

RESEARCH AND CREATIVE WORK



Prada Marfa. Elmgreen & Dragset with
Rael San Fratello Architects

The main focus of my research and creative practice is to seek creative strategies for activism to permeate architectural design culture. Drawing from movements in the 1960s, such as the *Chicano* and land art movements, particularly the protest by land artists against a-contextuality, plastic aesthetics and the commercialization of art, and the *Chicano* use of the concept *rasquachismo*, which the artist, writer and Mac Arthur fellow Amalia Mesa-Bains defines as a tactic where " ... the irreverent and spontaneous are employed to make the most from the least...[where] one has a stance that is both defiant and inventive. Aesthetic expression comes from discards, fragments, even recycled everyday materials..." Without making direct formal or ethno-cultural references to this work, my own research and creative work transforms the practice of architecture into an activist endeavor—one that is defiant, inventive and tied to contemporary issues and design vocabularies.

By situating my work in the contexts of scholarship, art, material, culture and ecology, exemplified in *Prada Marfa*, a collaborative endeavor with artists Elmgreen & Dragset, my work is geared towards the making of contemporary spaces, forms and artifacts with embedded political consequence. The work relies upon a deep understanding place, and its inherent resources, and makes careful links between a broad spectrum of tools that come from manual, industrial and digital approaches to making architecture. As a scholar who works within the vocations of writing, designing and making, the body of work that has emerged from this research has taken three distinct forms.

PUBLICATIONS

DESIGN COMPETITIONS

MATERIAL DEVELOPMENT

I will present these various forms below and discuss the impact and significance they have had on contemporary architectural culture and discourse.

IMPACT AND SIGNIFICANCE OF PUBLICATIONS AUTHORED BY RONALD RAEI



Earth Architecture (Princeton Architectural Press, 2008)

There are several important ways in which the research outlined above has resulted in publications that bring to light activist strategies that intervene within existing territories for the making of contemporary architectural provocations that demonstrate a deep understanding of context, material and manual, industrial and digital approaches.

To that end, my most significant published work thus far is my book, *Earth Architecture* (P000) published by Princeton Architectural Press in 2008 and reprinted in 2010. Supported by the Graham Foundation for Advanced Studies in the Fine Arts and the Architecture League of New York, the book provides a history of building with earth in the modern era, and of the architects who shaped the modern movement, but employed rammed earth, mud brick, compressed earth, cob, and several other traditional techniques during their career (e.g. Adolf Loos, Rudolph Schindler, Le Corbusier). The book also presents a selection of more than 40 projects that exemplify innovative uses of the oldest, and arguably the most ecological building material on the planet selected from 1970 forward, a bracket defined by the year that the Egyptian architect Hassan Fathy published *A construire avec le peuple – histoire d'un village d'Egypte: Gourni* (1970), which shed new light on Western and non-Western architects' conceptions of earth as a building material in contemporary society. *Earth Architecture* also addresses the misconceptions associated with earthen architecture.

Many assume that earth is only used for housing in poor rural areas—but there are examples of airports, schools, hospitals, museums, and factories that are made of earth. It's also assumed that earth is a fragile, ephemeral material, however the oldest extant buildings on the planet are made of earth. The book also touches on many topics that pervade both architecture and popular media today, such as the ecological benefits and the politics of building with earth, particularly in developing nations where earth buildings are often thought of as pre-modern or backward.

I am not the first to write a book on earthen architecture. There are several notable books on the subject. In addition to Fathy's, the books of Paul Oliver, notably, *Dwellings* (Phaidon 1997), and Jean-Louis Bourgeois with Carollee Pelos, *Spectacular Vernacular* (Aperture 1989) are among the most important books of the late 20th century to document vernacular earthen architecture. Perhaps the most relevant to my own particular interests, *Down to Earth*, by Jean Dethier (Facts on File 1983), a catalog of an international exhibit held by the Centre Georges Pompidou in Paris, is the first to touch upon the possibility of earth as not a vernacular material, but one employed by architects. The books by Paul Graham McHenry Jr. (University of New Mexico) and Dr. Gernot Minke (University of Kassel, Germany) while influential, contain important historical information and serve as guides for building, they represent more normative and methods of earthen construction. *Earth Architecture* is ground-breaking because it is the first and only book to present innovations in earth that are shaped by architects, and whose designs are responsive to the complexities of a contemporary world—or as the *Globe and Mail* describes the book: “a lesson in how one of the world's oldest and most popular building processes can be renewed in a high-tech age, lending its ancient beauty to architectural works of contemporary imagination.”¹



Mud House Marfa, 2009. Rael San Fratello Architects

My primary interest in studying, documenting and writing about earthen architecture is to create a vehicle for promoting earth as a contemporary building material—an activist representation for this humble material and the under-represented cultures that employ its use. The perceived hegemony of the industrialized world has for decades been directly responsible for causing an inferiority complex among earth building cultures and today, the most common building material on the planet is classified as “alternative” or worse—“primitive.” At the dawn of every country's segue to an industrialized society, it makes a concerted effort to shed its earth building traditions at the risk of depleting natural resources such as wood; investing in construction projects using expensive industrially produced materials such as concrete, which often perform poorly in developing nation contexts; and losing traditional cultural knowledge. The perception that industrial materials are better, because they represent progress, is often coupled with a society's embarrassment toward their highly developed, contextually responsive, and deeply meaningful traditions. My primary aim is to reposition earth among other contemporary building materials, demonstrating its global potency and instilling confidence in cultures who have long standing traditions in earthen construction, so that they may embrace the ecological heritage of the material—a critical imperative in our increasingly environmentally challenged world. Historian David Gissen describes the book as “...a powerful corrective to those commentators that view buildings made of earth, or the matter that constitutes earth buildings (mud, sand, gravel, soils), as primitive, poor, or crude.”² *Earth Architecture* not only reveals a crypto-history of modern architecture that details how the architects who shaped the modern era did not abandon the pre-existing traditions of earth, but also liberates earth as a material relegated to the low end of a technological spectrum, and connects earthen construction practices directly to the most advanced digital fabrication practices found in contemporary architecture today, making it a useful and meaningful guide to shaping the built environment in our increasingly technological and environmentally fragile world.

The origins of *Earth Architecture* (the book) stem from a blog I have authored since 2003—EarthArchitecture.org. The blog has served as a clearinghouse for disseminating earthen architecture, and connecting those interested in the topic in a contemporary forum that reaches an international audience of nearly a quarter of a million unique visitors each month. In 2009, EarthArchitecture.org was ranked among the top 20 most important blogs on architecture worldwide measured by the number of subscribers (Google Reader + Bloglines) and the number of hits in Google (Google + Google Images).³

Additionally, four years after its publication, the book *Earth Architecture* continues to be one of the top selling architecture books at Princeton Architectural Press, a world leader in architecture and design publishing, both in market share and in editorial and design excellence. Of the over 1000 titles published by Princeton Architectural Press, *Earth Architecture* is currently (as of May 15, 2012) their #16 best selling

¹ With a weekly readership of approximately 1 million, The *Globe and Mail* is Canada's largest-circulation national newspaper.

