adoption
- Sourcing local materials to reduce embodied carbon, lower material and transportation costs, and support local businesses
- Reducing regional embodied carbon by diverting construction waste

Climate Justice in Architecture

Case Studies

The 10 selected case studies in this report highlight exemplary architecture projects that center both the environmental and social aspects of climate change in their design process, approach to community engagement, and final design. They touch on many aspects of the AIA Climate Justice in Architecture Taxonomy at the building, neighborhood, regional, and global scales, while also aligning with the AIA Framework for Design Excellence.

These diverse case studies demostrate what integrating climate justice looks like in practice and across scales. By design, the selected projects range in size from a single-family home to neighborhood-scale revitalization. They also show that designing for climate justice can vary based on location, with projects represented on the East and West Coasts, in the South and Midwest, and even Alaska. Taken together, these projects exemplify what is possible when the environmental and social aspects of climate change are considered as two sides of the same coin.

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

Committee on the Environment

AIA Knowledge Community



Baltimore Unity Hall: Street View
Image Credit: Tom Holdsworth

Baltimore Unity Hall

This case study shares an exemplary architecture project that centered both the environmental and social aspects of climate change in their design process, approach to community engagement, and final design. It touches on many aspects of the AIA Climate Justice in Architecture Taxonomy at the building, neighborhood, regional, and global scales.

Baltimore Unity Hall

Baltimore, MD



Community Gathering at Renovated Baltimore Unity Hall
Image Credit: Baltimore Unity Hall

Summary

Baltimore Unity Hall (BUH) is a community center housed in the renovated 1964 Union Hall for Amalgamated Clothing and Textile Workers, the first example of International Style modern architecture in its location.

The renovated building was designed to support Baltimore Unity Hall's (BUH) mission: "By fostering community arts, education, and job training, we aim to dissolve barriers, empower individuals, address social justice issues, and create a safe, healthy, and harmonious future for all."

The project deploys climate change mitigation and resilience strategies to reduce disparities and build community connections across a historic red line that divided affluent white neighborhoods from disinvested non-white neighborhoods in Central West Baltimore.

Project overview

BUILDING PROGRAM TYPE(S):
Commercial/Industrial

PROJECT TYPE:
Existing Building/Renovation

CONDITIONED FLOOR AREA:
30,000 sq. ft.

TOTAL USERS:
40 (daily); 100 (events)

SITE AREA:
16,965 sq. ft.

NUMBER OF FLOORS:
3

PROJECT CLIMATE ZONE:
ICC Climate Zone 4A

PROJECT SITE:
Previously developed land,
Historic structure or district

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2022

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$7.38 million

THIRD PARTY RATING SYSTEM:
IgCC, Baltimore Commission for Historical and Architectural Preservation

Project team

OWNER:
Memorial Apartments Corporation (MAC) and Somerset Development

ARCHITECT:
Ziger|Snead Architects (Doug Bothner, partner in charge; Kelly Danz, project architect/manager)

MP ENGINEERS:
Engenium Group

STRUCTURAL ENGINEER:
Morabito Consultants

CIVIL ENGINEER:
Morris & Ritchie Associates, Inc

GENERAL CONTRACTOR:
Southway Builders

To me, [the BUH project] was a social impact project that integrated environmental sustainability. When you think about these two elements together, they add up to climate justice: Addressing the unequal impacts of climate change on underserved populations. This building was vacant and is now a sustainable community hub – a solution that addresses both the climate crisis and the underlying inequalities that exacerbate its effects. To me, that is climate justice."
—Kelly Danz, Project Architect/Manager, Ziger|Snead Architects

Design Process

Baltimore Unity Hall (BUH) completes the redevelopment of a key block at the border of Bolton Hill, Madison Park, Upton, and other neighborhoods in Central West Baltimore, Maryland. The remainder of the block was previously redeveloped by the same development team—renovating an existing 266-unit affordable, senior housing development and building a new, 62-unit market rate apartment building with a restaurant on the ground floor. BUH capitalized on the vibrancy introduced to the block by the residential developments, seeking to activate its western boundary with a community center dedicated to building a social network and bridging the historic divide across Eutaw Place Boulevard.

"I put [the BUH project] in the social justice bucket. Because, given the historical context of its [location] on the line where red lines started, that sparks a conversation about reparations. It starts a conversation about the state of repair of a building. It's not just about putting band-aids on it, because that's what I see [with other projects]. A lot of community folks trying to take a building that is old and preserve it ... without adequate funding. So, it's not brought to a state that's safe or what [neighborhood residents] deserve....To see [the development and design team] say to community members, 'You all tell us what you need' and actually listen to that—not come in with a plan already crafted, and say, 'Here's what we think you need.' But no, 'You guys lead the conversation, and we're here to support.' That is very rare, and I don't know how you bottle that. It really takes a mindset shift, and I think proving this can work is that that mindset shift can happen down the line. Hopefully. I do think we should unpack why this works and why there are powerful things happening in the building."
—Ash Esposito, ED of BUH, community leader



Baltimore Unity Hall Location in Relation to the Neighborhoods it Serves
Image Credit: Ziger|Snead Architects

Community engagement

The development and design team benefited from a years-long community engagement process that started with the redevelopment of an affordable senior housing development on the same block and continued through the development of market rate apartments. The developer and community advisory board invited the design team into the ongoing conversation, first as an active listener, and then as a co-designer alongside half a dozen community-based organizations from Central West Baltimore who became the anchor tenants of the new center. Together, they created a common vision for how the redevelopment could serve the needs of surrounding neighborhoods.

The process culminated with developer Somerset Development Company and community members jointly founding Baltimore Unity Hall, Inc., a 501 (c)3 not for profit organization, which is the development's master lessee. Its goal is to place the property on solid financial footing over the long term.

"We had an incredible opportunity to design by community and with this new home that had once been a community center and bring it back online for not one organization but for seven organizations and all the people who would walk by or would want to engage."
—Douglas Bothner, Partner in Charge, Ziger|Snead Architects

Project financing

BUH faced a difficult financing landscape. The project is located on the wrong side of the street to receive tax credits. And, its holistic programming did not fit naturally into philanthropic funding streams.

BUH balanced that financial reality and its social impact goals in two ways: First, the design minimized future operational costs by installing energy and water efficiency measures and a photovoltaic solar array on the roof. The solar array cost $129,581 and saves $6,000/year in electricity bills. $100,000 of the installation cost was offset by a grant from the France Merrick Foundation. BUH sells the solar renewable energy credits (SRECs) generated by the array to a state-based marketplace, generating ~$3,500 income annually. The electricity savings plus the SREC revenue have resulted in a three-year payback period net of the grant from the France Merrick Foundation.

Second, as a 501(c)3, the organization was eligible to receive grants and donations. The developer donated as an organization, as well as individually from its principals. BUH also received a capital grant from the Maryland State Bond Program, a mortgage loan from The Reinvestment Fund (TRF), and a bridge loan from People's Bank.

BUH's success demonstrates the need for governmental and philanthropic funders to embrace cross-cutting social impact projects, rather than sticking with well-established single-topic funding streams.

"If you look at the [BUH pro forma, it was] much less efficient than most multi-use building projects. It likely doesn't pencil out if you are a traditional developer, because we've got a shared auditorium, a huge gallery space, an immense event space, a commercial kitchen, a lounge, and a kitchenette. And, all of these spaces are shared amenities built into the pro forma. But, because [BUH] kept the leasing numbers down so that it could be affordable, philanthropic dollars or fundraising had to come in and fill those gaps. Or, leasing the space to weddings and the like. So, we're building the design around these community shared amenities. And we're doing that in a way that is an open door to everyone."
—Douglas Bothner, Partner in Charge, Ziger|Snead Architects

Essential climate justice design components include:

1. Select a development location and program that complements development on surrounding properties. Fill in programmatic gaps to help strengthen neighborhood social and economic networks.

2. Integrate meaningful community engagement from the beginning of the design process. Ask community members how the development could benefit them and center those priorities in the design.

3. Get creative with funding sources to bridge funding gaps related to social impact and climate resilience. Position the building as necessary to support programming that is a high priority for the funder.

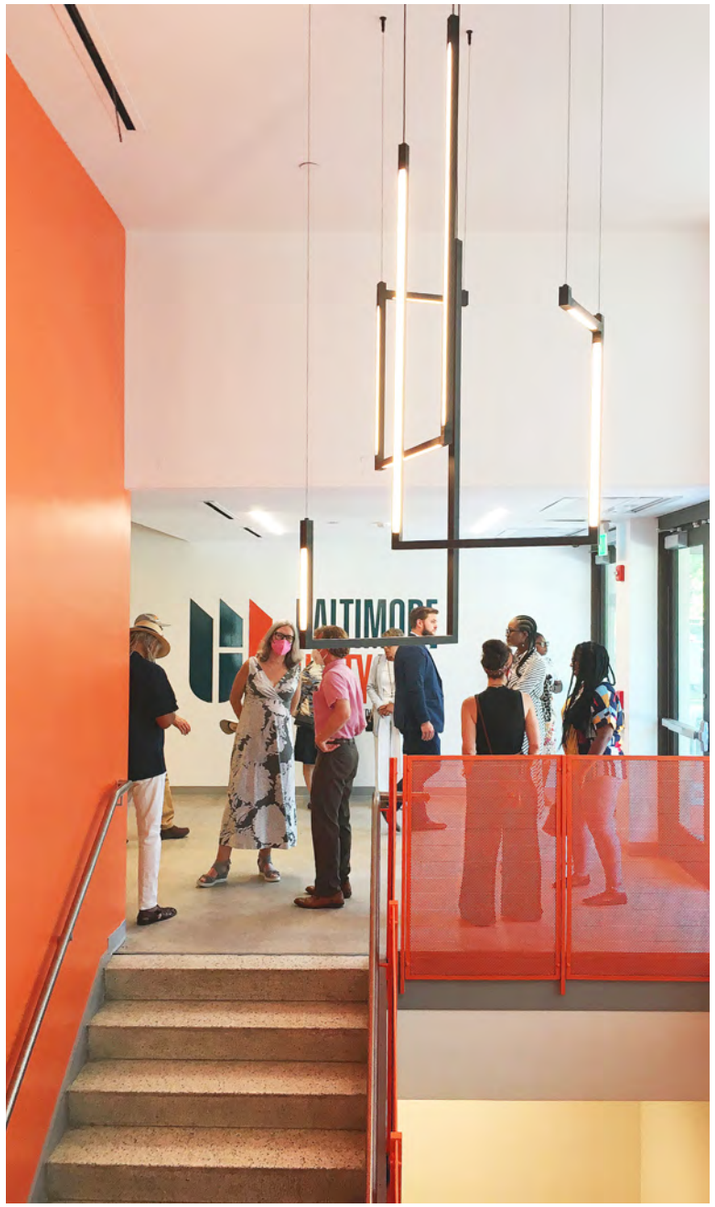
AIA Climate Justice in Architecture Taxonomy

Climate change creates new, and amplifies existing, environmental, and social challenges across the following seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy centers both the environmental and social aspects of climate change and helps teams respond with an architectural design impacting the themes across three scales: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The Framework is comprised of 10 principles and informs progress toward four outcomes – a zero-carbon, healthy, resilient, and equitable built environment.

Baltimore Unity Hall addresses all three scales in the taxonomy, with particular emphasis on the building and neighborhood scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	✓	✓		Integration; Equitable Communities; Economy; Well-being
Cultural Connection to Place	✓	✓		Integration; Equitable Communities; Economy
Economic Development without Displacement	✓	✓	✓	Integration; Equitable Communities; Economy; Energy
Environmental Justice	✓			Ecosystems; Well-being
Ecosystem Health		✓		Equitable Communities; Ecosystems; Well-being
Climate Change Health & Resilience	✓	✓		Equitable Communities; Change
Decarbonization	✓		✓	Integration; Water; Economy; Energy; Well-being; Resources; Change

Overview of AIA Climate Justice in Architecture themes and spatial scales: Baltimore Unity Hall. Source: Biositu, LLC



Entry Embraces Inclusive Design Principles
Image Credit: Ziger|Snead Architects

Social determinants of health

Reducing disparities in mental health: 27-28.4% of adults in the historically redlined neighborhoods served by BUH report poor mental health—35% higher than the average in Baltimore City (19.6%) and 80% higher than the U.S. average (14.7%). Meanwhile, adults in the historically white neighborhood adjacent to BUH report lower rates of poor mental health than Baltimore City (16.6% compared with 19.6% in Baltimore) and 13% higher than the national average of 14.7% (CDC Places). Skylights and windows were strategically placed in the renovated building to ensure that 100% of normally occupied spaces have access to natural daylight, which supports mental health and contributes to the sense of safety and well-being in the indoor environment. A wellness room on the second floor offers privacy for regular occupants and visitors who need to take a mental break.

Designing an inclusive & inviting space for people with all abilities: The building entrance and the flow of public spaces on the main floor use inclusive design principles to welcome people with all abilities and backgrounds to the space. The renovation added a ramp to an existing planter outside the building to create a single entrance for all visitors. This approach is one of many aspects of the building that seek to create a safe space for dialogue and collaboration across neighborhoods that had historically felt unwelcome to nonresidents. The anchor tenant, a non-profit who plays a catalyzing role in the mission of BUH to build cross-neighborhood social connections, is officed just inside the front door. The remainder of the main floor flows through exhibit and event spaces, drawing visitors into the building through engaging installations and activities relevant to Central West Baltimore.

> "We've seen … the mental health impact of people being in the building and believing, 'I deserve to be in this space. And, I deserve to be in a state of the art building.' [This is] a form of reparations to address the historic disinvestment [in redlined neighborhoods]. Partners like Somerset and everybody that's been at the table, have taken on that risk and recognize that there is a lot of bureaucracy [involved in] trying to … bridge the [funding] gap. I wish there were more developers that were willing to do that."
> —Ash Esposito, ED of BUH, community leader

Catalyzing neighborhood public safety: BUH's goal of acting as a bridge across neighborhoods that have historically been defined by their differences is designed, in part, to enhance real and perceived personal safety in all the neighborhoods surrounding the center.

Enhancing walkability, bikeability, & transit access in the surrounding neighborhood: The BUH renovation supported opportunities for physical activity in a neighborhood with a walkability score of 71 by upgrading the corner bus stop, adding bicycle parking, showers, and changing rooms inside the building, and providing priority parking for high occupancy vehicles.

Spurring neighborhood economic development: BUH is equipped with private office space, co-working space, collaboration spaces, and training spaces to accommodate local community-based organizations dedicated to creating economic development opportunities for residents and businesses in Central West Baltimore, including youth career training and food security programs for children.

Cultural connection to place

Redeveloping a building with a rich history in the neighborhood: Redeveloping the Union Hall instead of tearing it down and building a new building retains a piece of both social and architectural history in this part of Baltimore.

Incubating neighborhood artists: Significant space was set aside in the renovation for artist studios and an exhibition space designed to host exhibits that build a sense of shared culture and community in Central West Baltimore.

Mending a discontinuity in the urban fabric: The design team added red, vertical sunshades to the main façade to push the building towards the street and align it with the brownstones on either side. The changes to the building façade retain enough of the existing building to recall its historic use while also signaling to neighbors and passersby that it is being put to a dynamic new use.

Working with trusted community-based organizations to create a community hub: Having the right partners in developing the vision for the project and recruiting tenants from surrounding neighborhoods was crucial to the project's success in contributing to neighborhood revitalization without sparking displacement.

"It wasn't so much the building [that drew me to BUH] as that I trusted [the community-based organization] No Boundaries Coalition. That brought me to the area. And then, I was brought back again by Black Arts District, working with them as an artist. I think that's what really drew me to the space over and over again—the relationships with organizations that I've been actively involved in and trusted and are deeply rooted in the community. So, the space is, by default, a trusted space because these are trusted partners that we all know of in the community."
—Ash Esposito, ED of BUH, community leader

Economic development without causing displacement



Flexible Office Space Facilitates Collaboration
Image Credit: Tom Holdsworth

Building efficiency measures to offer below market leasing rates: The design prioritized public spaces and shared amenities that would create opportunities for collaboration across the community-based organizations leasing the space. Those decisions reduced the rentable square footage and made it more difficult to finance the project. Sustainability strategies were introduced to the design to lower operating costs as part of a multi-pronged effort to bridge the project's financing gap.

Adding to the vision of the HUD Choice Neighborhood plan: The renovation contributed to the vision of the existing HUD Choice Neighborhood plan which envisioned mix-income housing, neighborhood retail, accessible amenities, and improved neighborhood quality of life.

Offering accessible & affordable office space: By setting below-market rates for office spaces, the building makes its spaces accessible to community-based organizations that provide services in the neighborhood. Services include employment training, youth programming, and educational programs.

Community gathering space: The project prioritized exhibition and event spaces, as well as a commercial kitchen to create a flexible space for gatherings.

"The development became that catalyzing moment. That whole corner. It's not just one project. It's the homes ... and this building creating a critical mass of development that could really spark community reinvestment on multiple levels."
—Douglas Bothner, Partner in Charge, Ziger|Snead Architects



Façade Renovation and Vertical Fins Contribute to Both Environmental and Social Goals for the Project
Image Credit: Ziger | Snead Architects

Creating a replicable approach to community engagement: Deep community engagement and partnership with trusted community-based organizations have created an approach that could be replicated in other parts of Baltimore and in other cities. BUH's approach, which sought out, listened to, and partnered with community-based organizations who were deeply rooted in the neighborhood could be replicated in other communities.

"I live in a community that is prime real estate for some type of development, but not necessarily the development that we want. [BUH] proves that development without displacement can happen."
—Ash Esposito, BUH ED, community leader

Environmental justice

Embracing the responsibility of asbestos remediation to avoid demolishing a 1960s era building: The renovation project included remediation of asbestos and other contaminants from the 1960s era Union Hall. Remediating those environmental contaminants avoided the need to demolish the building and reduced the risk of future occupants and neighborhood community members being exposed to toxic chemicals through the air, water, or dust.

Ecosystem health

Contributing to urban regreening in an historically disinvested neighborhood: BUH strives to connect neighborhoods that have historically been divided by a beautiful, planted esplanade called Eutaw Place. BUH is turning the boulevard into a place of meeting and collaboration.

Climate change health & resilience

Battery ready: Central West Baltimore neighborhoods are at high risk of exposure to extreme heat. Adding a battery to the solar panels on the roof of BUH would allow it to act as a cooling center or resilience hub when the power goes out during extreme weather events like heat waves. Enhancements to the building envelope and building systems reduce the facility's electrical load, which increases the time it can function during power outages.

"While the tenant spaces were taking shape, they were flexing. Sometimes, somebody wanted 2,000 square feet, and then the next day they wanted 1,200. So, how they flex around these core public spaces was really important."
—Douglas Bothner, Partner in Charge, Ziger|Snead Architects

Decarbonization

Renovating a 1960s Union Hall instead of building new: Reduced embodied carbon by reusing the existing building's structure and shell.

Upgrading building systems to increase energy & water efficiency: The renovation met International Green Construction Code (IgCC) requirements (as amended by Baltimore City), which are 10% above code minimum in the state of Maryland. Exterior fins shade the front façade. The renovation includes a new high-performance curtainwall, new roof, increased insulation on all exterior walls; and, new high efficiency HVAC, lighting, plumbing, and fire protection systems. Windows and skylights provide natural light in spaces that are primarily used during the day. Energy efficient building systems reduce electricity demand.

Installing a rooftop solar array to offset electricity & increase resilience to power outages: The project installed a 5.418 kW solar array on the roof that produces ~54,000 kWh per year of clean energy, offsetting 20 tons of carbon emissions. The solar array produces 20% total annual electricity needs.

Leveraging flexible spaces and shared amenities to enhance carbon efficiencies & expand tenants' social networks: Space set aside for offices is easily reconfigurable to allow for established organizations to increase and decrease the space they occupy as needed. The adjacent spaces accommodate occupants who prefer a co-working set-up. Shared meeting and lounge spaces foster conversation and collaboration across the organizations leasing space. All of these changes can be made without construction and demolition—further reducing the building's lifetime embodied carbon.

Using high quality design as a global method of carbon sequestration: Beautiful designs can be used to protect the carbon embedded in existing buildings rather than tearing them down to accommodate a new use.

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Contributors

COTE Knowledge Community and AIA staff.

Special thanks

Baltimore Unity Hall, Ziger | Snead Architects, interview participants.

Additional information

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Committee on the Environment

AIA Knowledge Community

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

Committee on the Environment

AIA Knowledge Community



Frost Terrace, Street View
Image Credit: Robert Benson Photography

Frost Terrace

This case study highlights an exemplary architecture project that prioritized both environmental and social aspects of climate change in its design process, community engagement approach, and final design. It aligns with many aspects of the AIA Climate Justice in Architecture Taxonomy across the building, neighborhood, regional, and global scales.

Frost Terrace

Cambridge, MA



Aerial view showing historic and urban street front transitioning to retaining the tree canopy in the back
Image Credit: Multivista

Summary

Frost Terrace leveraged community priorities around historic and ecological preservation to expand access to two- and three-bedroom affordable housing units in a high rent neighborhood of Cambridge, MA. Over the course of a year, the design and development team collaborated closely with community members, building upon their existing track record with the City of Cambridge, local affordable housing advocates, and neighboring institutions like Lesley University. They successfully integrated a complex set of priorities and requirements into an elegant design for a tight site that enhances housing security and socioeconomic diversity. The project adaptively reuses three historic homes, preserves six landmark trees, and contributes to City of Cambridge's climate change mitigation and resilience goals.

Project overview

BUILDING PROGRAM TYPE(S):
Affordable housing

PROJECT TYPE:
New construction/addition,
Existing building/renovation

TOTAL FLOOR AREA:
49,000 sq. ft.

TOTAL USERS:
40 units: 13 three-bedroom,
13 two-bedroom, 13 one-bedroom,
and one (1) studio

SITE AREA:
22,068 sq. ft.

NUMBER OF FLOORS:
5

PROJECT CLIMATE ZONE:
ICC Climate Zone 6B

PROJECT SITE:
Previously developed land,
Historic structure or district

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2021

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$16.5 million

THIRD PARTY RATING SYSTEM:
LEED Gold

Project team:

OWNER:
CC HRE 1791 Mass Ave Tenant LLC

ARCHITECT:
Bruner/Cott Architects

MP ENGINEERS:
Petersen Engineering, Inc.

ELECTRICAL ENGINEERS:
R.W. Sullivan

STRUCTURAL ENGINEER:
L.A. Fuess Partners

CIVIL ENGINEER:
BSC Group

LANDSCAPE ARCHITECT:
Lemon Brooke LLC

SUSTAINABILITY CONSULTANT:
New Ecology, Inc.

GENERAL CONTRACTOR:
Keith Construction Inc.

"The city of Cambridge has a huge commitment to affordable housing ... and simultaneously to resiliency and climate and sustainability. It's projects like [Frost Terrace] that are the examples of where those connect and help people understand. The historic preservation of the three houses ... and then the modern addition in the middle .... show how you can combine the old in Cambridge with the future of Cambridge."
—Cassie Arnaud, City of Cambridge



Diagram showing the restoration of the historic street frontage by moving the front building closer to the street
Image Credit: Bruner/Cott Architects

Design Process

Frost Terrace achieved a feat that has eluded many cities: Adding 40 affordable housing apartments to a high rent neighborhood in Cambridge, MA. This success was made possible through a collaborative design process that brought together the design and development team with the City of Cambridge, the historical commission, neighbors, and residents of an adjacent condominium. Together, they navigated competing social, historical, and ecological interests related to the site.

The property faces Massachusetts Avenue, one of the busiest thoroughfares in Cambridge. It's bounded on the north by a historic church that Lesley University converted into a library and on the south by a row of condominiums that face the Frost Terrace property as they stretch back to the eastern boundary of their parcel. Initially, the site was divided into three parcels: The front half facing the avenue and two twin parcels in the back, which were accessed by an easement along the boundary with the condos. All three parcels were zoned residential and hosted an existing 19th-century house.

The City of Cambridge initially purchased the front half of the site from a landowner who had realized it would be difficult to change the zoning designation on the property. The city transferred the property to a for-profit developer with a track record of building high-quality affordable housing developments in Cambridge. The initial design called for a 27-unit, 6-story apartment building facing Massachusetts Avenue—a building type that aligns with the height and density of many 19th- and early 20th-century apartment buildings in that part of Cambridge. However, that design would have required demolishing the existing second empire house facing Massachusetts Avenue and eliminated most, if not all, the open space on the property—including the removal of a horse chestnut tree that is beloved in the neighborhood. Luckily, the owners of the back two parcels decided to sell their properties to the city when they learned about the developer's plans. Over more than a year, the design team met with stakeholder groups to listen to their concerns and revise the design accordingly.

The additional land made it possible to add 13 more units to the project while also reducing the overall height of the structure; preserving all three historic buildings, the horse chestnut tree, and an immense oak tree toward the rear of the site; as well as maximizing plantings and shade on the south side of the property. The tradeoff was the installation of two units in the basement of the new multifamily building and the provision of only three accessible parking spots.

> "The people involved [in the design] were wonderful to work with. They were very collaborative. We felt listened to in the whole process, and they addressed a lot of our concerns about the building ...which we own."—Matt Brownell, Lesley University, Public Comment at Planning Review Meeting

Affordable housing overlay

The developer's proposal to build entirely affordable housing on the property was central to its success in the regulatory and community engagement process. The Commonwealth of Massachusetts has instituted a comprehensive permit process for affordable housing projects that allows the local zoning board to issue all relevant approvals, including zoning waivers, in one step—rather than working through the more arduous special permit process involving approval by many separate boards. Frost Terrace utilized this process—known as Chapter 40B—to rezone the property, increase its height and density, and limit the number of on-site parking spaces, while maintaining 45% open space on the site. Furthermore, discussions with surrounding landowners about tradeoffs focused on how the proposed design change might affect the number of affordable apartment units that could be included in the scheme.

"I have been involved in the public community process of this project from the very beginning and I have been so incredibly impressed with this team's ability to listen and learn from residents and change the design."—Adrian Musgrave, Resident, Public Comment at Planning Review Meeting

Historic preservation

Purchasing the back half of the site opened enough space to both increase the total number of affordable housing units and allow for the renovation of the three historic buildings on the property rather than tearing them down. The final design places the higher-density multifamily portion of the project behind the renovated Second Empire home at the front of the property and links it to the two renovated historic homes at the rear of the property. The apartment building intentionally serves as a backdrop, shifting focus to the historic home and its position next to the church. Protecting the three homes and two equally historic trees demonstrated the design and development team's commitment to addressing community priorities for the site.

Project financing

Like all affordable housing projects, Frost Terrace required complex financing, drawing from 10 sources. The City of Cambridge was an essential partner, contributing over $7 million in land acquisition to the project. The Chapter 40B process allowed the development to increase density beyond currently zoned allowances, which boosted operating income and helped the project meet federal low-income housing tax requirements related to cost per unit. The project was also eligible for utility rebates for energy efficiency measures and both utility incentives and Inflation Reduction Act funding for rooftop solar.

Low-income housing tax credits and other public financing mechanisms also facilitated planning board approval by mandating public oversight of building and landscape maintenance for the first 15 years of operations.

"The trust you built. You had completed one project in Cambridge before this. , … you [now] have a well of trust among the funders, as well as a lot of folks in the community, which will serve you well as you do your next project."—Cassie Arnaud, City of Cambridge

Essential climate justice design components include:

1. Building long-term community and regulatory trust for flexibility, creativity, and unconventional financing: Both the design and development teams were known quantities to community groups and regulatory bodies before attempting to rezone this underutilized site in a high-rent neighborhood as a LEED Gold affordable housing development. The City of Cambridge and local non-profits trusted the developer based on a previous affordable housing development they had spearheaded in the city. Next-door neighbor Lesley University vouched for the architect, who had renovated the adjacent historic church.
2. Prioritizing affordable housing as the main driver for decision-making: Design decisions that provided climate mitigation and resilience co-benefits—such as energy efficiency and green infrastructure—were prioritized for their positive impact on future residents and the surrounding neighborhood.
3. Aligning seemingly conflicting environmental and social priorities to find innovative solutions: Frost Terrace successfully integrates the City of Cambridge's goal of expanding access to affordable housing with the historic commission's priority to renovate three existing structures; the neighbors' desire to preserve daylight, air, and views of nature, and the city and state's climate mitigation goals—all within a single, elegant design.

AIA Climate Justice in Architecture Taxonomy

Climate change creates new, and amplifies existing, environmental, and social challenges across the following seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy centers both the environmental and social aspects of climate change and helps teams respond with an architectural design impacting the themes across three scales: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The Framework is comprised of 10 principles and informs progress toward four outcomes – a zero-carbon, healthy, resilient, and equitable built environment.

Frost Terrace addresses all three scales in the taxonomy, with particular emphasis on the building and neighborhood scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	●	●		Equitable Communities; Water; Economy; Energy; Well-being; Resources; Change
Cultural Connection to Place	●	●		Integration; Equitable Communities; Well-being
Economic Development without Displacement	●	●		Economy; Resources
Environmental Justice				
Ecosystem Health	●	●		Integration; Ecosystems
Climate Change Health & Resilience	●	●	●	Equitable Communities; Ecosystems; Energy; Well-being; Resources; Change
Decarbonization	●	●	●	Energy; Resources

Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Frost Terrace. Source: Biositu, LLC



Historic cottages at the rear of the property
Image Credit: Robert Benson Photography

Social determinants of health

Prioritizing efficient design strategies to reduce the risk of housing insecurity: The savings from high-efficiency wall and roof insulation, energy- and water-efficient strategies, and on-site solar power generation are passed directly to low-income residents through reduced utility bills.

Centering universal and barriers-free design: Both the buildings and landscaping prioritize accessibility for mobility-impaired residents. Additionally, the three on-site parking spaces provided are designated for special needs. The resident services coordinator will also help residents with physical disabilities access public transportation services for mobility-impaired riders.

Creating a healthy living environment for residents: In stark contrast to many moderately priced rentals, Frost Terrace was designed with a budget for maintaining the building and grounds in support of resident health and well-being. Strategies include 100% outdoor air ventilation, enhanced filtration, and the use of low emitting paints, coatings, flooring, adhesives, sealants, and composite wood.

"I'm a big fan of residents paying for as many utilities as possible. They get a reduction in their rent accordingly. It helps encourage them conserve resources. ... We want the residents to be on the same page as us [in terms of building operations and maintenance]."—Jason Korb, Developer

Constructing 40 affordable housing units in a high-rent, transit-oriented neighborhood: The developer petitioned the planning review board to restrict Frost Terrace as affordable rental housing in perpetuity to permanently increase affordable housing options in a high-rent neighborhood of Cambridge. Examples of the neighborhood's advantaged socioeconomic status include its low social vulnerability and environmental justice scores (0.16 and 0.21, respectively, with 1.0 indicating perfect vulnerability), low rate of food insecurity (6.3% compared with 8.3% in Cambridge and 13.9% in the U.S.), and low rate of housing insecurity (6.9% compared with 8.5% in Cambridge, 14.9% in Boston, and 11.8% in the U.S.).

Designing family-friendly units for low- and moderate-income families: Most of the units are two- and three-bedroom because high rents have disproportionately displaced families from Cambridge. The development includes a play space for children in the lower level of the main building, as well as a part-time service coordinator offering family-friendly programming and help accessing social services.

Encouraging active living by making a walkable, transit-oriented neighborhood accessible to low- and moderate-income families: While Frost Terrace faces Massachusetts Avenue along a corridor that is ranked among the top 5% of bicycle and pedestrian crash clusters in Massachusetts, the location received a 97 on walk score, 73 on transit score, and 99 on bike score in pre-development. Over 50% of neighborhood residents commute to work using public transit, walking, or cycling (compared with 6.7% in the U.S.). The wide sidewalk in front of the development along Massachusetts Avenue encourages multi-model forms of transportation. The property further encourages active transportation by providing only three handicapped parking spaces and offering indoor bike parking for 48 bikes.

