

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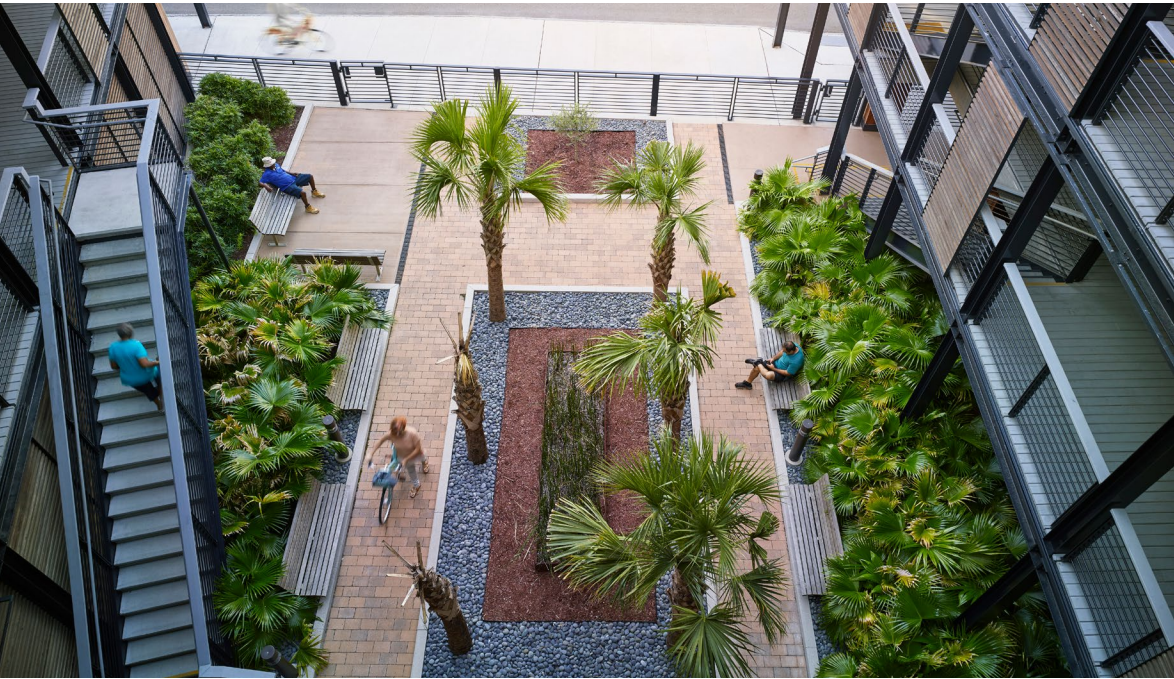
Williams Terrace: A modern reinterpretation of the Charleston "piazza"
Image Credit: Chris Luker

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 Garriss 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 homeImage
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-foot 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



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

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.

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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Lead Author

Biositu, LLC, [biositu.com](https://www.biositu.com)

Contributors

COTE Knowledge Community and AIA Staff.

Special thanks

David Baker Architects, interview participants.

Additional information

Architect magazine case study | https://www.architectmagazine.com/project-gallery/williams-terrace_o

David Baker Architects case study | <https://www.dbarchitect.com/projects/williams-terrace>

Elliott, Vittoria. “Williams Terrace Senior Housing by David Baker Architects and McMillan Pazdan Smith.” (2019). *Architectural Record*. | <https://www.architecturalrecord.com/articles/13938-williams-terrace-senior-housing-by-david-baker-architects-and-mcmillan-pazdan-smith>

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Committee on the Environment