² David Gissen is an historian and theorist of architecture and urbanism. He is associate professor of architecture and visual studies and coordinator of the history/theory curriculum for architecture at the California College of the Arts. His recent work specifically focuses on developing a novel concept of nature in architectural thought and the parameters for an experimental form of practice in architectural history.

³ The ranking was performed by www.eikongraphia.com, an online Dutch architecture website authored by Michiel van Raaij.

architecture title and the book has been widely and positively reviewed internationally (the seminal architectural monograph *Rural Studio: Samuel Mockbee and an Architecture of Decency* is #17). Below are excerpts from several of the reviews *Earth Architecture* has garnered:

- "From an introduction tracing the history of earth architecture to an afterward addressing hybrid building systems and the digital process of contour crafting, Rael offers a balanced reconsideration of earth architectures central issues and 40 of its most interesting built representations." — T.A. Horton, *Architectural Record* (PBR010)
- "...a satisfying survey both for the professional "mudder" and for those who want a quick scholarly survey of earthen buildings from all over." — *The Architects Newspaper* (PBR003)
- A "...beautifully produced and well-researched bookgiving a voice and power to the countless people who produce the bulk of the building culture throughout the world ..." — Paul Kotze, *Journal of the South African Institute of Architects* (PBR012)
- "Earth Architecture charts a grand history of architectural beauty crafted from one of the humblest of building materials." — *The Age*, Melbourne (PBR000)
- "Earth Architecture compellingly underscores the need for us to rethink how we can build sustainably by using old techniques in new ways." — Nova Tayona, *Azure Magazine* (PBR006)
- "...an excellent and thoughtful survey of earthen structures across the world and throughout building history." — Geoff Manaugh, *BLDGBLOG* (PBR009)
- "...an excellent book that outlines the history and explores in-depth contemporary uses of earth in architecture.....a powerful corrective to those commentators that view buildings made of earth, or the matter that constitutes earth buildings (mud, sand, gravel, soils), as primitive, poor, or crude." — David Gissen, *Architectural Historian* (PBR008)
- "The worlds first skyscrapers were built of mud brick and many famous Americans lived in earth houses at different points in their lives: this said, there have been few books on the contemporary architecture of earth houses, making *Earth Architecture* a real winner for any college-level arts collection. It surveys over forty projects and profiles the beauty of earth architecture, offering chapters covering new, creative uses of earth in buildings." — Diane C. Donovan, *The Midwest Book Review* (PBR005)
- "With more than 40 different building projects from around the world, *Earth Architecture* provides a history of building with earth in a modern era, focusing on projects using rammed earth, mud brick, compressed earth, cob and other techniques that are becoming increasingly important with changing ecological and economic imperatives. *Earth Architecture* showcases new and innovative uses of the oldest building material on the planet. *Earth Architecture* also contains a wide range of modern earthen residences from the simple to the stunningly opulent. A beautiful book for earth-based building enthusiasts." — *GreenMuze.com* (PBR001)
- "Dirt - that most ancient of building materials - is experiencing a popular resurgence... One of the world's oldest building products has now become one of the worlds most advanced sustainable building materials. The earth houses within are as aesthetically pleasing as they are ecologically sound." — *Houses Magazine*
- "... a lesson in how one of the world's oldest and most popular building processes can be renewed in a high-tech age, lending its ancient beauty to architectural works of contemporary imagination." — John Bently Mays, *The Globe and Mail* (PBR007)

- “a meticulously researched document that goes to great lengths to explore the historical antecedents of each styleand filled in many gaps in my knowledge of historical developments of the medium a must have book on contemporary earthen building techniques.” — Rob Hadden, The Owner Builder (PBR011)
- "A Must Have!" — WorldArchitectureNews.com
- "I would recommend Ronald Rael's book to all those people who are interested in this alternative means to architectureRonald writes in simple, descriptive prose, each project is traced in a way that creates an anthology and motivates the reader to further study and research. The book is rich in content and draws in other authors, architects, historical buildings and periods." — Valentina Del Fuoco, Building Design (PBR004)
- "Ronald Rael's book on some common techniques of construction, ones not typically seen as contemporary, brings to the fore earth architecture and its positive impact on architectural design An important addition to any architect's library for its important subject matter and the quality of projects included." — John Hill, archidose.com (PBR002)

Stemming from my work dedicated to the understanding of activism, place, making and politics through the lens of earthen architecture, I am widely considered an international expert on this subject and have also published and lectured at international academic conferences throughout the world. Briefly, I will summarize the outcomes of the book through publications, lectures, symposia, design proposals and books that cite *Earth Architecture*.

- In December 2008, Princeton Architectural Press, a world leader in architecture and design publishing, published my book, *Earth Architecture*.
- After selling out in the first year after its publication, *Earth Architecture* is reprinted by Princeton Architectural Press in paperback form (2010)
- In 2009 Alan Saunders interviewed me for the program ABC By Design, Australian Broadcasting Company on my book.
- In 2009 I was invited to lecture as part of the University of California Berkeley Lecture Series on the release of my book *Earth Architecture*.
- In 2009 *Earth Architecture* was presented at the AdobeUSA 2009 International Conference and Trade Fair in New Mexico.
- In 2009 *Earth Architecture* was presented at Mediterra 2009: 1st Mediterranean Conference on Earth Architecture in Cagliari, Sardinia, Italy
- In 2009 *Earth Architecture* was presented at the Lehm 2008 International Conference of Earthen Architecture in Koblenz, Germany.
- In 2009 I was invited to review the book *The Mason's of Djenné* by Trevor H. J. Marchand (Indiana University Press, 2009 and winner of the Amaury Talbot Prize for African Anthropology), which explores the technical, social, and magical processes involved in making buildings mud brick and renewing the unique urban environment of Djenné. The review was published in the *Museum Anthropology Review*, a peer-reviewed journal published in partnership with the Indiana University Libraries. (PN005)