"The City of Cambridge has a really big prioritization for affordable housing. We lost rent control in the mid-nineties. And, ever since then we've gone through a series of ever increasing interventions... openly driven by needs of preserving socioeconomic diversity, race diversity, and ... kids in schools. A lot of communities want senior affordable housing, because that feels least impactful. Cambridge is kind of the reverse. Cambridge really wants to see kids and families and the most vulnerable served in in the housing that we support."—Cassie Arnaud, City of Cambridge

Cultural connection to place

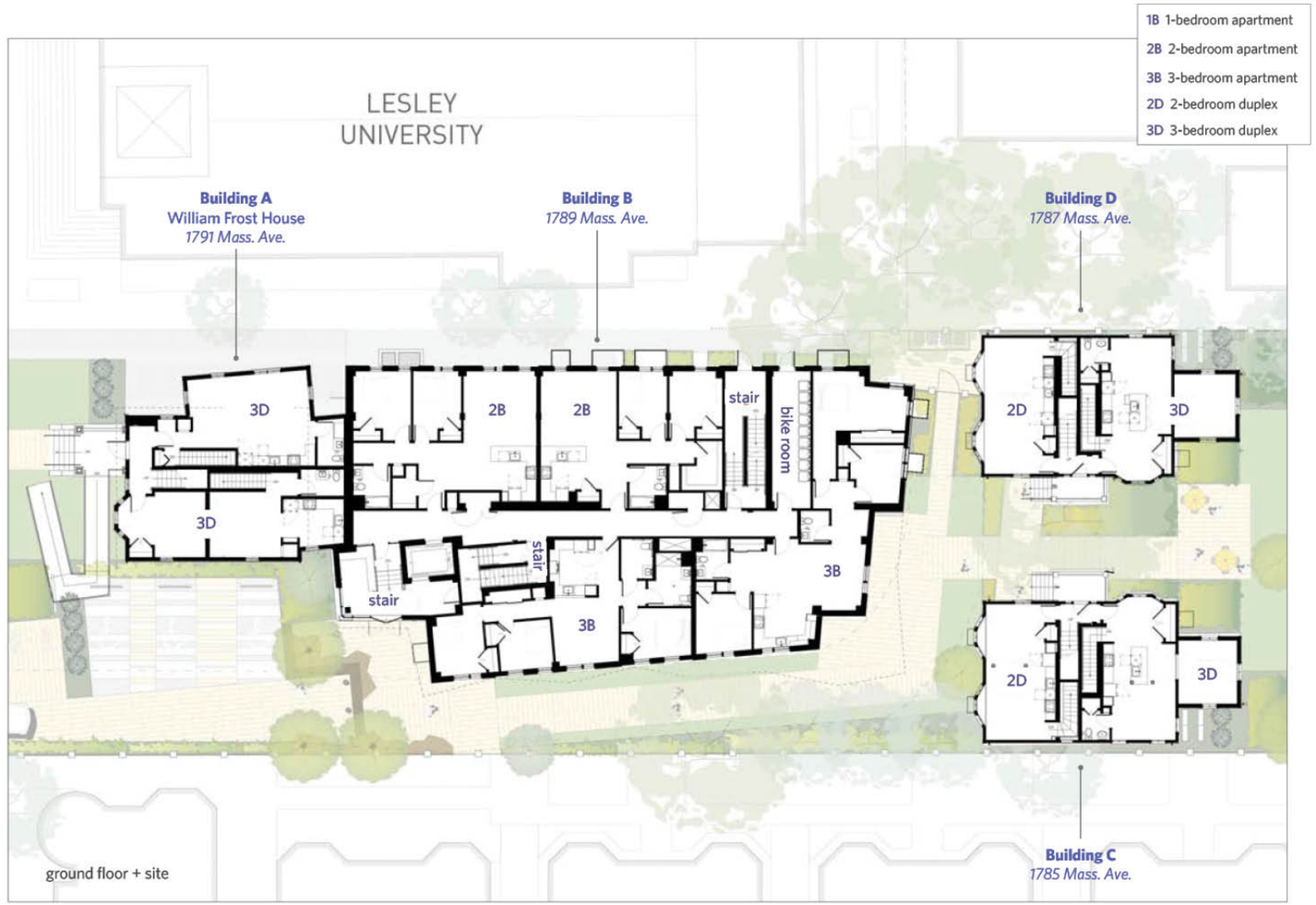
Foregrounding the historic structure at the front of the site to increase density while simultaneously enhancing the neighborhood's architectural heritage: The new multifamily building is designed as a backdrop for the second empire house facing Massachusetts Avenue. The masonry and clapboard materials on its façade echo other 3- to 5-story apartment buildings along the avenue.

Integrating a private pocket park: Cambridge is known for hidden gardens and pocket parks tucked into its deep lots. Frost Terrace follows that typology, wrapping around a welcoming, landscaped area in the interior of the site. This creates an outdoor community space and access to a quiet and nature-filled place steps from one of the busiest streets in Cambridge.

"We are working with an arborist and landscape architect … to make attempts to … restore six of the existing significant trees on the site, including the most significant tree, which a lot of people can see in the neighborhood, but they don't really know where it's coming up from. [It's] the multistory 39-inch red oak. It's enormous. And … we've actually designed our building around the 24-inch horse-chestnut tree. That's the reason why the building comes in and then comes back out, because of the concerns we heard about the tree."—Jason Korb, Developer, Public Comment at Planning Review Meeting

Restoring the historic street view: The project restored one of the few remaining examples of a Victorian residential street front in Cambridge by moving a second empire-style house, built in 1865, closer to Massachusetts Avenue. This move aligned it with a neighboring historic church that had also been relocated.

Designing the height and massing to enhance the transition from a major avenue at the front to a single-family residence at the back: Retaining shingle-style houses at the rear of the property helps transition from the higher density of Massachusetts Avenue to lower density residential development to the east. The larger apartment building, weaving between the houses and the Massachusetts Avenue property line, mimics the size and massing of other multifamily apartment buildings along the urban street. The south facing façade folds back and forth in a modern interpretation of bay windows, echoing the articulation of the condos next door.



Frost Terrace ground floor and site plan
Image Credit: Bruner | Cott Architects

"Just like the rest of Cambridge, our design is a mixture of old and new that responds to the layers and grain of the city along this part of Massachusetts Avenue."
—Jason Forney, Architect, Bruner/Cott Architects

Economic development without causing displacement

Integrating energy and water efficiency for housing security: The design prioritizes lowering out-of-pocket operational expenses for tenants through energy and water efficiency strategies.

Increasing affordable housing units in a high-rent neighborhood: Only 15% of housing units in Cambridge are affordable for families with low- and moderate incomes. Two- and three-bedroom units are in particularly short supply, leading to families either living in overcrowded conditions or moving away from Cambridge.

"On my street over the past ten years, 16 [of the 17 rental units] have been forced out due to increasing rents. ... I live at less than two blocks from Central Square subway station and ... off of Mass. Ave. Ten years ago ...-- we went car free my family, and we were the first person on the block to do it. Everybody else on the block has since followed with the exception of the four people who have parking spaces. If you build it, they will come. For all of us, having a place to live is more important than having a place to park our car."—Bill McAvinney, Resident, Public Comment at Planning Review Meeting

Ecosystem health

Preserving and enhancing the existing ecosystem: 30% of the property's open space is landscaped. The landscape design preserved six out of the nine on-site mature trees. New plantings are native, drought tolerant species.



Community open space at the rear of the property
Image Credit: Robert Benson Photography

Designing the natural features to enhance the neighborhood's ecosystem health: The landscaping and civil engineering was designed to retain the neighborhood tree canopy and all on-site stormwater using green infrastructure strategies. Green infrastructure is also an effective mechanism for reducing exposure to disease-carrying vectors, such as the two that are most prevalent in Middlesex County: Dengue, a mosquito-borne illness, and Lyme Disease, a tick-borne disease.The landscape architect's goal for the design was to "leave this place a leafier, greener, shadier space than it is currently."

"The landscape works to be a good neighbor. ... Along the south side of the property several large mature trees ... provide cover, visual privacy down into the site from the adjacent buildings. ... all the spaces where people might congregate to have a conversation or a small social gathering [are in] the interior of the site. And so ... the periphery is ... meant as a buffer for the privacy of the neighbors but also to be good neighbors to our abutters."
—Jason Forney, Architect, Bruner/Cott Architects, Public Comment at Planning Review Meeting

Climate change health & resilience

Integrating indoor air quality features to protect from infectious disease, ozone action days, and wildfire air pollution: The ventilation system introduces 100% outdoor air to the residential units and uses MERV 13 filtration media, which protected residents during COVID and continues to support respiratory health on air pollution days caused by traffic and/or wildfire smoke.

Using air conditioning to reduce exposure to extreme heat events: Many apartments in the greater Boston area do not have access to air conditioning, although extreme heat is one of the region's most deadly climate change exposures. Frost Terrace integrates passive and active systems to reduce resident exposure to extreme heat. Enhanced wall and roof insulation reduce cooling demand. All units are equipped with ERV heat recovery systems and high efficiency air source heat pump systems to provide low-cost air conditioning and heating.

Raising the ground floor and placing mechanical equipment on the roof to increase flood resilience: The ground floor apartments are lifted three feet above ground level, which reduces their risk of flooding during heavy rain events. Similarly, placing mechanical equipment on the roof reduces the risk that a flood event will result in a power outage.

"When we're building a building, we don't fight [climate change]. We adapt to it." —Jason Korb, Developer

Preserving the tree canopy on-site reduces the urban heat island in the larger neighborhood: The tree canopy in the neighborhood surrounding Frost Terrace averages just over 20%. Mature trees can contribute to mitigating the urban heat island beyond the edge of the site. Several of the heritage trees that Frost Terrace preserved reduce the urban heat island effect beyond the property line by offering direct and indirect shade for large swathes of the residential neighborhood to the east of the development.

Installing green infrastructure contributes to neighborhood flood risk mitigation: The neighborhood surrounding Frost Terrace has a high percentage of impervious surface, ranging from 65-82% imperviousness. The civil and landscape design uses plantings, permeable paving, and sub-grade retention to retain 100% of storm water on site, thereby mitigating the development's contribution to neighborhood flood risk.

"The storm water on this site is being dealt with on site. We live further down Mass. Ave. and the storm water's a huge problem, because the building development is on Mass. Ave. The fact that they actually have a comprehensive process to deal with their storm water is a great thing relative to other properties."
—Bhupesh Patel, Resident, Public Comment at Planning Review Meeting

Increasing solar power capacity in Cambridge: The 20kw solar ready roof is available to expand solar power generation in the greater Boston area when the time is right

"Some of the "decarbonization" was driven by the State of Massachusetts and the city of Cambridge having very high standards. ... [Frost Terrace has] robust envelopes like R30 walls, R60 roof, and that's both for the new building and the existing. We didn't let the historic nature of [the existing] buildings be an excuse to not do well."
—Jason Forney, Architect, Bruner/Cott Architects

Decarbonization

Restoring three historic structures on the property reduces the development's embodied carbon: Restoring existing buildings reduces the amount of new material used on the project, thereby reducing its embodied carbon.

Coordinating the project location with surrounding active transportation infrastructure encourages residents to choose low carbon transportation options: Frost Terrace is located less than ¼ mile from bus, metro, and commuter rail stops in a dense neighborhood with amenities like grocery stores, schools, and medical care. The design encourages residents to take advantage of its transit-oriented location by making only three accessible parking spaces available on site and accommodating 48 indoor bike parking spaces.

Meeting local and regional sustainability standards contributes to regional and global decarbonization efforts: Enhanced insulation, a white reflective roof, and energy and water efficient building systems and fixtures resulted in a 40% reduction in energy use intensity and 46% water use reduction compared with the baseline. The campus is also entirely electric except for water heating.

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COTE Knowledge Community and AIA staff.

Special thanks

Bruner/Cott Architects, interview participants

Additional information;

ARCHITECT Magazine | Frost Terrace Affordable Housing

Boston Society of Architects | Frost Terrace – BSA Design Awards

Housing Finance Magazine | Development to Bring New Affordable Homes to Cambridge, Mass.

HUD USER | Providing Affordable Housing Through Historic Preservation in Cambridge, Massachusetts

Cambridge Day | 'Frost-Terrace' affordable housing OK'd will bring 40 units to Porter Square area Cambridge Day

Committee on the Environment

AIA Knowledge Community

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

Committee on the Environment

AIA Knowledge Community



Front entrance of the Haven Domestic Violence Shelter.
Image Credit: MASS

Haven Domestic Violence Shelter

This case study highlights an exemplary architecture project that prioritized both environmental and social aspects of climate change in its design process, community engagement approach, and final design. It aligns with many aspects of the AIA Climate Justice in Architecture Taxonomy across the building, neighborhood, regional, and global scales.

Haven Domestic Violence Shelter

Bozeman, MT



Communal space in Haven's residence building provides clear sightlines and choice of movement.
Image Credit: MASS

Summary

Founded in 1979 as a grassroots movement run by women volunteers in Bozeman, MT, Haven is a nonprofit organization dedicated to helping survivors of domestic violence. In 1982, the organization purchased a single-family home and converted it into a nondisclosed shelter serving 12 survivors at a time. Over the past decade, Haven has supported more than 8,000 survivors by providing transitional housing, a 24-hour support line, counseling, support groups, a survivors' support network, a survivors' speakers bureau, legal support, relocation services, leadership development, and financial literacy education.

In 2023, Haven opened a new, publicly disclosed, 40-bed shelter for survivors of domestic violence, providing short-term housing (4–6 months). The new facility also includes a public-facing building that provides education and wellness services to about 4,000 community members per year. It serves a dual mission: (1) Safe, transitional housing for survivors; and (2) public-facing programs aimed at ending the stigma associated with domestic violence. The LEED-certified campus, which centers on trauma-informed design principles, reflects Haven's embrace of survivors' whole selves. Spaces are adaptable, so survivors can access the wrap-around services that are most helpful during their transition to a new living situation.

Project overview

BUILDING PROGRAM TYPE(S):
Multifamily/social services

PROJECT TYPE:
New Construction

TOTAL FLOOR AREA:
16,000 sq. ft.

TOTAL USERS:
30 rooms (40 users)

SITE AREA:
3 acres

NUMBER OF FLOORS:
2

PROJECT CLIMATE ZONE:
ICC Climate Zone 6B

PROJECT SITE:
Greenfield

PROJECT SETTING:
Suburban

YEAR OF SUBSTANTIAL COMPLETION:
2023

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$6 million

THIRD PARTY RATING SYSTEM:
LEED BD+C v4 Certified

Project team

OWNER:
Haven Domestic Violence Shelter

ARCHITECT:
MASS

MEP ENGINEERS:
Energy 1

STRUCTURAL ENGINEER:
IMEG

CIVIL ENGINEER:
Sanbell

GENERAL CONTRACTOR:
Martel Construction

PRO BONO CONTRIBUTORS:
MASS, Abby Hetherington Interiors, Alder & Tweed Design Co., Energy 1, Envi Interior Design Studio, Farland Interiors, Gallatin Valley Furniture, ICON Interiors, IMEG, Kath Williams + Associates, Montana State University Integrated Design Lab, Pyralis Sprinkler Design, LLC, Sanbell, SAV Digital Environments in partnership with Open Studio Collective, Shelter Interiors

"The center is a demonstration, in concrete and wood, of our vision to end the stigma of domestic violence through engaging our community, and through education, advocacy, and prevention."
— (Giving Hope a Home)



Upstairs lounge at Haven.
Image Credit: MASS

Design Process

Using the design process to begin destigmatization and healing

Haven is a survivor-driven organization. This approach to care informed conversations about the design of the new, disclosed shelter. For years, Haven held community listening sessions and surveys to understand how the types of services they provided were impacting survivors and how a new purpose-built shelter could better support them. This engagement process solicited feedback from survivors; community members; and Haven staff, Board of Directors, donors, and partners. These conversations extended the process of destigmatization and community healing.

In 2019, Haven launched a design competition for the new shelter. A Design Advisory Group, composed of Haven staff, survivors, and community stakeholders, was formed to provide guidance throughout the competition process and select the design architect.

The competition brief asked architects to envision a single campus that would serve two populations: (1) Survivors who needed a safe, supportive, and private environment to heal and (2) the larger Bozeman community who play a role in supporting the survivor community and addressing the root causes of domestic violence.

When Haven awarded the project to MASS in 2021, Erica Coyle, former executive director of Haven, spoke of the important role that both survivors and community members would play in the success of the new shelter:

To the survivor community, she said:

> " To prepare for this project, we looked to all of you—and in particular, survivors—to help us answer the questions that could help us realize our vision: What could it look like if we had a facility that responded to the needs of survivors as whole people, not just to the trauma they've experienced? How could it look if we had a shelter that didn't just provide physical safety, but provided the space to build community? What are the barriers to survivors seeking support and how might we remove those barriers? What if we could design a space that promoted healing and dignity?"
> —Erica Coyle, former Executive Director, Haven (Coyle, 2021)

And, to the larger Bozeman community, she said:

> "If we ever stand a chance of eradicating abuse, it's by engaging all of you in helping us do so. By moving towards a new model of providing shelter and services that rebuilds broken support networks and gives ownership of the issue to our community, that is where the real change will happen."
> —Erica Coyle, former Executive Director, Haven (Coyle, 2021)

The MASS shelter design proposal emphasized the design process itself, grounded in the five principles of trauma-informed care: Safety, trust, choice, collaboration, and empowerment. Their expanded approach accompanied partners and communities-served from early ideation through the project's opening day and ensured that resulting design is both functional, culturally resonant, and deeply rooted in place.

Trauma-informed design process

Haven's approach to care extended to conversations about the design of the new, publicly disclosed shelter. Conversations about a new, purpose-built shelter on a disclosed campus began up to five years before the design competition and continued throughout—including reviewing and commenting on the drawings during the design process. One survivor burst into tears after looking at the design, saying, "I feel so seen. You listened."

Design conversations began by clarifying Haven's mindset about trauma. Haven staff recognize that everyone has experienced trauma and that it might mean something different for each person on the

team. As former executive director Erica Coyle puts it, "For better or worse, we are in trauma every day. It is a daily conversation. We encourage staff to bring their boundaried but whole self to work." Taking that approach helps staff empathize with survivors and the traumas that survivors bring with them when they enter the Haven community and meet them where they are. Supporting staff in an environment where they experience vicarious trauma on a daily basis became a key component of the design conversation.

The design of Haven's new facility illustrates the critical role the built environment can play in lessening triggering or retraumatizing stimuli for individuals who have experienced traumatic experiences, along with providing respite for frontline care providers. This project serves as an example for how design can address acute needs of survivors and help facilitate a shift in the responsibility of healing from an individual burden towards a collective one. With this new facility, Haven is a model for others nationwide using the built environment as a platform to advocate for a broader, national conversation around the impact of domestic violence in our communities.

Key trauma-informed design considerations for the new shelter that emerged from conversations with survivors and staff included:

- **Design for dignity and "whole people":** The previous shelter was a converted single-family home. Some survivors described it as dark and unwelcoming. Designing a new, purpose-built shelter created an opportunity to bring more light, beauty, and dignity to the healing experience. The interior design stayed away from institutional aesthetics in favor of warm colors and natural materials. Separating the community-facing and administration building from the residence also honors the dignity and privacy of survivors. Survivors have diverse needs, requiring the design to respond to a multiplicity of needs rather than a one-size-fits-all approach. The design of the residential units centered on adaptability providing different room configurations, sizes, and ability to be grouped into pods, to meet the needs of different family sizes. Flexible shared spaces provide survivors with opportunities to relax, socialize, play, or otherwise exercise agency based on their individual circumstances.

- **Design for autonomy and choice:** Survivors experience a range of sensitivities to different sounds, smells, temperatures, and levels of activity. Many also did not experience full freedom of choice in their previous domestic circumstances. Acknowledging the importance of autonomy therefore became a central goal of the design, which includes a range of spaces, from private to public indoors and outdoors, and from quieter to more active lounge areas. The central kitchen responds to a strong message from survivors that they enjoy cooking together and value having control over what they cook for themselves and their families.

- **Design for calming overstimulation:** Trauma-informed design emphasizes spaces that help prevent retraumatization and mitigate triggers and potential stressors in the built environment. The residence design uses predictable spatial configurations, straightforward wayfinding, and clear signage to help reduce the cognitive load survivors need to process to move through the space when they are in an overstimulated state.

- **Design for safety**: While survivors supported the shift to a disclosed shelter and the ways in which it reduces the risk of social isolation and stigma, safety remains a prerequisite to the healing process. The campus layout, landscape design, and security features are designed to create a sense of safety and support for survivors. Security features occasionally came into tension with the goal of designing for dignity. For example, one set of exterior glass doors was replaced with metal doors, and an acrylic barrier was added to the upstairs balustrade inside the residence building to enhance security.

- **Design for children:** About half of the survivors walking through Haven's doors are children who deserve spaces tailored to their needs. The design of the facility provides a welcoming environment for children with designated play areas, within reach from parents and counselors. These spaces facilitate privacy for adults while providing clear sightlines to promote children's physical and emotional safety. Outdoor spaces and playgrounds are designed with younger survivors' needs in mind. A variety of spaces, designed to welcome survivors of all ages and appropriate for all development stages, encourage young survivors to meet with counselors and interact with other children with similar lived experiences.

Responses to the new shelter

Both survivors and staff have responded to the new space with a mixture of excitement and grief. Advocates brought the current residents over to tour the space a few weeks before the move to help with the transition. Everyone who had lived and worked in the previous location had found comfort and safety there, in spite of its downsides. Both groups have felt uplifted by the new building, the public-facing programming, and the community support that has accompanied a disclosed location. Staff members, in particular, feel that they no longer work in isolation. They now work openly and in partnership with community-based organizations and faith-based institutions.

"The old space was kind of old and dingy and dark. The new space was quite literally designed with survivors in mind and really prioritizes their dignity and their needs. They were involved in design conversations and provided input on what they feel like they needed in the space. Haven staff and the MASS design team really listened. So, people here have been really grateful for the beauty of the space. There's a lot of different communal spaces as well, so they have opportunities to engage with one another, but they also have the ability to remove themselves to their room when they need to. ... I have heard survivors say this is the nicest place they've ever lived."
— Kareena, Director of Programs, Haven

Reconciling tensions between social equity, mental health, and climate goals

Like many projects with a social service mission, environmental strategies in Haven's design support its social mission. When the design team was confronted with difficult choices—such as how to balance the mental health benefits of thermal comfort and access to daylight and views with the decarbonization goals in LEED—they implemented solutions that supported mental health and resilience while still meeting minimum energy standards. For example, the shelter includes air conditioning in the residence, even though many residential buildings in Montana have only installed heaters. Kath Williams + Associates provided green building consulting services pro bono, and the cost associated with LEED certification was covered through a charitable contribution.

"Our goal was to balance sustainable building practices with the comfort needs of survivors. We made it through one summer without air conditioning, but when we are supporting young families and mothers who are pregnant, we realized that as our climate warms, we needed to adjust. We added air conditioning in the form of mini splits so that survivors could have more control over their environment."
— Erica Coyle, former Executive Director, Haven

Project financing

The Gallatin Valley Land Trust purchased 12 acres using financing from The Conservation Fund. The trust sold nine acres to the City of Bozeman through the Trails, Open Spaces, and Parks Bond with the goal of expanding a local park and the remaining three acres to Haven at below-market rates.

The capital funding for the construction of the shelter campus was raised through donations from more than 400 donors and supplemented by pro bono work provided by 14 local companies. The construction budget was impacted by the rising costs of building materials. The contractor sourced materials locally, such as Douglas fir cladding, to minimize potential cost overruns.

Over the long run, the new facility has enabled Haven to increase its total staff size and provide space for community partners and wraparound services that previously had been housed off-site. Moving all operations to the administration building redirects funds previously spent on rent toward in-house operational expenses.

One unexpected financial challenge Haven has experienced as a result of the success of their new campus is the shift in the way they are viewed by the local philanthropic community. Their beautiful new facility has changed their image from being seen as a scrappy, grassroots nonprofit to one of the largest nonprofits in the community in terms of staff and budget. Energy and water efficiency strategies help lower operational costs, but Haven's fundraising efforts have had to shift toward supporting the expanded staff and services made possible by the larger facility.

> "This unique project demonstrates that effective land protection can also enhance the health and well-being of a community. It is a testament to how GVLT's unique skill set is a catalyst for visionary partnerships and bringing people together. ... The park and surrounding area serve as a critical connection, a shared backyard, and safe haven for all of our neighbors across the valley."
> —Chet Work and Erica Aytes Coyle (Bozeman Daily Chronicle, 2023)

Essential climate justice design components include:

1. **Survivors and community stakeholders led the design process from the beginning:** Conversations about the design of a disclosed shelter began with survivors, staff, and community stakeholders years before the design competition to select an architect. Stakeholders from all three groups worked together to select the architect and continued to provide feedback throughout the design process. While the project design happened at the height of the COVID-19 pandemic, the architecture firm delivered a design process to center survivor and community voices and built long-term personal connections that informed the design and enabled post-occupancy evaluation of the project's impact.

2. **Trauma-informed design principles set up the project to capitalize on co-benefits:** The focus on trauma-informed design naturally led to design strategies that prioritized co-benefits such as daylight and locally sourced, natural finish materials, which both promote mental health among survivors and reduce the project's carbon footprint.

3. **Environmental design decisions supported social and mental health priorities:** The strong emphasis on centering survivors' experience in every aspect of the design guided the design team in deploying their baseline design toolkit, including green building strategies, in the interest of promoting a healing environment.

AIA Climate Justice in Architecture Taxonomy

Climate change both creates new and amplifies existing environmental and social challenges across seven themes or categories: Social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy addresses both the environmental and social dimensions of climate change, guiding teams to design architectural responses that impact these themes at three scales: Building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The framework is comprised of 10 principles and informs progress toward four outcomes: A zero-carbon, healthy, resilient, and equitable built environment.

Haven addresses all three scales in the framework, with particular emphasis on the building and regional scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	✓	✓	✓	Integration; Equitable Communities; Well-being; Change; Discovery
Cultural Connection to Place	✓		✓	Integration; Equitable Communities; Well-being; Discovery
Economic Development without Displacement	✓			Equitable Communities; Economy
Environmental Justice				
Ecosystem Health	✓		✓	Integration; Equitable Communities; Ecosystems; Well-being; Resources; Change; Discovery
Climate Change Health & Resilience	✓		✓	Equitable Communities; Ecosystems; Water; Well-being; Change
Decarbonization	✓		✓	Equitable Communities; Economy; Energy; Resources; Change

Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Haven. Source: Biositu, LLC





Double-height lounge space at Haven with views of the outdoors.
Image Credit: MASS

Social determinants of health

Publicly disclosing the shelter location to increase access and support the mental health of survivors: Shifting from an undisclosed location to a public shelter supports survivors who are still living with abusers in three ways. First, Haven is easier to find when survivors are ready to seek help. Second, the disclosed location reduces social isolation and supports social connectedness for survivors by allowing visits from family and friends—something that was not possible in the undisclosed location. Third, moving the topic of domestic violence into the community helps erode potential self-stigmatization that could stand in the way of seeking help.

Tailoring trauma-informed design principles to serve the unique needs of survivors: Conversations with survivors led the design team to prioritize design solutions that would center safety, trust, choice, collaboration, and empowerment to promote peace of mind and healing within the Haven campus. To address these principles, the shelter's functions were organized into two separate buildings and three outdoor areas offering a range of privacy and community interaction levels. The public-facing building hosts community-oriented classes and events. It also houses staff offices, wrap-around services, and an office for local law enforcement. Visitors are screened before being allowed entry, and cameras attached to a security system flag license plate numbers associated with abusers. The residence building, tucked into a quiet spot toward the back of the property, is dedicated to resident housing and accessed by pedestrians using a key card and by cars through a gated, private driveway. These siting strategies are the result of careful consideration around adjacency and programming with the goal of centering the survivor experience as one that promotes a sense of safety and healing.

Taking a holistic approach: The design at Haven that survivors arrive at the shelter with their whole selves. It seeks to create a welcoming environment for all types of family situations, including rooms in the residence that can combine to become private suites, accommodations for pets, and a variety of shared common indoor and outdoor spaces.

Supporting a sense of safety and choice: Survivor input inspired the design team to include double-height living room spaces at each end of the residence and a main open staircase. These spaces draw in natural light and offer views to the surrounding landscape, creating a visual connection to nature that supports calm, orientation, and emotional safety. Operable shading systems allow users to regulate light and privacy, reinforcing a sense of control and choice. Throughout the building, clear sight lines, multiple routes, and the absence of blind corners ensure that movement feels intuitive and secure, allowing survivors to decide how to navigate and where to pause within spaces that remain open, bright, and connected to the outdoors.

Building community among residents: The residence features a single, central communal kitchen instead of several small kitchens placed throughout the building, because survivors at the previous shelter valued the connections they made with each other as they cooked and shared meals together. In the public-facing building, spaces like the library offer additional, intimate spaces for community building while maintaining the design principle of clear sight lines and multiple access points.

Supporting families through child-focused design elements: Recognizing that children often accompany survivors when they take up residence at Haven, rooms set aside for counseling and private phone calls in the intake area of the public-facing building include a window into an adjacent playroom so survivors and their children can see each other while maintaining acoustic separation during intake and counseling sessions. Child-specific features of the campus include a children's library, therapy rooms with children's artwork displayed at their eye level, and an outdoor playground.

"Mental health can be and should be supported and maintained by the environment. Functionality, clarity, and sense of order help to regulate our central nervous system. To those coming from chaos and anxiety-provoking homes ruled by abusive partners, there is nothing more soothing than well-defined spaces and roles."
—Ania Bartkowiak, Counselor at Haven (Giving Hope A Home)



Exterior view of Haven.
Image Credit: MASS

"It's not necessarily about the building design at all. It's more about the work that [Haven] does in the space. The fact that this is a disclosed shelter is so important for resilience of the community and the survivors; because, resilience is a lot about the connections that you have in a community. If people you know are there and something's going on, or a climate event happens, then having those connections and not being hidden is really important. That in itself is a strategy."
—James Kitchin, Director, Abundant Futures Lab, MASS

Supporting the financial stability of survivors by eliminating the need for personal vehicles: Bozeman reports twice the national average of residents who commute to work using public transit, walking, or cycling (13.5%, compared with 8.2% in Gallatin County, 6% in Montana, and 6.7% in the U.S). Many survivors arrive at Haven facing financial insecurity, including lack of access to a personal vehicle. Locating the campus in a safe neighborhood within walking distance to a grocery store, an elementary school, a large park, and multiple bus lines eliminates the need to own a car while living at Haven and contributes to the organization's holistic support for survivors as they transition to a more stable living situation.

Supporting mental health through community-facing programs: Haven's community-facing wellness services are geared towards both destigmatizing conversations about domestic violence and acknowledging the role that mental health and social connections play in fostering health-promoting family dynamics. This is particularly important in a community where 18.5% of adults report poor mental health, compared with 16.6% nationally.

Increasing community access to nature and opportunities for physical activity: Regular access to nature and opportunities for physical activity can improve mental health and reduce the risk of chronic disease. Bozeman boasts a high percentage of physically active adults (84.8%, compared with 76.3% in the U.S.) and significantly lower rates of many chronic diseases than the U.S. average, such as high blood pressure (19% in Bozeman, compared with 32.7% in the U.S.), diabetes (4.9%, compared with 11.3%), obesity (21.7%, compared with 33%), and heart disease (3.7%, compared with 6.1%). However, access to parks and opportunities for physical activity is not distributed equally across the community. Only 55.6% of the population in Montana and 61% of U.S. residents report living near a park. The real estate deal that carved out space for the new Haven campus was motivated, in part, by the Gallatin Valley Land Trust's commitment to increasing access to parks and trails for underserved community members. Haven's outdoor spaces were intentionally designed to support healing and physical activity for all ages, including areas for children's play, walking, and quiet reflection. Indoor wellness programming, such as yoga classes, further supports those goals while also increasing community awareness about the links between physical health, mental health, and domestic violence.

"We programmatically as an organization have been working over the past decade to really mobilize the community in addressing intimate-partner violence, but with this new facility we'll actually have the space that neighbors, friends, family members can easily interact with the org, support survivors and help us find the path forward to a future without violence."
—Erica Coyle, former Executive Director of Haven. (Bozeman Daily Chronicle, 2021)

Cultural connection to place

Creating a domestic feel to help destigmatize conversations about domestic violence: The modest building footprint, transparent façade, and architectural elements, such as the gable roofs of the residential building, evoke domestic architecture. These strategies lift up the dignity of all people and the importance of destigmatizing conversations about domestic violence by creating a welcoming, empowering environment of support for both survivors and community members.

Responding to the range of survivors' cultural needs: The design of the residence building is intentionally flexible, accommodating the wide range of backgrounds, belief systems, and family compositions



Haven is located adjacent to a large public park.
Image Credit: MASS

represented within Bozeman's survivor community. For example, Native American survivors expressed a strong preference for centering visual and physical access to natural spaces into their healing process. As a result, ample daylight and visual access to nature are integrated throughout the building. Multiple exterior spaces—ranging from fully private to semi-private to accessing the public park next door—provide survivors with choice and autonomy.

"Designing for the whole person was central to the project's trauma-informed approach. Conversations with Haven emphasized that survivors should have access to the same opportunities and facilities as anyone else in their community. In the public-facing building, the multipurpose room was designed for flexibility, serving as a space for yoga, small lectures, and community gatherings, while a small library offers computer access and a quiet reading room. In the residential building, we discussed how we should design a shared kitchen that could also host group cooking classes and, more importantly, give survivors the ability to choose and prepare their own food, a simple act that restores agency and connection."
— Ana Fernández Martínez, Senior Architect, MASS

Leaning into Haven's rural community where "everyone knows everyone": Making the shelter public-facing allows it to tap into community resources that will help support survivors as they transition to the next phase of life.

Accommodating pets to acknowledge their central role in many families: Pets are integral members of many families in the U.S. According to the American Humane Association, 71% of survivors report their pets were also abused. As a result, up to 65% of survivors with pets delay leaving a dangerous situation because they do not want to leave their pet behind. The design of the facility includes ample outdoor areas for pet relief and a variety of indoor spaces where survivors could relax and spend time with their pets.

Building trust with law enforcement through daily contact: The public-facing building includes office space for law enforcement. This security feature helps build trust between law enforcement and the domestic violence survivor community, which creates a sense of safety, supports them in their healing journey and transition to their new phase of life, and enhances their ability to hold abusers accountable for their actions.

Economic development without causing displacement

Allocating space for wraparound services for survivors: The new campus is large enough to accommodate wraparound services that were previously housed off-site. These services, located in the public-facing building, support survivors as they prepare for their next phase. They include relocation services and financial literacy programs, which help survivors prepare for potential future homeownership. Many survivors face economic hardship when they arrive at Haven, including the need to secure employment that pays enough to cover both transportation and housing costs for themselves and their children. Housing and transportation are particularly challenging because the combined expense consumes an average of 42% of a family's annual income in Bozeman and 47% in Gallatin County. This housing and transportation burden may help explain the relatively low levels of homeownership in Bozeman (43.7%), compared with 69% in Montana and 65% in the U.S.

