## BROOKLYN SAYS, MONE TO DETROOM 105<sup>TH</sup> ACSA ANNUAL MEETING DETROIT, MI

PROJECT PROCEEDINGS

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# BROOKLYN SAYS, MOVE TO DETROT

105<sup>™</sup> ACSA ANNUAL MEETING | DETROIT, MI

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## **CONFERENCE DESCRIPTION**

"It is now well-documented that some of Brooklyn's much-written-about creative class is being driven out of the borough by high prices and low housing stock. Some are going to Los Angeles (or even Queens), but others are migrating to the Midwest, where Detroit's empty industrial spaces, community-based projects, experimental art scene and innovative design opportunities beckon, despite the city's continuing challenges," wrote Jennifer Conlin in a recent New York Times article titled "Last Stop on the L Train: Detroit." Design and designers, art and artists, creativity and creatives; all playing a major role in a process we know well: a city on the verge of reinventing itself after a near-death experience.

Over the last century, two paradigms have dominated attempts at dealing with the challenges of the city. On one hand, a "substantive" approach that aims to control the physical substance of the city, treated as a completely predetermined object: form and life dictated by some architects who claim a universal understanding of the goals and values of society to which they incorporate the advances of science in order to improve the conditions of the city. On the other, a "procedural" or strategic approach where the focus is on the process, better understood as a form of social action, a negotiated creation involving many stakeholders with overlapping or competing interests in the process of

### developing visions, identity and, of course, physical projects. The substantive and the procedural are not antagonistic concepts, but two different approaches to controlling the evolution of urban space. Furthermore, in the context of the city as a collective production that is at the same time poetic and pragmatic, the distinction of the procedural and the substantive is inevitably subsumed by the "practice" of city building as distinct from city design.

Different pedagogical models expose students to their potential role in the process of making and re-making the city. Detroit is the perfect frame of reference to debate the merits of worldwide academic and professional practices in the continuum between the substantive and the procedural. It is an inspiring back drop to discuss a range of issues that include the expanding role of the architect and the relevancy of architectural education, density vs. growth; technique and strategies of urban regeneration; technology, smart cities and their impact on space and governance; new models of public space; changes in cities due to the rise of the shared economy; affordable housing and housing models for shifting demographics; resources, energy waste and sustainability; urban-rural balance and interconnections, the role of educational institutions, and community building.

## **PROJECT SESSIONS**

### ARCHITECTURE IN AN EXPANDED FIELD, FROM INTERIORS TO LANDSCAPES

Scholarship and design-based investigations situated at the architectural scale often slip toward the space of the room or the expanse of the site. Indeed some of the most often studied projects of recent years operate within this larger field of space making. This topic seeks to provide a home for work beyond the precise scale of the building.

### DESIGN RESEARCH IN THE STUDIO CONTEXT

The studio is the traditional core of the architecture school. The 1996 Boyer Report on architectural education described it as the "holy of holies" of architectural education: "these studios scruffy though they may be are models for creative learning that others on campus might well think about." Since the Boyer report was written design has become a hot trans-disciplinary phenomenon, putting the architecture studio in an enviable position relative to our peers in the academy. This topic might include research done on the design studio or research done in the design studio.

### HOUSING

As the planet's population grows it becomes increasingly imperative that housing effectively provide appropriate shelter with reduced means. Housing research varies from historic and emerging typologies to urban and social concerns to evolving family types, all set in a global arena of cultural confluences. Research and design projects in all these areas are encouraged.

### MATERIALS

In recent years the convergence of new manufacturing processes and new materials has led to a proliferation of material studies with spatial, economic and societal implications. In addition, traditional materials and their methods of fabrication continue to hold interest for researchers and offer new information to the construction industry.

### MEDIA INVESTIGATIONS

Theories and practices of media and representation, ranging from historic drawing techniques to contemporary digital modalities, are critical to the production of architectural ideas. Scholars and designers often focus their inquiries on this key link in the design process.

### URBANISM

Designers and scholars study and engage the differences between private and public, individual and societal spaces, incorporating buildings and public space in a variety of scales and densities within an increasingly global context. Two well-developed research trajectories are smart growth and new urbanism, and we solicit posters from our members working in these areas. In addition, we are seeking proposals that redefine architecture, urban design, city planning, and life in the cyber-age, in unexpected terms. We recognize that positions taken today may be located on the periphery of the architectural discourse but are poised to make a significant impact tomorrow.

