

2022 SEFA Lab of the Year®:

The Joan and Sanford I. Weill Neurosciences Building - *A Place of Hope*

By Victor J. Cardona, AIA, NCARB

The 2022 Laboratory of the Year winner is *The Joan and Sanford I. Weill Neurosciences Building*, a landmark, exciting and transparent edifice at the Mission Bay Campus of the University of California San Francisco (UCSF). SmithGroup with Mark Cavagnero Associates, San Francisco are the architects, laboratory, and clinical planners for the project.

The Joan and Sanford I. Weill Neurosciences Building serves as the headquarters for the *UCSF Weill Institute for Neurosciences*, which unites UCSF's departments of neurology, psychiatry and behavioral sciences, and neurological surgery to solve the most complex challenges in brain health through research, education, and patient care. Combined with the nearby Sandler Neurosciences Center, Arthur and Toni Rembe Rock Hall, and forthcoming Nancy Friend Pritzker Psychiatry Building, it is part of one of the largest institutional complexes for neuroscience research and care anywhere in the world.

Opened in 2021, the 282,900-square-foot Weill Neurosciences Building is designed to fuel connectivity and collaboration and bring together multi-departmental clinics and clinical research centers. As a cross-disciplinary hub, the building drives advances in new treatments for disorders of the brain and nervous system while providing expert and compassionate care for patients.



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"I don't think there is another facility quite like this - anchored in a huge medical and neuroscience community, focused on the neuroscience of human beings and human disease, and that brings clinical care and clinical research on the real diseases under the same roof as the basic lab investigations."

Dr. Stephen L. Hauser, director for the UCSF Weill Institute for Neurosciences

Mission

"Working together, from bench to bedside, the mission of this building is to support the full spectrum of translational research – it's the back-and-forth relationship between lab and clinic where scientific discovery and clinical innovations are born. The Weill Neurosciences Building is designed to promote these interactions and speak to these needs, a place that brings scientists and clinicians and patients and students working together to provide the best possible care while striving for better outcomes for the conditions they face. The Weill Neurosciences Building is envisioned as a beacon for UCSF Mission Bay and a manifestation of the ambitious world-changing research and treatments that are projected within it."

Goals

UCSF and project donors Joan and Sanford I. Weill recognized that the brain is a part of the body that is fundamental to our health and well-being but that we are only starting to understand. Driven by this reality, they set an ambitious and inspiring goal to integrate the neurosciences under one roof, linking three clinical departments (Psychiatry and Behavioral Sciences, Neurology, and Neurological Surgery) alongside cross-disciplinary research programs (Institute for Neurodegenerative Diseases and Neuroscience Graduate Program), to foster innovative, efficient, and profound research and clinical care.

A prominent goal for this project was to ensure that patients seen at the Weill Neurosciences Building are treated with dignity. The donor envisioned a model very different than a typical hospital or healthcare facility, one in which patients are greeted as they enter the building by somebody who checks them in and takes them personally to where they need to go. Creating a concierge-like patient experience placed emphasis on the need for hospitality space within the building.

Additionally, they predicted the confluence of the disciplines to be rewarding for researchers, clinicians, and patients alike. Researchers and clinicians can witness people directly benefiting from their work and are further inspired and informed towards future discoveries. Similarly, patients see researchers and clinicians working hard to provide the best possible care while achieving better outcomes for the conditions they face.

One of the primary goals for the project was to destigmatize psychiatric treatment and reach out to this excluded community. Responding to this goal, the project created a transparent and open building with an elevated level of finishes that helped to create pride in the quest to understand, treat and demystify these conditions of the brain.



The Site

The Weill Neurosciences Building is centrally located on the main quad at UCSF's Mission Bay Campus, built atop the final undeveloped site that most recently was utilized as surface parking lot serving the Mission Bay area. In developing the design for the building, SmithGroup with Mark Cavagnero Associates incorporated the idea of creating a building that could communicate with the other neuroscience buildings to form a hub and strengthen the sense of place and campus within Mission Bay. The goal was to encourage collaboration between the people working in the two adjacent neuroscience buildings and to

maintain ease of pedestrian movement throughout the campus, allowing these facilities to function in concert toward their shared goals.