Ecosystem health

Using biophilic design principles to create a healing environment: Haven makes use of natural building materials, including cork flooring and wood used in both interior finishes and façade cladding, along with landscaping, visual connections to the outdoors, and daylighting to increase a sense of safety, support the healing process, and promote mental health.

"I work a lot with the participants, and I understand how the spaces impact their wellbeing and how important it has been for them to have green spaces and to have big, beautiful windows and light."
—Kareena, Director of Operations, Haven

Integrating native plants with public safety considerations into the landscape design: The landscape design strategically places plantings, boulders, concrete benches, and other landscaping elements in locations where they double as protection for the building façade facing the public driveway and parking area. The landscape also creates a natural barrier that reinforces the fence separating Haven from the adjacent public park. As former executive director of Haven Erica Coyle explained: "Haven feels separate from the park next door. It's got fencing around it. And when you are at the park, you can see [Haven], you can see the buildings. But it does not feel integrated into the park. That was intentional to what we wanted to communicate to the general public. ... This is not a place for you to come play without an invitation. ... There are both natural barriers, like a grove of trees and a little creek running through, and the additional barrier of a fence."

"Together with the landscape team at MASS, the site was designed to feel both welcoming and protective. During early conversations with Haven staff and local partners, we discussed how the site layout could create a gradient of privacy and safety, from more public areas near the administrative wing to quieter gardens toward the residential building. Survivors who feel comfortable engaging in community can spend time in the front courtyards, while others may prefer to use the more private outdoor areas. We wanted the design to give each person the ability to choose what feels safe and comfortable for them at each moment in their healing process."
— Ana Fernández Martínez, Senior Architect, MASS

Aligning the landscape design with a large community park next door: Haven collaborated with the Gallatin Valley Land Trust and the City of Bozeman to purchase 12 acres of undeveloped land. Three acres were set aside for Haven, and the remaining nine acres expanded the existing Bozeman Ponds Park, creating space for a new, natural playground, a fenced dog park, a community garden, outdoor gathering spots, and a trail system.

Protecting the regional ecosystem: Haven is located in the greater Yellowstone ecosystem, the largest intact ecosystem remaining in North America. The campus landscape design seeks to preserve this natural and cultural resource.

"Our landscape team thought about [the fact that] we're part of the greater Yellowstone ecosystem, which is the largest intact ecosystem in North America. ... The site was a greenfield. So, our intent was to place the building to preserve as much of the existing site as we could ... and then bring in native plantings to help bring it back."
—Taylor Klinkel, Senior Architect, MASS

Climate change health & resilience

Reducing exposure to extreme temperatures: The shelter installed roller shades that can cover the large windows in the residence common rooms to increase insulation during extreme temperatures. It also uses radiant heat, which retains warmth longer during a power outage in winter weather than heat delivered through the air supply.

"At least for most of our winters, we do still have really cold weather. So, even when it's negative 20 outside, you can still be in one of the living room spaces in the shelter and feel the sunshine and feel the warmth and have that really nice, comforting experience while not being outside in it."
—Erica Coyle, former Executive Director, Haven

Enhancing community and occupant resilience to extreme heat: Bozeman, Montana's climate vulnerability assessment from 2019 identifies extreme heat, floods, drought, reduced mountain snowpack, wildfire, and winter storms as the primary climate change–related hazards expected to increasingly impact the city through the end of the century. Survivors reported to the design team that the previous shelter felt safe, but it was cramped and uncomfortable, particularly during the summer because it did not have air conditioning and the windows were not operable due to safety concerns. All bedrooms in the new residence include fans and operable windows, in addition to optional air conditioning. Staff have found that providing this flexibility helps foster community-building by reducing the potential for temperature-related conflict among residents.

Community and occupant resilience to wildfire: According to the Montana Department of Natural Resources and Conservation, the total risk of wildfire damage to structures is extremely high in Bozeman (>95th percentile). Haven's enhanced filtration system and backup batteries, designed to bridge disruptions in the power supply for up to four hours, will help protect residents in the event a power outage occurs during a future wildfire.

"I really like thinking about climate justice together with social and cultural justice. When we started designing Haven, we wanted to provide survivors with the thermal comfort they need and deserve, but also to question the idea, rooted in Western culture, that comfort is a fixed concept entirely dependent on mechanical systems. We wanted a building that feels resilient and gives people choices to adapt their environment to their own needs. At Haven, for example, windows are operable, equipped with solar shading devices, and rooms have individually controlled fans. Giving residents this flexibility provides agency and control over their environment. Recognizing that diversity of experience is central to a trauma-informed design approach and it's what connects comfort, safety, and justice in the same conversation."
— Ana Fernández Martínez, Senior Architect, MASS

Contributing to community resilience to extreme heat: According to the CDC Heat and Health Tracker, Haven's zip code (59715) falls in the 92nd percentile in the U.S. for the historical number of extreme heat days and 75th percentile for heat-related illnesses. Several aspects of the neighborhood built environment contribute to the risk of heat-related illness, including 50-80% impervious surface and only 3% tree canopy. Haven's landscaping contributes to citywide efforts to protect green space and expand the tree canopy—enhancing community resilience to heat while also protecting shelter residents and staff from exposure to extreme heat if the power goes out during a heat wave.

Emphasizing water conservation to support community resilience to drought: The Bozeman climate vulnerability assessment predicts more frequent and severe drought in an already semi-arid ecosystem. The city's reliance on snowpack in the Gallatin mountain range for 80% of its potable water—a resource under threat by climate change—has prompted Bozeman to prioritize water conservation to enhance the long-term resilience of the water supply. Native and drought-resistant landscaping and water-efficient fixtures at Haven support the city's efforts to use water conservation as a drought-resilience strategy.

> "We've always had wildfires, but if you want to go hiking now you've got to do it in the first half of the summer, because ... usually the second half of the summer is just too smoky. You don't want to be outside. And it's getting hotter earlier. It feels like we have fires in June, when usually we wouldn't get them until late July or early August."
> —Kareena, Director of Operations, Haven; Erica Coyle, former Executive Director, Haven

Decarbonization

Minimizing embodied carbon through flexible spaces: Many spaces in Haven are adaptable to multiple uses, which helped shrink the building footprint and reduces the need for renovation over the long term.

Minimizing embodied carbon through materials selection: The materials selection process prioritized products that were durable, modular, and/or recyclable. For example, carpet tiles in the reading area can be swapped out individually rather than replacing the entire floor, as well as materials with a lower fabrication carbon footprint such as wood windows instead of aluminum or PVC. Facility furniture is also durable and designed to look better as it ages.

Reducing organizational carbon footprint: The larger space in the new facility allows Haven to consolidate offices previously in rental spaces into the new building. That budget will now support operational expenses in the core campus, which is designed for energy and water efficiency.

Sourcing local materials reduced embodied carbon, saved money, and supported local businesses: Lightweight and glue-laminated timber framing and Douglas fir cladding were locally sourced, which reduced the new building's embodied carbon while also contributing to a warm, welcoming, and residential feel to the building design.

Reducing utility costs through decarbonization strategies to free up budget: The increased square footage in the new facility made it possible to set aside space for local non-profits and government agencies to provide on-site case management and direct services to survivors. The larger space also allowed Haven to increase its staff size, adding overnight advocates, a facilities manager, and an outreach coordinator for programs with boys, men, and faith communities.

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Haven, MASS, and interview participants

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Committee on the Environment

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Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

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Hurricane Strong Home, front elevation
Image Credit: Eric Soltan for +lab Architect PLLC

Hurricane Strong Home

This case study highlights an exemplary architecture project that prioritized both environmental and social aspects of climate change in its design process, community engagement approach, and final design. It aligns with many aspects of the AIA Climate Justice in Architecture Taxonomy across the building, neighborhood, regional, and global scales.

Hurricane Strong Home

Queens, NY



Hurricane Strong Home, side and back porch
Image Credit: Eric Soltan for +lab Architect PLLC

Summary

In October 2012, Hurricane Sandy battered the Breezy Point neighborhood in Queens, New York—a peninsula jutting out into the Atlantic southeast of Manhattan—with high winds and storm surge. The storm caused structural damage and building fires that destroyed more than 300 homes in the neighborhood and damaged many others.

The Hurricane Strong Home is a 1,200 square foot, one-story single-family home that replaced the previous house on the property. The owner, a lifelong resident of Breezy Point, lives on a fixed income. Her new home is designed to both protect her from future storm events and reduce her daily utility bills. The home was designed as a prototype for climate-resilient, environmentally sustainable, cost-effective, and attainable housing in New York, the U.S., and internationally.

Project overview

BUILDING PROGRAM TYPE(S):
Single Family Housing

PROJECT TYPE:
New Construction/Addition

CONDITIONED FLOOR AREA:
1,200 sq. ft.

TOTAL USERS:
1

SITE AREA:
3,675 sq. ft. (35' x 105')

NUMBER OF FLOORS:
1

PROJECT CLIMATE ZONE:
ICC Climate Zone 4A

PROJECT SITE:
Previously developed land

PROJECT SETTING:
Suburban

YEAR OF SUBSTANTIAL COMPLETION:
2019

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$492,000

THIRD PARTY RATING SYSTEM:
IBHS FORTIFIED Home Gold – Resilient Building Standard for High Wind & Coastal Flooding; Home Energy Rating System (HERS); Federal Alliance of Safe Homes (FLASH) Designation

Project team

OWNER:
Diane Hellriegel

ARCHITECT:
+lab Architect PLLC

MP ENGINEERS:
MAR Consulting Engineers, LLC

STRUCTURAL ENGINEER:
Cragnolin Engineering & Design

CIVIL ENGINEER:
Norman C. Lok, P.E. MBA

GENERAL CONTRACTOR:
Malbro Construction

"The ethos of [the Hurricane Strong Home] is that … resilience is a human right. Health, safety, and welfare go back to the core of who we are as architects, our standard of care. Resilience must now be considered an essential part of our standard of care. So, the idea of it being resilient became a question in the owner's mind – will it stand out or be different? It doesn't have to look different, it just has to perform differently. It has to be accessible in terms of the way you look at it … and attainable in so many ways, such as affordability and through the use of common materials."
—Illya Azaroff, FAIA, Architect, +lab Architect PLLC

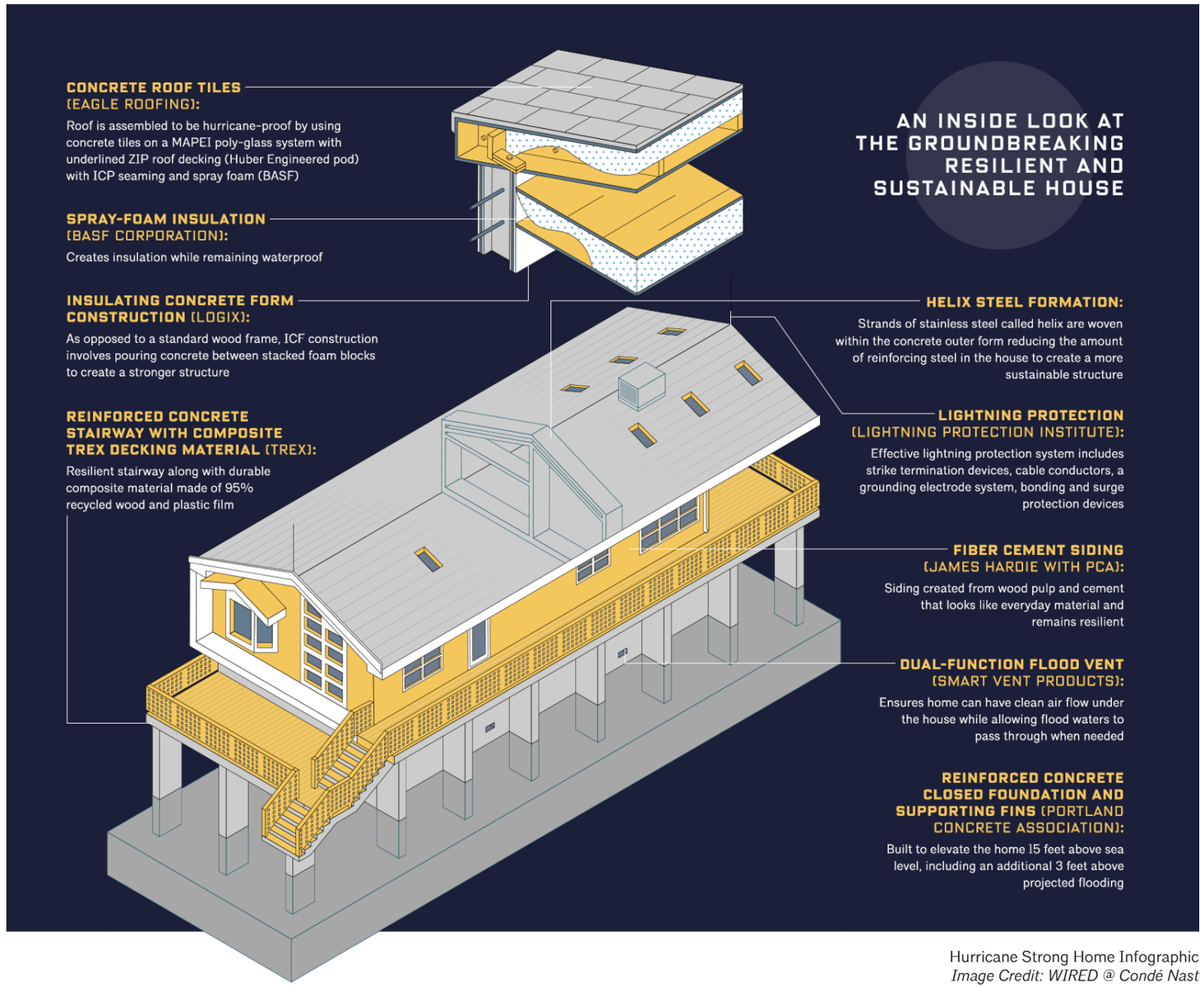
Design Process

After Hurricane Sandy destroyed her home, homeowner Diane Hellriegel decided not to rebuild to the same standards as the original. Instead, she partnered with architect Illya Azaroff, FAIA with +lab to build a home that maximizes both resilience and energy and water efficiency on a modest construction budget.

The design process started with a multi-hazard assessment of the neighborhood, including time as a dimension. According to federal agencies like the Federal Emergency Management Agency (FEMA) and the U.S. Forest Service, the neighborhood is at extremely high risk for coastal and riverine flooding and at high risk of exposure to extreme heat. The property is located in a 100-year flood plain. And, Queens County is at greater risk of wildfire than 82% of counties in New York State. The team considered how the design could reduce exposure to extreme heat and extreme cold in addition to the high winds, flooding, and storm surge associated with hurricanes. The ultimate design combines best practices and performance standards for each hazard to develop holistic key performance criteria tailored to the location's current and future environmental exposures.

Creating something new with common building materials

The social implications of climate change often manifest as financial hardship and forced displacement following storms like Hurricane Sandy. To address the homeowner's fixed income status, +Lab turned the project into an opportunity to test the ideal combination of common building systems and materials to achieve four goals: reduced construction cost, low ongoing utility and maintenance costs after occupancy, climate resilience, and environmental sustainability. The design team convened industry partners such as the Portland Concrete Association (PCA), Simpson Strongtie, and BASF; not-for-profit organizations like the Federal Alliance of Safe Homes (FLASH); and New York City agencies like Housing Preservation and Development (HPD), the Mayor's Office of Resiliency (MOR), and the Office of Emergency Management (OEM), to pilot test materials and building systems.



Hurricane Strong Home Infographic
Image Credit: WIRED @ Condé Nast

A prototype for resilient design

After the home was completed, it became an educational tool for local building officials, design teams, and homeowners interested in maximizing cost savings, climate resilience, and environmental sustainability. The team realized a demonstration project could help overcome widespread assumptions in the market that an efficient and resilient home costs more and requires more complex building systems than the industry standard. The home's welcoming design, use of familiar materials, and proven ability to protect the homeowner and her neighbors during storms have helped groups like FLASH. They use it as an example to convince home builders that taking a similar approach can generate value for both them and future homeowners with minimal tradeoffs.

The project was included as a case study in the New York State Climate Impacts Assessment. The project documents are available online as an open-source prototype, aiming to influence the homebuilding design process worldwide.

Project financing

Habitat for Humanity gutted the home immediately following Hurricane Sandy. To turn the rebuild into a living laboratory, the project received federal funding through New York City's Build It Back program, which is designed to enhance resilience in waterfront neighborhoods. That funding helped unlock additional funding from the Federal Emergency Management Agency (FEMA).

"Building beyond code is essential because code is merely a minimum standard. When we conduct an all-hazard assessment, we design for the specific climatic conditions and risks revealed by data—not just for today, but for the next 100 years. As architects, we are designing for the future, not just the present. If we let data guide us and align our final design with the true needs of the project, we will always exceed code. And that's exactly what we should be doing—because our standard of care and ethical responsibility to the health, safety, and welfare of the public demand it. High-performance buildings don't just protect individuals; they safeguard entire communities."
—Illya Azaroff, FAIA, Architect, +lab Architect PLLC

Essential climate justice design components include:

1. **Centering the design around the functional and aesthetic needs of the homeowner:** The home is affordable to operate and maintain, an essential feature for a homeowner on a fixed income. Its design fits in with the neighborhood architecture, featuring similar massing, details, and building materials.

2. **Integrating climate resilience with passive house design strategies:** The design team took an all-hazards approach, researching current and future environmental exposures that could be mitigated through building design. They integrated those insights with passive house design principles to create a home that is both resilient during extreme weather events and energy- and water-efficient in daily use.

3. **Contributing to neighborhood resilience:** Rebuilding one home is not enough to rebuild a tightknit community like Breezy Point. The Hurricane Strong Home enhances neighborhood resilience by incorporating infrastructure that supports a neighborhood microgrid. Homeowner Diane has also invited her neighbors to use her home as a refuge during storms that disrupt electricity and water supply to the peninsula.

AIA Climate Justice in Architecture Taxonomy

Climate change creates new, and amplifies existing, environmental and social challenges across the following seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy centers both the environmental and social aspects of climate change and helps teams respond with an architectural design impacting the themes across three scales: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The Framework is comprised of 10 principles and informs progress toward four outcomes – a zero-carbon, healthy, resilient, and equitable built environment.

The Hurricane Strong Home addresses all three scales in the taxonomy.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale: Building	Neighborhood	Regional/ Global	Alignment with Framework for Design Excellence
Social Determinants of Health	●		●	Water, Economy, Energy, Well-being, Resources
Cultural Connection to Place		●		Integration, Well-being, Change
Economic Development without Displacement		●		Economy
Environmental Justice				
Ecosystem Health				
Climate Change Health & Resilience	●	●	●	Water, Change, Discovery
Decarbonization	●		●	Equitable Communities, Water, Economy, Energy, Well-being, Resources, Change, Discovery

Overview of the AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Hurricane Strong Home. Source: Biositu, LLC



Hurricane Strong Home, ICF construction
Image Credit: +lab Architect PLLC

Social determinants of health

Installing non-absorptive and low-emitting materials to reduce the risk of exposure to airborne toxins and mold growth: People with chronic diseases, like asthma, are at heightened risk of poor health outcomes following exposure to toxins in building materials and mold growth after flooding events. To address these risks, the Hurricane Strong Home installed non-absorptive and low-emitting materials that do not emit toxins into the air and are easily cleanable after flooding events.

Maximizing energy and water efficiency for low- and fixed-income homeowners: The Hurricane Strong Home design upgraded the home to meet the highest standards of energy and water efficiency, as well as insurability. This was particularly impactful for the homeowner, who lives on a modest fixed income.

Designing with off-the-shelf building systems and materials increases access for low- and fixed-income homeowners: The home was purposefully designed to use widely available, off-the-shelf building systems and materials to demonstrate that resilient, efficient homes are accessible to people at all income levels.

Calibrating the payback period to the homeowner's timeline: For most Americans, a home is their highest-value asset and long-term investment. While the Hurricane Strong Home costs about 9% more than a typical home of that size and price point, its 8-10-year payback period is likely to be recouped by the homeowner. The upgrades not only enhance the home's resale value but also reduce day-to-day expenses. These considerations are particularly relevant in a neighborhood where 96.9% of homes are owner-occupied—compared with 45.2% in Queens, 32.9% in NYC, and 64.8% in the U.S.

"Resilience should be accessible to everyone. That's why we partnered with FLASH who brought in companies like Home Depot, BASF, and Kohler—brands people already trust when making home improvements. The materials in this home, from Hardie plank siding to Anderson windows and doors, are familiar to builders and homeowners alike. The idea is simple: if you need to replace a door, you're not just getting a new one—you're getting a better one, an impact-rated one, right off the shelf. This project proves that building resilience doesn't have to be complicated or out of reach—it can be as easy as making the right choice at the local store."
—Illya Azaroff, FAIA, Architect, +lab Architect PLLC

Cultural connection to place

Using finish materials and design elements that blend with the surrounding neighborhood: The project used finishing materials that can be purchased off-the-shelf at big box stores, such as fiber cement siding. Its design, including shape and detailing, aligns with the surrounding neighborhood, which reduces the mystery around a net-zero, climate-resilient home and has increased curiosity in the neighborhood about the added value a climate-resilient and green building design brings to the homeowner.

"I had no idea that a resilient house could look so beautiful."
—Diane Hellriegel, owner (AIA Designed to Last, 2019)

Designing to last 100+ years to support community resilience: After the widespread destruction caused by Hurricane Sandy in Breezy Point, the Hurricane Strong Home was designed to last over 100 years a testament to the homeowner's commitment to rebuilding a resilient neighborhood.

"What it means to be safe and at home are synonymous. And, that feeling of home is quite important for the psychology for someone who has gone through disasters in the past."
—Illya Azaroff, FAIA, Architect, +lab Architect PLLC (AIA Designed to Last, 2019)



Hurricane Strong Home, interior
Image Credit: Eric Soltan for +lab Architect PLLC

Economic development without causing displacement

Designing to reduce maintenance, utility, and insurance costs to increase home affordability in neighborhoods at risk of gentrification: Breezy Point shows signs of impending gentrification. For example, the high percentage of adult residents over the age of 65 (23.3%, compared with 16.5% in Queens, 15.5% in NYC, 16.5% in U.S.) and high housing and transportation burden (47% of household income, compared with 41% in Queens, and 36% in NYC) contrast with a disproportionately high median household income and low poverty rate ($134,563 median income/3.9% poverty rate, compared with $82,431 income/11.7% poverty in Queens, $76,607 income/17.2% poverty in NYC, and $75,149 income/12.5% poverty in the U.S.). The flood insurance premium for the Hurricane Strong Home is one example of ways resilient housing can slow financial pressures for existing residents to move out of the neighborhood. Priced at $675, compared with $5,075 for a typical home of that size in that location—an 87% reduction—the homeowner will save $44,000 in insurance premiums over 10 years.

> "For our client, a retired homeowner on a fixed income, this house isn't just a place to live—it's a key to financial stability. Its energy efficiency and resilience keep money in her pocket with lower operating costs, reduced energy bills, and lower insurance premiums. A well-built home isn't just about protection; it's about long-term affordability and peace of mind."
> —Illya Azaroff, FAIA, Architect, +lab Architect PLLC

Climate change health & resilience

Elevating the home 15 feet above the flood line plus an additional 3 feet for projected future sea level rise to enhance flooding resilience: The designers considered both current and future flood risk when deciding how high to elevate the structure above the flood line.

Designing the foundation to resist floating debris impact and reduce hydrostatic pressure: The reinforced concrete foundation protects the structure from storm surge, impact from floating debris, and erosion. Stainless steel, dual action flood vents allow storm surge to enter and exit the foundation, which can reduce hydrostatic pressure. Vents also allow air flow beneath the structure, which reduces the risk of moisture damage and mold growth throughout the year.

Integrating wind and flood resistant structure and façade materials to enhance the home's hurricane resilience: Resilient building materials include: A poured in place concrete structure with stacked polystyrene block forms designed to withstand 300-mile per hour peak gust, or 225-mile per hour winds and driving rain; fire-resistant fiber cement board siding; interlocking concrete roof tiles affixed to the roof with screws capable of resisting wind borne debris from a category 5 hurricane; underlined ZIP roof decking, ICP seaming, and spray foam; hurricane ties connecting walls to each other, connecting the walls and the roof, and connecting the structure and its foundation; windows installed with safety glass designed to withstand impact from flying debris; a reinforced concrete stairway; cast iron plumbing; and an armored electrical cable.

Designing the home as a tornado "safe room" to increase the safety of sheltering in place for the entire neighborhood: The Hurricane Strong home is one of the first single family homes in New York to pilot as a shelter in place with city emergency management.

Installing a natural gas backup generator to enhance resilience to power outages and establish the home as ready to link to a future neighborhood micro-grid: The combination of passive house net zero design features and the on-site generator make it possible to keep the house fully functioning during power outages.

"Everybody in her neighborhood of Breezy knows her house. It stands out—not because it looks different, but because of how it performs. Neighbors constantly ask about it, especially after recent storms. 'Why did all of our generators fail when yours didn't?' Her home isn't just a structure; it's a testament to resilience, sparking conversations and setting a new standard for what's possible.'"
—Illya Azaroff, FAIA, Architect, +lab Architect PLLC

Organizing the design process as a demonstration project to lead to numerous guidance documents and case studies, all aimed at making climate resilient design standard practice for residential buildings: Construction videos, diagrams, case studies, and project documentation were disseminated by industry partners, non-profit educational organizations like FLASH and AIA, and the New York State Climate Impacts Assessment.

"I've never seen a resilient home like this. Weaving everything together into one platform with so much documentation of process is significant. It's going to set the standard for resilient building practices."
—Joel May, BASF, contractor (Wired, 2019)

Decarbonization

Meeting passive house standards to lower the home's energy demand to near net zero: Passive house design features included an insulated slab and roof, as well as a wall system with spray foam insulation,

Integrating passive design features to reduce the home's energy demand: The placement of windows maximizes daylighting and cross ventilation—two passive features that reduce the need to run building systems.

Reducing water demand and offsetting water use with on-site rainwater strategies to reduce the home's operational embodied carbon budget: The home features dual flush toilets and low flow faucets, as well as well as minimizing the building footprint and maximizing site and landscape permeable surfaces to capture and reduce storm water runoff.

Selecting structure and finish materials that reduce embodied carbon: The 1,375-sq.-ft. T-beam floor slab used 48% less concrete than a typical slab (19 yards compared with 37 in a typical slab). Helix steel was woven into the concrete wall formwork, reducing the total quantity of rebar required for the structure. Finish materials also prioritized recycled content, such as the Trex 95% recycled wood and plastic porch decking material.

Installing a radiant floor heating and LED lighting to lower adoption barriers for energy-efficient technologies: As a demonstration project, the Hurricane Strong Home models the durability, low maintenance, and long-lasting characteristics of these highly efficient lighting, heating, ventilation, and air conditioning (HVAC) systems—many of which remain an emerging choice for single-family homes. The design's decarbonization strategies reduced total operating costs by 80% while increasing the square footage of the replacement house by 20%.



Hurricane Strong Home, Radiant floor heating installation in floor slab for thermal mass and comfort
Image Credit: +lab Architect PLLC

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Special thanks

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Rendering of future I-5 Rose Quarter Freeway Cap
Image Credit: created by ODOT and ZGF

I-5 Rose Quarter Independent Cover Assessment

This case study highlights an exemplary architecture project that prioritized both environmental and social aspects of climate change in its design process, community engagement approach, and final design. It aligns with many aspects of the AIA Climate Justice in Architecture Taxonomy across the building, neighborhood, regional, and global scales.

Committee on the Environment
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I-5 Rose Quarter Independent Cover Assessment

Portland, OR



Rendering of I-5 Rose Quarter Freeway Cap Streetscape
Image Credit: created by ODOT and ZGF

Summary

This project is a rare example of public transportation agencies responding to community advocacy around a proposed freeway expansion. The I-5 Rose Quarter Independent Cover Assessment was commissioned in response to the joint request from community-based organization Albina Vision Trust, the City of Portland, and the Metro Regional Government that the Oregon Department of Transportation convene a more robust community-centered engagement process as part of the environmental impact assessment for the proposed expansion of Interstate 5—a freeway that separates the central business district in Portland, Oregon, from Albina, a formerly majority Black neighborhood. Architecture firm ZGF saw their role as working with the community and public agencies to jointly answer the questions: "If we were to do something that truly was responsive to the community's interests, what would the cost be? What would the schedule impact be?" The result is a proposal for capping the I-5 corridor that prioritizes neighborhood revitalization and cultural connections within the Portland Black community, alongside city-level goals for reducing single-car use and exposure to extreme heat and traffic-related air pollution.

Project overview

BUILDING PROGRAM TYPE(S):
Highway cover, Local streets, Future mixed-used development, Public open space

PROJECT TYPE:
Urban design

TOTAL FLOOR AREA:
Approximately 9 city blocks

TOTAL USERS:
Publicly accessible

SITE AREA:
7.97 acres

NUMBER OF FLOORS:
3

PROJECT CLIMATE ZONE:
ICC Climate Zone 4C

PROJECT SITE:
Previously developed land, Historic structure or district

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2021

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
TBD

THIRD PARTY RATING SYSTEM:
N/A

Project team

OWNER:
Oregon Department of Transportation

ARCHITECT:
ZGF

MEP ENGINEERS:
N/A

STRUCTURAL ENGINEER:
ARUP

CIVIL ENGINEER:
N/A

GENERAL CONTRACTOR:
N/A

"The environmental impact of this project needed to provide better outcomes than the status quo. The most important question for us was not whether or not a lane should be added to the freeway. It was 'What is the environmental impact of reconstituting a neighborhood versus continuing to have this trench exist in the heart of the neighborhood' ... One of the struggles was that there was no framework for accounting for historic, present or social impact in the ways that were important to us from the beginning."
— Winta Yohannes, Albina Vision Trust



Aerial photo of construction of I-5
Image Credit: N/A

Design Process

In 2021, the Oregon Department of Transportation (ODOT) released a draft plan for updating the Interstate 5 (I-5) freeway corridor, which runs along one side of the central business district in Portland, Oregon. The original plan for capping the freeway was met with skepticism by many in Portland, because it did not go far enough in reconnecting the neighborhood on the far side of Interstate 5 with downtown—a pre-established goal set by the City of Portland. Instead, the design proposed expanding the width of the freeway by one auxiliary lane to reduce congestion—a proposal that would only lower traffic-related emissions by a fractional amount.

The construction of the freeway in the mid-1960s both materially damaged the economic vibrancy of the Albina neighborhood and physically separated residents and businesses in this historically Black neighborhood from downtown. While many Black residents were displaced after the freeway was built, a higher percentage of Black residents continue to call the neighborhood home compared with Portland as a whole. Today, 7.5% of neighborhood residents self-identify as Black, compared with 5.9% in Portland, 5.4% in Multnomah County, and 1.9% in Oregon. However, the neighborhood hosts a lower percentage of young children (2%) and youth (5.6%) than the regional average (4.4% children under five and 9.5% youth aged 10-18 in Portland; 4.8% children and 10.2% youth in Multnomah County). Once a vibrant hub of economic activity, the neighborhood has suffered economically over the past 60 years. The median household income is $55,673, compared with $85,876 in Portland, $83,668 in Multnomah County, $76,632 in Oregon, and $75,149 in the U.S. The poverty rate is correspondingly high: 25.6% compared with 12.2% in Portland, 12.2% in Multnomah County, 11.9% in Oregon, 12.5% in the U.S.

The economic, environmental health, and social damage caused by the original I-5 construction eroded the neighborhood's trust in transportation agencies. In 2015, Albina Vision Trust convened a broad array of stakeholders to ask what would need to change in the neighborhood to make it whole again. Unlike many transportation design projects, designers were asked to think of wealth building as part of their scope of work. The designers identified the freeway as a key barrier that needed to be addressed to rebuild a resilient neighborhood. When ODOT proposed the freeway expansion plan in 2021, Albina Vision Trust was ready to respond, because the framing had already been developed through the design challenge.

Albina Vision Trust, in partnership with local public agencies, requested that ODOT convene a more robust, community-centered engagement process to refine the original freeway redesign and cap project, because the environmental impact assessment then underway did not account for the project's social impact.

In response, architecture firm ZGF worked with the community and public agencies to convene an Independent Cover Assessment (ICA) consisting of 23 stakeholder advisory meetings and 3 multi-day working sessions—totaling 24 hours of direct discussion with 59 community collaborators and 5 public agencies. The design team supplemented their core expertise by hiring subconsultants, such as urban economists who helped identify opportunities for wealth creation and quantify their potential neighborhood impact. They also engaged a governance specialist to assess jurisdictional issues, since the freeway cap crosses multiple boundaries. That consultant helped them understand the governance implications of creating land over a public right-of-way and then transferring it to the community.

After this extensive community engagement process, ZGF forwarded several freeway cap scenarios to the governor and the Oregon Transportation Commission. The consensus scenario aimed to balance community priorities with their impact on the construction schedule.