### OPEN

Submission will accommodate promising research posters that do not fall into any of above areas.

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DESIGN RESEARCH IN THE STUDIO CONTEXT

## Trade Secrets: An Architectural Enclave

ASHLEY BIGHAM University of Michigan

Raoul Wallenberg, a 1935 graduate of the University, has been called one of the 20th century's most outstanding heroes. He is credited with saving tens of thousands of Jews from extermination at the hands of the Nazis and Fascists in the waning days of World War II. Each year, students in their final studio of the BS in Architecture degree participate in the Wallenberg Studio, which honors the legacy of Raoul Wallenberg through an overall studio theme focused on a broad humanitarian concern, explored through propositions put forward by studio section faculty. Students are challenged to question architecture's relationship to humanitarian issues. Trade Secrets: An Architectural Enclave focused on the intersection of architecture and ethics by exploring the architectural spaces and working conditions of one of America's largest corporations, Amazon.com. This studio took the position that we need to look no further than our own backyard (or computer) to find spaces where architecture can have a meaningful impact on the humanitarian issues of today. Students in this studio explored themes ranging from workplace discrimination and income inequality to the transparency of corporate headquarters and workplace surveillance. Students uncovered the deep reach of Amazon.com. which includes data storage for the NSA, delivery drone programs, and growing consumer information banks. The studio included a field trip to a 1-million-square foot Fullfillment Center so that the students could experience the vast, endlessness workplaces inhabited each day by thousands of Americans.

**Mission Statement:** This studio will explore the architecture of secrets.

**Warning:** Students who elect this studio should be prepared to explore an architecture of secrets, whispers, miscommunications, optics, and political strategies.

**Background:** Our lives are filled with enclaves. We move seamlessly from gated communities and shopping malls to office parks and airports. Architecture has often obsessed over the enclave. From Michel Foucault's heterotopias to David Grahame Shane's armatures and Keller Easterling's zones, architects have interrogated the enclave as an architectural glitch in the spatial system.

This studio will explore one of the most fascinating mutations of the modern enclave: the corporate campus. Participants of this studio will delve into the inner workings of one of the largest, most well-known American companies, Amazon.com. As the company's CEO, Jeff Bezos, recently stated, "Frugality drives innovation, just like other constraints do. One of the only ways to get out of a tight box is to invent your way out." Corporate campuses as enclaves are closed systems which create their own hierarchies, regulations and cultural practices that may or may not reflect the territories, states, or cities they reside within. Recent corporate clients have looked to famous architects to see the design of their headquarters not as a mere building design, but as a broader, ideological statement about the future of work-life balance, inclusive workplaces, information driven social hierarchies, and corporate public image. This studio will begin to challenge the status quo of contemporary corporate headquarters and create designs which consider issues such as privacy, fear, and social strata, as well utopian corporate identities.

### Trade Secrets

### An Architectural Enclave

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## Integrating Cultural Research into the Design Studio

M. NAOMI DARLING University of Massachusetts, Amherst

### **RAY MANN**

University of Massachusetts, Amherst

This poster presents research to integrate culture into the design process and studio, undertaken with fourth year undergraduate BFA and Liberal Arts Architectural Studies students.

""Culture" (exists in architecture) in two senses. One relates to activities that are often understood as specific to architecture. The other is inextricably connected to the realm of human existence and demarcates the ways in which human life differentiates itself from nature. Taken in isolation each is potentially problematic - holding to the exclusivity of the culture of architecture denies its presence as part of human society, while thinking of architecture as nothing other than cultural precludes any consideration of, for example, the way different materials realize different effects within architectural practice. What matters is the way concerns of one understanding can - perhaps should - intrude into the other."

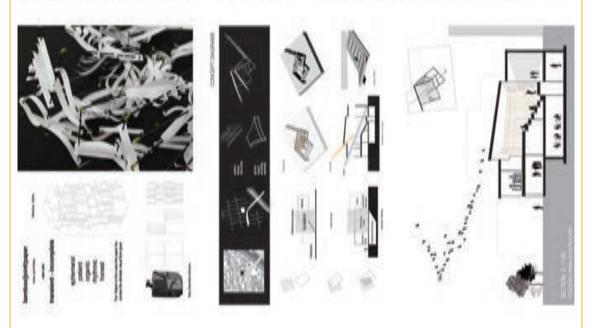
(http://architectureau.com/articles/ essay-architecture-and-culture/)

### THE CULTURE OF ARCHITECTURE VS. ARCHITECTURE AS A PART OF CULTURE

In the mode of Comparative Literature or Cultural Studies, we introduced a project that would provide both a window into another culture and a foil for our own. Accepting that "culture" can be fraught when used as an instrument of chauvinism or nationalist myths of origin, we recognize that it is also what gives depth to our societies and sense of being in the world.