The Program and Conceptual Design

The building program is visionary and, through incorporating rich and diverse research, clinical, and academic programs, creates a unique environment for cross-disciplinary science. In speaking with the scientists about their work it was clear to the project team that uniting disciplines and providing treatment under one roof was advantageous, giving them the opportunity to bring together the 'hardware' and 'software' of the brain to better understand and treat the patient.

The challenge of creating a unified project bridging diverse factors became a central tenet of the project design. The team sought to create a building that would express and reveal its vision, logic, and craft to engage and inspire the community, emblematic of the research within. In conceptualizing the project, SmithGroup with Mark Cavagnero Associates created a forward-thinking building that expresses both the precision of science and warmth of patient care, and in simplest terms could be a 'great place for science'.

Architecturally, the Weill Neurosciences Building is conceived as a pair of programmatically driven wings united around a central atrium which includes public and social spaces. Wrapped with an architectural screen, expressive of the precise science conducted within, the four-story research volume is lifted above a transparent two-story clinical volume wherein natural materials seek to create a warm, serene space conducive to care. This clear and concise massing is enlivened through powerful articulation of the forms that are informed by the campus to create a dynamic and welcoming environment that is illuminated and connected to the environment.



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Using a restrained material palette and simple architectural massing, the building is envisioned as a clear, legible, and engaging part of the campus. The design is firmly tied into its site and is formed from its study. Whether this is the angled plaza that connects campus circulation, the powerful symmetry focusing and connecting across Koret Quad, or the large opening in the screen reflecting the bay windows in the housing development, the project creates an iconic presence that speaks to, and is rooted into, its built community.

"The Weills' support will allow us to dramatically expand our efforts to recruit and retain the very best basic scientists who are devoted to unlocking the secrets of neurologic illness and transforming our ability to treat and cure these conditions."

Sam Hawgood, MBBS, UCSF Chancellor, Arthur and Toni Rembe Distinguished Professor

Building Organization and Circulation

The functional program was stacked vertically to provide ease of public visitor and patient access at the lower levels and separate and more secure research floors at the upper levels. Due to the number of distinct uses within the facility, circulation was a major driver of the planning within the project. It was important to separate public from private, delivery waste streams from personnel, and clinical from research circulation due to varied degrees of security.

The building's planning brings shared spaces to the heart of the building, ensuring that they are accessible and usable to all occupants. The central atrium collects the social spaces of the building to provide an energizing core clad in natural materials and bathed in natural light. This light and airy atrium organizes the building. Patients see scientists making advances, enticing participation in trials. *Science is on Display.*



Photo © Kyle Jeffers

With the stairs and the elevators visible, wayfinding is apparent, even to the neurologically impaired patient. Encouraging people to move and interact through communicating stairs, carefully tuned acoustics, curated furniture and custom benches give this large space an intimacy and humane feeling that speaks directly to a building that seeks to be 'both/and'.

The building design honors wellness and inclusivity. Building access is barrier-free with sliding doors and curb-less drop-off. Gender-inclusive restrooms in addition to gender-specific restrooms and lactation and meditation rooms are provided to create a supportive environment. Conference rooms and Town Centers are shared and dispersed across the building to encourage interaction and collaboration, and outdoor terraces are accessible for staff and faculty enjoyment.

Through the building's planning, natural daylight provides orientation and connectivity to nature and the rhythms of the day as well as the larger campus landscape and community. Breaking away from artificially lit corridors and workspaces, the building takes a more equitable stance that light and views should be shared and enjoyed by all.

Patient Experience

Destigmatizing psychiatric/neurological illness was critical to the vision of the donor. SmithGroup with Mark Cavagnero Associates architectural sensitivity realized this vision. Diagnostic and clinical spaces serve as a major aspect of the building program.

Light filled family lounges, visible from the atrium, give a connection to nature for easing patient anxiety while providing a respite for companions and patients alike. These lounges are spacious and clutter free for supervision from the desk, and to give space for patient assistance and mobility. Soft up lighting, calm finishes and good acoustics give comfort to the neuro patient. Finely detailed finishes add quality to the experience. Luggage storage is included for out-of-town patients.