"Every single professional [involved in the project] has been called to take a multidisciplinary approach, including to think about how their work interacts with the social sciences. We asked them to take a multidisciplinary approach to delivering justice."
— Winta Yohannes, ED, Albina Vision Trust

Community-centered engagement and oversight

The ICA team partnered with neighborhood faith institutions and civic organizations to identify and recruit community collaborators who represented a range of ages and viewpoints and were respected within the community. Because of COVID, all meetings were held over Zoom. To ensure that every voice was heard, the group size was kept small, and a variety of engagement methods—such as live polls—were offered. The community engagement facilitator met three times over Zoom with a small cohort of community members, giving them enough time to learn about the project's history and ODOT's objectives before proposing an alternate design. Community meetings were facilitated by a longtime neighborhood resident who leveraged her relationships to connect community priorities with a range of urban planning ideas aimed at meeting local needs while addressing public agencies' transportation and environmental goals.

Engagement started with a broad visioning exercise for the neighborhood's future, then narrowed down to brainstorming how the freeway cap could support that vision. At each phase, the facilitator worked with community collaborators to refine the design to better reflect their feedback. Participants weighed trade-offs around cost, schedule, the amount and quality of land generated by the freeway cap, and ownership models for different design scenarios developed by the ICA team. They based their decisions, in part, on the time frame and scale of job creation and wealth generation embedded in each scenario.

The final vision for the freeway cap coalesced around three pillars: community health, community wealth, and community cohesion. The design stiches the street grid back together on both sides of the freeway; emphasizes active, pedestrian-friendly streets and intersections to encourage ground-level activity; and balances maximizing developable land with expediting construction. Community collaborators envisioned adding culturally tailored services to promote health and wellness; Black-controlled economic development institutions; permanently affordable rentals and homeownership opportunities; and expanded expressions of Black culture and history.

The design process concluded with a governance plan establishing next steps for community oversight of the freeway cap's regulatory and construction process. It also created a framework for determining ownership and management of the developable land created by the cap.

Advocacy and regulatory considerations

To ensure the study led to action, Albina Vision Trust worked with its federal delegation and the governor's office. They also maintained ongoing advocacy with local elected officials to keep stakeholders engaged with both the impact study and the negotiations over which highway cover scenario would move forward to the bidding stage.

After ZGF developed scenarios based on community input, ODOT, the governor's office, and the City of Portland signed an intergovernmental agreement allowing technical staff from each agency to collaborate on resolving questions related to regulations, rights-of-way, ownership, and other details. The updated NEPA Environmental Impact Statement (EIS) found no significant impact for the proposed scenario, allowing the project to move forward to the development of a 30% construction package.

"When we're asking architects to think about climate justice, [the political dynamics are] really important. Everybody here will tell you that the ICA process was highly politicized, and that the quality of work, both from a technical perspective and also the quality of the engagement was really important. Both the engagement process and the technical expertise had to withstand serious scrutiny."
— Winta Yohannes, ED, Albina Vision Trust

Project financing

The U.S. Department of Transportation's Reconnecting Community and Neighborhood Access and Equity Grant program provided key funding for the cap project, awarding $450 million. Albina Vision Trust and the City of Portland raised an additional $800,000 after stakeholders selected the final cap design in a process convened by the governor of Oregon. Additional funding that would pay for construction of the freeway cover portion of the project is included in a transportation package that has been proposed to the state legislature. Development of the land on the cap will be structured as a long-term land lease—a novel financing mechanism.

"The amazing thing for me as an engagement person working with the design team was that the design team followed the community's input, which is very unusual. Usually design teams on these large capital projects … let the community react after they've done some designing. They're using their expertise to set the table. And then the community is really just reacting to the options that are put in front of them. I think what was very unique about this process is that we started [by] creating a process that allowed the community to create its own vision about what it wanted to see. And then … given all the constraints and all of the issues and context that we had, we tried to design options that responded to the community's vision. … The whole design team made adjustments. All of our experts made adjustments to try to be responsive. And, I think where we ended up was a joint product that was created from the community, with the community leading and us processing, you know, responding to the community and then tweaking and responding to the community while we kept [the design] within the boundaries of the context of what we were charged to do."
— Jeana Woolley, Community Engagement Lead, JM Woolley & Associates

Essential climate justice design components include:

1. **Centering an honest conversation about the historic harms caused by the initial construction of the freeway:** Because current and former Albina neighborhood residents and business owners continue to experience lasting social, economic, and health harms from the construction of I-5 in the 1960s, directly addressing that legacy was an important first step in imagining a freeway cap that would reconnect Albina with Portland's central business district.

2. **Framing the design team's role as facilitators of a community-led co-design process:** Rather than presenting themselves as experts, the design team worked closely with a skilled community engagement professional and Albina resident to create an environment of mutual learning and collaborative decision-making. This approach was essential to raising the project's profile with local, state, and federal elected officials and funders.

3. **Developing success metrics meaningful to both the Albina neighborhood and public agencies:** The freeway cap project requires coordination among multiple local, state, and federal agencies, as well as diverse interest groups. It was critical to acknowledge early on that success would be measured differently by different stakeholders over different time horizons. Developing the final set of metrics remains a work in progress.

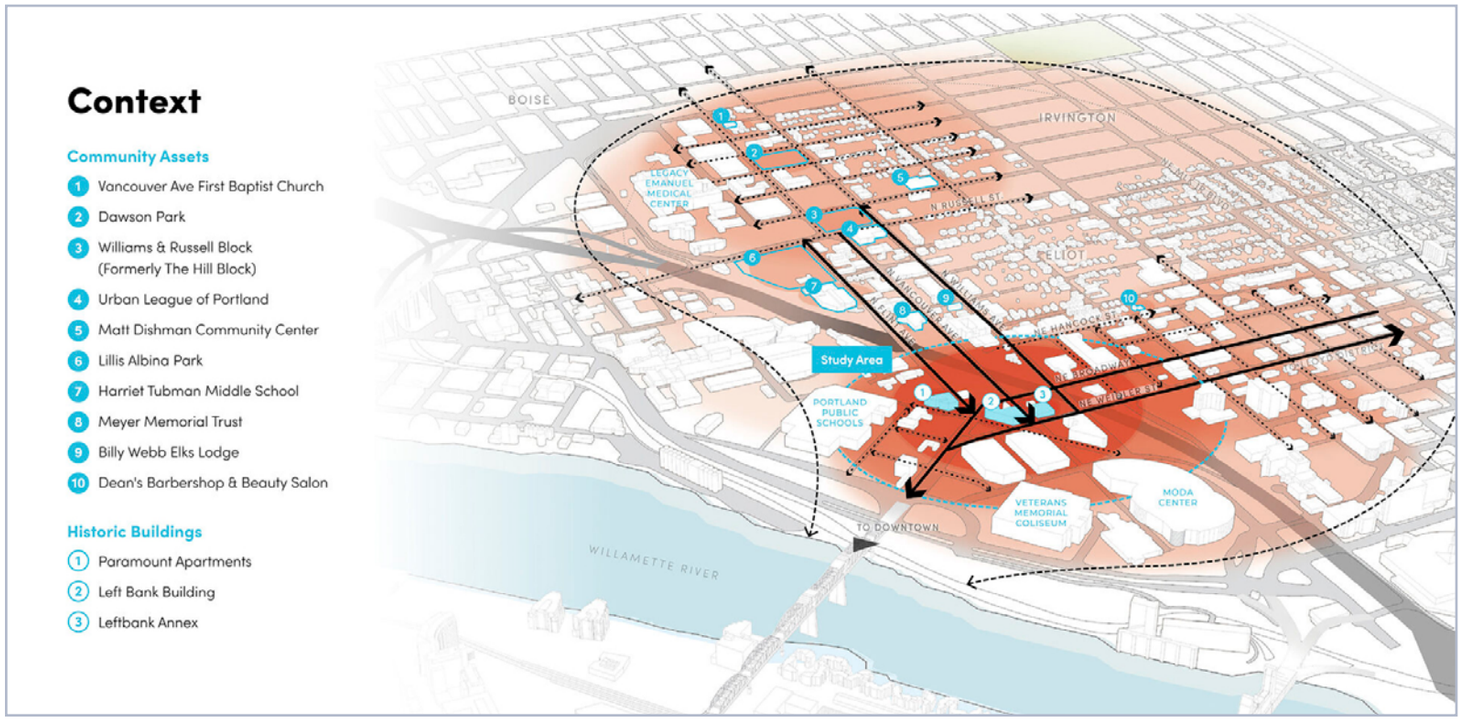
AIA Climate Justice in Architecture Taxonomy

Climate change both creates new and amplifies existing environmental and social challenges across seven themes or categories: Social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy addresses both the environmental and social dimensions of climate change, guiding teams to design architectural responses that impact these themes at three scales: Building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The framework is comprised of 10 principles and informs progress toward four outcomes: A zero-carbon, healthy, resilient, and equitable built environment.

The I-5 Rose Quarter Independent Cover Assessment addresses all three scales in the taxonomy, with particular emphasis on the neighborhood and regional/global scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	●	●		Integration; Equitable Communities; Well-being; Discovery
Cultural Connection to Place	●	●	●	Integration; Equitable Communities; Economy
Economic Development without Displacement		●	●	Equitable Communities; Economy; Well-being
Environmental Justice		●	●	Integration; Equitable Communities; Ecosystems; Discovery
Ecosystem Health		●		Equitable Communities; Ecosystems; Change
Climate Change Health & Resilience		●	●	Equitable Communities; Ecosystems; Economy; Well-being; Change; Discovery
Decarbonization		●		Energy

Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: I-5 Rose Quarter Independent Cover Assessment. Source: Biositu, LLC



Context around the proposed I-5 Rose Quarter freeway cap
Image Credit: Created by ODOT and ZGF

Social determinants of health

Leveraging new real estate on the freeway cap to address gaps in social and health services: The plan calls for developing a cultural health and wellness center, along with a high-quality, culturally-appropriate childcare and child development center on the freeway cap. These facilities will increase access to primary care for physical and mental health needs and support for families with young children living in the neighborhood.

Increasing access to outdoor space and opportunities for physical activity: The I-5 freeway cap project builds on several assets in the Albina neighborhood, including Lillis Albina Park, which is within walking distance for all residents. Current adult residents report lower rates of two chronic diseases influenced by physical activity: high blood pressure (21.6% compared with 24.5% in Portland, 25.1% in Oregon, and 32.7% in the U.S.) and Type 2 diabetes (6.9% compared with 7.9% in Portland, 8.7% in Multnomah County, and 11.3% in the U.S.). Building a new outdoor community gathering space will enhance the health-promoting built environment. By fostering social connections and increasing access to nature, the space will also support mental health—a longstanding challenge in the area. Currently, 28.8% of neighborhood adults are estimated to experience depression and 21.3% report general poor mental health, compared with 27.4% depression and 18.8% poor mental health in Portland, 27% depression and 18.7% poor mental health in Multnomah County, and 19.5% depression and 16.6% poor mental health in the U.S.

Enhancing safety for pedestrians and cyclists on both sides of the freeway: Residents of the Albina neighborhood commute using public transit, walking, or cycling at a much higher rate than the regional and national average: 42.6%, compared with 17.5% in Portland, 15.6% in Multnomah County, 8% in Oregon, and 6.7% in the U.S. In addition to the dangers posed to pedestrians and cyclists by the I-5 freeway, one of the major thoroughfares running through the neighborhood—Broadway—has been designated by the City of Portland as high risk for driving crashes, pedestrian crashes, and cycling crashes, with its intersection at I-5 identified as one of the most dangerous intersections in the city. Creating wide, pedestrian-friendly sidewalks with space for terraces and other outdoor activities can reduce the risk of traffic-related injury and chronic disease by encouraging active modes of transportation in a safe urban environment.

Balancing social, economic, and health objectives in the final design: The final consensus design balanced the short-term economic needs of local Black, Indigenous, and People of Color (BIPOC)-owned construction companies to bid on the construction project with design options that would have required additional engineering analysis, thereby slowing down the construction schedule.

"The social justice aspect of [the project] was an outcome that had never been considered [before the community engagement] and that people were extremely supportive of. Being able to restore that cover, restore the fabric and then create a community on top of the cover. Not just have a big, giant, empty park. But to restore the street grid to be able to create extended community from either side and connect the two sides across the freeway. All of that was what we heard from all of the community members."
— Jeana Wooley, Community Engagement Leader, JM Woolley & Associates

HYBRID 3

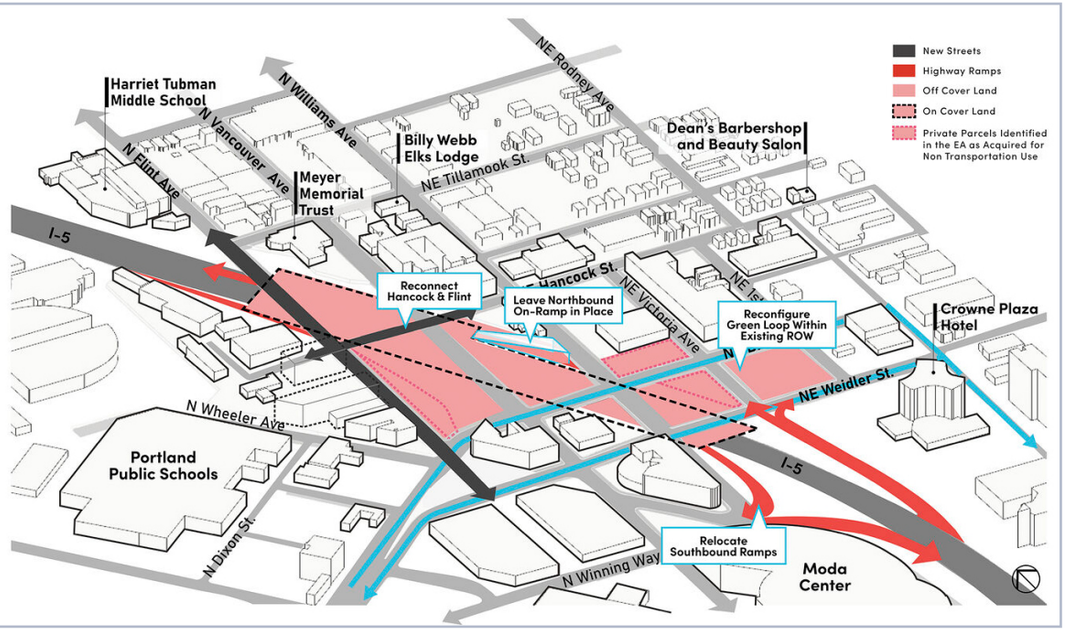
A Shared Solution

Hybrid Scenario 3 proposes to relocate the southbound ramps only, to maximize the amount of developable land, and minimize the schedule impacts. Restoring the street grid to provide ground-floor activities was chosen over a larger central parcel on the cover.

Land Area
7.97 Acres

Schedule Delay
Low to Moderate | 16 Months
(More complex process with slightly more risk to completion)

> If there's a great opportunity to **get all we can AND not be held up** by minimizing contractor opportunities, **that's what we want**.
> —BLACK COMMUNITY MEMBER



I-5 freeway cap design approved through the community engagement process
Image Credit: Created by ODOT and ZGF

Cultural connection to place

Showcasing the rich history of Black Portland with a cultural center: The final design calls for developing a Black cultural center on the freeway cap and installing historical markers and public art reflecting local Black culture throughout the district.

Reconnecting the neighborhood with historically significant Black cultural institutions: The freeway cover design reconnects the bulk of the historic Albina neighborhood with culturally significant institutions on the other side of I-5, including the Vancouver Avenue First Baptist Church, Dawson Park, and the Williams and Russell Block—Black Portland's central commercial district prior to the construction of the freeway.

"I want Black culture to be the thread that runs through every fabric of this endeavor."
— Black community member (Restorative Justice, n.d.)

Contributing to a citywide effort to revitalize and repopulate historic BIPOC neighborhoods: Despite the population displacement caused by the construction of the I-5 freeway, neighborhoods in north and northeast Portland have retained their strong cultural identity as community hubs for Black Portlanders. The neighborhoods continue to host the highest concentration of Black cultural institutions in the city. Many in the community wish to revitalize and repopulate the area.

Economic development without causing displacement

Developing economic opportunities that balance near-, medium-, and long-term benefits for residents and business owners: Adding eight acres of land adjacent to the historic Albina neighborhood presents an opportunity to accelerate economic development both on the cap and in the existing neighborhood, which will become more accessible from the central business district. The question of what will be built on the freeway cap is being guided in part by Albina Vision Trust's community investment plan to ensure that long-time residents and business owners benefit from the new real estate and economic opportunities.

Prioritizing permanently affordable housing: While the neighborhood currently reports a lower percentage of owner-occupied residences (10.2% compared with 53.3% in Portland, 54.5% in Multnomah county, 63.2% in Oregon, and 64.8% in the U.S.), the percentage of homeowners who are Black is much higher in the Albina neighborhood than regional and national averages: 15.7% compared with 3.2% in Portland, 3.1% in Multnomah county, 0.9% in Oregon, and 8.1% in the U.S. The final design builds on that success by emphasizing the development of permanently affordable housing in the neighborhood—both rentals and home ownership—to promote economic development without pricing out existing residents and businesses.

"One of the important things that happened early and has been consistent [throughout the Community Investment planning process] is that [Albina Vision Trust] asked architects to think about wealth building as part of their job. We don't expect them to be the economists on the team, but we do want them to think about how the built environment facilitates wealth building for communities or continues the wealth taking from communities, including from a climate perspective."
— Winta Yohannes, ED, Albina Vision Trust

Targeting freeway cap development to create economic and wealth-building opportunities for Black Portlanders: The development plan calls for establishing a Black-controlled community development corporation, a community land trust, a job training and development center, and a food sovereignty center/market.

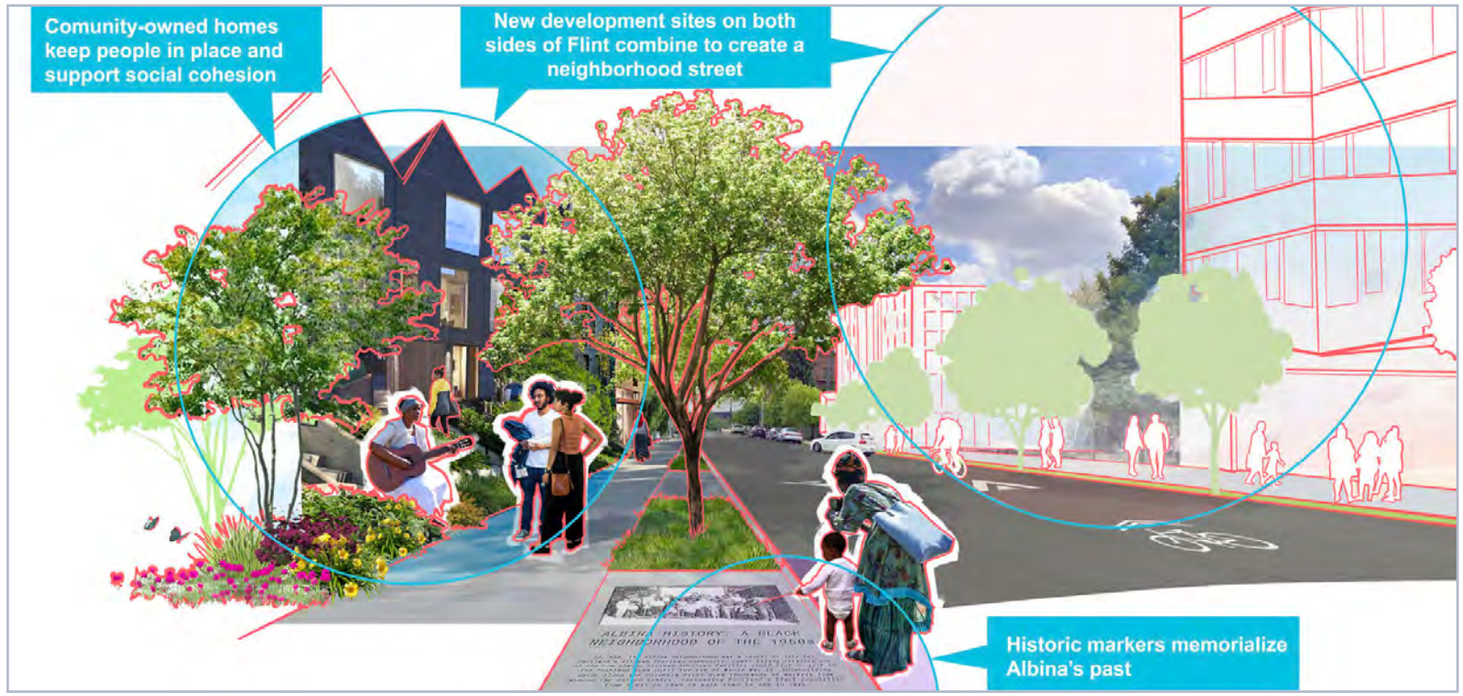
"The freeway cover is a new thing, so that allows us to look at eight acres of additional land and a new connected street pattern that hasn't been there since the 1960's."
– Troy Doss, Bureau of Planning and Sustainability

Environmental justice

Recognizing the environmental injustices of the original freeway construction: The Lower Albina neighborhood was partially destroyed by the construction of Interstate 5 and subsequent urban renewal projects in the 1960s. Many residents—the majority of whom were Black—were forced to move out of the neighborhood, while those who remained were exposed to traffic-related air pollution from congested streets and the new freeway.

Collecting baseline environmental exposure metrics: At the community's urging, the City of Portland is tracking the impact of traffic-related air pollution on at-risk populations living adjacent to the freeway. These baseline metrics will allow for post-construction assessments of the project's environmental justice impacts.

Reorienting the original freeway expansion plan through community engagement: ODOT's original plan focused on reducing freeway congestion, traffic-related injuries, and exposure to traffic-related air pollution, as well as increasing pedestrian connections between downtown and the historic Albina neighborhood. After engaging in the ICA community engagement project, the revised consensus plan set a goal of restorative justice, as defined by neighborhood residents and ex-residents.



Rendering of I-5 Rose Quarter Freeway Cap Streetscape
Image Credit: Created by ODOT and ZGF

"The consensus was that [the community] wanted to see [the urban] fabric restored. ... That was literally the most important thing. ... There was a lot of talk about how to make [the project] environmentally sound and ... sustainable. But, first and foremost, they wanted to see social justice goals served."
– Jeana Wooley, Community Engagement Facilitator, JM Woolley & Associates

Ecosystem health

Balancing biodiversity, environmental exposures, and climate mitigation goals: Heat exposure is one of the key environmental health goals for the project, in part because the existing neighborhood's exposure falls into the 95th percentile compared with the rest of Oregon. The project's goal is to increase the overall tree canopy (which is currently estimated at only 22.5%) and reduce impervious surface (currently 80%). Because the freeway cap is a thin layer of concrete covering eight acres of the depressed freeway, the landscape architect faces challenges in extending the city's tree canopy into the new district.

Climate change health & resilience

Reducing exposure to traffic-related air pollution: The highway cover reduces the concentration of traffic-related air pollution reaching the Albina neighborhood, which historically has experienced disproportionate exposure.

Balancing trade-offs between heat mitigation and construction timelines: The consensus weighs the structural costs of building a thicker freeway cap against the benefits of maximizing plantings to help mitigate Portland's urban heat island effect.

Aligning success metrics with both neighborhood and city priorities: The City of Portland is working with Albina Vision Trust and other community partners to revise the climate equity metrics in the city's comprehensive plan, aligning them with the goals and priorities of the neighborhood.

"In the community engagement meetings, we talked about how we would measure wealth building. For example, how many street frontages have we created that are on nice, walkable, low-traffic streets where businesses will thrive? Or how much land is on the highway cover versus off the highway cover? The difference matters because land off the cover could be owned by the community, so it had more wealth-building potential. Over the course of the engagement, the community told us what was important, we determined how to measure those things together, and then we reported how different design options performed according to what the community cared about."

— Morgan Maiolie, Project Designer, ZGF

Decarbonization

Reducing local carbon emissions by lowering total vehicle miles traveled: The highway cover and street plan promote transit use and active transportation within the historic Albina neighborhood and between downtown and North Portland, supporting goals to lower vehicle miles traveled citywide.

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Lead Author

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Contributors

COTE Knowledge Community and AIA Staff.

Special thanks

Albina Vision Trust, ZGF, JM Woolley & Associates, Oregon Department of Transportation, interview participants

Additional information

I-5 Rose Quarter Improvement Project. https://www.i5rosequarter.org

(Restorative Justice, n.d.) ZGF, Restorative Justice on Portland's Interstate 5: I-5 Rose Quarter Independent Cover Assessment. https://www.zgf.com/work/4405-i-5-rose-quarter-independent-cover-assessment

Committee on the Environment

AIA Knowledge Community

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

Committee on the Environment

AIA Knowledge Community



Louisiana Children's Museum, Aerial View
Image Credit: Kevin Scott

Louisiana Children's Museum

This case study highlights an exemplary architecture project that prioritized both environmental and social aspects of climate change in its design process, community engagement approach, and final design. It aligns with many aspects of the AIA Climate Justice in Architecture Taxonomy across the building, neighborhood, regional, and global scales.

Louisiana Children's Museum

New Orleans, LA



Louisiana Children's Museum, Exterior Porch and Cloud Installation
Image Credit: Kevin Scott

Summary

The Louisiana Children's Museum (LCM) proudly identifies as a social justice organization dedicated to creating a "world where communities value children." After welcoming visitors to their building in New Orleans' warehouse district for two decades, the museum was flooded by Hurricane Katrina along with large swathes of the city. The trauma experienced by children and their families in the hurricane's aftermath, coupled with ongoing disparities in educational attainment—particularly among children in low-income and BIPOC (Black, Indigenous, and People of Color) neighborhoods of the city—inspired the museum to relocate to City Park, a 1,300-acre urban park in the center of New Orleans. This move turned the museum into an educational resource supporting social and environmental resilience among Louisiana's children and their families.

Project overview

BUILDING PROGRAM TYPE(S):
Cultural institution

PROJECT TYPE:
New construction

CONDITIONED FLOOR AREA:
56,000 sq. ft.

TOTAL USERS:
262,500 annual visitors

SITE AREA:
348,480 sq. ft.

NUMBER OF FLOORS:
2

PROJECT CLIMATE ZONE:
ICC Climate Zone 2A

PROJECT SITE:
Greenfield (Previously Golf Course)

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2019

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$33,400,000

THIRD PARTY RATING SYSTEM:
LEED 2009 BD+C Gold

Project team

OWNER:
Louisiana Children's Museum

ARCHITECT & INTERIOR DESIGNER:
Mithun (design lead and executive architect); Waggonner & Ball (collaberating local architect)

LANDSCAPE ARCHITECT:
Mithun

MEP ENGINEERS:
ARUP

STRUCTURAL ENGINEER:
Thornton Thomasetti

CIVIL ENGINEER:
Schrenk Endom Flanagan

GENERAL CONTRACTOR:
Roy Anderson, Corp.

"Katrina and its aftermath foregrounded climate and environmental issues specific to the Gulf Coast as well as the profound educational woes in southeast Louisiana. So, in light of what we were seeing, LCM came back to the visioning table and said, 'the new museum, already laser focused on early childhood education, needs to be bigger. It needs to be bolder. It needs to have greater reach. And, it needs to have a strong and intentional focus on the environment."
— Allison Stouse, former Project Director, Louisiana Children's Museum



Louisiana Children's Museum, Collaboration with a Neighborhood Charter School during COVID
Image Credit: Crista Rock / Courtesy: LCM

Design Process

When Hurricane Katrina devastated New Orleans in 2005, the Louisiana Children's Museum was already planning a renovation and small expansion in the warehouse district, where it had been housed for two decades. The trauma experienced by the children and families it serves prompted the museum to expand its mission, offering holistic education that supports children's health and development—particularly for families living on limited incomes.

The design process began with years of community outreach, which intensified after Hurricane Katrina. The museum and design team engaged in five months of workshops to gather perspectives from a diverse range of children and families about the exhibits and overall museum design. Recognizing Katrina's lasting impact on children's relationship with water, the engagement process included "water journals" created by children and their families to help inform trauma-informed exhibits exploring the relationship between water and land in the Mississippi Delta.

The project team also included an expert involved in the Greater New Orleans Urban Water Plan, who was familiar with the neighborhood's historic flooding risks and how the museum design could help mitigate them. The final design includes numerous exhibits that allow children to engage with the landscape and water play—including a cloud garden experienced by crossing a bridge over a marsh. A floating classroom also enables children to explore the lagoon in a safe and non-threatening environment.

In addition to engaging with the wider community, the museum convened a steering committee of specialists in childhood development from Tulane and Loyola universities, a naturalist from Louisiana State University, and professionals and community members from across New Orleans, representing different family cultures, traditions, values, and heritage. Over the course of two years, the committee provided regular input as the design took shape. The exhibit design was influenced by interviews with 24 grandparents from a range of backgrounds. Excerpts from these conversations are displayed in the museum lobby.

"A lot of people talk the talk about community engagement during the design process. But, it takes time, and it takes organization, and it takes rigor and devotion. You need to be able to not only bring people to the table, but also document their input and implement it into the design-in our case, that meant into our experiential exhibits, our building, and our landscape. So, Mithun, the architect, went away for a time while the museum and exhibit team engaged in this demanding work. When we brought Mithun back into the process, we had this whole other body of information that really worked to not only enrich the project but to also establish the foundation for a deep and meaningful collaboration ... between the exhibit team and the architectural team that resulted in a stronger project."
— Allison Stouse, former Project Director, Louisiana Children's Museum

Social benefits in New Orleans and beyond

The new museum is making a meaningful impact on children in New Orleans and beyond. Its success—reflected in annual attendance tripling compared with the previous facility—demonstrates the value of investing in early childhood education and cultural institutions. The Governor of Louisiana and the Mayor of New Orleans have publicly cited the museum as a successful model when approving increased funding for early childhood development. Additionally, a regional economic group survey has ranked early childhood development as the region's top priority.

During COVID, the museum's flexible design and indoor/outdoor educational spaces allowed it to host preschool and kindergarten students from Langston Hughes Academy. The charter school's curriculum had a natural alignment with the self-directed experiential learning environment, based on the Reggio-Emilia approach.

The school's student population faces a high risk of educational disparities: 98% are Black, 74% qualify for free lunch, and 94% live below the poverty line. After participating in the program, students scored 35% higher on standardized tests than the average score in three comparable charter schools and 44% above grade level. Teachers also reported a dramatic reduction in disruptive behaviors.

The success of the program inspired the New Orleans superintendent of schools to create outdoor classrooms across city campuses, integrating outdoor education into STEM and project-based learning curricula.

"During COVID, LCM served as a school for students from a local public school in a unique partnership. The pandemic created an immediate need for LCM to utilize the museum in a way we always envisioned it could be. The school had the whole museum to themselves every day. Their teachers were trained in how to use the exhibits to teach. It was a magical thing that came out of COVID."
— Allison Stouse, former Project Director, Louisiana Children's Museum

Project financing

Hosting the Langston Hughes Academy during COVID was partly a financial decision for the museum, as closing the exhibit space to the public cut off its main source of revenue. Temporarily relocating to the museum also increased costs for the school, including transportation, food, and student support. To offset some expenses, the museum secured a $25,000 grant from a local foundation, covering four months of operational expenditures such as janitorial services, facility operations, exhibit maintenance, and educational support.

In the years since COVID, the building and landscape design have strengthened grant applications for both museum programming and larger community projects. For example, funding proposals to extend the museum's Living with Water exhibit highlight how the integration of indoor exhibits and landscape design creates an immersive experience. At the city scale, the green infrastructure on the Louisiana Children's Museum grounds contributed to New Orleans' successful bid for a $141 million grant through the 2015 National Disaster Resilience Competition.

"When we are applying for funding, we do talk about the indoor-outdoor space. We talk about how the building was designed, how the landscaping was designed, and how all of that goes together, and why were a prime location for this kind of experience to happen. That gives credibility to the application, because you have the optimal environment that helps to make that programming happen."
— Louisiana Children's Museum."

Essential climate justice design components include:

1. **Responding to community needs, even when it requires major project changes:** After Katrina, the museum recognized that relocating to a park setting would better serve the educational needs of children aged 0–8 and play a unique role in educating all New Orleanians on how to increase their own, their neighborhood's, and their community's social and environmental resilience in the face of climate change.

2. **Integrating environmental and social objectives into a single, cohesive design:** Designing the building in tandem with environmental exhibits resulted in a facility that offers layered services through a single set of design features. It not only educates visitors about water and the Mississippi Delta ecosystem but also protects the community from flooding and extreme heat, supports mental health and well-being through access to nature, promotes education and access to fresh, healthy food, and democratizes access to museum exhibits and services. The layout of spaces, indoor-outdoor visual connections, and passive design strategies—such as deep porches and outdoor rooms—support a wide array of social services, most prominently demonstrated by hosting a school at the museum during COVID.

3. **Measuring the design and museum programming's impact on visitors:** 83% of post-occupancy survey participants reported the museum promotes healthy movement. 83% responded that the museum enhances feelings of well-being. When asked, "What does the new museum communicate to visitors and the community?" participants responded, in part: "You are valued. Beauty is all around you." "Children are important—their health, well-being, connection to the environment and one another."

AIA Climate Justice in Architecture Taxonomy

Climate change creates new, and amplifies existing, environmental, and social challenges across the following seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy centers both the environmental and social aspects of climate change and helps teams respond with an architectural design impacting the themes across three scales: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The Framework is comprised of 10 principles and informs progress toward four outcomes—a zero-carbon, healthy, resilient, and equitable built environment.