The International Style was a call to neutralize what was viewed as the idiosyncrasies of the historical and the regional—i.e. culture-and to impose an abstract "functional" aesthetic. Since the 1980's Critical Regionalism has stood as a strong critique of the International Style as well as the more superficial tendencies of Post-Modernism. (Frampton, Kenneth. "Towards a Critical Regionalism: Six points for an Architecture of Resistance" in The Anti-Aesthetic, essays on Postmodern Culture edited by Hal Foster. Bay Press, 1983.) However, methods for achieving a cultural awareness of sufficient depth to practice Critical Regionalism effectively, is often neglected in architectural education. Architectural precedents are often the extent of the research, which, while rich, overlook deeper considerations that only emerge from a broader historical study, not only of material culture but of modes of thought, social structures, rituals and even policy.

Our pedagogical goal was to provide a studio condition in which this interface of architecture and culture could be explored in an accessible and fruitful way. We developed an assignment sequence where research topics and readings segued into analytical writing and diagramming, then further into making exercises. In this way, students "channeled" the thought processes, techniques and values embodied in the individuals, artifacts or issues they were examining. Initially students researched an artist or designer and selected one artifact from that artist for analysis, be it a ceramic vessel, a paper lantern, a woven basket, a dress, etc. Students ruminated on the processes, patterns, and materiality of their objects as the starting point in a three-dimensional making exercise combining bamboo skewers, fuel tube and paper. Subsequently, students are introduced to a specific site and cultural program to develop a project proposal enriched by the cultural awareness acquired.



## INTEGRATING CULTURAL RESEARCH INTO THE DESIGN STUDIO

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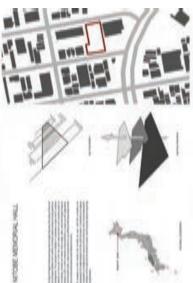
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## Technified Ecosystems: The City as an Artificial Landscape

HENRIQUE M. HOUAYEK Clemson University

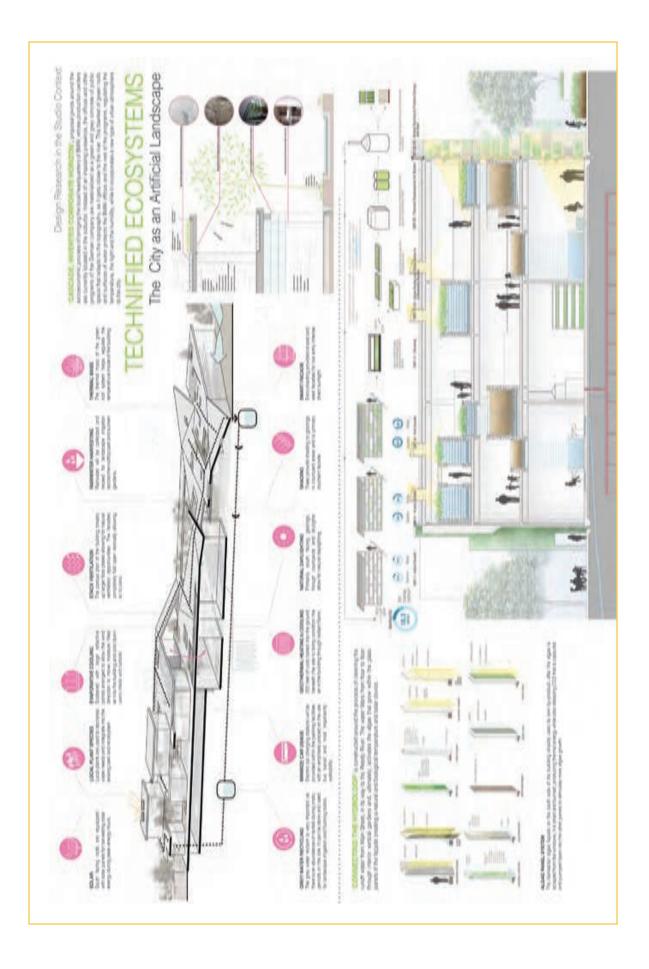
DAVID FRANCO Clemson University ULRIKE HEINE Clemson University

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The very notion of architecture as a sustainable endeavor remains problematic despite its now mainstream acknowledgment. The obsession with energy efficiency, strengthened by institutionalized validations such as LEED, conceals a much more intricate array of factors -from social and technical to natural and urban- that, rather than too complex or problematic, might actually constitute an innovatively ecological design thinking. In the studio displayed in this poster we have attempted to approach this wide question without downscaling it neither to a mere technical issue nor to marketing imagery. With that end we have chosen to work on a site in Greenville -South Carolina-, where an unresolved and intense urban condition merges with a recently recovered river area.