- In 2010 I was invited to present a series of lectures in Riyadh, Saudi Arabia sponsored by the King Saud University School of Architecture, the Ar-Riyadh Development Authority and its sponsoring organization, the Supreme Commission for Tourism and Antiquities as part of the U.S. Embassy Speakers Program. Among the lectures I presented were: “The Use of Earthen Building Materials in Contemporary Architecture”, “The Future of Earth Building and Computer Aided Design”, and “Traditional Adobe Construction in Yemen”.
- In 2010 I presented the lecture “Digital Earth” at the 2nd Pan African Cultural Festival in Algiers, Algeria as part of the festival an exhibit and symposium entitled *Terres, d’Afrique et d’Ailleurs*, sponsored by the Algerian Ministry of Culture.
- In 2011, I was invited by Museum of Modern Art (MoMa) curator Andres Lepik to write an essay for his book *Moderators of Change: Architecture that helps* (Hatje Cantz, 2011) that would define the concept of “designing local” in a global world employing materials such as earth, stone and bamboo and introduce a series of projects that employ those materials. The book is a follow up to his previous book related to the MoMa exhibit Small Scale, Big Change (which cites *Earth Architecture*), and presents contemporary examples of social engagement in architecture on a global scale and explores various strategies for how design can actively influence underserved communities. (PR011)

In addition to these activities, *Earth Architecture* has been cited in several published articles and essays:

- PC000 Ham, Anthony. *West Africa*. Footscray, Vic: Lonely Planet. 2009
- PC001 Gissen, David. *Subnature: Architecture's Other Environments*, (New York: Princeton Architectural Press), 2009.
- PC002 Lepik, Andres and Bergdoll, Barry, editors. *Small scale, big change: new architectures of social engagement*, (New York: The Museum of Modern Art), 2010
- PC003 Galán-Marín, C., Rivera-Gómez, C. and Petric, J. “Effect of Animal Fibres Reinforcement on Stabilized Earth Mechanical Properties.” *Journal of Biobased Materials and Bioenergy*, Volume 4, Number 2, (June 2010) : 121-128(8)
- PC004 Galán-Marín, C., Rivera-Gómez, C. and Petric, J. “Clay-based composite stabilized with natural polymer and fibre.” *Construction and Building Materials*, Volume 24, Issue 8 (August 2010) : 1462-1468
- PC005 Ulloa, Mirentxu and Lau, Bernson. “The application of ‘techno-mud’ in residential building in Chile—A critical review.” *27th Conference on Passive and Low Energy Architecture*, Louvain-la-Neuve, Belgium, 13-15 July 2011.
- PC006 Niroumand, Hamed and Jamil, Maslina. “Hill Development by Earth Architecture.” *International Journal of the Physical Sciences* 6, no.6 (March, 2011) : 1249-1256.

The influence that *Earth Architecture* has had around the world as evidenced by the diversity of reviews (in respected journals, magazines on several continents), invitations to lecture in the Middle East, Africa, Asia and the Americas, and citations (from scientific journals to the Museum of Modern Art) it seems that the intentions of the book, to influence and reach a wide audience, have manifested in positive ways and my expertise on this subject and desire to continue to play an important role in my research and creative practice.

IMPACT AND SIGNIFICANCE OF MATERIAL RESEARCH BY RONALD RAEI

In the *Earth Architecture*'s afterward, I pose a future scenario for earth based materials—one that employs Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) processes. While it is commonly considered that digital manufacturing and earthen architecture exist at opposing ends of the technological spectrum, the material research that emerges from this provocation bridges the wide gaps that exist between non-industrial, industrial and digital modes of production and expands on the benefits of each. Over the past year and a half I have devoted much of my time laying the foundation for this current research, purchasing equipment, materials, and staffing support in initial phases of research. Supported largely by the Hellman Family Fund, awarded to “promising assistant professors who show capacity for great distinction in their research”, I have embarked upon a focused investigation that extends past the post-fordian and modernist issues and innovations discussed in my book, and seeks material processes and applications relevant to 21st century applications, particularly by way of material development for digital design, and most specifically for additive manufacturing.

Additive manufacturing technology typically employs materials intended for the immediate analysis of form, scale, and tactility. Rarely do the materials used in this process have any long-term value, nor does the process—except in rare cases with expensive metal prototyping—have the ability to create durable and sustainable working products. This research alters this state of affairs by developing methods for 3D printing using friable materials, such as clay, soil, soil-cement, concrete, fly-ash, wood and other materials for the production of long-lasting performance-based components that require no form work (typically up to 60% the cost of construction), produce no waste and use readily available, inexpensive and recycled materials—a *rasquache* approach to technological innovation.

Because the inherent nature of 3D printing opens new possibilities for shaping materials, the process reformulates the way we create architectural building components. *Digital materiality*, a term coined by Italian and Swiss architects Fabio Gramazio and Matthias Kohler, describes materiality increasingly enriched with digital characteristics where data, material, programming and construction are interwoven.⁴ Unlike Gramazio and Kohler, both researchers at ZTH, who primarily rely on the development of software to control robots that imbue digital materiality to the artifacts they produce, my own research aspires towards digital materiality directly through material development (rather than software development) coupled with the use of parametric modeling tools, analytic software and quantitative and qualitative analysis, making my work unique in that my research enters the realm of material science rather than computer science.

Other researchers in this field include Dr. Behrokh Khoshnevis at the University of Southern California, Dr. Enrico Dini of D-Shape (London) and Dr. Richard Hague of the Additive Manufacturing Research Group at Loughborough University, in the UK. In each case, their research represents a centralized focus on specialized hardware development to use standardized materials. Following the ethos of my research in activism and the availability of common resources, my own research focuses on material development and material processes and the use of distributed manufacturing methods tied to parallel computing using commercially available equipment. Whereas Khoshnevis, Dini and Hague's methods are highly specialized, inaccessible and closed, my research has arrived at methods that are inexpensive, highly accessible and open. Rather than the creation of one large machine, my research posits the potential for a number of machines producing architectural components and much of my research has gone towards developing assembly methods for the production of large assemblies with smaller parts.