Louisiana Children's Museum addresses all three scales in the taxonomy, with particular emphasis on the building and regional/global scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	●	●	●	Integration, Equitable Communities, Ecosystems, Water, Economy, Well-being, Change, Discovery
Cultural Connection to Place	●		●	Integration, Equitable Communities, Ecosystems, Water, Economy, Energy, Change, Discovery
Economic Development without Displacement			●	Equitable Communities, Water, Economy, Change, Discovery
Environmental Justice			●	Equitable Communities, Water, Economy, Change, Discovery
Ecosystem Health	●	●	●	Integration, Equitable Communities, Ecosystems, Well-being, Change, Discovery
Climate Change Health & Resilience	●	●	●	Equitable Communities, Ecosystems, Water, Economy, Energy, Change
Decarbonization	●			Energy, Well-being

Overview of AIA Climate Justice in Architecture Framework themes and spatial scales: Louisiana Children's Museum. Source: Biositu, LLC



Louisiana Children's Museum, Eatable Garden and Outdoor Kitchen
Image Credit: Christian Runge / ©Mithun

Social determinants of health

Dedicating a wing of the building to wraparound activities that complement museum programming to promote income inclusivity: City Park draws visitors from across the city and state, both of which have a lower median income than the national average. The median family income in New Orleans is 32% lower than the US national average ($51,116 in New Orleans and $57,852 in Louisiana, compared with $75,149 in the US). One wing of the building provides space for local non-profits and academic centers like the Tulane Institute of Infant and Early Childhood Mental Health to provide social services—such as parenting classes, literacy programs, and local Head Start programs—without requiring admission to the museum.

Integrating outdoor classrooms that offer nature-based learning for all to promote income inclusivity: In addition to the Museums for All ($2 general admission for patrons with SNAP benefits) and Art for All (free admission to Louisiana residents every other month) initiatives, 47,000 sf of outdoor immersive exhibits are free to all City Park visitors—almost doubling the functional size of the museum, which includes 56,000 sf of conditioned space. Freely available outdoor exhibits include the Toddler Landscape, a wetlands exploration area, the Music Hummock, the Cistern and Runnel Water Play activity, Pelican's Perch, a floating classroom, and a labyrinth. Exhibits like the Edible Garden and outdoor kitchen contribute to regional efforts to reduce the food insecurity rate, which is 18.6% in Orleans Parish and 18.1% in Louisiana—over 30% higher than the national average of 13.5%.

Adding welcoming spaces and exhibits to promote cultural inclusivity: New Orleans is a culturally diverse city made up of neighborhoods with distinctly different characters. The overall population is roughly 2/3 black and 1/3 white. But, neighborhood demographics can shift dramatically. For example, of the three neighborhoods closest to the LCM, Fairgrounds is 48% black and 43% white, Mid-City is 2.2% black and 89.3% white, and Navarre is 11.3% black and 69.6% white—compared with 12.5% black and 66% white in the US as a whole. The architecture and exhibits at the LCM actively seek to celebrate New Orleans' diversity and build bridges of community connection across the distinctive neighborhoods that characterize the city. For example, the Welcome Porch at the front of the museum is open to all City Park visitors, regardless of ticket status. Just inside, the lobby displays reflect input from residents with many cultural backgrounds and contain quotes from grandparents that speak to a diverse array of children and their families.

Supporting holistic early childhood development by creating safe spaces to learn and commune with nature: Pathways and activity zones are designed to support child-led discovery and engagement. Deep windows—known as "kindows"—allow children to climb inside a window nook and view the landscape from a semi-private perspective.

Supporting mental health through the intentional use of daylight: The use of views plays a major role in improving visitor mental health, as described in the following quote from a post-occupancy survey: "Visibility to outside. Views are everywhere, planned brilliantly allowing maximum daylight, connecting us to the joy of children, connecting us to wildlife (pelicans are our favorites—they always perform for us), and the fog is magical."

> "If you are looking in New Orleans for places that are accessible and welcoming to everyone, New Orleans City Park is probably at the top of that list. So, to locate the museum there was really important for increasing access."
> — Allison Stouse, former Project Director, Louisiana Children's Museum

Centering trauma-informed design principles in the building, landscaping, and exhibits' engagement with water: The Fujiko Nakaya fog installation is integrated into a Mithun-designed bridge that leads children across the lagoon and into the west entry of the museum. The goal is to help support healing from trauma caused by hurricanes like Katrina.

Integrating universal design principles throughout the building, landscaping, and exhibits: With extensive ramps, the exhibits are designed to be fully accessible to visitors with mobility challenges, including small children in strollers and grandparents, many of whom act as caregivers. Mobility inclusion is also explicitly addressed in exhibits, such as a life-sized musician in a wheelchair in the Jammin' House exhibit. Two of the three neighborhoods nearest the museum are home to a higher-than-average percentage of adults over age 65: 29.6% in the Fairgrounds neighborhood and 20% in Mid-City, compared with 16% in New Orleans and 16.5% in the US.

"It came across strongly that post-Katrina children had potential discomfort around water, or had seen water do some really powerful and damaging things. So, it was important to make sure there would be ways that children could engage with water in a non-threatening way—elements like the mist sculpture when they arrive and getting close at certain places to the edge of water. We wanted to make sure that water would be a comfortable and friendly part of the environment."
— Rich Franko, Partner, Mithun

Supporting mental health and well-being through biophilic landscape design: LCM contributes to the higher-than-average exposure to parks and green space enjoyed by New Orleanians (90%, compared with 35% in Louisiana and 61% in the US). Major landscaping features at LCM, such as the historic live oak grove and lagoon, combine biophilic design elements with educational signage to support the mental health and well-being of all park visitors. By calling out the ways in which spending time in nature can alleviate conditions like depression, the signage contributes to city-wide public health efforts to reduce the higher-than-average prevalence of depression in New Orleans (26%, compared with 19.5% in the US) and could be particularly beneficial for residents of the nearby Mid-City and Navarre neighborhoods, where 27.7% and 28.5% of adult residents, respectively, are estimated to experience depression on a regular basis.

"The new LCM is set up in a way that the landscape and building are interwoven. The thing we want children to take away from the building and landscape would be a positive engagement around water and the environment, a sense of play and delight in these native landscape elements."
— Rich Franko, Partner, Mithun (Curbed, 2019)

Responding to statewide disparities in educational outcomes: The museum's emphasis on holistic childhood education is a direct response to Louisiana's ranking as the 48th state (lowest 5%) in educational outcomes at the time of design.

Creating an equitable model for improving the health and well-being of low-income children: The museum's holistic approach to early childhood development prompted its move from the New Orleans Warehouse District to City Park, shifting the focus of exhibits from indoors to connecting children with nature and educating them about ecology and resilience. The location in the park also made it possible to expand the museum's reach beyond paying visitors to all park visitors.

Reducing chronic disease risk through education and access to physical activity and fresh, healthy food: Easy access to opportunities to be physically active and eat fresh, healthy food can reduce the risk of chronic disease. For example, a portion of the lower rates of diabetes and poor general health as well as higher rates of physical activity in the Mid-City and Navarre neighborhoods may be attributable to their location next to City Park: 8.5% diabetes, 12.4% poor general health, 84% regular physical activity in Mid-City and 7.3% diabetes, 11.3% poor general health, 84.3% regular physical activity in Navarre compared with 14.1% diabetes, 22.6% poor general health, and 73.3% regular physical activity in New Orleans. The educational outdoor space teaches children about the relationship between food and nature. It features an edible garden, outdoor kitchen, picnic tables, and a waterway that irrigates the plants. The museum café serves healthier versions of popular local foods using local ingredients, including from the on-site community garden. The kid's culinary lab and an edible demonstration garden connect the food we eat with how it grows and is prepared. Activities include harvesting herbs and fruits and making meals at a shared table in the garden.

Welcoming local non-profits to program activities after regular museum hours: To expand access for children and youth beyond its target age range of 0–3, the museum provides spaces for local non-profits to run activities from 4–8pm. The museum further supports these activities by connecting them with educational content and skill building activities, offering exclusive access to relevant areas of the building and landscape.

"We know that once you open those lenses up, they're never going to go back to the same size. So, we want to make sure that we give exposure to children on any careers that are associated with exhibits, the building, and anything displayed in the building. We want to make certain that we are highlighting those as potential opportunities for children to explore more."
— Tifferney White, CEO, Louisiana Children's Museum



Louisiana Children's Museum, Indoor-Outdoor Ecological Exhibits
Image Credit: Kevin Scott

Cultural connection to place

Presenting a modern interpretation of New Orleans vernacular architecture: Vernacular design elements include the deep porch next to the lagoon and live oak grove, which provide shade and create conditions for a breeze on hot days. The interior courtyard is also a common feature in historic New Orleans architecture. The interactive glass spheres installation on the porch railings was inspired by the orginal glass Mardis Gras beads, and created by local artist Mitchell Gaudet.

Highlighting the importance of City Park to New Orleans culture: As described in the following quote from a post-occupancy survey: "Windows in boardroom overlooking lagoon, they perfectly frame what being in City Park is all about."

Spotlighting diverse voices from across New Orleans: To explicitly connect the building, grounds, and exhibits to cultural touchstones in New Orleans, many local artists influenced the design elements. For example, Terrance Osborne designed a multicolored shotgun house exhibit, and Alex Beard painted a mural inspired by Louisiana natural landscapes. Children's artwork and grandparents' thoughts about local art are also prominently displayed.

Installing native vegetation and signage to highlight the park's role in New Orleans culture: The Louisiana Children's Museum is in a public park near other cultural institutions like the art museum and botanical garden. The museum's landscape exhibits educate visitors on the historic elements of the site, which is one of the country's oldest urban parks.

Designing the lagoon to maximize flood resilience: In the 1930s, City Park transformed brackish marshland into a manmade lagoon and canal system linking Lake Pontchartrain and Bayou St. John. The construction of the museum offered an opportunity to convert some of that "grey" flood infrastructure into "green" infrastructure while increasing awareness about the history of flood mitigation in the city.

Building awareness of the importance of the environment: Answers to a question in a post-occupancy survey about what the new museum communicates to visitors and the community demonstrate how the museum enhances visitor appreciation for the natural world. For example, one visitor wrote: "The importance of our local environment to our everyday lives."

"There is a lot of what I see in design intent that is being actualized in the museum experience. Oftentimes when I'm touring adults through the building, one of the things they say is they understand the ecosystem better. They've been living in New Orleans. They've been living with the river and the port and the lakes, and somehow, seeing those elements in this building as well as the indoor and outdoor playing together or interacting together, engaging together, gives them a different picture."
— Tifferney White, CEO, Louisiana Children's Museum.

Economic development without causing displacement

Exposing local high school students to environmental careers and ways to increase resilience in their home neighborhoods: Museum programming uses the building's green infrastructure to expose local high school students to potential career pathways related to environmental science that could benefit their home neighborhoods. For example, youth living in nearby neighborhoods like Fairgrounds, which combines moderately high rates of home ownership (46%, compared with 49% in New Orleans and 65% in the US), particularly for black residents (59.3%, compared with 48.7% in New Orleans, and 8% in the US) with exposure to a 100-year floodplain, can apply the skills they learn at LCM to help their families increase neighborhood resilience to flooding and protect their property value.

"We are talking with high school students about the hidden challenges that are visible in the museum building. They live in neighborhoods where the flooding is huge and they're experiencing that. So, we're trying to go from lived experience and then talk about the challenge. And use the museum building and landscape design to think about how we might be able to find solutions to those challenges, or at least be able to understand what's happening so that they have that knowledge and education."
— Louisiana Children's Museum

Environmental Justice

Building regional awareness of flooding and water pollution and sustainable ways to address them: The museum's exhibits and landscaping highlight pollution in the Mississippi River caused by upstream sources, while also showcasing green infrastructure techniques to reduce flood risk and clean the water before it flows into the Gulf.

"Water is paramount in New Orleans. It drives our economy. It drives our culture. It shapes the city geographically. It's critical to our personal and environmental health. But, we have this balance of living with water as both an asset and a threat, a gift and a challenge. On the one hand, we have an abundant diverse landscape supported by our extensive wetlands. We have a robust port economy that connects us to the world. We have this amazing river that has inspired music and art and literature. On the other hand, we think every day about how do we live with all this water? How do we manage stormwater? How do we address pollution from all the industry upriver that flows to us. New Orleans is at almost the very end of the Mississippi/ Atchafalaya River Basin, so we receive whatever flows down from everybody above us. How do we address the incredibly rapid land loss that is making New Orleans more vulnerable to storms and eroding land, indigenous cultures, and ways of life? We sit at a dynamic intersection of inspiration, opportunity and peril."
— Allison Stouse, former Project Director, Louisiana Children's Museum

Ecosystem health

Maximizing the restoration of native ecosystems: 61% of the site (5 of 8.5 acres) is protected or restored native habitat.

Weaving indoor and outdoor spaces to enhances biodiversity education and ecosystem services: The sequencing of exhibits connects visitors to the surrounding natural systems, directing them through a grove of oak trees, across the lagoon, into immersive exhibits with choreographed window views, and finally outside to a sensory garden and edible garden/outdoor kitchen.

Building awareness and appreciation for ecosystem health through immersive and experiential exhibits: Child-led immersive exhibits transition from indoors to outdoors, featuring a mock-up of the Mississippi River and a floating classroom barge. 100% of respondents to a post-occupancy survey reported that the museum's location in City Park, its landscape design, and the educational signage "enhance children's connections to nature and the environment."

Educating visitors on the transitions in the river delta ecosystem: Signage marking elevation changes, at every six inches, in the wetland along the bank of the lagoon educates visitors about the changes in ecosystems and the role each set of plants play in creating an overall healthy ecosystem.

Creating immersive experiences for children to imagine life in different parts of a massive live oak tree: The heritage live oak trees on the museum site, with their expansive root systems and horizontal branches inspired the design of indoor exhibit spaces, which create small spaces for children to play within large, expansive interior spaces.

"The exhibit designer, Gyroscope, Mithun, and the Louisiana Children's Museum had a really great collaboration early on, so that when you're up at the Mississippi exhibit, you look out on the lagoon and the water in the exhibit is connecting to the water outside the window. When you're in the Dig into Nature exhibit, you see out into these vines that are growing up the building so that the inside and outside connect."
— Rich Franko, Partner, Mithun

Restoring a native wetland habitat in a manmade 1930s lagoon: The landscape design maximizes biodiversity, replacing the steep banks of the manmade lagoon with 20-footwide shallow terraces planted with wetland species.

Attracting native flora and fauna back to City Park: Floating bio-islands are designed to attract nesting birds. Habitat logs support turtle, fish, and bird habitat.

Protecting nocturnal ecosystems: Lights are turned off at night to support the nocturnal ecosystem in City Park.

Southern Louisiana is "a place where water and land are constantly interwoven and interdependent."
— Rich Franko, Partner, Mithun (Curbed, 2019)

Protecting the world's largest grove of live oaks—a World Heritage Site: The building footprint and pier foundation avoid disturbing a grove of heritage oak trees that are of great historical and environmental significance to the region.

Safeguarding migratory birds through a curtainwall design: The building's design supports native habitat through external louvers and bird-safe fritted glass to reduce bird collisions.

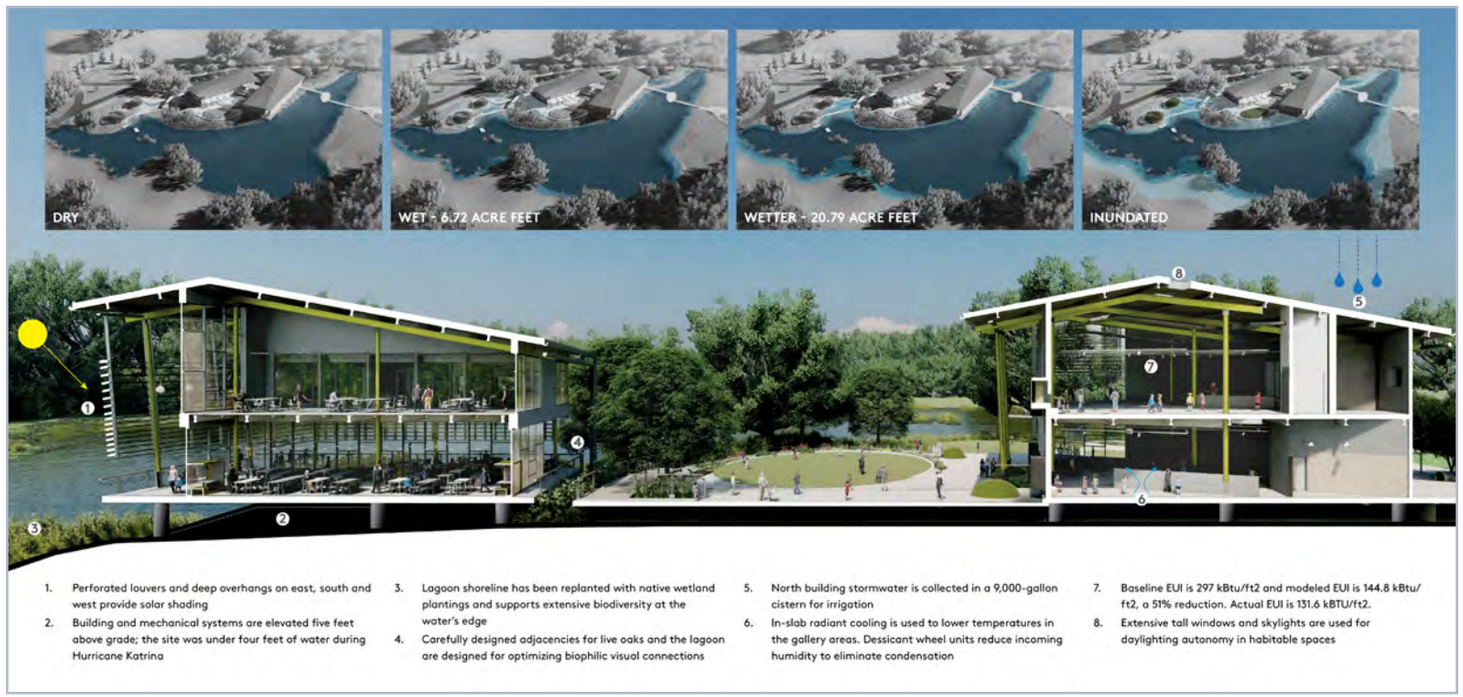
Climate change health & resilience

Enhancing social and environmental resilience by creating a building designed to be flooded: The site is located below sea level with no natural drainage. It is adjacent to a 1930s era manmade lagoon and canal system. The building is designed to withstand up to four feet of water without compromising the structure or primary walking paths. Critical building equipment is elevated five feet above ground level—one foot higher than flooding reached during Hurricane Katrina. A flow-through zone is located below the slab to reduce water pressure on the structure during flooding events. Educational signs are designed teach New Orleans residents how to enhance their own homes' resilience to flooding. Flood resilience measures made it possible for the museum to reopen quickly after five major flood events in 2020.

Enhancing resilience to extreme heat through passive design features: Perforated louvers and deep overhangs along a long porch and near the water body increase shading and airflow. Tall windows, skylights, window frits, solar louvers, and roller shades increase resilience to power outages by delivering daylighting without glare. Highly efficient wall insulation and light-colored exterior walls and roofing reduce occupant exposure to extreme heat.

Integrating practical climate resilience strategies into outdoor exhibits and play elements: Flood-related green infrastructure exhibits and play elements are interwoven with educational placards that teach museum visitors how to build resilience to flooding.

"The building has these very distinctive roofs and a vast gutter system. On one of the buildings, rainwater is collected in a giant cistern that is a contributor to the landscape irrigation and also an interactive water feature—water comes out of the lower part of the cistern into a basin where children can pump and splash and stamp their feet in it."
— Allison Stouse, former Project Director, Louisiana Children's Museum



Louisiana Children's Museum, Design for Resilience
Image Credit: Mithun

Safeguarding facility operations during power outages: Building systems are connected to a central battery system and generator that will run for four hours.

Designing the roof to collect rainwater: The museum's roof directs rainwater to a 9,000-gallon cistern. It teaches children about the water cycle, reduces flood risk, and stores water for irrigation.

Enhancing resilience to hurricane-force winds: Like all of New Orleans, LCM is at high risk of hurricanes. As a result, all glazing and façade elements were designed to withstand high winds.

Offering limited shelter from heat and flooding during daylight hours: The elevated courtyard and covered porches surrounding the building are available for outdoor sheltering during daylight hours. The interior courtyard is also available for limited sheltering. It offers additional security and access to restrooms whose toilets are supplied with emergency water from a 9,000-gallon rainwater cistern.

We have at the front of our building a room, the Entergy Charitable Foundation Talk & Play Center. It is available for anyone to use. It could be families that are in the park that just want to get out of the heat. We have story time in that space. And, there are early childhood organizations that come in and take advantage of the story time. Sometimes we customize those experiences based on what they're studying in their classroom or what they're doing with their students."
— Louisiana Children's Museum

Using the renovations to the manmade lagoon as a pilot for the Greater New Orleans Urban Water Plan: Neighborhoods surrounding City Park are located in the 100-year flood plain. To maximize the urban flood mitigation services provided by the park, the landscaping renovation turned the lagoon into green infrastructure that retains stormwater from surrounding neighborhoods and streets. It is designed to relieve pressure on the pump systems that drain most neighborhoods.

Mitigating nonpoint source water pollution from surrounding areas: Bioretention swales are designed to filter 80% of total suspended solids from parking and street runoff and treat 90% of stormwater runoff from an average rainfall. The system filters an estimated 1.7 million gallons per year of stormwater that would otherwise flow directly into the Mississippi and the Gulf of Mexico.

Expanding the definition of a resilience hub: Passive design features and abundant outdoor spaces provide refuge from heat and flooding, allowing the museum to be used as an ad hoc shelter during extreme weather. Its flexible design, combined with adaptable operations, enabled its conversion into a temporary school during COVID.

"The site is designed to be part of a stormwater receiving area for the surrounding community. That's an example of adaptive resilience where it's serving a broader community. If you have a generator, you're up and running during a climate event, but that might not benefit a larger group unless you are acting as a community shelter. But, things like stormwater mitigation are actually serving the larger neighborhood and showing that everybody can be a team player with that type of green infrastructure design."
— Rich Franko, Partner, Mithun

Decarbonization

Combining a desiccant wheel with radiant cooling to increase energy efficiency and improve thermal comfort: The mechanical design innovatively uses radiant cooling in gallery area slabs with desiccant wheels to reduce the humidity of incoming air. Tall windows and skylights reduce lighting demand by providing daylighting. The resulting design modeled an energy use intensity (EUI) of 144.8 kBtu/ft2 compared with 297 kBtu/ft2 in the baseline model (a 50% reduction). The actual measured EUI for the first year was even lower—131.6 kBtu/ft2.

"The approach to the design was always to create a building that would be a tool for learning. As young children or adults move through the building, at a height of 3'-6" or 6'-3", they have these delightful interactions with the light, the structure, the sound and textures that are experiential in nature and demonstrative of the sustainable strategies that have been integrated throughout."
— Allison Stouse, former Project Director, Louisiana Children's Museum

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Contributors

COTE Knowledge Community and AIA Staff.

Special thanks

Louisiana Children's Museum, Mithun, interview participants.

Additional information

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Committee on the Environment

AIA Knowledge Community

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

Committee on the Environment

AIA Knowledge Community



Santa Monica City Hall East, aerial view
Image Credit: Alex Nye, courtesy of Buro Happold

Santa Monica City Hall East

This case study shares an exemplary architecture project that centered both the environmental and social aspects of climate change in the design process, approach to community engagement, and final design. It touches on many aspects of the AIA Climate Justice in Architecture Taxonomy at the building, neighborhood, regional, and global scales.

Santa Monica City Hall East (CHE)

Santa Monica, CA



Santa Monica City Hall East Section Render
Image Credit: Frederick Fisher and Partners

Summary

Santa Monica City Hall East (CHE) is the first-ever municipal building to achieve certification under the Living Building Challenge (LBC). CHE is a 50,200 sq. ft. building that increased the square footage of city hall to accommodate city services in a single campus location. The building both celebrates the history of Santa Monica—reflecting the landmark 1938 art deco city hall in its glass façade—and exemplifies the city's contemporary vision of modernizing city governance, improving transparency and wellness for everyone in the city, and working toward equilibrium with local ecosystems.

Located in Santa Monica, California, an eight-square-mile city surrounded by Los Angeles on three sides and the Pacific Ocean on the fourth, the building takes advantage of the sunny, mild climate and sea breeze to meet the LBC's net zero energy requirements. Achieving net zero water was more difficult, given the drought-prone climate and small site footprint. City staff rose to the challenge, turning the building into a test case for new alternative compliance pathways for composting toilets and rainwater purification systems for potable water use. CHE is a symbol of the city's desire to partner with permit seekers and reduce barriers to new, high-performance building technologies for all income levels and building types. This building is meant to be a demonstration of what is possible in the Southern California climate zone and encourage others to seek environmental and social balance.

Project overview

BUILDING PROGRAM TYPE(S):
Civic (Office)

PROJECT TYPE:
New Construction/Addition

TOTAL FLOOR AREA:
50,200 sq. ft.

TOTAL USERS:
244

SITE AREA:
46,152 sq. ft.

NUMBER OF FLOORS:
4

PROJECT CLIMATE ZONE:
ICC Climate Zone 3B

PROJECT SITE:
Previously developed land

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2020

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$60 million

THIRD PARTY RATING SYSTEM:
Living Building Challenge 2.1

Project team

OWNER:
City of Santa Monica (Amber Richane, Principal Design & Planning Manager)

ARCHITECT:
Frederick Fisher & Partners (Joseph Coriaty, FAIA, Managing Partner)

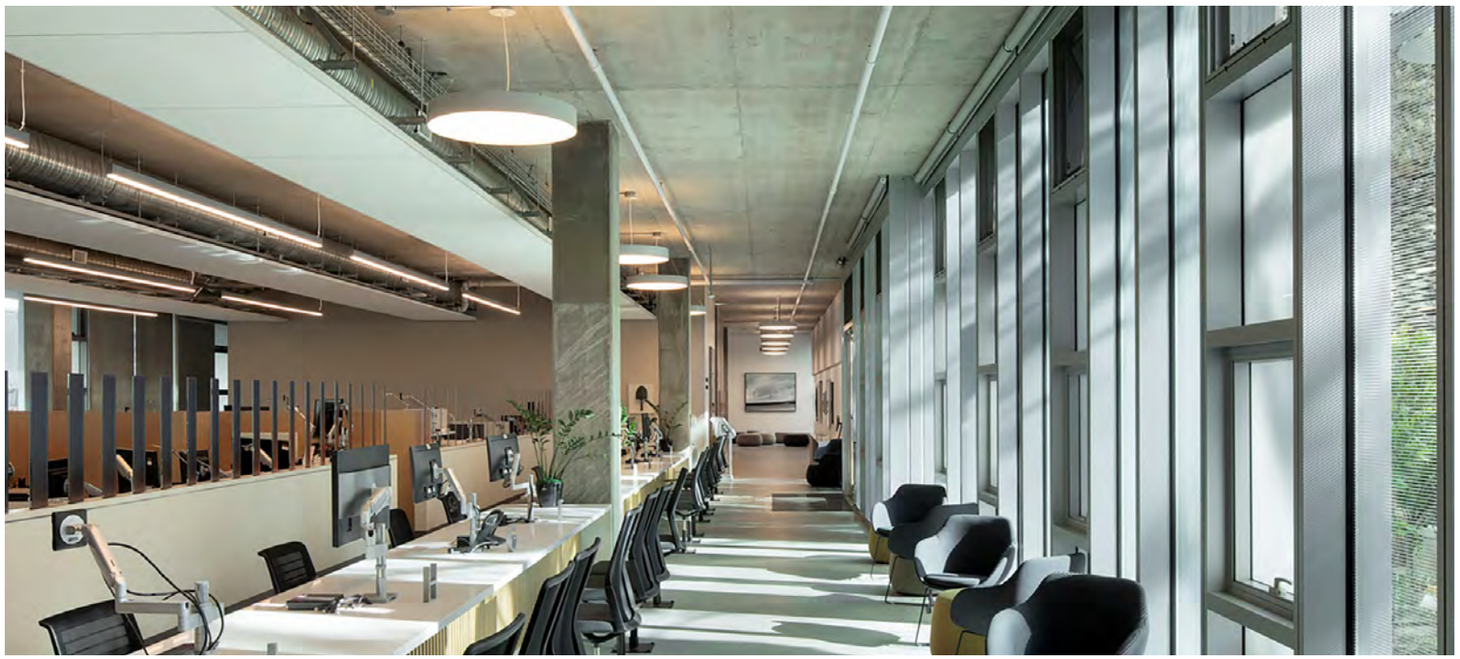
MEP ENGINEERS:
Buro Happold

STRUCTURAL ENGINEER:
JAMA

CIVIL ENGINEER:
KPFF

GENERAL CONTRACTOR:
Hathaway Dinwiddie

"The project's goal was to make the Santa Monica City Hall a more generous, useful place for the citizens of Santa Monica."
— Joseph Coriaty, FAIA, Managing Partner, Frederick Fisher & Partners Architects



Santa Monica City Hall East, public permitting counter
Image Credit: Billy Hustace

Design Process

Santa Monica is proud of its history as one of the first cities in the world to publish a sustainable city plan in 1994. Starting with that first plan, the city has set measurable goals for improving the environment and used data to track progress.

When it became clear in the early 2010s that adding an addition to the landmark 1938 city hall building would make it possible to consolidate all city services in a single location—thereby eliminating annual leasing expenses and improving customer service—the city set a stretch goal: building the first municipal building certified under the Living Building Challenge (LBC). The new building was intended to increase awareness of Santa Monica's commitment to fiscal, environmental, and social sustainability.

Three elements of the design process lay the foundations for meeting such an ambitious goal. First, Santa Monica benefits from strong civic engagement and a value system that includes a deep appreciation for the environment and commitment to social equity. Second, the city structured the contract as design-build, which required the architect and general contractor to work hand in hand starting with their response to the design competition. Given the challenges associated with achieving the LBC Materials Petal, it was essential for the design and construction team to start educating suppliers and subcontractors about the importance of using nontoxic products as early as the programming and site analysis stage. Third, the city leaned into its expertise as a public sector developer and regulator to lead conversations about alternative compliance pathways with regulators at the California Water Resources Control Board (SWRCB), the California Coastal Commission, and Los Angeles County's departments of public works and health. The city council had recently passed legislation requiring net zero energy, net zero water, and resilient construction practices. So, CHE became a demonstration project to educate the design and construction community on technical strategies and convince the development community that such a building was financially feasible in the Southern California climate.

The project's guiding design principle was to create a space that improved city services in practice while also evoking democratic ideals of transparent and nonhierarchical local governance. During the first nine months, the architect, contractor, and city staff worked with community members and city departments to study the best way for city departments to co-locate so they could provide the highest level of service to their constituents. A primary example of the design goals was the improved experience of construction permit seekers in the new building. Previously, permit seekers were often sent to multiple locations to meet various requirements before pulling the permit in a dark, unfriendly room. The new building co-locates all relevant offices and places the permit counters in a light-filled lobby with a view of the outside courtyard.

"There are a lot of developments in Santa Monica that the city takes on. So, in some ways, they are practically professional developers. I think they understood that if you could have a cohesive team, … you would share rather than be up against each other. [Our firm] had 3-4 project experiences with [the contractor]. … We used that relationship of trust, level of expertise, and shared ethos of taking care of the client [to come together to create] something that helps Santa Monica. … When we built the team, we told the story of how we would work with the city to not just do the project but also to figure out how we were going to get to the path of what was the right project for everybody. … The effort of figuring out what the project was going to be was almost harder than doing the project. Not that it was that easy to do either."
— Joseph Coriaty, FAIA, Managing Partner, Frederick Fisher & Partners

"People always say it's bad to be a 'yes person,' but on a project like this, you need someone who's always fighting for 'yes' when the obstacles start piling up. As the owner, we had to be certain the building would truly work — and it does. This project succeeded because everyone had a clear purpose and worked together to deliver a building that's not only beautiful and high-performing, but also came in on time and under budget."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica

Demonstration project

The process of permitting CHE took two to three times longer than normal because the team needed to seek alternative compliance pathways—particularly for the composting toilet and rainwater purification system. Approvals were required from the city, State Water Resources Control Board (SWRCB), the California Coastal Commission, and Los Angeles County's departments of public works and health.

Navigating these multiple regulators required diplomacy and never taking no for an answer. The project team reached out to officials very early in the process to answer questions and make changes that would remove barriers to approvals. Officials from agencies with overlapping mandates also coordinated with each other, not just the design team. The design team also scheduled a tour of the Bullitt Center, a Living Building in Seattle, Washington, and facilitated opportunities for California officials to meet with their counterparts in Seattle who approved that building's composting toilet system. It was important to demonstrate that the proposed systems would not allow cross-contamination—including in the greywater system. The fact that the project was owned by Santa Monica also made it easier to work with the public water utility to find a workaround to the fact that rainwater is not identified in California regulations as a potential source of potable water.

The city continues to push the boundaries of traditional environmental health regulations in the direction of circular energy and water systems. For example, a municipal sustainable water infrastructure project has been approved to treat 10% of the black water that Santa Monica produces to a potable standard. Currently, that water is distributed through the purple pipe (reclaimed water) system. But the long-term goal is to integrate it into the municipally supplied potable water system.

While the alternative compliance pathways approved for CHE have not been codified into local regulations yet, they set a precedent for private sector projects seeking to meet Santa Monica's increasingly stringent requirements for energy, water, and resilience. The city has uploaded technical guidance and educational materials to its website. And building tours offer additional, hands-on orientation to how low-tech and high-tech design strategies were integrated into the final design.