The long-term transformation of Greenville's Main Street according to the project by Laurence Halprin in the 1970's was just the first step in a longer transformative process for Greenville, in which the civic value of public space strategically overcame the economic value of the urban lot. The recent recovery of the banks of the Reedy River as a scenario of urban activity, with the addition of a pedestrian suspension bridge, constitutes a continuation to Halprin's work, bringing back the hidden green landscape of the waterfalls of the Reedy into the heart of the city. Sadly, these two urban operations -Falls Park and Main Street- remain disconnected by the amorphous structure of a large block currently occupied by the local newspaper: the Greenville News. This will be precisely the site that we have analyzed and redesign, taking advantage of its potential for integrating the water landscape of the Reedy River with the intense urbanity of Main Street.

In the two sample projects shown in the poster the connection between the urban and the natural is resolved through processes that transform the relationship of this site with the city and the park. In the first case, in the proposal titled 'Cascade, Inverted Corporate Horizon', the projects pivots around the socioeconomic process of bringing the local headquarters of BMW, whose production centers are currently located in the suburbs. Instead of an imposing presence, the offices and other programs of the German company are materialized as a green and grey concrete of public space that adapts to the topography, as it gets closer to the river. This blanket of green roofs, common areas and water surfaces protects the BMW offices and the rest of the programs, regulating the temperature, the light and the humidity, while it incorporates a new type of urban atmosphere to the city. The second project, titled 'Connecting the Hybrid Loop', is constructed around the process of cleaning the runoff water from Main Street, in its way to the Reedy River. The water filters from floor to floor through interior vertical gardens and, ultimately, activates the algae that grow within the glass panels of the facade creating a natural and biological temperature and solar device.



## Morphology of Adaptive Systems

MONA GHANDI Washington State University

SALEH KALANTARI Washington State University

**Purpose:** Many aspects of our physical environment are becoming integrated with information systems, a phenomenon that has been referred to as the "The Internet of Things (IoT)." In Architecture, IoT can be understood as a seamless combination of data-driven design, data analysis, and adaptive systems. Adaptive Systems Studio, composed of 17 graduate architecture and 14 undergraduate interior design students led by one architecture and interior design faculty, seeks to develop new methods of architectural design by using information-based toolsets.

By showcasing the application of data-driven design strategies within a pedagogical context, students' projects present innovations made possible by our current technological environment, remark the concepts of contemporary data-driven design, and show how they can be used in a pedagogical framework to nurture student's creative capacities within an ever-changing technology-driven era. They also demonstrate how architectural design can accompany data systems to connect the two worlds of information and physical design.

Method: Students began with exploring scholarly resources on computational methods for information analysis, and responsive systems operations. Such instruction was combined with conventional architectural education regarding the materials behavior, fabrication, assembly, and so forth. Then, students made use of cutting-edge architectural software such as Grasshopper, Firefly, Dynamo, Python scripting, augmented reality, and physical computing environment using Arduino microcontrollers. Students in this interdisciplinary studio designed a new university visitor's center with the principles of sustainability, adaptive systems, and data-driven design. Student's research investigated possibilities of designing amid the IoT, big-data and, informational–physical interconnectivity.

**Process:** In the first step of the studio, students conducted a literature review and presented their understanding in the form of infographics to better understand contemporary outlooks on the IoT. For this project, the topics to focus on were "IoT Smart City", "IoT Smart Building", "IoT Smart Space Applications" as well as "IoT Building Automation Applications".

In the second step, experiment with physical spaces, students were observing how built environments can gradually morph based on various environmental and user inputs. They designed and fabricated a kinetic mechanism to explore adaptive systems while investigating how naturally occurring adaptive systems can serve as inspiration for programmable built environments. Focusing on material behavior and physical transformation, students were to observe how their designs would change over time and to incorporate activators such as heat, humidity, light, and motion. Computational modeling along with digital fabrication technologies was also used in this stage. Besides, they collaborated with the members of the university's Robotics Club to learn about the microcontrollers' use.