The impact of the research thus far has been the development of a material process for 3D printing that has been patented by the University of California, presented at peer-reviewed conferences and published in the peer-reviewed conference proceedings.⁵ Welcoming collaborations with peers in my area of expertise, I am also currently beginning to work with Enrico Dini of D-Shape, who has built the largest 3D printer in the world, to test my material on his equipment. Additionally, I have integrated this research within the department's CAD/CAM lab, effectively reducing the cost students pay on rapid prototyping costs by

⁴ Gramazio, Fabio and Kohler, Matthias. *Digital Materiality in Architecture*. Lars Müller Publishers. 2008

⁵ Rael, Ronald. 3D Printer Cement Compositions, September 20, 2011, Ser. No. 61/536,766, BK-2011-168-1

more than half—a first step towards actively making 3D printing technologies much more accessible than is currently the case. To summarize, I'll briefly offer a list of accomplishments this research has produced thus far:

- In 2010 the research was funded (\$36,577) by the Hellman Family Fund Award, UC Berkeley, which is awarded to “promising assistant professors who show capacity for great distinction in their research”, as well as a 2009 Committee on Research Grant (\$5,152) and a 2008 Junior Faculty Research Grant (\$6,000).
- In March 2010, the research, organized as an installation entitled *Earthscrapers* was selected by an international team of curators (chaired by Paola Santocoy) as one of four architectural projects featured in the inaugural Biennial of the Americas in Denver, Colorado. Alongside architectural projects by Estudio Teddy Cruz, Alexis Rochas, and Nicholas de Monchaux, the work joined 25 artistic works from North and South America in the biennial's exhibit in downtown Denver. In this context, the entire body of research was relocated and displayed on a 15-foot long table that imagined a world where additive manufacturing is a scaleable technology producing architecture where the landscape and building are seamless.
- In November 2010, *Earthscrapers* (as exhibited at the Biennial of the Americas) was exhibited at the Wurster Gallery in Berkeley, CA as part of the department lecture and exhibition series.
- In April 2011, I was invited presented the research and work to legislatures at the symposium “3D/DC: 3D Printing Comes to the Nation's Capital”. The exhibition joined leaders in the additive manufacturing industry alongside Stratasys, Makerbot Industries, Materialise and many others. Only one other academic, Dr. Mark Ganter from the University of Washington, a leader in material development for additive manufacturing and a collaborator, was invited to present.
- In June 2011, my research, in the form of piece of furniture that is considered to be the largest 3D printed object in the world using commercial additive manufacturing technology, was exhibited at Fort Mason in San Francisco. The furniture piece, entitled “Seat Slug”, was designed by Rael San Fratello Architects. The exhibit, “SEAT”, was an exhibition of 34 unique public furniture designs by Bay Area artists, architects and designers.
- In 2011 the University of California filed a provisional patent application for my research: 3D Printer Cement Compositions, Ser. No. 61/536,766, BK-2011-168-1
- In October 2011 a peer-reviewed paper entitled “Developing Concrete Polymer Building Components for 3D Printing”, co-authored with Virginia San Fratello, was published in the Conference Proceedings for the Association for Computer Aided Design in Architecture (ACADIA). Banf, Canada. October 16, 2011 (PR008)
- In November 2011 a peer-reviewed paper entitled “Material Design and Analysis for 3D-Printed Fiber-Reinforced Cement Polymer Building Components” and associated with this research was presented at Ambience 11: International Conference of Technology, Art and Design at The University of Borås, Sweden and published in the conference proceedings. November 29, 2011. The paper was co-authored with my partner, Virginia San Fratello. (PR009)

Much of this research was made possible through my creative practice, Rael San Fratello Architects, and also with close collaborations with the Department of Art Practice here at Berkeley and specifically with Professor Richard Shaw and ceramic technician Ehren Tool whose expertise with clay bodies and the equipment available in that department have allowed me to bring these innovations to the fore. My work with the Department of Art Practice, which have grown to involve several of the art practice faculty, has resulted in a joint appointment with their department (0% below the line) that will open new doors to the trans-disciplinary research and collaborations I believe is necessary in academia, and to supplement my interest in the folding of architecture, art, culture and the environment in my work.

In addition to the publications and material development, my creative practice seeks to more broadly utilize activist tactics to form the basis for an ongoing series of design proposals targeting specific

international design competitions that, like my work in earth architecture and additive manufacturing, seek to improve upon and question the physical and social condition of the built environment.

IMPACT AND SIGNIFICANCE OF DESIGN COMPETITIONS

My creative activities center on the speculation of architecture as a material, cultural, social and political endeavor, primarily in the form of peer-reviewed design competitions, through my creative practice, Rael San Fratello Architects, which I share with Virginia San Fratello. While our work is explored at a number of scales and through diverse media from exhibitions, installations, commissioned projects and theoretical proposals, it our success in international design competitions that have brought much attention to our practice since arriving to Berkeley in 2008.

While much of architectural discourse, particularly that which grows from architectural competitions, surrounds the production of architectural form and work that engages the urban environment through spectacle, the design-research of my creative practice attempts to expose the latent potential found in some of societies most pressing issues. Other architects concerned with societal issues, such as Hassan Fathy, Teddy Cruz and Samuel Mockbee, have demonstrated the importance of addressing these concerns in specific and local regions. In contrast, the work of Rael San Fratello Architects addresses much less well defined territories—those not necessarily defined by geographical location, but by specific issues, such as immigration, homelessness, and the urgency to address the state of our country's infrastructure 70 years after the creation of The Works Progress Administration. We consider this approach to be a robust response to a global ecology and media-driven and networked society that is increasingly interconnected in profoundly complex ways. As I mentioned, an important outlet for this exploration has been in the form of peer reviewed architectural competitions, where design research and digital representation are the vehicles for illuminating topics of critical social, cultural and environmental importance in the context of design and architecture.

In the past 10 years, my creative practice has won, been selected as a finalist, placed or recognized in 9 high-profile international competitions (qualified by the caliber of jurors and the competition organizer). During my time at Berkeley, this has accounted for 3 winning entries, 2 finalist selections, one 2nd place entry, and 1 honorable mention. I'll outline each one below with a brief discussion of how this work situates itself into my larger research agenda as well as outcomes from the competition in the form of lectures, peer-reviewed authored publications, or important venues that published or exhibited the work.

In terms of attribution of work, it is impossible to definitively separate out individual aspects of responsibility – both Virginia and I design each and every project together with a team of talented employees. However, we do tend to gravitate toward particular areas of interest; and I have attempted to note these in the sections below.



What would you do? Entry to Life at the Speed of Rail Competition

Life at the Speed of Rail International Design Competition Winner (1 of 10 of 130)

Competition Description

At this critical moment for American infrastructure, New York's Van Alen Institute, an independent nonprofit architectural organization that promotes inquiry into the processes that shape the design of the public realm, called upon the international design community to envision the cultural, environmental and economic impact of a new rail network.

Project Description

Our competition submission, *What will you do?*, choreographs how high-speed rail might combat the detrimental effects of sitting for long periods of time by proposing a set of experiences that make us productive, healthy and social individuals during the journey in an effort to combat obesity and diabetes which are directly related to our sedentary lifestyles. The competition was peer-reviewed by the following distinguished panel of jurors:

Carol Coletta, Former executive director of the Mayor's Institute on City Design

Keller Easterling, Associate Professor, Yale University

Christopher Hawthorne, Architecture Critic, Los Angeles Times

Gary Hustwit, Documentary film-maker (Helvetica)

Michael Lejeune, Creative Director, Los Angeles County Metropolitan Transportation Authority

Thom Mayne, Founder and Design Director, Morphosis and Pritzker Prize Winner

Petra Todorovich, Director of America 2050

Sarah Whiting, Dean, Rice School of Architecture

- The proposal was exhibited and presented to legislators, urban planners and transportation authorities at symposiums hosted by the National Building Museum in Washington D.C, the Museum of Contemporary Art in St. Louis, MO and the Baker Institute in Houston, TX, and at the Caltrans Headquarters in Los Angeles, CA, effectively engaging the vary people who will shape our 21st century transportation infrastructure.