The city is also applying the lessons learned from CHE to publicly funded projects serving low-income residents. For example, plan review officials ask design teams working on affordable housing, permanent supportive housing, and homeless shelter projects to create a health and wellness plan for future users. They encourage design teams to use projects like CHE as a guide to integrating daylight, green spaces, and biophilic elements into their proposals without running over budget.

"City Hall East taught us that good design isn't just about performance — it's about people. We've carried those principles forward into every project, especially those serving our most vulnerable communities. We now ask teams to demonstrate how they're supporting health and wellness through daylight, green space, and biophilic design and not by checking boxes, but by truly thinking about how people will feel in these spaces. It's not about building the cheapest building, it's about building the right one."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica

"As a team, we believe [the lessons we learned from the project are] not our proprietary information. ... It is a demonstration project for all of Santa Monica. ... Commercial developers I know who have [toured the building] say, 'Oh, it makes sense. It doesn't look that complicated.'"
— Joseph Coriaty, FAIA, Managing Partner, Frederick Fisher & Partners

LBC Materials Petal

The general contractor took the lead in managing the LBC Materials Petal, which is notoriously difficult to achieve. That approach seamlessly integrated materials selection and procurement into the larger construction budget and schedule. Because of the focus on the Materials Petal, the design process emphasized "dematerializing," or eliminating materials (particularly finishes), whenever possible to reduce the number of products and assemblies evaluated for toxic ingredients.

The contractor's workflow was as follows:

1. The contractor prescreened potential products through a "pre-submittal" rather than relying on subcontractors to provide documentation for products not explicitly called out in the specifications. This workflow reduced friction with subcontractors by using products they were already familiar with, shortening the review and documentation process.

2. The contractor onboarded subcontractors to train them in the Materials Petal and documentation requirements, including providing a submittal cover sheet template and asking them to fill out the pre-submittal template and provide backup documentation for the products they planned to install on the project. LBC submittals were often reviewed within 24 hours of receipt.

3. The contractor conducted field training on the key differences in an LBC project for construction workers, including the need to enforce documentation for all products installed in the building, approve hardware store runs, and follow construction waste protocols. All construction workers signed a training completion form and displayed an LBC training sticker on their hard hat.

"This was a design-build project ... so the general contractor had a big part to play. I think it was really critical to the success of the project that we were all involved from day one, and we were involved in the feasibility and began our research into material options and ingredients as the design was being formed. We started that process incredibly early. Explaining things to our subcontractors as we onboarded every single one, they were able to connect with the health aspect of sustainability. A lot more than some of them are able to connect on the environment side. I think that was really, really helpful to get their buy-in to get everyone on the same page."
— Jessie Buckmaster, Hathaway Dinwiddie

LBC Water Petal

The design process began in 2015 when the city adopted a water neutrality ordinance, which came into effect in 2017. The ordinance prohibits any new buildings to consume more water than what was previously being used on the site unless developers pay a fee to offset the cost of building water-saving infrastructure in another part of the city. The project team worked with the local health department to develop and pilot test an Alternative Means and Methods Application (AMMA) to meet potable water, sanitary sewer, and stormwater regulations. It took advantage of a 2018 California law calling for the development of regulations for reusing water captured on-site.

The process involved more than 30 meetings with officials at all levels of government to find workarounds for antiquated regulatory language and conservative readings of current requirements. The project lead engaged a nutrient recovery specialist and a certified industrial hygienist to educate regulators about composting toilets, respond to their questions, and revise the design in response to the conditions they set for approval.

The county environmental health regulators were particularly concerned about operation and maintenance of the composting toilets. They had recently rejected a request to permit composting toilets at a campsite on Catalina Island for those reasons. Input from regulators and an industrial hygienist resulted in additional safeguards to the system, such as raising the height of the discharge stack and installing an odor-control system, ultraviolet lights, CO_2 sensors, safety equipment, a clean room vestibule, and fan systems that function on emergency power. Before requesting a final building inspection from the city, the project received approvals from a third-party certified industrial hygienist as well as inspection reports from the building engineer and composting toilet manufacturer. An industrial hygienist was required to perform quarterly inspections for the first two years after the facility received its certificate of occupancy.

The project was required to demonstrate that the rainwater purification system produces water that meets federal and state drinking water requirements. The team used the LBC-certified Bullitt Center's NSF P151 testing results measuring the quality of water collected from that project's solar photovoltaic array. The manufacturer of the TPO roofing agreed to get the product tested according to the NSF P151/61 protocol, verifying that the material will not leach contaminants into the rainwater. Future projects going through Living Building certification can take advantage of that testing.

A 40,000-gallon cistern was installed beneath the building and includes a system that does not allow the water to stagnate. Regulators also required one year of testing before allowing anyone to consume water from the cistern that had been run through the water treatment system. The project also requested a waiver from the Living Building Challenge Red List, which considers chlorine a toxin, because public health regulators required the addition of chlorine to disinfect water moving from the cistern, through the water treatment system, and then to faucets.

Project financing

To attain the Living Building Challenge, it was estimated that construction costs would only increase by 9%.

Prior to building CHE, the city of Santa Monica leased office space downtown for services that could not be accommodated in the main city hall building. The city's budget office estimated that the financial burden associated with leased office space would increase to $10 million annually over the next 30 years. Building a city hall addition would eliminate those expenditures.

The city issued $76,760,000 in bonds to pay for construction. The contract structure, a "progressive" design-build with three phases (design-bid-build, design-build, and a guaranteed maximum price (GMP) phase), minimized the city's cost risk and brought in both design and construction expertise from the start of the project. The projected utility cost savings associated with the Living Building Challenge's net zero energy and net zero water requirements helped the city make the financial decision to build the addition. Furthermore, as an emergency services building (ESB), CHE was designed to function for 100 years, which puts its estimated 16-year payback period within the first 20% of its estimated useful life.

Essential climate justice design components include:

1. **Design-build contract with a hands-on owner:** The contract structure required by the design competition set expectations for a highly integrated design and construction team. Adding a sophisticated and hands-on client created the conditions for an integrated team that was able to meet highly ambitious stretch goals for sustainability, health and wellness, beauty, and social equity while staying on budget.

2. **Project vision linking equitable local governance with resilient design:** The project vision called for a design that would use green and healthy building strategies to create a space that would both support staff in delivering the best possible service to community members and become a gold standard for equitable and transparent local governance.

3. **Leveraging a public sector owner to trailblaze new compliance pathways:** The city of Santa Monica used CHE to create regulatory precedents for alternative compliance pathways that would lower barriers for private development projects aiming to meet the city's increasingly stringent energy, water, and climate resilience regulations without increasing construction costs.

AIA Climate Justice in Architecture Taxonomy

Climate change both creates new and amplifies existing environmental and social challenges across seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy addresses both the environmental and social dimensions of climate change, guiding teams to design architectural responses that impact these themes at three scales: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The framework is comprised of 10 principles and informs progress toward four outcomes: a zero-carbon, healthy, resilient, and equitable built environment.

Santa Monica City Hall East addresses all three scales in the framework, with particular emphasis on the building and regional/global scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	●	●	●	Integration, Equitable Communities, Economy, Energy, Well-being, Change, Discovery
Cultural Connection to Place	●	●	●	Integration, Equitable Communities, Well-being
Economic Development without Displacement	●		●	Equitable Communities, Economy
Environmental Justice			●	Resources
Ecosystem Health	●	●	●	Ecosystems, Water, Well-being, Resources, Change
Climate Change Health & Resilience	●	●	●	Equitable Communities, Water, Well-being, Change
Decarbonization	●		●	Integration, Equitable Communities, Economy, Energy, Resources, Change, Discovery

Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Santa Monica City Hall East. Source: Biositu, LLC



Santa Monica City Hall East, tour of the courtyard
Image Credit: Joseph Coriaty, FAIA, Frederick Fisher & Partners

Social determinants of health

Creating a healthy and productive workplace for all city staff: The open, daylit interior layout is designed to facilitate communication and collaboration across city departments, both to reduce the number of stops community members need to make to get their business done and to improve the staff work experience.

Reducing the risk of airborne infection: The natural ventilation and open floor plan made it possible to flush the building with outdoor air during the COVID-19 pandemic. As a Santa Monica official reported, "Four years [after occupancy], we have not had a single case of transmission of COVID in the building, and we attribute a lot of that to being able to open the windows. You can't do that in a lot of office buildings. … We also programmed in an extra flush during the day … — [one] at 10 o'clock, and … [another] at 2 o'clock. … And I was one of those people that when the windows were open … my whole body felt better."

Promoting the mental health of staff and visitors by creating visual and physical connections between the indoors and outdoors: Abundant daylight, manually operable windows at desk height, and views of the courtyard garden and Pacific Ocean create a sense of connection with the outdoors from the interior of the building. The open office plan facilitates natural ventilation throughout the building.

Facilitating fresh food prep for staff: Each floor includes a kitchen that doubles as a meeting space, which makes it easier for staff to prepare fresh and healthy meals.

Creating an outdoor living room for both the historic city hall and occupants of the addition: The new building closed in the fourth side of an outdoor space behind the historic city hall, converting it from unused exterior space into a highly used indoor/outdoor space that people in both buildings enjoy.

Adding pedestrian and cycling paths that cut through the property: A pre-design occupant survey found that a high percentage of staff bike to work. Neighborhood residents report a slightly higher average of commuters using public transit, walking, or cycling compared to the city average (14.1% compared with 11.3% in Santa Monica) and a markedly higher percentage than in LA County (7.7%), California (8.7%), and the U.S. (6.7%). The building property is also located one block from high-risk intersections along the beachfront. Installing pedestrian and cycling paths separated from the street helps expand the network of pedestrian- and cycling-only infrastructure that is being built out throughout the city.

Co-locating services for older adults and housing-insecure residents alongside free educational materials and amenities like edible plants and a safe outdoor gathering place: Santa Monica is home to a higher-than-average percentage of adults over age 65 (18.4% compared with 14.2% in LA County, 14.9% in California, and 16.5% in the U.S.). Roughly 700 community members are unhoused, a high percentage for such a small city. The estimated prevalence of food insecurity in the CHE neighborhood and surrounding neighborhoods ranges from 7% to 22%, compared with 8.5% in the city of Santa Monica, according to CDC Places. The city uses the CHE building and landscaping to demonstrate low-cost strategies that can help reduce housing and food insecurity. In addition, the fruits, vegetables, and herbs cultivated in the courtyard are harvested and made available for free to visitors.

Demonstrating transparent and welcoming governance through the building design and operations: The building encourages civic engagement by co-locating related services, such as permitting, in an open, welcoming space that is a pleasure to visit.

"People used to have to go to two or three different places to get their business done, and that's frustrating for folks, right? By the time they got to the counter, they were already short-tempered. … It was in a dark area. It was loud. There were a lot of things that made it really challenging. And so, … when you walk into the [new] space, especially if you're hitting the light when it's coming over the building, … you look at the light, [and] your brain … calms down. It is not in that fight-or-flight mode. It makes everybody feel better."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica



Santa Monica City Hall East, interior view with biophilic elements
Image Credit: Undine Prohl, courtesy of Frederick Fisher & Partners

Cultural connection to place

Enhancing the visibility of the landmark art deco city hall through design: CHE enhances appreciation for the landmark 1938 art deco Santa Monica City Hall by reflecting the historic building in its façade and by reactivating an existing courtyard that previously many occupants overlooked.

Linking design elements promoting daylight with Santa Monica's tradition of strong civic engagement: Public areas are intentionally designed as welcoming spaces, including transparency across the floorplate and installations of local art. The entrance courtyard is designed to function as an outdoor room with full visual connections to the services that are provided on the other side of the glass. It presents a functional example of transparency in local government.

Creating a community gathering space in downtown Santa Monica: The courtyard is designed to act as a community gathering space. In the courtyard, people from different backgrounds can sit, talk, pick fruit, hold meetings, and enjoy each other's company a block from the beach.

Starting a conversation to right historic wrongs: The public art in CHE counterbalances murals in the historic city hall that trouble members of the Santa Monica community whose ancestors were marginalized. The CHE lobby, which is accessible during the work week, displays an art exhibit called "Lives that Bind," which highlights the works of underrepresented populations tied to Santa Monica and their histories.

Economic development without causing displacement

Creating a demonstration building for all income levels: The city used the building as a test case to increase the flexibility of outdated regulations to reduce the cost and amount of time that individuals with private projects would have to expend to meet increasingly stringent green and healthy building requirements. Keeping construction and operations costs down is particularly important for affordable and mid-income housing due to the high percentage of income that goes toward housing and transportation: 49% in Santa Monica and 48% in LA County.

"Is everyone going to do a Living Building? Absolutely not. But they can learn something from the building? Absolutely. We have had community members, developers, and others come through; public officials come through and say, 'Oh. That's what you were talking about' or 'Oh. That isn't so scary' or 'Can I talk to your maintenance person? What on earth is a composting toilet like?' Those are the types of conversations we want to lean into."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica

Reducing the tax burden on Santa Monica residents: The building is designed to save taxpayers' money (roughly $10 million per year in savings from leases + $0 utility bill), which is part of an overall effort to make Santa Monica more affordable.

Reducing the cost of doing business in the city of Santa Monica: By bringing all city services under a single roof, the new wing lowers friction for residents and businesses in need of city services to advance their economic aims.

"Much of what we need to do is common sense. We enjoy a really wonderful, benign climate in Santa Monica. ... We have a prevailing breeze off the ocean from Santa Monica Bay and abundant light. [Harnessing those environmental benefits using] common sense principles doesn't take a lot of money. We just have to think about it as designers and builders."
— Joseph Coriaty, FAIA, Managing Partner, Frederick Fisher & Partners

Environmental justice

Influencing building product manufacturers to rethink the ingredients in their products: The project team's advocacy led the CEO of Aeroflex, which makes elastomeric insulation, to publicly commit to creating a Red List–free product. R&D around eliminating HFRs from the insulation product also ramped up.

Educating subcontractors about the health benefits to their installers of switching to nontoxic materials: This quote from a subcontractor illustrates the ripple effect of the CHE project on the local construction community: "We're going to make sure we use [LBC] Red List–free [materials] for every project from now on. Now that we know, why would we go back?"

Paying it forward: The project team relied on publicly available information about Red List–free products that had been used on previously certified Living Buildings. To reduce the burden on future projects, the Santa Monica team has made their extensive materials research available to others seeking Living Building Certification.

"I spent about five years researching and verifying and validating materials. We talked to hundreds of manufacturers. And the vast majority were very much on board. A lot of them just didn't know what was in their product. ... It was really a partnership and education with the manufacturers. We've learned a lot of chemicals show up in products that you would never expect."
— Jessie Buckmaster, Hathaway Dinwiddie

Ecosystem health

Centering biophilia in the design: CHE is located on a property with an extensive park across the street and is three blocks from the beach and the Pacific Ocean. However, the main city hall blocks most of the view from the addition. And the surrounding neighborhood is covered with 80–100% impervious surface. Integrating biophilic elements in the building's interior and creating strong sight lines to the tree-shaded courtyard outside turn CHE into a mini garden oasis in the middle of downtown Santa Monica.

Creating a site-specific ecosystem: The city talks about the building having its own ecosystem, with the roof as its watershed, an underground cistern as the reservoir, and the on-site water treatment skid as a decentralized water treatment plant.

Infiltrating stormwater into the site: The site captures, filters, and uses or infiltrates all stormwater coming onto the site to prevent it reaching the ocean. In this way, it helps protect nearby marine ecosystems by reducing the volume of nonpoint-source water pollution introduced to the Pacific Ocean, which borders Santa Monica. Stormwater is mostly infiltrated on-site, contributing to the underground aquifer, which remains depleted after years of historic droughts.

Balancing native ecosystem restoration with cultural heritage: The landscaping and civil engineering design seeks to balance a recycled grey water irrigation system with native habitat restoration, the historic code overlay, the LBC requirement to introduce urban agriculture to the site, and the need to minimize maintenance costs.

Contributing to city composting: The biosolids collected from the composting toilets are anticipated to be used as compost and used through the city to replenish nutrients in local soil.

"We have a beautiful building that has a lot of biophilic elements, connects with nature, ... [connects] daylight to fresh air and natural ventilation. We're also trying to bring in those pieces where we can talk about our histories in a productive way and ensure that this is a building for the people."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica



Santa Monica City Hall East, cistern installation
Image Credit: Frederick Fisher and Partners

Climate change health & resilience

Designing with the future in mind: On-site water use and exposure to drought and flooding were analyzed within the context of climate change projections and the carrying capacity of the site and its surroundings.

Respecting water as a precious resource in a drought- and flood-prone region: Santa Monica averages 14 inches of rain each year, mostly in the winter (December–March). The city has a goal of becoming water self-sufficient and this building helps prove that model. The net zero water design, including a 40,000-gallon cistern underneath the building, and the project's leadership in increasing the flexibility of environmental health regulations support the city's goal of achieving water independence.

Mitigating occupant exposure to traffic-related air pollution: The building site is adjacent to the terminus of Interstate 10. As a result, it experiences high exposure to traffic-related air pollution (80th and 90th percentile exposure to particulate matter and ozone in California, respectively). Diesel particulate pollution, a known carcinogen, is estimated to be 20.39 kg/day. Enhanced filtration media required by the LBC, orienting the building away from the freeway, and funneling ocean breezes through the building help mitigate occupant exposure to the outdoor air pollution. Air quality is monitored both inside and outside before the windows are opened by the building management system (BMS).

Designing for earthquake resilience: According to the FEMA Hazard Risk Index, Santa Monica City Hall is located in the 99th percentile of earthquake risk. As an essential services facility, CHE was designed to function after a major earthquake. The structure meets seismic code requirements 1.5 times above the normal California code. A 15,000 sq. ft., 240-kv solar array works in tandem with the net zero energy design to allow the facility to operate during power outages.

"The composting toilets work if the power goes out, although they might not smell as good. We have an on-site water treatment plant, so we can process water if there is a water main break. We can adjust the temperature using the operable windows. And the systems furniture could be taken out to convert the building into an emergency shelter."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica (Common\Edge)

Mitigating the site's contribution to introducing polluted stormwater to Santa Monica Bay: The site is several blocks from the Pacific Ocean in a metropolitan area with high percentages of impervious surface (roughly 60%). It is therefore at risk of contributing to nonpoint-source water pollution in Santa Monica Bay. The roofs, landscaping, and civil engineering design ensure that no stormwater leaves the site.

Mitigating neighborhood exposure to extreme heat: The CHE neighborhood falls within the 93rd percentile in California for disparities in heat vulnerability, a particularly troubling statistic given the high percentage of older adults and unhoused individuals living in the neighborhood— both of whom are more sensitive than the general population to heat-related illness. The net zero energy design, publicly available lobby, and shaded courtyard work hand in hand with city services aimed at reducing disparities in exposure during heat waves.

Mitigating wildfire risk: While the trajectory of wildfires is notoriously unpredictable, Santa Monica is estimated to experience greater wildfire risk than 92% of communities in the U.S. and 64% of communities in California, according to the U.S. Forest Service. The concrete structure, minimal flammable materials on the building's interior, hybrid ventilation system design, and drought-resistant landscaping all reduce the risk of wildfire disrupting building operations. They also demonstrate strategies for community members working to reduce their own property's exposure to wildfire risk—including protecting occupants from poor air quality when downwind from active fires.

Decarbonization

Achieving net zero energy use: CHE meets the LBC requirements for net zero energy use through a combination of building design, high-efficiency insulation, natural ventilation, high-efficiency HVAC, and on-site solar power. It also acts as a demonstration building supporting the city of Santa Monica's goal of becoming a carbon neutral city by 2050.

Balancing transparency with energy efficiency: The glass curtainwall includes a low-e coating and ceramic frit. From the outside, it looks like an entirely glass façade, but from the inside it reveals its 40% window-to-wall ratio, which is typical of net zero energy buildings.

Windows and the building mass work together to maximize the passive cooling system: Automatic windows controlled by a weather station to capture sea breezes are located near the ceiling. Windows automatically open at night to draw in cool air, which is absorbed into the mass of exposed concrete decks. The concrete building mass passively cools the building for the first part of the workday, eventually shifting to active radiant heating/cooling, which provides uniform thermal comfort and can cover about 50% of peak load. A ducted variable air volume system kicks in on very hot and very cold days.

"Really crucial to our project was being design wise. The architecture team was very intentional. We called it 'dematerializing' — [deciding] what is absolutely necessary for the building? And what can we … leave out?"
— Jessie Buckmaster, Hathaway Dinwiddie

Testing new technologies to provide passive auxiliary cooling: The building uses 40,000 square feet of PCM (phase change material) sheets in the curtainwall spandrels, interior stud frame walls, and acoustical ceiling clouds. PCM are filled with a vegetable oil–based material that absorbs heat to cool its surroundings during the heat of the day and re-radiates it when the ambient air cools at the end of the day.

Supplying electricity using on-site solar power: A 15,000 sq. ft., 240-kv solar array works with the net zero energy design to eliminate scope 1 and 2 greenhouse gas emissions through facility operations. Scope 1 emissions refer to direct emissions generated by burning fossil fuels on-site. Scope 2 refers to indirect emissions from electricity, steam, or other building systems.

Reducing the operational carbon footprint associated with water use by meeting LBC net zero water goals: The project reduced demand for potable water by installing the greatest number of composting toilets in a single property in California. The foam-based composting toilets reduced the building's water demand by 70% (270,000 gal/yr). A 40,000-gallon cistern under the building captures rainwater, and an on-site well that penetrates 50–60 feet beneath the building can supplement the water supply during droughts. Rainwater and well water is purified using cartridge filters and granulated active-carbon filters. Greywater is captured from air handling unit condensate, showers, and lavatories. It is treated using a moving bed-membrane bioreactor and used for on-site irrigation.

"One of the reasons we chose the Living Building Challenge is that it's not just about net zero energy or … water. You're not checking boxes. … The Living Building Challenge really looks holistically at how the building lives within the means of the site. And how it supports the human health and wellness of its occupants, including construction and kind of all the way through. It really was a paradigm shift."
— Amber Richane, Principal Design & Planning Manager, City of Santa Monica

Reducing the building's construction embodied carbon by diverting almost all of its construction waste: The project worked with a construction waste management company to divert waste for recycling and reuse, such as grinding gypsum scraps into dust that was sold as agricultural amendments. Final diversion rates demonstrated that city of Santa Monica's goal of zero waste production by 2030 is feasible: 95% of paper and cardboard, 100% of soil, 90% of rigid foam/carpet/insulation, and 80% of combined construction waste were diverted from landfills.

Leveraging the decarbonization goal to benefit local businesses: The city actively encouraged the design team and contractor to source products that combined a small carbon footprint with supporting local businesses and integrating local materials and cultural references into the design. For example, several of the tables in CHE were made from trees that came down in a windstorm, were dried, milled, and fabricated all within a 15-mile radius of the site.

"There was a big windstorm in Los Angeles in the period that we were designing the building, and we came across a company called Angel City Lumber that [recycles] trees that had fallen down, and a bunch of the millwork in the building are those trees from Santa Monica. … The story [is] that as much as possible the city was conscious and pressing us all the way."
— Joseph Coriaty, FAIA, Managing Partner, Frederick Fisher & Partners

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Committee on the Environment

AIA Knowledge Community

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change.

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the era of climate change.

Committee on the Environment

AIA Knowledge Community



Sealaska Heritage Institute Arts Campus, Heritage Square, and Sealaska Cultural Values Totem Pole
Image Credit: Zane Jones

Sealaska Heritage Institute

This case study highlights an exemplary architecture project that prioritized both environmental and social aspects of climate change in its design process, community engagement, and final design. It aligns with many aspects of the AIA Climate Justice in Architecture Taxonomy across the building, neighborhood, regional, and global scales.

Sealaska Heritage Institute

Juneau, Alaska



Heritage Plaza
Image Credit: MRV Architects

Summary

The Sealaska Heritage Institute (SHI) was founded in 1980 to celebrate and perpetuate the history, heritage, and cultures of the three Native peoples served by the Sealaska Corporation—the Tlingit, Haida, and Tsimshian. SHI's architectural design is notable, in part, for embracing regional Native building materials and monumental formline designs within a historic district whose design standards required new buildings to meet antiquated historical standards, designed to blend in with existing buildings from Juneau's mining heyday in the late 19th and early 20th centuries, which ignored Indigenous people and architecture that predated them.

The SHI campus is anchored by the LEED Gold–certified Walter Soboleff Building, which houses exhibition space for historic and contemporary Alaska Native art, as well as SHI offices. Across the street, SHI converted a surface parking lot into the only pedestrian plaza in the city center, surrounded by artist studios and classrooms. The overall effect is a welcoming space that serves as a community hub for the Tlingit, Haida, and Tsimshian; a regional center celebrating Native heritage, history, and art of the Pacific Northwest; and one of the preeminent centers of cultural exchange in Southeast Alaska. Designed as a demonstration project blending local materials and longstanding Native construction practices with Western building science and sustainability metrics, the complex exemplifies Southeast Alaska Native core cultural values:

Haa Aaní | Íitl' Tlagáa | Na Lax̲yuubm: Honoring & Utilizing Our Land
Haa Shuká | Íitl' Kuníisii | Na Łagigyetgm: Honoring Our Ancestors & Future Generations
Haa Latseení | Íitl' Dagwiigáay | Na G̲atlleedm: Strength of Body, Mind & Spirit
Wooch Yáx̲ | Gu Dlúu | Ama Mackshm: Social & Spiritual Balance

More information: mysealaska.com/AboutSealaska/MissionCoreValues

Project overview

BUILDING PROGRAM TYPE(S):
Cultural

PROJECT TYPE:
New Construction/Addition

TOTAL FLOOR AREA:
30,000 sq. ft.

TOTAL USERS:
104 staff, 50,000+ visitors, beneficiaries

SITE AREA:
6,000 sq. ft.

NUMBER OF FLOORS:
4

PROJECT CLIMATE ZONE:
ICC Climate Zone 6A

PROJECT SITE:
Previously developed land, Historic structure or district

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2022

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$18M

THIRD PARTY RATING SYSTEM:
LEED Gold

Project team

OWNER:
Sealaska Heritage Institute

ARCHITECT:
MRV Architects

MEP ENGINEERS:
PDC Engineers, Haight and Associates

STRUCTURAL ENGINEER:
BBFM Engineers, Inc.

CIVIL ENGINEER:
PDC Engineers

GENERAL CONTRACTOR:
Dawson Construction, Inc.

"The core cultural values we follow at the Sealaska Heritage Institute allowed our people to survive and thrive here in Southeast Alaska for at least 12,000 years before modern heating, before ventilation, before anything. We are good stewards of the environment. It's who we are. It's the way we work. It's the way we live. And it's the way we think from an Indigenous perspective. The way we've routed the construction of our properties. And the rationality of how we've utilized Indigenous art and Indiginous materials in the construction of our projects speaks to the heart of what climate justice is about."
—Lee Kadinger, Chief of Operations, Sealaska Heritage Institute



Entrance to the Walter Soboleff Building in Downtown Juneau, Alaska
Image Credit: Ken Graham Photography

Design Process

The Sealaska Corporation is the Alaska Native corporation for Southeast Alaska, representing the interests of the Tlingit, Haida, and Tsimshian peoples, who have called the region home for more than 12,000 years. The corporation founded Sealaska Heritage Institute (SHI) in 1980 to celebrate and perpetuate the heritage, history, and cultures of the three Native peoples it serves. In 2008, the Sealaska Corporation purchased a property next to its headquarters in downtown Juneau and donated it to SHI with the goal of accommodating expanding staff and creating a new space for programs, education, and outreach. The second phase of development, which converted a surface parking lot into a pedestrian plaza surrounded by classrooms and artist studios over an underground parking garage, was completed in 2022.

Design competition

SHI held a design competition for the anchor building, the Walter Soboleff Building, to signal its intention of establishing Juneau as the Northwest Coast Native arts capital—similar to the role the Institute of American Indian Arts in Santa Fe, New Mexico, plays for Southwestern Native art. Central to the design challenge was a call for concepts that integrated the highest contemporary sustainability standards and techniques with the traditional knowledge and underpinnings of the Native cultures of Southeast Alaska.

Local firm MRV's winning design drew on their long history collaborating with Tribal organizations in Southeast Alaska, starting with their founder Linn Forrest, who moved to Alaska from the lower 48 states in the 1930s to document and restore Tribal houses through the Civilian Conservation Corps. That decades-long relationship enabled MRV to communicate effectively with SHI staff and master craftsmen, interpret project goals, and co-create new hybrid building technologies that apply traditional materials and techniques in contemporary commercial buildings.

Native reviewers with expertise in design facilitation guided the process to blend Alaska Native design concepts, materials, construction techniques, and artistic expression with Western green building strategies. The architecture of the Walter Soboleff Building was particularly inspired by Northwest Coast clan houses built by the Tlingit, which feature large-scale flat carvings on their façades and carved structural columns throughout.

"SHI set LEED Gold as a design goal 'to comport with core cultural values that honor past, present, and future generations. … Although we realized that meeting the Gold standard would mean higher initial construction costs, we had no other alternative but to ensure that we complied with our core cultural values, such as Haa Shuká, which translates as honoring our ancestors and future generations. … Buildings have an enormous impact on the well-being of people and the planet, and we're proud to say we've achieved one of the greenest LEED levels in the world.' "
—Dr. Rosita Kaaháni Worl, President,
Sealaska Heritage Institute (Alaska Business, 2019)

Increasing the visibility of Alaska Native culture, history, and art in the center of Juneau

The property Sealaska Corporation purchased to house the future SHI headquarters was located in the historic district of downtown Juneau. The building code overlay identified the period of architectural significance as 1889–1944, encompassing the late Victorian through Art Deco periods and explicitly excluding traditional Alaska Native architectural features.

While the SHI complex meets the spirit of most of the requirements in the historic standards—including building scale, massing, a transparent storefront along the sidewalk, and canopies to protect pedestrians from the climate's near-constant rain—the monumental formline panels created by celebrated Haida master artist Robert Davidson for the Walter Soboleff Building; the glass canopy displaying etched formline designs by artist Steve Brown who studied with Tlingit master artist Nathan Jackson; and the arts campus pavilions that evoke Tlingit, Haida, and Tsimshian bentwood boxes challenge the historic standards' emphasis on Western architectural styles.

After a prolonged debate within the Historic Review committee about whether or not Native art and architecture met the design standards, the borough assembly removed the SHI campus from the historic district, allowing construction to proceed.

While the debate did not lead to an immediate update to Juneau's historic district design standards, it started a local conversation about how to do a better job of acknowledging and celebrating the cultures living side by side in Southeast Alaska. The city's most recent Cultural Historic Preservation plan recognizes Indiginous cultures and histories as significant to Juneau's sense of place.

"I think the Walter Soboleff Building and the larger campus project have changed the mindset of the preservationists in Juneau. In fact, the recent cultural preservation plan has some cover images of the SHI project, presenting it as the gold standard of how Indigenous design fits into historic preservation. So, [the debate in the Historic Review Commission] had a tremendous ripple effect. It has created a cultural identity that is recognized alongside other identities in Juneau."
—Zane Jones, AIA, Partner & Senior Architect, Principal-in-Charge, MRV Architects

Blending Alaska Native and Western design and construction practices

SHI worked with MRV Architects to use the design and construction process as a model for weaving Indigenous building and environmentally responsive technologies together with Western construction practices and regulations. The project delivery process required flexibility and ingenuity on all sides to design, procure, manufacture, install, and verify code compliance for the new construction.

SHI worked closely with MRV Architects to identify opportunities for integrating Indigenous materials and construction technologies adapted to the harsh climate of Southeast Alaska, which experiences freezing temperatures, rain, and high humidity for much of the year. For example, the heavy timber cedar columns in the Walter Soboleff Building both echo pairs of totem poles that would grace the entrance and interior of regional clan houses and meet fire code ratings for commercial buildings. Similarly, large scale screens decorated with formline designs that adorn the exterior of many longhouses were reinterpreted in metal on the exterior by Haida and Tlingit master artist Robert Davidson and in glass on the interior by Tlingit master artist Preston Singletary. Untreated local yellow cedar cladding replaced the prefabricated metal panels often used in high-efficiency buildings in Southeast Alaska. The cedar panels were assembled off-site and quickly installed on custom steel brackets. The final assembly meets requirements for a 100-year building envelope system.

SHI worked with designers and Alaska Native artists and builders to translate traditional construction techniques from Northwest Coast longhouses into details in the building information management (BIM) computer model. The resulting architectural plans clarified which elements of the building would be constructed by Alaska Native artists and builders using traditional methods, which elements would be manufactured using contemporary commercial construction practices, and how these components would be coordinated during installation.

"The task, then, was both a sense of material, or 'being,' that the building material and environment impose on the design. Instead of looking to leading products and the latest and greatest technology, the design team at MRV Architects looked to how the ancient practice of thick-cut yellow cedar could be added to a sealed envelope housing a contemporary high-efficiency mechanical system. Thick-cut yellow cedar planks, two inches or more, have incredible natural weathering properties. Yellow cedar is naturally anti-fungal and is one of the slowest weathering local wood species."
—Zane Jones, AIA, Partner & Senior Architect, Principal-in-Charge, MRV Architects (Jones, 2018)

Project financing

SHI built the campus in several phases due to evolving programmatic needs and fundraising timelines. Initially housed within the headquarters of the Sealaska Corporation, SHI began expanding into its own office and exhibition space when its programming outgrew existing capacity. After purchasing an adjacent property in 2008, which had sat abandoned for a number of years after the previous structure was destroyed in a fire, the corporation donated the site to SHI for the future campus.