Clinicians have access to diagnostic cutting-edge clinical trials on-site to deliver effective therapies to their patients and round out the patient experience. Organized clinical planning gives legibility to the healthcare and diagnostic facilities. Generous 6' clinic corridors allow for large mobility aids. Separate staff and patient circulation paths provide for no interference between public and clinical operations. Light at the end of lateral corridors allows for easy wayfinding, with "touch-down" space for the researcher's convenience.



Photo © Kyle Jeffers



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“For patients to come to a place where it is clear that on the floor above them that the most exciting research anywhere is going on to transform these disorders, I think is an incredible vision.”

Matthew W. State MD, PHD Chair and Director, UCSF Langley Porter Psychiatric Institute and Hospital

All exam rooms have telepresence to bring families, specialists, and researchers to the patient. Large identical exam rooms provide space for patients and their companions. Specialized diagnostic and treatment facilities contain testing spaces, such as long daylit exam rooms specifically designed for gait analysis, patient walking lanes for improved patient experience & touchdown, infusion suite and imaging facilities, including two 3T MRIs. A flexible, U-shaped corridor connects the various clinical suites, allowing for expansion or contraction depending on the changing clinical demands.

Paradigm Shift Through Neuroscience Lab Design

Neuroscience research has challenged the lab design community to rethink the way neuroscience labs are designed. In response, SmithGroup with Mark Cavagnero Associates created an innovative design concept that consolidates research typologies that have previously been dispersed throughout campuses and buildings. Their solution was to create research hubs that bring together critical research elements to their fingertips to increase efficiencies, spark collisions in research, clinical and education within neuroscience.



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Each research hub is designed and engineered with research equity in mind. This allows UCSF the ability to offer researchers equal spaces that can adapt, flex and evolve in response to the diverse needs in Neuroscience. Each Research Hub consists of:

- Open Wet Lab
- Support Labs
- Specialized/Flex Support Labs
- In/Out Space
- Linear Equipment Room
- Behavioral/Testing Suites
- Environmental Room
- Dry Lab
- Computation Lab
- Write-up/Office/Collaboration Space
- Freezer Farm

Learning Center

Learning opportunities abound at the Institute for the next generation of health leaders in neurosciences. The Learning Center is a dynamic space that can host a variety of educational activities for students, patients, and researchers alike, from game-based learning to collaboration and learning about the latest research and treatment.

Wellness

Wellness and the comfort of occupants is a fundamental part of the design response. The architecturally screened glass curtain wall provides abundant and balanced natural daylight, connecting occupants who may work long hours to the rhythms of the day. Connecting stairs are visible from the atrium and accessible to encourage activity and movement, and a carefully selected material palette seeks to balance a warm environment with the need for durable, long-lasting materials.

Not only has the project prioritized the health and wellness of occupants through the design with usable daylight and views, but also with the integration of biophilia at several levels. The glazed curtain wall protected by an architectural screen is complemented with a large skylight bringing connection to nature in the waiting area and lobby of the building.



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Exterior Skin

At a detailed level, the building's articulation supports and amplifies the project's vision. This approach is most clearly seen with the exterior architectural screen, where the precise and repeated forms are carefully articulated and celebrated. As a key component of the façade's sustainability strategy, the screen shelters occupants from the harsh heat gain and glare of the California sun while bringing in abundant, soft, and diffuse light and maintaining views for the occupants and softening of night glow for the lab lighting at night. The rhythm and proportions of the screen stem directly from the lab bench module, rooted in function and use while being delicate and elegant in craft. As the unifying element of the building, the screen's manifestation is not of a singular, static, or defended facade but instead is an open, dynamic, and engaging one that shifts between shear and transparent through your movement around the campus. It is invigorated, illuminated, and transformed by the passage of light and shadow.

The Structural System

Given that the principal threat to the building is by earthquake, and its aftermath, the building was engineered to the Tier 2 seismic level, thus exceeding the minimum code requirements and allowing for continuous operations and immediate occupancy after an event in order to protect research assets.

The project team was able to confirm that a 2-way concrete slab provided performance and cost benefits that outweighed other systems, including a discrete cost over steel. The building's structure was designed using a distributed shear wall system to achieve its high-performance criteria. This approach reduces the likelihood of significant cracks in the shear wall that can occur where walls join.