Sukkah City International Design Competition Winner (1 of 12 of 600+)

Competition Description

Sukkah City was an international design competition to re-imagine the ancient phenomenon of the sukkah, an ancient architectural type, develop new methods of material practice and parametric design, and propose radical possibilities for traditional design constraints in a contemporary urban site. Twelve winners constructed in a visionary village in Union Square Park from September 19-20, 2010.

Project Description

Our proposal, *Sukkah of the Signs*, also known as *The Homeless House*, was constructed in New York City's Union Square, as part of Sukkah City. For two days over 150,000 people visited the structure, which was made of nearly 300 signs collected from indigent across the U.S. and found material from Union Square. The project speaks to the tenuous nature of being with and without housing during a time of unease and foreclosure in the USA. It also allowed the competition to reach out to the homeless population by purchasing the signs directly from the indigent—directly transferring the competition funds to those who need them most. Our proposition convinced the competition organizers to auction each sukkah and transfer the funds to a New York City homeless shelter. The competition was peer-reviewed by a distinguished panel of jurors that included:

Thom Mayne, Founder and Design Director, Morphosis and Pritzker Prize Winner

Adam Yarinsky, Principal, Architecture Research Office

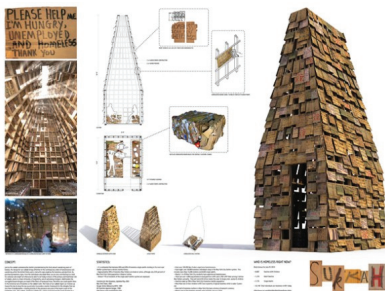
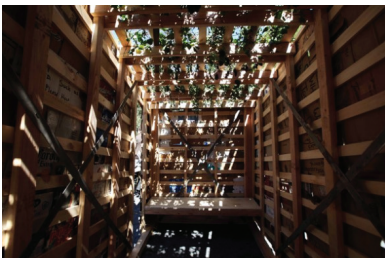
Natalie Jeremijenko, Associate Professor NYU Depart of Visual Art

Michael Arad, designer of the National September 11 Memorial

Ron Arad, internationally renowned designer, artist and architect

Rick Bell, Executive Director of the American Institute of Architects New York

Paul Goldberger, Architecture Critic, The New Yorker

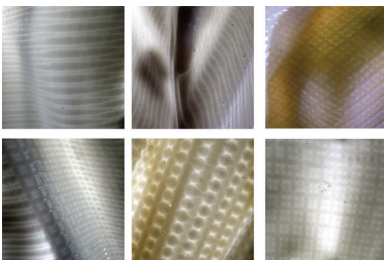


Sukkah of the Signs, a.k.a. The Homesless House

Steven Heller, Art Director, The New York Times

Geoff Manaugh, author BLDG BLOG and WIRED contributing editor

- *The Homeless House* was written about by New York Magazine (PA026), J! Weekly (PA027), and profoundly by the New York Times (PA030), who commented, “*The most moving may be the sukkah comprised of signs that its designers (Ronald Rael and Virginia San Fratello of Oakland, Calif.) bought from homeless people. The result will be a meditation on how little separates the world’s housed and housed-nots.*”
- Metropolis Magazine writes of *The Homeless House*, “*The one sukkah that literally celebrated homelessness was Ronald Rael and Virginia San Fratello’s Sukkah of the Signs, clad with cardboard signs purchased from destitute individuals across the US. It was the most provocative of all the structures on display, an uneasy reminder of hard times that seemed very much in the spirit of the festival. People spent a lot of time poring over signs that they might have ignored on the street, and a cloud of quiet contemplation hung over this sukkah.*”
- *The Homeless House* was exhibited at the Center for Architecture in New York City in September 2010.
- *The Homeless house* was published in the inaugural issue of the new architecture journal, *SOILED*. No. 1: *Groundscapers*, no. 1. (PA029)



The Night Garden, 2009

Descours American Institute of Architecture Design Competition Winner

Competition Description

DesCours is a free, public, ten-night architecture and art event held the first week of December in New Orleans. The event invites internationally renowned architects and artists to create 15 architecture installations within 'hidden' locations in the heart of New Orleans, including private courtyards, rooftops, abandoned buildings and walkways, all locations normally unseen, inaccessible or unused by the public. The American Institute of Architects (AIA) New Orleans presents the event in partnership with the Downtown Development District, the City of New Orleans, the Louisiana Architecture Foundation and numerous private businesses, organizations, and individuals.

Project Description

The Night Garden is inspired by the historic Spanish courtyards of New Orleans that were built after the fires of the 1780's and 90's. Their construction was mandated to be constructed from ceramic masonry and include a water fountain that could be used to exterminate future fires. The use of ceramic masonry for construction meant that the courtyards would be safe havens and would not burn as they had in the past and the fountains offered water to extinguish a fire. Borrowing from this rich history, The Night Garden is a vertical landscape built of glowing porcelain tiles within a steel structure supporting translucent vessels designed to hold water and flowers such as evening primrose, moonflowers and brassavola. The flowers were chosen due to their fragrant nature and night blooming characteristic. The installation references the traditional construction material, such as wrought iron, brick, tile, the intentional placement of water, and the historic relevance of fire, all while highlighting the exotic plant life of New Orleans. Moreover, the project is a contemporary examination of sustainable materials and processes with the introduction of vegetation into the urban environment and the work is a direct result of my continued research combining rapid manufacturing methods with clay materials. The review committee was comprised of members of the New Orleans chapter of the American Institute of Architects and Executive Director Michele Urcan. The project was realized through a graduate special topic course at Berkeley and was subsequently exhibited at the following locations:

“Night Garden”

DesCours, New Orleans, LA, Dec. 8-13, 2009.

“Vertical Gardens”

Exit Art. New York, NY. March 28 to May 23, 2009

“Night Garden”

Vertical Gardens Exhibit, San Francisco AIA Gallery, San Francisco, CA Feb. 21 - May 3, 2010.