SHI included anticipated construction premiums associated with decarbonization and climate resilience strategies in its overall fundraising goal, including LEED Gold certification for the Walter Soboleff Building. Because the campus is intended as a 100+ year capital investment, SHI sent clear direction to the design and construction team that they were willing to pay a modest construction premium to minimize their long-term operations and maintenance costs—particularly for building systems.

SHI President Dr. Rosita Kaaháni Worl and COO Lee Kadinger built public support for the projects through conversations with state legislators and the Juneau borough assembly, creating a strong foundation for public sector grants and private philanthropic support. This included a $3 million investment from the City and Borough of Juneau, a $5 million investment from the State of Alaska for the Walter Soboleff Building, and a $5.6 million federal grant from the U.S. Department of Education for the arts campus. Local artists also supported the fundraising effort. For example, Haida master artist Robert Davidson donated his painting *Greatest Echo*, which inspired the monumental formline screens on the Walter Soboleff Building, to help raise funds.

The COVID pandemic temporarily slowed the fundraising effort for the arts campus, which had raised $10.4 million of the $13.2 million budget by 2020. With support from the City and Borough of Juneau, including a $1.5 million contribution, SHI decided to start construction that summer and build in phases while continuing outreach to funders.

SHI has capitalized on the success of the Walter Soboleff Building and arts campus to seek funding for public art installations radiating out into the community from the campus that will help establish Juneau as the Native arts capital of the Northwest Coast. For example, a $2.9 million grant from the Mellon Foundation in 2023 made it possible for them to hire Tlingit, Haida, and Tsimshian master artists to carve ten totem poles along the waterfront. The project, called Kootéeyaa Deiyí (Totem Pole Trail), will eventually comprise 30 totem poles leading from the waterfront to the SHI arts campus plaza, known as Heritage Square.

> "We looked at having hardwood flooring in the Walter Soboleff Building. But after going back and forth and looking at the maintenance and the cost of having to refinish it, we went with another option—a large tile that looked almost like an old growth tree ring. We ended up playing with that pattern, and we are much happier in the long run. There is no maintenance, aside from mopping and cleaning. It is holding up wonderfully eleven years later, and you would think it was installed yesterday. We changed what we were going to do initially when we considered not only the environmental impacts of the material but also the short-term and long-term costs."
> —Lee Kadinger, Chief of Operations, Sealaska Heritage Institute

Essential climate justice design components include:

1. **Leading with Alaska Native core cultural values:** Setting high environmental standards for the campus reflected SHI's core cultural values around protecting and honoring past, present, and future generations.

2. **Centering cultural exchange:** The campus architecture set a precedent for architectural design that weaves together traditional construction materials and techniques with contemporary building science in Juneau's historic district, whose design standards had previously ignored the 12,000-year history of Native peoples in Southeast Alaska.

3. **Decarbonization and resilience strategies supporting social connections:** This urban infill project converted an unsightly vacant property and surface parking lot into the only open-air public space in downtown Juneau. The SHI campus promotes walkability in the center city and reduces urban heat island effects, street flooding risk, and nonpoint water pollution entering nearby Gastineau Channel.

AIA Climate Justice in Architecture Taxonomy

Climate change both creates new and amplifies existing environmental and social challenges across seven themes or categories: Social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy addresses both the environmental and social dimensions of climate change, guiding teams to design architectural responses that impact these themes at three scales: Building occupants, the surrounding neighborhood, and regionally and globally.

The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The framework is comprised of 10 principles and informs progress toward four outcomes: A zero-carbon, healthy, resilient, and equitable built environment.

Sealaska Heritage Institute addresses all three scales in the framework, with particular emphasis on the building and regional/global scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	●	●	●	Integration; Equitable Communities; Economy; Well-being; Resources
Cultural Connection to Place	●	●	●	Integration; Equitable Communities; Well-being; Resources; Discovery
Economic Development without Displacement	●		●	Equitable Communities; Economy
Environmental Justice				
Ecosystem Health	●			Integration; Equitable Communities; Ecosystems; Well-being; Change
Climate Change Health & Resilience	●	●	●	Integration; Equitable Communities; Ecosystems; Economy; Energy; Well-being; Resources; Change; Discovery
Decarbonization	●		●	Integration; Equitable Communities; Water; Energy; Well-being; Resources; Change; Discovery

Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Sealaska Heritage Institute. Source: Biositu, LLC



Shuká Hít Community Space in the Walter Soboleff Building Evokes Regional Alaska Native Clan Longhouse Architecture
Image Credit: Ken Graham Photography

Social determinants of health

Creating a health-promoting indoor environment through design: The buildings on the SHI campus are designed to promote mental health in a climate that is rainy and/or dark for much of the year. Relevant green and healthy building design elements include daylighting; biophilic materials, particularly wood paneling and heavy timber columns; and occupant control over lighting and thermal comfort.

Reducing exposure to airborne pollutants in the interior environment: Low-emitting paints and coatings were installed throughout the campus to reduce occupant exposure to pollutants emitted from interior finishes. The project also met requirements for the LEED Outdoor Air Delivery Monitoring credit, which further protects building occupants from exposure to outdoor air pollution entering the indoor environment.

Reducing exposure to traffic-related air pollution and vehicle-related injury: Downtown Juneau boasts a high percentage of residents who commute using public transit, walking, or cycling—27.2%, compared with 8.6% in the City and Borough of Juneau, 9.5% in Alaska, and 6.7% in the U.S. Moving a surface parking lot underground and replacing it with a pedestrian plaza surrounded by buildings encourages that culture of active transportation by reducing plaza users' exposure to traffic-related air pollution and the risk of vehicle-related injury in the heart of downtown Juneau.

Enhancing neighborhood public safety in one of Juneau's most visited areas: SHI is located in an area that has been identified on the Juneau Community Crime Map as moderate- to high-risk for theft, assault, and larceny. The pedestrian plaza and educational and cultural programming hosted by SHI reduce the risk of crime by increasing foot traffic.

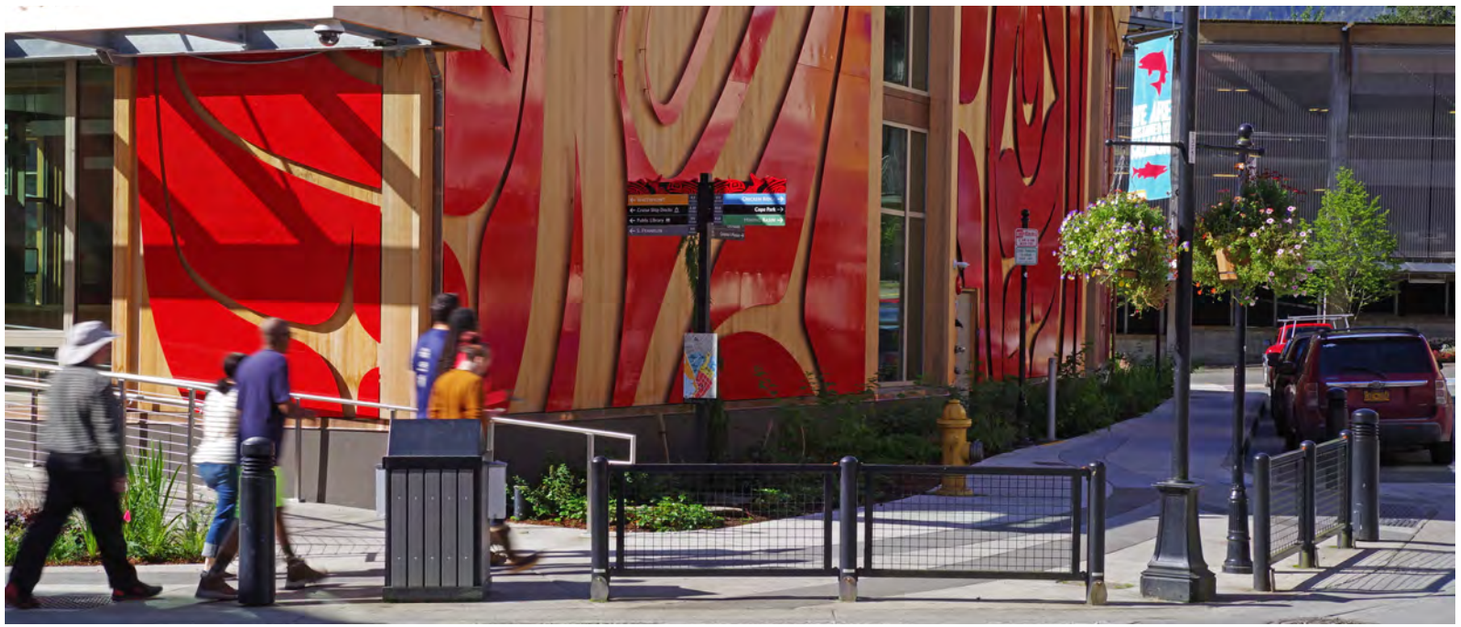
"[SHI] will bring needed vitality to the downtown region and generate economic and educational benefits to both Juneau and the region."
—Beth Weldon, Mayor, City of Juneau, Alaska (ICT, 2020)

Creating a regional Alaska Native art and culture educational hub for all ages: The arts campus filled a gap in Native arts and culture programming in Southeast Alaska. It helps perpetuate traditional Alaska Native arts and cultural practices and fosters contemporary artists by offering classes to all ages both in person and online, as well as making studio space available to local artists and craftsmen.

Supporting short- and long-term mental health among Native peoples in Southeast Alaska: SHI began construction of the arts campus during the COVID pandemic, in part as a gesture of optimism and hope for the future during a difficult time. Classrooms were fitted out with technology to enable distance learning during the pandemic.
By constructing the first public pedestrian plaza in downtown Juneau and expanding venues for cultural events, the campus is designed to support social connections and community building, which contribute to mental health.

"It's really amazing that we're in the capital city of Alaska, and the arts campus is truly the first public plaza. That was especially important during the COVID years. It's amazing that that was done by the Sealaska Heritage Institute."
—Zane Jones, AIA, Partner & Senior Architect, Principal-in-Charge, MRV Architects

"Sealaska Heritage Institute also hopes the project will boost morale in a year when bad news has prevailed. We're living in a time when people are just trying to get by, but the Sealaska Heritage Arts Campus is about the future. It's about a vision to help revitalize Juneau and provide opportunities in-person and online for artists and the public. We're living in a new and challenging world, but the campus will rise in spite of that."
—Dr. Rosita Kaaháni Worl, President, Sealaska Heritage Institute (ICT, 2020)



Street Level Wayfinding Signage Directing Pedestrians to Heritage Plaza at the Sealaska Heritage Institute
Image Credit: Zane Jones

Cultural connection to place

Celebrating the living and vibrant Native cultures of Southeast Alaska through architecture: The architecture of SHI integrates culturally significant building forms and climate-responsive technologies with contemporary Western materials and construction practices. For example, a clan house Shuká Hít is embedded within the ground floor of the Walter Soboleff Building, where it both serves the traditional purpose of providing a place for community gatherings and gives visitors the opportunity to experience the materiality of traditional Tlingit hand-adzed cedar beams and panels. Similarly, the classroom pavilions that ring the pedestrian plaza on the arts campus resemble bentwood boxes capped with red cedar, a Tlingit, Haida, and Tsimshian art form that represents the place where the Raven keeps knowledge.

Demonstrating the relationship between traditional Alaska Native building science and artistic expression: The metal rain screens and untreated cedar cladding on the Walter Soboleff Building demonstrate how traditional longhouses integrated public art—through monumental formline paintings—with rainscreen technology and rot-resistant wood to create buildings that lasted more than 100 years in a harsh climate.

Reinforcing the living nature of Alaska Native building technologies through ongoing cultural practice: Activities hosted at SHI foster the continued use of traditional materials, such as hand-adzed cedar. A carving area is set up outside the building during summer months to shelter Native cedar carving artists. As MRV architect Zane Jones writes,

"The fresh smell of yellow and red cedar permeates the air around these carvers as they continue to practice their art." (Jones, 2018).

"We strove to build a work of art that befits the great traditions of our ancestors. We have taken an ancient art form and rendered it on metal in a modern way. To me, it expresses the antiquity of our culture but in a new and vibrant way."
—Dr. Rosita Kaaháni Worl, President, Sealaska Heritage Institute (ICT, 2022)

Setting a precedent for recognizing Alaska Native architecture as a valued part of Juneau's history: While the SHI campus was technically removed from the Juneau historic district to speed the permitting process, the fact that it blends Native art and traditional materials and building techniques with the historic overlay design standards has set a precedent for expanding the definition of historic architecture in Juneau to include the Native cultures who have called Southeast Alaska home for over 12,000 years.

"The city didn't want Indigenous looking buildings in the historic district. So that was kind of a difficult topic. We lost at the Historic Resources Advisory Council. We lost at the Planning Commission, where they felt the building needed to look Victorian or Art Deco in nature, not following Native architecture. So we appealed to the assembly. Through their wise review, they ended up just removing our lot from the historic district. That was the creative solution to get us to a point where we could build a building that was inspired by 12,000 years of history, that was inspired by our Indigenous core cultural values, and, further, takes into account Indigenous science—how buildings have survived here for 12,000 years. So, that was our initial push to have a building that represents us and incorporates the environmental stewardship that Alaska Natives have had for 12,000 years that's predicated on utilizing the land while also respecting the land."
—Lee Kadinger, Chief of Operations, Sealaska Heritage Institute

Creating an indoor-outdoor venue for Alaska's largest social gathering: The campus acts as one of the main venues for Celebration, a biennial dance-and-culture festival that features more than 2,000 dancers from 50+ dance groups, juried art shows for adults and youth, a Northwest Coast art market, a parade through downtown Juneau, and opportunities to sample Alaska Native food.

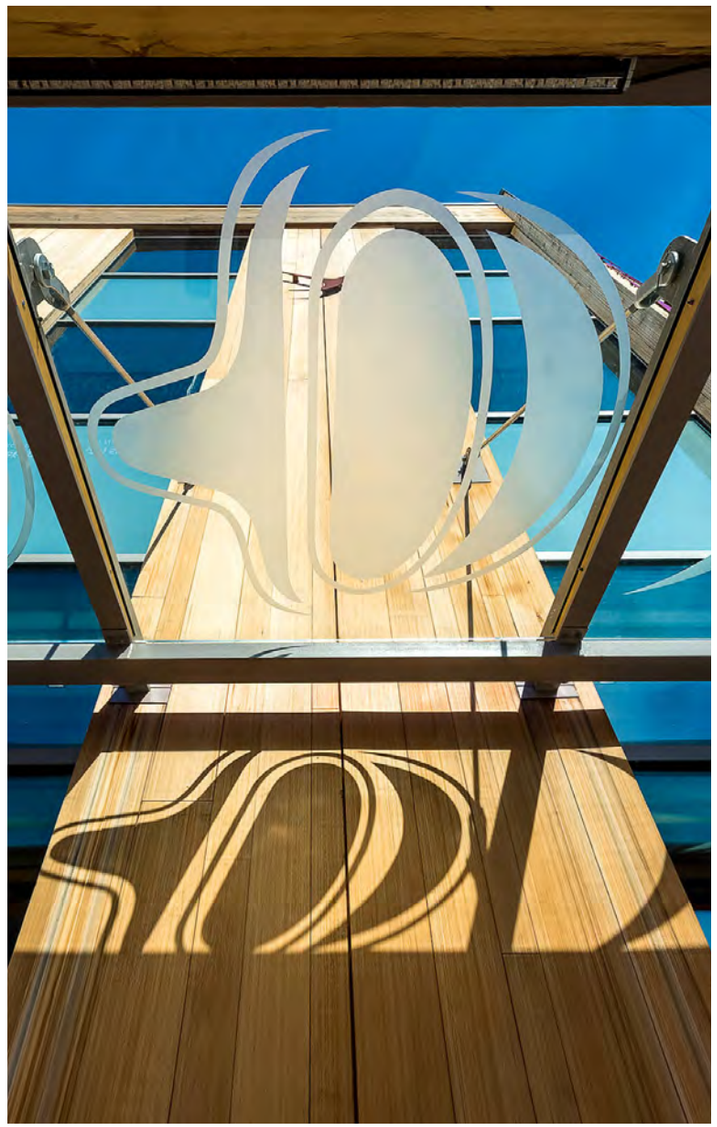
"[Celebration is] a time when Tlingit, Haida, and Tsimshian people come together to celebrate their cultural survival and also to share their cultures with the public."
—Dr. Rosita Kaaháni Worl, President, Sealaska Heritage Institute (SHI, 2022)

Raising the visibility of Alaska Native history, culture, and art in the state capital: While 14.3% of Alaskan residents and 9.4% of residents in the City and Borough of Juneau self-identify as American Indian or Alaska Native on the U.S. Census, compared with 0.8% nationwide, the SHI campus is the first contemporary building project in the city center to celebrate Native art and architecture with its design. Public appreciation for the SHI campus has helped build support for expanding Native artwork into other parts of the city. For example, wayfinding signs in downtown Juneau incorporate Native art. A 60-foot by 80-foot mural of civil rights icon and Native leader Elizabeth Peratrovich greets the 1.7 million tourists who enter Juneau each year through the cruise terminal. In addition, a line of 30 totems, known as Kootéeyaa Deiyí, representing all of the clans in Southeast Alaska is under construction along the waterfront and lining a trail leading to the public plaza on the SHI campus.

"Our vision, our goal is to have all along the waterfront what one would have seen 200 years ago when you came up to a village. All of the Tlingit clans of Southeast Alaska as well as Haida and Tsimshian will have representation on the waterfront as a statement of, 'This is who we are. This is whose lands you're on.' And, when you walk the Kootéeyaa Deiyí (Totem Pole Trail), it will lead you to Heritage Square and the Walter Soboleff Building and the arts campus area. So, the whole trail is geared towards providing an introduction to Alaska Native people and Alaska Native culture."
—Lee Kadinger, Chief of Operations, Sealaska Heritage Institute

Creating a civic space and source of pride for Juneau residents: By providing exhibition space for Alaska Native art across various scales, opportunities to take lessons, and places to view artists at work, the arts campus serves as the epicenter of SHI's public art initiative. It attracts Juneau residents and visitors to a public space where they can experience Native art and artists who work at various scales—including monumental artistic practices such as carving totem poles. During Celebration, the biennial Native arts and culture festival, 60 Native artists from across the state set up booths in the plaza to sell their work.

"One of the things that I take the greatest pride from is going down to the plaza and watching people's reaction. It is palpable that [Heritage Square] has become a source of Native pride. It is an important, beautiful place. A marker of cultural resurgence... The campus feels very representational, and a place where all are invited. Just a lot of that next tier step of connectiveness, both cultural and physical."
—Zane Jones, AIA, Partner & Senior Architect, Principal-in-Charge, MRV Architects



Glass Promenade in the Walter Soboleff Building Displays Etched Formline designs by Steve Brown
Image Credit: Ken Graham Photography

Economic development without causing displacement

Moving surface parking underground to create urban opportunity: Converting a surface parking lot and empty lot into an arts, education, and cultural hub with underground parking has the potential to spur economic development in downtown Juneau, in addition to the $30.1 million economic impact that SHI contributes to Juneau. The SHI campus also supports the $58 million Native art industry in Southeast Alaska by providing platforms for artists and craftsmen to train, refine, showcase, and sell their work.

Creating construction jobs during an economic downturn: The construction of both phases of the SHI campus created construction jobs—65 for the Walter Soboleff Building and 55 for the arts campus. The construction jobs created by the arts campus project were particularly welcome to the local economy, because they helped counteract the economic downturn caused by the COVID pandemic.

Ecosystem health

Combining materials, construction techniques, and audio to create sensory connections with local ecosystems: SHI is located two blocks from the waterfront and a city park, placing 100% of the neighborhood within easy walking access to green space, compared with 66.3% in Alaska and 61% in the U.S. However, the neighborhood is generally urban and devoid of trees and green space. The untreated cedar wall finish inside the clan house on the ground floor of the Walter Soboleff Building gives off a distinctive fragrance due to the hand-adze technique used to shape it. These visual and olfactory elements, combined with audio of local birds and forest sounds, create a sensory connection with local ecosystems despite the campus' urban context.

Using interior finishes to commemorate the intertwined history of nature and people in Southeast Alaska: Local marble tiles from Prince of Wales Island in southern Southeast Alaska contain fossils—reminding Walter Soboleff Building visitors of the core cultural values that have made it possible for Native cultures to survive and thrive in their unique ecosystem for 12,000 years.

Protecting nocturnal plants and animals through lighting design: The Walter Soboleff Building achieved the LEED light pollution reduction credit, minimizing the development's negative impact on nocturnal ecosystems.

Climate change health & resilience

Combining Alaska Native and Western building materials and techniques to protect occupants and cultural artifacts: Climate change is increasing the risk of exposure to precipitation in a region that is both cold and experiences rain over 200 days per year. Climate models predict increased risk of heavy precipitation from atmospheric rivers, particularly in downtown Juneau. The SHI campus pairs untreated yellow cedar siding with exterior wall detailing recommended by the Cold Climate Housing Research Center in Fairbanks, Alaska to construct highly insulated buildings with breathable, rot-resistant materials and rainscreens outside the waterproofing barrier, keeping the dew point on the exterior of the building.

Enhanced building energy efficiency reduces hydroelectric demand and supports electrification: Nearly all of Juneau's electricity is generated at hydroelectric dams, whose ability to operate is placed at risk during periods of drought. Furthermore, roughly two-thirds of Juneau's electricity needs relate to heating and are required during the winter, when freezing temperatures result in reduced inflows to the storage reservoirs. As a result, ramping up building energy efficiency is seen as a key strategy for increasing the resilience of Juneau's energy and water systems.

"The incorporation of yellow cedar and the direction of the grain is why we got into an argument with the city over Victorian requirements for the Walter Soboleff Building. They wanted us to run it horizontally rather than vertically. But we knew that 1) that didn't represent the Northwest Coast art style, and 2) running across the grain wouldn't allow for proper drainage."
–Lee Kadinger, Chief of Operations, Sealaska Heritage Institute

Protecting the site and neighborhood from increasing flood risks: Extreme precipitation events increase the risk of combined sewer overflows and small landslides in Juneau. This is particularly true in downtown Juneau, with its sparce tree canopy and very low percentage of green space. The SHI campus reduces neighborhood exposure to stormwater by capturing rainwater and allowing it to percolate on site.

Educating architects, contractors, and regulators on traditional weatherization techniques: Permitting the Walter Soboleff Building created an opportunity to increase regional awareness of the durability of traditional construction techniques. For example, hand-adzed cedar is a durable, weather-resistant material in the Southeast Alaskan climate. Adzed planking left untreated is rated to last longer than metal siding, which is the industry gold standard.

"Preliminary findings [from modern researchers] indicate that adzing crushed and folded the wood fibers at a micro-level, making the wood more water resistant."
–Zane Jones, AIA, Partner & Senior Architect, Principal-in-Charge, MRV Architects (Jones, 2018)

Creating weatherized public spaces that support the Native arts economy: A glass covered promenade linking the Sealaska Plaza building with Atnané Hít (Sealaska Heritage Arts Campus) includes infrastructure such as electric outlets for artists, allowing them to sell their wares all year regardless of the weather and the changing climate.

Decarbonization

Maximizing LEED credits that align with SHI's cultural values: The design of the SHI campus buildings prioritizes LEED credits that enhance energy and water efficiency (such as LED lighting), as well as credits that reduce the risk of exposure to toxic chemicals (such as low VOC paints and coatings).

Encouraging efficient operations through flexible spaces: The interior layout of buildings on the SHI campus echo the flexible use of space in traditional Southeast Alaska Native buildings, such as clan longhouses, supporting multi-tasking and the efficient use of space.

Reducing embodied carbon with regional cedar and minimal concrete: Local yellow and red cedar are used for structure (e.g., glulam beams), exterior cladding, wall caps, and interior finishes, reducing embodied carbon through both carbon sequestration and short transportation distances for key building materials. The plaza structure in the arts campus was designed as a post-tensioned concrete slab to minimize concrete.

Reducing operational greenhouse gas emissions through active and passive design strategies: The energy-efficient building envelope and daylighting design are complemented by renewable pellet heating and high-efficiency building systems, such as air source heat pumps. Furthermore, the parking garage under the public plaza was engineered to be passively ventilated.

"We're pretty proud of doing right [across cultural heritage, sustainability, and climate change]. There was a lot of quiet consideration during the design process to make sure that the buildings were highly energy efficient. The new facility is heated with air source heat pumps that are discreetly located on the roof. No one even knows they're there. And, combining traditional cedar materials for siding and heavy timber construction feels very familiar to people in Southeast Alaska."
–Paul Voelckers, AIA, President, Principal Architect, MRV Architects

Framing LEED certification as a demonstration of Alaska Native cultural values: SHI President Dr. Rosita Kaaháni Worl framed her decision to set a high LEED certification goal for the Walter Soboleff Building as an opportunity to communicate the parallels between Alaska Native values of living with nature and the goals of Western green and healthy building practices.

Contributing to local climate action: Many of the LEED credits achieved by the Walter Soboleff Building support the City and Borough of Juneau Climate Action Plan, including increasing building energy and water efficiency, renewable energy generation, and public transportation.

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Contributors

COTE Knowledge Community and AIA Staff

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Committee on the Environment

AIA Knowledge Community

Climate Justice in Architecture

Design centering both the environmental and social aspects of climate change

Climate justice in architecture refers to engagement, advocacy, planning, and design that draw down emissions; build resilience and capacity; support human, cultural, and ecological health; and protect all communities in the context of climate change.

Committee on the Environment

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Stanley Center for Peace and Security: Front Entrance
Image Credit: Cameron Campbell, Integrated Studio

Stanley Center for Peace & Security

This case study shares an exemplary architecture project that centered both the environmental and social aspects of climate change in their design process, approach to community engagement, and final design. It touches on many aspects of the AIA Climate Justice in Architecture Taxonomy at the building, neighborhood, regional, and global scales.

Stanley Center for Peace & Security

Muscatine, IA



Stanley Center for Peace and Security Atrium
Image Credit: Cameron Campbell, Integrated Studio

Summary

The Stanley Center for Peace and Security is a nonprofit in Muscatine, IA, with the mission "to catalyze just and sustainable solutions to critical issues of peace and security by driving policy progress, advancing effective global governance, and advocating for collective action. Their new headquarters, located in a locally designated historic district named after 19th century civil rights leader Alexander Clark, embodies the principles of empathy and social responsibility. The design weaves together exceptional environmental achievements with tangible efforts to promote social equity—within the workplace, in relation with neighboring institutions, and through their global initiatives.

Project overview

BUILDING PROGRAM TYPE(S):
Nonprofit (office)

PROJECT TYPE:
Existing building/renovation

CONDITIONED FLOOR AREA:
19,823 gsf.

SITE AREA:
17,097 gsf.

TOTAL USERS:
26 staff + public events

NUMBER OF FLOORS:
2

PROJECT CLIMATE ZONE:
ICC Climate Zone 5

PROJECT SITE:
Previously developed land

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2023

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$11,502,500

THIRD PARTY RATING SYSTEM:
Living Building Challenge

Project team:

OWNER:
Stanley Center for Peace and Security

ARCHITECT:
Neumann Monson Architects (Khalid Khan, Principal in Charge; Sally Obernolte, Project Manager)

MEP ENGINEERS:
MEPT Engineer

STRUCTURAL ENGINEERS:
Raker Rhodes

WATER SYSTEMS ENGINEER:
Biohabitats

CIVIL AND LANDSCAPE ENGINEER:
Environmental Consulting and Technology (ECT)

MATERIALS CONSULTANT:
Integrated Eco Strategies (IES)

WORKPLACE FURNISHINGS:
HNI Corporation

GENERAL CONTRACTOR:
Graham Construction

"I'm amazed at how this process put us through the paces and allowed us to express our values in ways that I never would have dreamed would have been part of a building project."
–Keith Porter, Stanley Center



Community Engagement Workshop
Image Credit: Neumann Monson Architects

Design Process

The Stanley Center approached the design of their new headquarters full of questions about what would need to change about standard design procedures, building technologies, and coordination with external stakeholders in order for the building sector to lead the way towards a more just, fossil fuel-free future. The resulting process influenced not just the final building design but also company policies internal to the Stanley Center, architecture firm Neumann Monson, and furniture consultant HNI.

Living building challenge

The project set the goal of achieving Living Building certification, in part, because it aligns with the Stanley Center's efforts to accelerate global climate action. As the integrated design process progressed, they discovered that conversations around connection to place and social equity dovetailed with their environmental goals to achieve net zero energy, net zero water, and low embodied carbon. The decision to adapt the concrete shell of a vacant 1970's era library building into their new headquarters is a visible demonstration of carbon sequestration, a memorial to the site's long history as a center for local education, and an example of the organization's commitment to benefit their neighbors in tangible ways.

Parallel organizational development

The Stanley Center selected regional architecture and construction firms that aligned with their valued were eager to learn how to design and construct a Living Building. This approach led to parallel continuous improvement efforts across the team, such as the Stanley Center and architecture firm Neumann Monson Architects seeking simultaneous Just certifications to enhance social equity within their organizations. Neumann Monson was also inspired to seek Living Building Core certification for their own office renovation, and they have integrated sustainability, biophilia, and cultural connection to place into their standard project delivery process.

> The Stanley Center decided to work with a local firm that aligned with their values, but had no prior Living Building Challenge experience, hoping to "take on the journey and the challenge together, so we could, in turn, continue to spread what we learned to more and more people. ... [It reflects the Stanley Center's values of] advocacy, education, and learning together on the journey."
> – Sally Obernolte, Neumann Monson Architects

Community engagement

Muscatine residents expressed strong interest in using the new Stanley Center headquarters to expand local knowledge about the industrial history of the region, the region's role in the civil rights movement, and the history of the Indigenous peoples who lived in the Muscatine region before European settlement (Wolf 2024, p. 148). These topics are visually integrated into the design and have influenced the new center's outward facing programming.

The project is also next door to a community-based non-profit called the Muscatine Center for Social Action (MCSA), whose services include a food pantry, a shelter, and support services for Muscatine residents experiencing housing instability. The Stanley Center started conversations early on in theearly in the design process with MCSA to ensure the construction did not disrupt the center's daily operations.

The new building creates several tangible benefits for its neighbors—shading and beautifying an alleyway where people wait in line for the food pantry, upgrading the water fixtures and washing machines at MCSA, and donating most of their harvests from the urban agriculture in the central courtyard to the food pantry. Residents of the public housing development next door and MCSA patrons also enjoy the gardens along the periphery.

Project financing

The climate justice components of the design aligned closely with the Stanley Center's mission and key issue areas. As a result, they were not seen as adding cost to the project. Instead, stretch goals like the Living Building Challenge Materials Petal were seen as opportunities for the center's new headquarters to embody the organization's mission and goals for the future.

Essential climate justice design components include:

1. The owner, design team, and contractor should approach the project with aligned values.
2. The site analysis and the discovery process should include the property's social and environmental history, its future neighbors, and opportunities to leverage the project location and program to create a positive ripple effect on the surrounding neighborhood.
3. When landowners and building professionals establish long-term personal, trusting relationships with neighbors and local government, regulatory challenges can be resolved using a collaborative problem-solving process that does not slow down the project schedule.

Climate justice in architecture taxonomy

Climate change creates new, and amplifies existing, environmental, and social challenges across the following seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. Climate Justice in Architecture, centering on both the environmental and social aspects of climate change, helps teams respond with an architectural design impacting the themes across three scales: building occupants, the surrounding neighborhood, and regionally and globally. The themes align and connect with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The Framework is comprised of 10 principles and informs progress toward four outcomes – a zero-carbon, healthy, resilient, and equitable built environment.

The Stanley Center for Peace and Security addresses all three scales in the taxonomy, with particular emphasis on the neighborhood and regional/global scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	●	●		Integration, Equitable Communities, Ecosystems, Water, Well-being, Change
Cultural Connection to Place		●	●	Integration, Equitable Communities, Ecosystems, Economy, Well-being, Resources
Economic Development without Displacement		●	●	Economy, Resources, Well-being
Environmental Justice		●	●	Well-being, Resources
Ecosystem Health		●	●	Ecosystems, Water, Change
Climate Change Health & Resilience		●		Equitable Communities, Ecosystems, Water, Energy, Resources, Change
Decarbonization	●		●	Equitable Communities, Ecosystems, Water, Economy, Energy, Resources, Change, Economy

Overview of Climate Justice in Architecture themes and spatial scales: Stanley Center for Peace and Security. Source: Biositu, LLC

Social determinants of health

Enhancing equity in the workplace through design: As a living building, the Stanley Center was designed to create parity in access to positive environmental exposures that support mental and physical health among staff and visitors. All of the offices are the same size and have equivalent access to daylight and views of nature. Offices that do not look out on the internal atrium or agricultural courtyard are installed with edible wall plants.

Enhancing equity in the workplace through policy: The Stanley Center added a "living wage" human resources policy as part of their pursuit of a Just label under the Living Building Equity Petal.

> "This is more than the building influencing what we're doing; it's the building giving us those opportunities to walk the talk in so many different ways." (Wolf 2024, pp. 143-145)
> – Jennifer Smyser, Stanley Center

Using sustainability to support neighborhood action on water efficiency: Upgrading next-door neighbor MCSA's faucets, showerheads, and washing machines frees up their operational budget to better serve Muscatine residents experiencing housing and food insecurity.