The building skin was also carefully designed and tested through a performance mock-up, engineered to withstand an M7 seismic scenario without system failure. For enhanced safety it was also tested to an M8 seismic scenario, which showed that it could meet this higher event threshold without delta fallout of elements. Equally important is the need to anchor equipment, including clinical, research, electrical and mechanical to remain functioning.

MEP Systems

Attaining LEED Gold v4 Building Design + Construction (BD+C), the new building is predicted to achieve an energy usage intensity (EUI) of 85 kBtu/sf/yr through the utilization of several energy efficiency measures, including a high-performance building envelope, efficient LED lighting fixtures, and advanced AHU controls. Consisting of a laboratory building with high energy use spaces, several measures to reduce the exhaust air were implemented, among them night-time exhaust air setback, and lowering the background air change rate.

This level of EUI is substantially lower than a typical lab building and is 24% lower than the ASHRAE 90.1-2010 baseline. An EUI of 85 is the lowest in the International Institute for Sustainability Laboratories' benchmarking database for the San Francisco/Bay area and the second lowest in the entire database.

Noting that the Architecture 2030 challenge does not have laboratory buildings included in the database, SmithGroup established the baseline EUI of this building as a combination of hospital & medical office building (EUI of 400 - 450). For such a baseline, the project meets the Architecture 2030 challenge.

The building systems strategies to reduce energy consumption included:

- Advanced metering and AHU controls
- Wet bench research labs with 6 ACH
- Reduction in exhaust air measures include night-time exhaust air setbacks and lowered background air change rate
- Lab airflow and temperature reset
- Efficient condensing boilers
- Efficient central cooling plant
- High performance building envelope
- Optimized exterior shading
- Automated interior shading system
- Efficient LED lighting fixtures

Project Delivery

Applying an *integrated project delivery (IPD)* approach, the team collaboratively developed the project design in dialogue with the project requirements, and holistically evaluated the cost, schedule, and quality implications.

Utilizing a collaborative *Big Room cross-discipline teaming approach*, the project team drew inspiration from the incredible scientific research and innovative treatments for brain disorders already underway at UCSF. They understood that the Weill Neurosciences Building will renew hope for patients and families affected by neurological and psychiatric disease and thus should express its potential as a catalyst for progress.

Our integrated team delivered a world-class neuroscience research facility over four-and-a-half years of design and construction, advancing innovation and quality, while maintaining an accelerated construction schedule – even in the face of challenges like a global pandemic. By embracing *Lean Design* and construction techniques, strategies, collaboration, and transparency, they identified ways to deliver this megaproject smarter, faster and more efficiently.

In responding to the program needs, the team studied where program elements overlapped and could be shared or reduced. The team maintained a *Risk & Opportunity (R&O) Log* throughout the project timeline to identify and track ways to refine the project, and studied options through calculation, drawing, mockups, and virtual reality (VR) to validate these risks and opportunities. This allowed for evolution and refinement to ‘right size’ a building supportive of its planned use and flexible for future.

Project Data

Building Area	282,900 gsf
Assignable Area	211,799 sf
Atrium Area	5,700 sf
Building Population	3,900 occupants allowed by code
Site Area	1.94 acres

Program Areas

Wet Research	68,000 sf
Dry Research and Offices	70,200 sf
Clinical Care	
Health	49,800 sf
Diagnostic Hubs	7,200 sf
Treatment (Pods)	29,500 sf
Infusion	8,900 sf
Imaging	4,200 sf
Clinical Research	8,700 sf
Building Support	14,600 sf

Project Team

Client	University of California, San Francisco (UCSF)
Architect of Record	SmithGroup
Design Architect	Mark Cavagnero Associates
Clinical Planner	SmithGroup
Laboratory Planner	SmithGroup
CM-At-Risk Builder	DPR Construction

About the author

Victor J. Cardona is a retired architect and laboratory designer based in Michigan and Florida. He served as a senior planner, vice-president, and Director of Laboratory Planning Group for SmithGroup. A past member of SEFA’s Advisory Board, he has been a past judge in the LOY competition. He has published many laboratory-planning articles and presented them at national and international forums. His projects have been recognized by multiple entities, including four LOY projects. He now spends most of his time sailing Lake Michigan.