“Vertical Gardens”

Virginia Center for Architecture, Richmond, Virginia, April 19 - May 29, 2011



Borderwall as Infrastructure

**WPA 2.0 International Design Competition
Finalist (1 of 5 of 200)**

Competition Description

WPA 2.0 was an open competition that sought innovative, implementable proposals to place infrastructure at the heart of rebuilding our cities during this next era of metropolitan recovery. WPA 2.0 recalled the Depression-era Works Projects Administration (1935-43), which built public buildings, parks, bridges, and roads across the nation as an investment in the future—one that has, in turn, become a lasting legacy. Unlike the previous era, the next generation of such projects will require surgical integration into the existing urban fabric, and will work by intentionally linking systems of points, lines and landscapes; hybridizing economies with ecologies; and overlapping architecture with planning. The competition was sponsored by cityLAB, founded in 2006 as a think tank within UCLA's Department of Architecture and Urban Design, and concerned with contemporary urban issues, urban design, and the architecture of the city.

Project Description

Borderwall as Infrastructure envisions a productive potential for border security investment by proposing a wide array of retrofits and new schemes for the border wall that builds on existing conditions and seeks to ameliorate current problems created by the physical divider created by the passing of the U.S. Secure Fence Act of 2006. The law finances 800 miles of fortification dividing the U.S. from Mexico at the average cost of \$4 million dollars per mile. 600 miles of barriers have been constructed since 2006, at the cost of \$2.4 billion. Additionally, the new wall has been breached over 3000 times, incurring \$4.4 million in repairs. The construction and maintenance costs are estimated to exceed \$49 billion over the next twenty-five years—and there are several hundred more miles of wall construction recently proposed. The wall, at such prices, should and could be thought of not only as security, but also as productive infrastructure—and our proposal focuses on water, renewable energy, and urban social infrastructure—transforming security infrastructure into the very backbone of a borderland economy. The competition was peer-reviewed by the following distinguished panel of jurors:

Stan Allen, Principal, Stan Allen Architect and Dean, School of Architecture, Princeton University

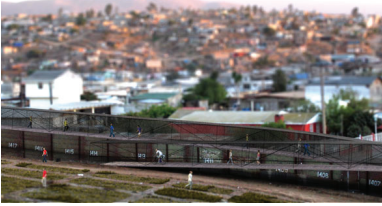
Cecil Balmond, Deputy Chairman, Ove Arup and Partners and the Paul Philippe Cret Practice Professor of Architecture, University of Pennsylvania

Elizabeth Diller, Principal, Diller Scofidio + Renfro and Professor, Princeton University

Walter Hood, Principal, Hood Design Urban Landscape + Site Architecture and Professor, University of California, Berkeley

Thom Mayne, Founder and Director of Design, Morphosis and Professor, University of California, Los Angeles and 2005 Pritzker Prize Winner

Marilyn Jordan Taylor, Consulting Partner, Skidmore Owings & Merrill and Dean, PennDesign, University of Pennsylvania



Borderwall as Architecture, 2009

The project was also assessed in the following ways:

- Rael San Fratello Architects contributed an installation entitled, *Recuerdos*, or Souvenirs, that grow from the competition proposal to the exhibit, *Trazando la Linea*, which tells the story of the Mexico-U.S. border In Baja California from 1848 to the present day, at the Centro Estatal de las Artes in Mexicali, Baja California, Mexico, from May 4-July 8, 2012.
- *Borderwall as Infrastructure* appeared in the international journal of architecture, *PRAXIS: Journal of Writing + Building*, Volume 1, Issue 13. 2012. (PA037)
- I authored, "Boundary Line Infrastructure" (PR012), which appeared in issue 40 of *Thresholds*, the peer-reviewed, bi-annual journal of architecture, art, and media culture produced by editors in the Department of Architecture at Massachusetts Institute of Technology and published by MIT Press.
- An essay I authored in 2011, "Border wall as architecture" (PR010) was published in *Environment and Planning D: Society and Space*, an international and interdisciplinary peer-reviewed journal that provides a forum for the discussion of the mutually constitutive relation between the social and the spatial.
- I presented "Borderwall as Infrastructure" in a public symposium at the National Building Museum, Washington D.C. November 16, 2009
- I presented "Border Wall as Architecture" presented at the peer-reviewed International conference, *Fences, Walls and Borders: State of Insecurity?*, organized by the Raoul Dandurand Chair at the University of Quebec at Montreal in association with the Association for Borderlands Studies. Quebec, Montreal. May 18, 2011.
- I presented "Borderwall as Architecture: A Proactive Manifesto for the U.S. / Mexico Barrier", presented to the University of Buffalo's Transamerica Research Workshop, Buffalo, NY. November 4, 2011
- I was invited to speak at Teddy Cruz' Political Equator 3—Conversations on co-existence: Border neighborhoods as sites of production. Tijuana, Mexico. June 4, 2011
- I was invited to lecture on "Rasquachetecture: Architecture Reconsidered from Mud to Border Fences" presented at the 4th Annual Celebrando: Water + Resilience sponsored by the Arid Lands Institute at Woodbury University. Embudo, NM. June 10, 2011
- With Teddy Cruz, I co-presented "800X60: Adaptive Architecture and Security Infrastructure at, along and across the U.S.-Mexico Border", as part of the 1st Biennial of the Americas, Denver, CO. July 6, 2010
- I lectured on the topic "Reformulating Infrastructure," as part of Woodbury School of Architecture Lecture Series, moderated by Los Angeles Times architecture critic, Christopher Hawthorne. February 23, 2009.
- "Border Wall as Infrastructure" was exhibited at the National Building Museum in Washington D.C., Nov. 8-12, 2009.

2009 Rafael Viñoly Grants for Research in Architecture Competition Finalist (8 of 180)

Competition Description

The training and research programs at Rafael Viñoly Architects were launched in 2005 to generate architectural knowledge that is informed by practice yet exceeds the limits of commissioned work. The programs supplement both the offerings of universities and the experience of architectural employment.



The Hydrowall prototype

RONALD RAEI, Assistant Professor

Self Statement for Promotion to Associate Professor

Review Period: July 1, 2008 — May 1, 2012

Statement of Activities

13 of 16

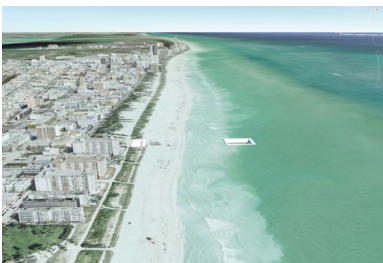
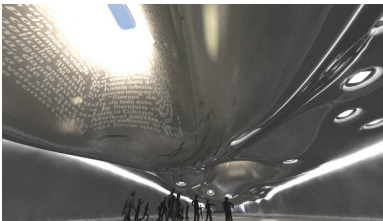
The training program aims to hone the professional skills of participants through a single-semester course at the firm's New York office. The research program seeks to expand the boundaries of design and practice by offering financial grants and technical support for individual research.