Using sustainability to support neighborhood food security: MCSA distributes the fresh vegetables and herbs grown at the Stanley Center to clients at their food pantry.

Using sustainability to support neighborhood access to nature: The perimeter of the site is designed to welcome passersby to sit on the wall and enjoy the vegetation and wildlife on the property. While the Stanley Center property does not function as an active park, it brings a feeling of access to nature to an otherwise urban area that is separated by a freight railroad track from a nearby park along the Mississippi River.

Cultural connection to place

Reusing a building structure to create a connection to the history of the site: The Stanley Center chose to build their headquarters on the site of a historic library to boost the local historic district that was harmed by the presence of an empty building at such a prominent corner. The original library built in 1902 was a town landmark and the location continues to hold cultural significance for many residents in Muscatine, even though the replacement library (built in the 1970s) was not universally loved. Reusing a portion of the 1970's library's structure in the Stanley Center headquarters acknowledges the role it played in the community before it was closed, avoids construction waste, and dramatically reduces the carbon footprint of the new building.

> "We are an organization with resources. So, it's very important for us not only to recognize our privilege, but also recognize how we're going to use that privilege in action. We chose this particular place as an example of using our privilege in a way that may not have been the easiest path for us but probably had the most positive impact on the community."
> – Keith Porter, Stanley Center

Integrating land acknowledgement into the construction process: Throughout the project, the Stanley Center and the design team used language to communicate the importance of linking the new building to the history of the place where it is located. For example, construction began with a "ground healing" ceremony rather than a "groundbreaking" to pay tribute to the history of the Meskwaki people who lived on the land prior to European settlement.

Using public art to bridge the gap between words and action on repairing historical harms: Community input into the project led the Stanley Center to commission a public sculpture called "Tree of Accountability," co-designed by two artists—Deana Dartt (PhD, Coastal Chumash, Mestiza, and descendant of Indigenous People of California) and Nancy Judd (descendant of European settlers). The sculpture was created using repurposed guardrails and decommissioned books from the demolished library. Each leaf shares an answer to a question that the Stanley Center asked of the Meskwaki Nation—who were displaced by European settlers in the early 19th century—"How can settlers be accountable to the people of the lands on which they live?" The answers raise awareness about history, culture, and environmental stewardship: "Care for the Earth like it's your body," "Respect our religion and culture," "Learn a true American history," and "Always think about how your decisions will affect generations to come." The Stanley Center used the sculpture dedication to launch a longer collaborative dialog with local Native stakeholders about what accountability and justice might look like in the Muscatine region. (Wolf 2024, pp. 150-151)

> "The Stanley Center decided to work with a local firm to "keep spreading the knowledge and take on the journey and the challenge together, so we could spread that learning amongst more and more people. ... [It reflects their values of] advocacy and learning together on the journey."
> –Design team

Economic development without causing displacement

Reusing the vacant library removed an impediment to economic development in the neighborhood economy: The new building replaces a drag on the neighborhood economy with a community resource that benefits existing residents and businesses.

Prioritizing construction that minimized disruption to neighboring properties: The Stanley Center project team coordinated construction hours and materials supply deliveries with MCSA to minimize disruption to clients seeking the food pantry.

Creating a welcoming space and access to nature while retaining a separation between private and public spaces: The landscaping, low perimeter wall, and shaded alley between the Stanley Center and MCSA create welcoming, public spaces for community members, Clark House residents, MCSA clients, and the public to gather and build community.

> Thinking of it from a library point of view, our role is to provide services for everybody in the community, regardless of their ability to pay, or any other barriers that they might experience. The Stanley Center purchasing the old library and turning it into this new structure that isn't open to the public in a way that the library was, but still provides a service to the community, speaks to that continuity of being a force for good here in Muscatine."
> – Robert A. Fiedler III, Musser Public Library & HNI Community Center

Supporting local businesses: The project team prioritized selecting building materials from local producers to support the local economy (Wolf 2024, p. 133).

Environmental justice

Modeling investment in a just, circular economy: The Stanley Center used the headquarters project as an opportunity to educate community members in Muscatine about the environmental harm caused by the industries that historically fueled the city's economy, such as pearl button making and the lumber industry. The new building's materials demonstrate a new approach to the economy, which includes adapting existing buildings to new uses, sourcing products that grow local businesses, and prioritizing products with nontoxic components. demonstrate a new approach to the economy, which includes adapting existing buildings to new uses, sourcing products that grow local businesses, and prioritizing products with nontoxic components.

> The biophilia place-making workshop "gives you a much more comprehensive idea of what you're trying to preserve or recreate. [After the workshop,] you know how you want to connect to nature, what is important for the whole group – not just the design team. It helps get the community members engaged. It's very powerful."
> – Khalid Khan, Neumann Monson Architects

Protecting furniture manufacturing workers from exposure to toxic chemicals: Workplace furniture maker HNI, which was established by Stanley Center founder Max Stanley, reevaluated many components in its products after its experience supplying furniture for the foundation headquarters. The process of learning about the ILFI Red List inspired HNI to earn ILFI Declare Labels for two popular products (Wolf 2024, p. 132). Removing toxic chemicals from the furniture supply chain reduces exposure among manufacturing workers and building installers, in addition to safeguarding indoor air for building occupants.

Adaptive Reuse of the Existing Structure on the Site
Image Credit: Neumann Monson Architects



Ecosystem health

Engaging non-traditional consultants to broaden design and community perspective: A biophilia place-making workshop educated the Stanley Center, designers, and community stakeholders about the human and ecological history of the site. Experts in geology, ecology, and cultural history looked in detail at the influence of Indigenous communities on the ecosystem and the influence of industry on the land after European settlement.

Using biophilia to improve environmental sustainability, social equity, and the historical connection to place: The biophilia workshop led to a more holistic approach to the design process and community building activities post-occupancy.

> The biophilia place-making workshop "gives you a much more comprehensive idea of what you're trying to preserve or recreate. [After the workshop,] you know how you want to connect to nature, what is important for the whole group – not just the design team. It helps get the community members engaged. It's very powerful."
> – Khalid Khan, Neumann Monson Architects

Translating one pilot experience into standard practice: Neumann Monson has integrated their newfound expertise in biophilia and place-making into their standard project delivery process.

Climate change health & resilience

Creating a micro-emergency shelter/resilience hub to increase resilience to power outages: A small, designated shelter space—including bathrooms, shower facilities, and a dedicated battery storage—is located in a staff-only section of the building. In the event the full building is called upon to operate during a power outage, its photovoltaic arrays and battery storage will allow it to function at 75% capacity.

Preparing for increasing risk of drought and flooding: The indoor and outdoor water system Vwas designed with the future climate in mind. Models indicate that the region may experience less rainfall overall in future decades but a greater frequency of heavy rain events and flooding.

Making the hidden water cycle visible: The building uses its unique position—straddling a buried creek—to educate occupants and visitors about the natural watershed crossing the site. The pavement at the entrance mimics the path of the original stream beneath occupants' feet. The building's water treatment and distribution system is also visible through a window in the main conference room.

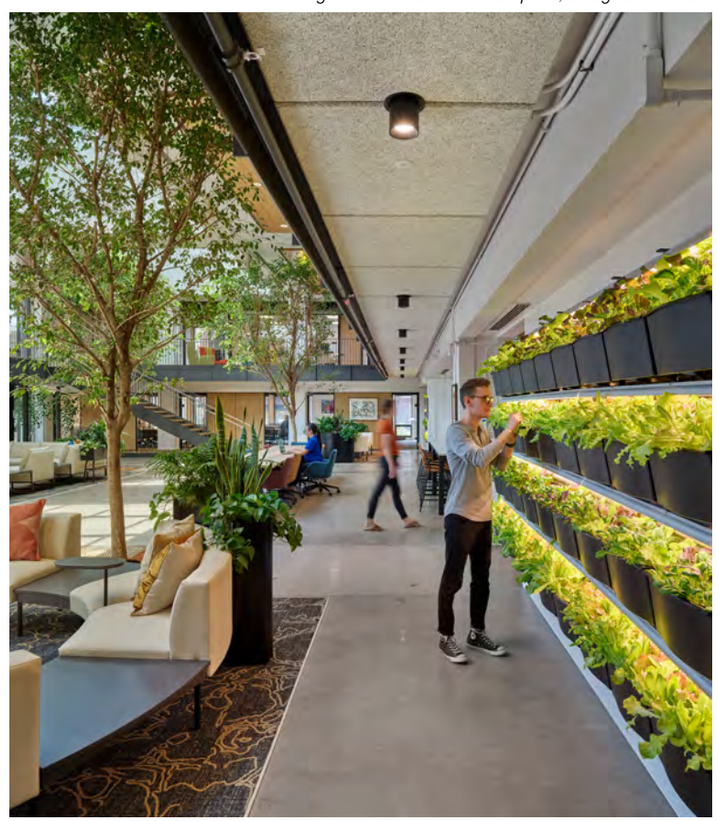
Reducing neighborhood flood risk: The landscaping along the property boundary functions as a rain garden—reducing flood risk. Other areas of the site use pervious pavement to contribute to flood mitigation.

Reducing demand for the city water and wastewater infrastructure: Next to the entrance, two large water cisterns show passersby the quantity of water stored to supply all of the building's needs. The center also reduced its burden on local wastewater infrastructure by upgrading the efficiency of faucets, showerheads, and washing machines at MCSA, their next-door neighbors.

Providing short-term access to fresh food during disasters: Depending on the time of year, the on-site agriculture covering 5% of the site and lettuce walls on the interior could provide limited food supplies to people sheltering in place during an extreme weather event. The solar panels and battery storage also safeguard the contents of facility refrigerators.

Increasing redundancy in the local water supply: The cistern storage and on-site purification system are designed to generate potable water regardless of city utility disruptions (Wolf 2024, 107).

Stanley Center for Peace and Security: Interior Plantings and Green Wall
Image Credit: Cameron Campbell, Integrated Studio



Decarbonization

Reducing embodied carbon and preserving local history through adaptive reuse: 94% of a 1970's era library structure was reused in the new Stanley Center—resulting in 193,545 Kg/CO2 embodied carbon compared with 854,037 Kg/CO2 for a new building the same size (Wolf 2024, p. 105).

> It seems natural to say ... renovating a building that already exists is the most sustainable thing to do. Yet how naturally so many of us unfortunately slip to, 'Oh, it's so much easier to build new.' It's less hassle, and maybe even less effort. Having a client remind us of that, and purposely choose the 'harder' path, opened our eyes and reignited our awareness. In our office, we've talked about it over and over again. How can we help communities take a better look at the existing building stock within their communities and understand the potential?."
> – *Sally Obernolte, Neumann Monson Architects*

Addressing the root cause of climate change: As a living building, the Stanley Center produces enough energy and water to cover its operational needs.



"Tree of Accountability" Sculpture, co-designed by two artists Deana Dartt and Nancy Judd
Image Credit: Cameron Campbell, Integrated Studio

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Additional information;

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Healing Ground, Living Values

Stanley Center for Peace and Security, Building + Community

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Design centering both the environmental and social aspects of climate change.

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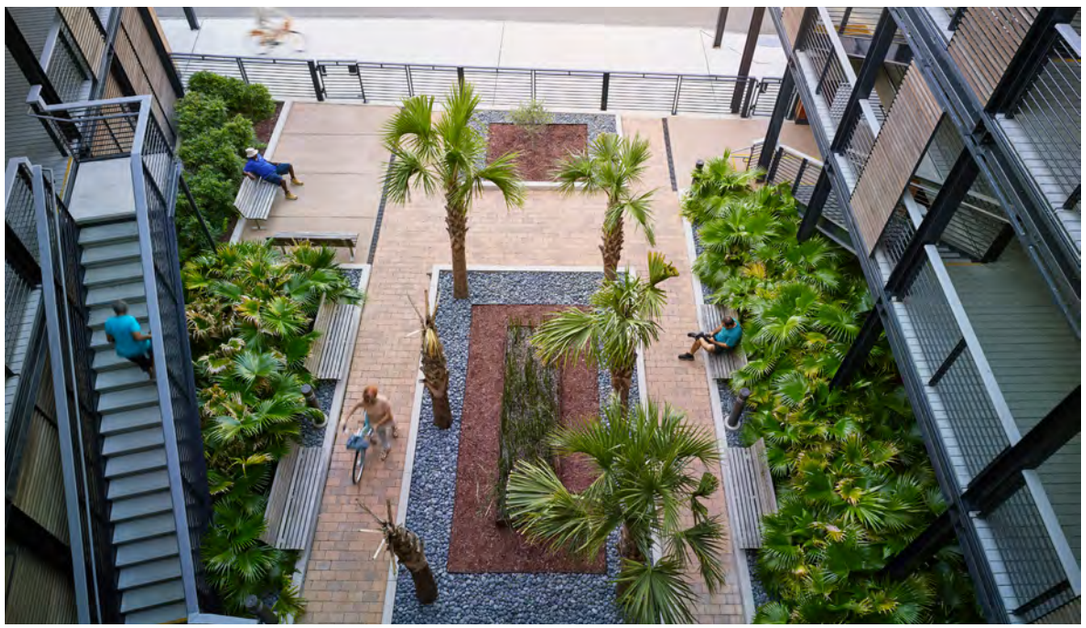
Williams Terrace: A modern reinterpretation of the Charleston “piazza”
Image Credit: Chris Luker

Williams Terrace

This case study shares an exemplary architecture project that centered both the environmental and social aspects of climate change in their design process, approach to community engagement, and final design. It touches on many aspects of the AIA Climate Justice in Architecture Taxonomy at the building, neighborhood, regional, and global scales.

Williams Terrace

Charleston, SC



Ground floor designed to withstand a high-velocity flood
Image Credit: Chris Luker

Summary

Williams Terrace anchors a mixed-use, mixed-income brownfield redevelopment located downtown near the Port of Charleston in a neighborhood with a deep history of social and environmental inequities. The 41-unit multi-family apartment building creates a welcoming home for low-income adults aged 62 and above to age in place and contribute to the vibrant street life of downtown Charleston. The design successfully integrates hurricane- and heat-adaptive technologies with strategies that create conditions supporting independent living and residents' physical and mental health.

Project overview

BUILDING PROGRAM TYPE(S):
Senior Affordable Housing

PROJECT TYPE:
New Construction/Addition

CONDITIONED FLOOR AREA:
47,851 sq. ft.

TOTAL USERS:
41 one-bedroom units

SITE AREA:
18,274 sq. ft.

NUMBER OF FLOORS:
5

PROJECT CLIMATE ZONE:
ICC Climate Zone 3A

PROJECT SITE:
Brownfield

PROJECT SETTING:
Urban

YEAR OF SUBSTANTIAL COMPLETION:
2017

COST OF CONSTRUCTION (EXCLUDING FURNISHING):
$12 million

Project team

OWNER:
Housing Authority of the City of Charleston

ARCHITECT:
David Baker Architects (David Baker, Founding Principal; Daniel Simons, Principal in Charge; Katie Ackerly, Designer/Job Captain)

ARCHITECT OF RECORD:
McMillan Pazdan Smith Architecture (Eddie Bello, Project Architect/Project Manager)

MEP ENGINEERS:
RMF Engineering

STRUCTURAL ENGINEER:
4SE Structural Engineers

CIVIL ENGINEER:
Forsberg

LANDSCAPE ARCHITECT:
Wertimer + Cline Landscape Architects

GENERAL CONTRACTOR:
GSC Construction, Inc.

"There is something about this building that is magical. I think it comes in part from having a great team that was so grounded in this place. … [Williams Terrace] is both 'of Charleston' and it is totally not Charleston at the same time."
—Daniel Simons, FAIA, Principal, David Baker Architects

Design Process

Williams Terrace is a 41-unit affordable housing development for adults over age 62. It anchors a brownfield redevelopment located in historic downtown Charleston near the Port of Charleston and is currently one of two senior housing developments owned and operated by the local housing authority.

The design process was complicated by the long history of the site, which includes a previous public housing development that was destroyed in 1989 by Hurricane Hugo and longstanding environmental contamination caused by a coal gasification plant next door.

The Housing Authority of the City of Charleston kicked off the design process by issuing two challenges to the architecture team. First, the design needed to avoid long, dark, and double-loaded corridors. Second, the design needed to foster a sense of belonging to counteract the risk of social isolation that increases as we age.

"A lot of times [residents] might be fairly mobile when they move in, but as they age, [they] may be less so. And we don't want them to be isolated. So, one of the very first things we did [was come] up with the idea of taking the building and … pulling it apart and having [porches] instead of that corridor. … So, [the corridor] was [both] a … functional thing and a social element of the building. Also, because we faced west, we had to make these areas very livable, you know, in terms of an outdoor porch. So that's where the idea of the shifting louvers came up."
—Eddie Bello, AIA, Principal, Bello Garris Architects

Modern take on vernacular architecture

Charleston's historic residential architecture is well-known for two design elements that respond to the hot, humid climate along the Atlantic coast: (1) Deep porches on the first and second floors of single-family homes (known as 'piazzas'), and (2) one-room wide homes (known as 'singles') that stack space in a progression rather than using corridors. Both of these design features cool the interior by maximizing shade and drawing natural ventilation through every space in the home.



Rooftop community room and terrace
Image Credit: Chris Luker

Williams Terrace was able to incorporate both of Charleston's signature design elements by placing deep porches facing each other around the interior of a U-shaped courtyard and stacking rooms in the apartments from front to back according to the 'singles' configuration. These elements take advantage of both the environmental benefits of providing shade and drawing the sea breeze through the home as well as the social benefits of turning the porches into the complex's main circulation pathways and social heart.

"I came … from a background in building science and sustainable design. So, … I was really committed to this idea that all porches [should] face south. I remember the moment when [the local associate architect, Eddie Bello, said that it would be] so much better for the porches to face each other. … It was the first time I realized [that] when you talk about climate justice, it really is a merging of social and environmental considerations."
—Katie Ackerly, AIA, CPHC, Principal/Sustainable Design Director, David Baker Architects

Community engagement

The review process for remediating and re-platting the existing brownfield—which was seen as a 'no man's land' adjacent to downtown—into a mixed-use, mixed-income neighborhood took place in a very public setting that allowed for continual community input.

"Every resident when they move in, the first thing they have to do after they open the door is get the rocking chair [the Housing Authority is giving them] out of the way because they cannot move in the apartment. … The idea is that they will pick it up, stick it on the porch, and claim the space on the porch as an extension [of their apartment]."
—Don Cameron, CEO of the Housing Authority of the City of Charleston (Retired)

The design team consulted with residents from other housing authority properties to learn what types of design features would encourage social connections amongst residents. Consultation with local historic preservation experts also influenced the design team's materials selection and helped justify the additional costs associated with installing moveable louvers.

The Housing Authority created conditions for the development of strong social ties by giving each resident a rocking chair as a housewarming gift. The chair is purposefully too large for the interior space, so each resident's first action when moving in is to set it up on their front porch.

"When we visited the building a few years after it opened, the porches were messy in a good way. It was great, because people were using the porches just like we hoped they would. And, the residents we talked to that day were super excited, super proud of their spaces."
—Eddie Bello, AIA, Principal, Bello Garris Architects

Project financing

The Housing Authority self-funded the project rather than seeking federal grants, which often include restrictions that stand in the way of major design decisions like avoiding a double loaded corridor. The Authority received the land from the City of Charleston and was repaid by the city for the cost of paving the road in front of the apartment building.

The $12 million development received a $7 million loan from Bank of America and bridged the gap in capital with $5 million from the Housing Finance Agency—a component fund of the housing authority.

The project's location in a flood zone and seismic zone dramatically increased the cost of structural engineering measures to protect the building from storm surges and exposure to hurricanes. All windows were required to include costly impact-resistant glazing. On the other hand, by providing such deep porches, the design team conceived of the porches as an additional living room for each unit, which cost less per square foot than conditioned interior spaces. The design challenge included activating the ground floor as a public gathering place in a neighborhood where the city wants to encourage active transportation and a vibrant street life, even though the property's location in the floodway required that all ground floor elements be designed to be carried away by flood waters. When the project was estimated to be over budget, the Housing Authority reduced the size of the building instead of lowering the quality of materials.

Residents do not pay for their utilities. Therefore, energy and water savings are recouped by the Housing Authority, which reported that the project has been self-sustaining financially since it was fully occupied. This is due in part to the array of active and passive efficiency design strategies integrated into the design. While Williams Terrace does not require additional subsidies to operate, 1% of the gross sales price for market rate residential units in the larger redevelopment were placed in a trust managed by the Housing Authority and a nonprofit. They are used to maintain and upkeep the property over time. The trust currently has over $1 million in its rainy-day fund.

Williams Terrace "is a testament to [the persistence of the design team and] the contractor. [For example,] the moveable shutters [are something] that we dream about getting [to include on] affordable housing projects, but they always get cut because of the budget or they don't work because the contractor doesn't build them right. It was amazing that we were able to hold on to them through the entire design process and execute them in a way that people can use. They're kind of big and heavy, yet they slide really well and people actually move them" for shade or views.
—Daniel Simons, FAIA, Principal, David Baker Architects

Essential climate justice design components include:

1. Creating a modern version of vernacular design elements to replicate the dual environmental and social functions of place-based architecture.
2. Placing older adults at the center of a redevelopment project created an opportunity to catalyze an environmental and social ripple effect in the surrounding neighborhood—adapting to hurricanes, flooding, and extreme heat, fostering social connections, and encouraging an active lifestyle.
3. The Housing Authority openly prioritized design and materials decisions that would create a development where residents can age with dignity without financial constraints. This approach led the authority to self-fund the project. They also worked with the city to use market rate housing sales in the larger redevelopment to fund a trust for ongoing maintenance and upkeep.

AIA Climate Justice in Architecture Taxonomy

Climate change creates new, and amplifies existing, environmental, and social challenges across the following seven themes or categories: social determinants of health, cultural connection to place, economic development without displacement, environmental justice, ecosystem health, climate change health and resilience, and decarbonization. The Climate Justice in Architecture Taxonomy centers both the environmental and social aspects of climate change and helps teams respond with an architectural design impacting the themes across three scales: building occupants, the surrounding neighborhood, and regionally and globally. The taxonomy aligns and connects with the AIA Framework for Design Excellence, which represents the defining principles of design excellence in the 21st century. The Framework is comprised of 10 principles and informs progress toward four outcomes – a zero-carbon, healthy, resilient, and equitable built environment.

Williams Terrace addresses all three scales in the taxonomy., with particular emphasis on the building and neighborhood scales.

Climate Justice Taxonomy	Impact of Design Features by Spatial Scale			Alignment with Framework for Design Excellence
	Building	Neighborhood	Regional/ Global	
Social Determinants of Health	✓	✓	✓	Integration, Equitable Communities, Economy, Energy, Well-being, Change, Discovery
Cultural Connection to Place	✓	✓		Integration, Equitable Communities, Economy, Energy, Well-being, Change
Economic Development without Displacement		✓		Equitable Communities, Economy, Discovery
Environmental Justice		✓		Integration, Equitable Communities
Ecosystem Health			✓	Ecosystems, Water
Climate Change Health & Resilience	✓			Equitable Communities, Water, Economy, Energy, Well-being, Change
Decarbonization	✓	✓		Equitable Communities, Economy, Energy, Well-being, Change

Overview of AIA Climate Justice in Architecture Taxonomy themes and spatial scales: Williams Terrace. Source: Biositu, LLC



Deep porches provide circulation, social space, and an extension of the home*Image Credit: Chris Luker*

Social determinants of health

Integrating inclusive design principles to support residents with limited mobility: The porches on each residential floor, the walking loop on the top floor, and the inviting staircases between floors offer various opportunities for physical activity that each resident can tailor to their specific needs in response to changing levels of mobility. While the Williams Terrace neighborhood reports a lower proportion of adults living with a disability (24.6%) compared with the US national average (30.6%), promoting active living through the design both supports the long-term mobility of aging residents and also serves as a model for nearby buildings in a neighborhood where almost one third of residents are over the age of 65, compared with 16.3% in Charleston City.

Installing 14-feet deep porches in front of each unit encourages social connection among a resident population that is at risk of social isolation: Research has shown that adults over age 65 are at higher risk of loneliness and social isolation than younger segments of the population. The Housing Authority gifts each resident with a rocking chair when they move in—a nudge towards fully occupying the deep porch outside their front door. Many residents have fitted out their designated porches as outdoor living rooms and enjoy spending time talking with their neighbors and observing the neighborhood.

Sharing the best views with all residents to support mental health: The community room and laundry room, which would normally be located on the ground floor of an apartment complex, were moved to the top floor to protect them from flooding. The result democratizes access to the floor with the best views of the park and harbor across the street, a reminder that residents have easy access to the mental health benefits of experiencing green and blue spaces in a safe, walkable community. All of these design "nudges" help reinforce elements of the design—such as the deep porches and healthy materials—that foster a sense of aging with dignity and access to nature that are not always present in publicly owned residential facilities.

Combining social engagement with physical activity: The design team tucked the elevator in a corner, turned individual porches into the main pathway of travel on each floor, placed large, inviting stairs front and center, and installed a walking loop on the top floor next to the laundry room to turn residents' exercise regimes into an opportunity to build community. The view also reinforces resident walking access to natural and cultural destinations such as the International African American Museum and South Carolina Aquarium a couple of blocks away.

Integrating trauma-informed design principles for community building: The U-shaped building reduces the number of units on each corridor, so residents are more likely to get to know their immediate neighbors. The deep porches also contribute to that goal by creating a pleasant, semi-public space that neighbors walk through to access the stairs and elevator.

> "I want it to be uplifting for the people who live here." (Metropolis, 2019)
> —Don Cameron, CEO of the Housing Authority of the City of Charleston

Encouraging an active lifestyle by locating the housing within easy walking distance of downtown: Adults over age 65 are more likely to experience multiple chronic health conditions compared with younger adults. For example, residents in the Williams Terrace neighborhood, almost one third of whom are over the age of 65, report a 42% higher rate of heart disease than the city average (7.1% compared with 5%). Maintaining an active lifestyle is one of the strongest determinants of living a longer and healthier life free of chronic disease—particularly among older adults.

Supporting seniors to live independently within the community—not apart from it: As the first affordable housing development for seniors in downtown Charleston, Williams Terrace's design goal was to fulfill the pledge on the plaque of the city's first affordable senior housing complex, William Enston Home (1887): "To make old age comfortable."

Cultural connection to place

Balancing modern aesthetics with Charleston's historic architectural typology: The deep front porches with floor-to-ceiling, moveable louvers echo similar moveable shutters in nearby historic Charleston single family homes. The lime-washed brick veneer walls also echo materials commonly used in downtown Charleston.

"One of the things that is nice about Charleston is that we have a fantastic historic district. We preserved entire neighborhoods. And, it's something we're very protective of. Unfortunately, we don't have a lot of very good new buildings. And, this is one of those that most people recognize is one of our best new buildings. ... I think part of it is ... the subtle references to Charleston. The porch doesn't look like our typical porch, but it still is a porch that people use. And that instantly brings you into Charleston."
—Eddie Bello, AIA, Principal, Bello Garris Architects

Returning low-income residents to a historic central neighborhood: The site has strong historical connections with workforce housing. In the 1700s and 1800s, the neighborhood was home to families who worked at the Port of Charleston. In the 1930s, the majority of the land was converted into 162 units of public housing, which were destroyed by Hurricane Hugo in 1989. Returning senior public housing to the neighborhood in a wind-, flood-, and heat-resilient structure that promotes aging with dignity, acknowledges the contribution that port workers have made to the city throughout its history.

Economic development without causing displacement

Integrating affordable senior housing in a mostly upscale redevelopment increases economic and age diversity in the neighborhood: The neighborhood is home to a greater mix of incomes than surrounding areas, perhaps in part due to the presence of Williams Terrace. For example, while the median household income ($69,250) is 17.5% lower and the poverty rate (17%) is 35% higher than Charleston City, economic indicators in surrounding neighborhoods range from $31,016 income/40.9% poverty in census tract x00400 east of Williams Terrace to $180,491 income/5.5% poverty in the historic district south of the development. Similar disparities are reflected in home ownership rates. 53.1% of housing units in the Williams Terrace neighborhood are owner-occupied, compared with 20.1% in census tract x00400 and 83.7% in the historic district (x00200). Williams Terrace makes it possible for low-income seniors who have lived most of their lives in downtown Charleston to age in place with dignity rather than move out to the suburbs where most of the Housing Authority's properties are located.



Long, narrow apartments encourage cross-ventilation and social connections
Image Credit: Chris Luker

Designing & maintaining a high-quality building to improve neighborhood integration: The building's design, envelope materials, and high-quality maintenance regimen all help integrate the affordable housing development into the overall neighborhood, which includes market rate housing and a luxury hotel.

In Charleston, "affordable housing has always tried to be mixed in wherever there's an available lot of land, whether that be a couple of small single-family residences or an apartment building. ... We don't have enough room to just say 'Let's put them over there.' ... You shouldn't do that anyway."
—Eddie Bello, AIA, Principal, Bello Garris Architects



Movable shade screens protect the deep porches
Image Credit: Chris Luker

Environmental justice

Removing contamination & restoring access to the adjacent harbor: The housing complex is part of a mostly upscale redevelopment of a brownfield adjacent to the Port of Charleston. A coal gasification plant adjacent to the property contaminated the soil over many decades. Some portion of the relatively high cancer rate among adults (10.2% in the Williams Terrace neighborhood compared with 7.5% in Charleston City and 7% in the US) may reflect the long tail of past environmental exposures. By redeveloping the property, the Housing Authority removed exposure to an important source of legacy contamination from the people living and working near the property, as well as marine life in the harbor.

Ecosystem health

Converting a disused industrial brownfield into a mixed-use neighborhood and park: The Housing Authority designed the new neighborhood around a large park—ending the property's contamination of the air, water, and soil in surrounding areas and returning native landscaping to a large portion of a formerly industrial area.

Climate change health & resilience

Preparing for the increasing risk of storm surge and hurricane-force winds: Williams Terrace is located in a high velocity flood zone and on the site of an affordable housing development that was destroyed by Hurricane Hugo in 1989. The building is raised up 14 feet to protect dwelling units from exposure to flooding and storm surge. The ground floor houses the parking garage and a public space that is designed to act like a public screened-in porch connected to an adjacent park via a shaded sidewalk. Housing low-income seniors in a building raised 14 feet above ground level on a site facing the harbor is an expression of the city's climate adaptive approach to "living with water."

Preparing for the increasing risk of power outages during hot weather: Outdoor corridors and deep porches encourage outdoor living and enhance resilience to power outages. Moveable louvers and ceiling fans harken back to historic passive design strategies that use shade, the organization of interior spaces, and window placement to enhance thermal comfort in a hot, humid climate with access to a sea breeze.

Using building modeling tools to maximize shading: The Yale Center on Climate Change and Health has placed Williams Terrace and surrounding neighborhoods in the 83rd percentile for disparities in heat vulnerability compared with other locations in the US, perhaps in part due to disparities in shading. The tree canopy over roadways in the Williams Terrace neighborhood is less than half as extensive as the historic district (11.8% compared with 27.3%). In response to the warm climate and lack of shading adjacent to the site, the design team modeled the sun path and heat gain on all sides of the building. The model's results influenced the ultimate location, height, and shading of windows and porches to reduce exposure to direct solar heat gain and maximize the volume of air drawn through the unit when the front and back windows are open.

"The units all have through ventilation. They have windows on both [ends – rear and front, facing the porches]. … We [decided against double-loaded corridors – using the porches as circulation instead] – in the hopes that at least [during] some of the shoulder months, people wouldn't have to run their air conditioning. They could just open the windows on both sides and get a breeze that would go through their apartments."
—Daniel Simons, FAIA, Principal, David Baker Architects

Decarbonization

Reducing electricity demand with daylighting & cross ventilation: The apartment units are configured according to the "single house" style—a local vernacular design—to reduce electricity demand by encouraging the use of daylighting and cross ventilation. Deep shaded porches with ceiling fans cool the air entering from the front of each unit and stimulate the Venturi effect—sucking natural ventilation through the main living space and bedroom and out the parallel window at the back of the apartment. The window placement on the front and back introduces daylighting to all regularly occupied spaces except the bathroom.

"The unit plans are pretty amazing. They are very narrow, which allowed quite a bit of density in the project. At the rear of each apartment there is a fully private space, and at the front the living space opens out onto the communal porch, which is shared with neighbors. As a climate response, ensuring through ventilation and daylight on two sides of the apartment reduces energy use and increases comfort."
—Daniel Simons, FAIA, Principal, David Baker Architects

Creating walkable, fossil fuel-free development: The Williams Terrace neighborhood combines a high percentage of residents who commute using public transit, walking, or cycling (18.7% compared with 6.8% in Charleston City) with dangerous roadways in the direction of the historic district. The Housing Authority used the construction of Williams Terrace—along with a park and pedestrian and vehicular right-of-way—as the catalyst for market rate development in the remainder of the property (a remediated brownfield). The new neighborhood encourages fossil fuel-free active transportation by drawing residents and businesses into a new, walkable neighborhood next to downtown.

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Additional information

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Committee on the Environment

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Climate Justice in Architecture

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Resources

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Architect Credit: Ziger|Snead Architects

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Architect Credit: Frederick Fisher & Partners
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Image name: Frost Terrace, Street View
Architect Credit: Bruner/Cott Architects
Image Credit: Robert Benson Photography

Image name: Movable shade screens protect the deep porches
Architect Credit: David Baker Architects
Image Credit: Chris Luker

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Image name: Hurricane Strong Home, side and back porch
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