Project Description

The Hydro Wall is a proposal to create an advanced thermal mass that will absorb and store warmth and coolness until it is needed. Through direct gain design, sunlight is admitted to the wall and virtually all of it is converted to thermal energy. *The Hydro Wall* is used for solar collection and thermal storage by intercepting radiation directly, and by absorbing reflected or reradiated energy. As long as the room temperature remains high in the interior space storage mass (walls, floors) will conduct heat to their cores. At night, when outside temperatures drop and the interior space cools, the heat flow into the storage masses is reversed and heat is given up to the interior space in order to reach equilibrium. This re-radiation of collected daytime heat can maintain a comfortable temperature during cool/cold nights and can extend through several cloudy days without "recharging". Finalists were selected by Rafael Viñoly, Principal, Rafael Viñoly Architects and Ned Kauffman, RVAGRA Program Director.

- The Hydrowall project was published in:
Klooster, Thorsten, ed., "The Hydrowall" In *Smart Surfaces – and their Application in Architecture and Design*, (Cottbus: Birkhauser, 2009) , p. 48

Architectum Miami Pier-Museum International Academic Competition 2nd Place (2 of 418)



Miami Pier Museum, 2009

Competition Description

The competition is to design a Pier-Museum, located at the end of Fifth Avenue leading to South Beach, Miami, and pointing out to sea, which will stand as a horizontal monument to immigrants (particularly Cuban immigrants) who arrived on these shores in search of a better future. The 100 meter long structure will point out to sea off Miami Beach and will house a museum in which the personal effects, souvenirs and photos belonging to the new generation of immigrants will be exhibited – those who came to the city of Miami from the 1950s to the 1980s in search of their own personal American Dream.

Project Description

The entire Pier-Museum monument glows at night and during the day the light shafts will serve as markers in the sand of the unseen journey happening in the void below the beach. Swimmers and boaters may choose to approach the island via the water making it both a beacon and a refuge. Visitors to the Pier-Museum will enter the museum by descending into a void below the beach. 200 light shafts and 10 commemorative spaces along the journey to the museum populate the void. Upon arriving at the museum, visitors enter an island off the coast of Miami. The island glows with a thousand points of light that were generated through the abstraction of a popular Cuban painting. Visitors may enter the cafe, the exhibition spaces, the library and the multi purpose room that flanks the auditorium and has views to the glowing void below. The competition was peer-reviewed by the following distinguished panel of jurors:

Jean-Francois Lejeune, Professor and Director of Graduate Studies, University of Miami

Rene Gonzalez, Architect, Miami

Chad Oppenheim, Principal, OppenOffice, Miami

Nathaniel Belcher, Professor and Director, Stuckeman School of Architecture and Landscape Architecture

Rocco Ceo, Professor and Director of Undergraduate Studies, University of Miami

Zeuler Lima, Associate Professor, Washington University Saint Louis

- The project was published in C3 (PA024) and the *Wettbewerbe Aktuell Technical Journal* (PA023) in 2009.

Pamphlet Architecture 32: Resilience Competition Honorable Mention (4 of 115)

Competition Description

Founded in 1977 as an alternative to mainstream architectural publishing, Pamphlet Architecture encourages architects and writers to put forth their ideas, theories and designs in modest, affordable booklets. Its success is legendary: Pamphlet Architecture helped launch the careers architects from Steven Holl and Lebbeus Woods to Zaha Hadid, and has had influence far exceeding the ad-hoc nature of these humble books. Pamphlet Architecture 32: Resilience addresses the capacity to cope, the ability to bounce back, and the mitigation and management of risk, proposals are welcome that showcase a fresh understanding of the possibilities and opportunities of resilience in architecture, from the large to the small scale.

Project description

Borderwall as Architecture: A Proactive Manifesto of the U.S./Mexico Border envisions a productive potential for border security investment by proposing a wide array of retrofits and new schemes for the border wall that builds on existing conditions and seeks to ameliorate current problems created by the physical divider created by the passing of the U.S. Secure Fence Act of 2006. The law finances 700 miles of fortification dividing the U.S. from Mexico at the average cost of \$4 million dollars per mile. 600 miles of barriers have been constructed since 2006, at the cost of \$2.4 billion. Additionally, the new wall has been breached over 3000 times, incurring \$4.4 million in repairs. The construction and maintenance costs are estimated to exceed \$49 billion over the next twenty-five years—and there are several hundred more miles of wall construction recently proposed. This wall, at such prices, should and could be thought of not only as security, but also as productive infrastructure—as the very backbone of a borderland economy. The competition was peer-reviewed by the following distinguished panel of jurors:

Steven Holl, renowned architect and professor of architecture, Columbia University

Kevin Lippert, Editor in Chief, Princeton Architectural Press

Michael Bell, professor of architecture, Columbia University

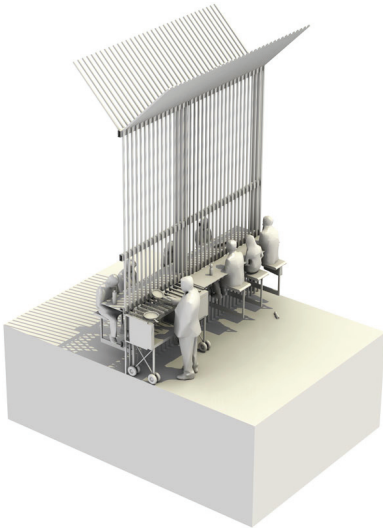
Stella Betts, architect and partner, LevenBetts, New York

David Ross, architect, Code-A, New York

Becca Casbon, editor, Princeton Architectural Press

Megan Carey, senior editor, Princeton Architectural Press

©



The Burrito Wall: Borderwall as Architecture



Straw Gallery, Rael San Fratello Architects, 2011

While these projects represent work that was garnered attention through the competition, they represent only a portion of the many other design-research proposals captured public attention through the international recognition of my creative practice and I would like to turn the review committee's attention to my CV and website (<http://www.rael-sanfratello.com>) for further evidence of awards, publications and exhibitions featuring the work of my creative practice, but I will mention just a few more accolades as they pertain specifically to my role as an academic, professional and guardian of culture:

- In 2011, California Home + Design (PA034) nominated Rael San Fratello Architects as 1 of ten architects on the Rise in 2011 selected by a distinguished panel of jurors that included Neil Denari, Hsinming Fung, John Peterson, Tom Buresh, Luke Ogrydziak, Barbara Beslor, Steven Ehrlich, Margaret Griffin, Carrie Byles and David Meckel.
- In 2010, the organizing committee of the 2010 Biennial of the Americas and Chief Curator Paola Santoscoy selected me as the 2010 Biennial of the Americas Architecture Curator with an invitation to also produce a project for the exhibition (*Earthscrapers*, mentioned earlier).



Migrating Floating Gardens, 2010

- Migrating Floating Gardens, a design proposal that proposes the introduction of gardens into urban environments in dynamic ways, a 21st century challenge to Le Corbusier's roof top garden, was published as both a project and authored essay (Ronald Rael) in the book, *Utopia Forever: Visions of Architecture and Urbanism* (PA035) introduced with essays by Dan Wood and Geoff Manaugh, and in Kerbed 18PlastiCity FantastiCity (PA028), the Journal of the Royal Melbourne Institute of Technology School of Architecture along side visionaries Mitchell Joachim and Thomas Hiller.

FUTURE PLANS FOR RESEARCH AND CREATIVE WORK

My current research, which folds the lessons from Earth Architecture and interests in the social project with my acumen in digital design and manufacturing have only emerged in the past year and I have only just begun to embark upon the potential of additive manufacturing and architecture and intend to expand this research to include the development of new materials and their continued testing of compressive and tensile strengths, water absorbing characteristics, filtering characteristics, and fire-resistance, as well as to publicize and share this nascent, technical discipline. I believe this critical research will open the doors to the production of *geomimetic* architectural components that are weather proof, solar responsive, store or filter water, hold plant life, contain embedded technologies, create insulation barriers between interior and exterior surfaces, dissipate seismic forces and many other possibilities offered by this emerging and potent process. It is perhaps appropriate that the technological manufacture of architecture using readily available materials, should hold such great promise for our current, ecologically challenged moment. In conjunction with this research, I am currently preparing a manuscript, *"Emerging Objects: Design at the Forefront of Technology"* for submission to Princeton Architectural Press in the fall of 2012. The proposed book will look at how the process of additive manufacturing is beginning to re-shape the way designers are approaching design. Additionally, I am actively seeking industry partners through the Office of Industry Sponsored Research at Berkeley to collaborate on a National Science Foundation Innovation Corps grant. Industry leaders such as D-Shape in London, Kreysler and Associates in Marin, CA and Ponoko.com in Oakland have expressed interest in the innovations I've developed for the building industry.

Due to the inherent slowness of architecture, buildings can take years, if not decades, to design and realize (often times longer!), and architecture's momentum brings work to a close just as slowly. The repercussions from my previous work still have lingering consequences that I intend continue to elaborate upon. My work on alternative proposals to the U.S. / Mexico Barrier are being refined to present in an invited competition for Pamphlet Architecture 33, where the publishers of this esteemed publication have asked the previous 32 authors to nominate this year's entrants, which Rael San Fratello Architects was honored to be included. I am also preparing the work for publication, which we intend to submit to a range of publishers (Actar, Princeton Architectural Press, NAI) that presents the consequences of border wall as an important design-centric lesson, just as *Delirious New York* or *Learning from Las Vegas* did for past generations.

Finally, I anticipate a much more evolved role in creative practice as it evolves from architectural provocation through proposal to the making of buildings. After investing in a professional practice in the bay-area for the past 3.5 years, the potential to build is increasing as evidenced by a recent temporary gallery constructed of straw for the San Francisco gallery, HEDGE as part of the 4th annual sf20/21 San Francisco Art and Design Show held at the Festival Pavilion, Fort Mason Center—a benefit for the San Francisco Museum of Modern Art's educational programs. This gallery, constructed from agricultural by-product, and completely recycled at the end of the show, will be featured in an upcoming book published by Links Books (Barcelona), *Interior Design Magazine* and *Frame* in 2012. Other examples of future design work include commissions to design a new restaurant in Berkeley, a global center for food activism, by clients who have expressed interest in employing the additive manufacturing research innovations I've developed as well as an installation for the Berkeley Botanical Gardens, who hope to re-think their cultural role in the 21st century. Ultimately, the final aim of my work will be to continue to actively seek to improve the physical and social condition of society through design.



Seat Slug, 2011



3D Printed wood

SERVICE

In addition to my roles as a researcher, educator and designer, my activities in service to the University have become much more substantive each years as it has grown from service to the department, the college and the university. In 2011 served a member of the member of the Undergraduate Affairs Committee/Commission on Lower Division Experience, a college wide committee whose focus is central to the improvement of the undergraduate experience, the identity of the program and the role of environmental design education in the college.

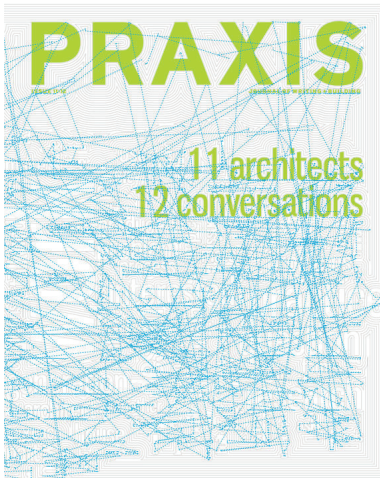
I am also a member of a departmental search committee as we seek to welcome a new faculty in Structures and Emerging Building Technology.

Since 2011 I have been a member of the Faculty Advisory Committee to the Berkeley Art Museum / Pacific Film Archive. The committee serves an important role in ensuring the overlap and synergy between the museum's curatorial mission and the larger educational and research objectives on the campus. The current focus of the committee is the development of the Museum's new building in downtown Berkeley.

Since 2009 my work with the Digital Fabrication Laboratory has moved from supervisor, to an advisory role to the new lab technician, who was hired by the college in a search in which I participated in as a member. My ongoing role in the lab now focuses on the additive manufacturing portion of the lab and with my assistance, the lab has obtained 3 new 3D printers in the past year and as my research using that equipment has created a new palette of materials for students to use that are much more affordable.

My various other service has included work on developing the undergraduate curriculum, several departmental student award selection committees and for two years I was a member of the Architecture Department Lecture Series Committee.

Finally, since 1999 I have served the professional community through my work on PRAXIS: The journal of writing + building. The journal, funded through grants from the National Endowment for the Arts and the Graham Foundation, has established itself as a distinctive voice in international architectural culture. The journal is assembled annually by an all-volunteer staff, with my role as one of the founding members of the journal and as the graphic designer and cover designer for the journal. The cover received a design award from ID Magazine in 2004 and the entire collection of journals was acquired by both the Museum of Modern Art in New York, and the Frac Center in Paris in 2011, and most recently presented in *Archizines*, an exhibition hosted by Storefront for Art Architecture in New York of the most important architecture publications from the last decade, demonstrating the journals international contributions to architecture culture.



PRAXIS: Journal of Writing+Building