In the last step, using the knowledge gained, they produced designs for a new university visitor's center implementing data-based scenarios and adaptive system ideas to successfully integrate the informational and physical environments. While acknowledging building as a component of a smart city, they incorporated elements that could respond to data (from Internet-based media, city

and transportation data, and "machine-tomachine" data from sensors and related devices). This studio encouraged designers to reinterpret architecture within the IoT to evaluate data-driven design potentials to create smarter future that is responsive to both human and environment needs.

## MORPHOLOGY OF ADAPTIVE SYSTEMS

### Purpose

Many agrects of our physical environment are becoming integrated with information systems, a phenomenon that has been referred to as the "the internet of things [bit], "in Architecture, tof can be understood as a seconiess combination of adda-driven design, data analysis, and adaptive systems. Adaptive Systems Studies composed of 17 graduate architecture and 14 undergraduate interior design students led by one architecture and interior design faculty, seets to develop new methods of architectural design by using information-based toolies.

By thosecaring the application of diabaditiven design strategies within a pediagogical context, student's projects present innovations made possible by our current technological environment, remark the concepts of contemporary data-driven design, and show how they can be used in a pediagogical formework to nutrue student's creative capacities within an ever changing technology-driven era. They also demonstrate how architectural design can accompany, data systems to connect the two works of information and givence design.

### Method

Student began with replaning scholarly resources on computational method for Information analysis, and responsive systems operations, such instruction was combined with conventional architectural education regarding the materials behavior, labelcation, assembly, and so tash. Then, students made use of cutiling-edge accilitectural schware such as Crosshopper, Relly Dynamic, fyrthan scripting, ougmented reality, and physical computing environment using Arduino microsonholes. Students in the interdecipinos studio derigined a mer university visitor's center with the physical is publication and the schema, and dota-driven design. Student's respacmicrosond-physical interconnect-try.











### Nocess

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## A Studio Focused on Societal Challenges: Case Study on Placemaking and Resilience

JOONGSUB KIM Lawrence Technological University

This submission is based on the results of our architecture school's multiphase project in Detroit from spring 2015 to spring 2016. The project's central question was, "what would be an ideal studio model to help our students to address societal challenges frequently raised in two low-income study communities." This project focused on two societal challenges: lack of social construction (an inability to shape their own community reality) and lack of resilience (an inability to bounce back after misfortune).

Nature of the collaboration: To address the central question and the two societal challenges, we engaged in a multifaceted collaboration consisting of hybrid studios (with the participants being 22 undergraduate and graduate students in architecture, urban design, engineering, behavioral science, landscape architecture, and environmental graphic design), partnership with community organizations and the College of Management, the integration of social scientific research and design, the use of conceptual models, and pilot studies that used small quasi-experiments to test theories and their applicability. What students learned: Three collaborative models for placemaking (see

supporting materials) can strengthen social construction and increase resilience. Each model has pros and cons, and each community needs a different model or integration of some or all of the models. Models are useful only when they are considered pragmatically. Collaboration with communities through public participation requires the right timing and facilitation of "informing," "consulting," and "deciding." Democratic design can create value and build social capital. How the community benefited: The community had ample opportunities to experience shared governance via collaborative decision-making, reciprocal appreciation of disagreements via social learning, empowerment via co-designing, and more meaningful design via placemaking. The project helped us win the National Endowment for the Arts grant, which will allow us to develop detailed designs to address the two societal challenges under consideration through placemaking and resilient community development.



### A STUDIO FOCUSED ON SOCIETAL CHALLENGES: CASE STUDY ON PLACEMAKING AND RESILIENCE





COLLABORATIVE STRATEGIES

OVERALL APPROACH TO THE PROJECT







### HREE PRACTICAL PPROACHES TO LACEMAKING





- 12

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EMOCRATIC DESIGN VS. ONVENTIONAL DESIGN







## Designing for Rising Water A Competition Studio

JORI A. ERDMAN Louisiana State University

In this studio, students were challenged to address issues of rising water and community in a remote and unfamiliar place. Through research conducted in the field, in the studio and with the input of interdisciplinary experts, two teams created design proposals that challenged conventional thinking about resilience and what is possible in a coastal environment. The work was completed as part of an invited design competition called Designing Resilience in Asia, sponsored by the National University of Singapore. By applying their skills as designers, these US based students were able to respond to an unfamiliar culture and site in Manila, Philippines.

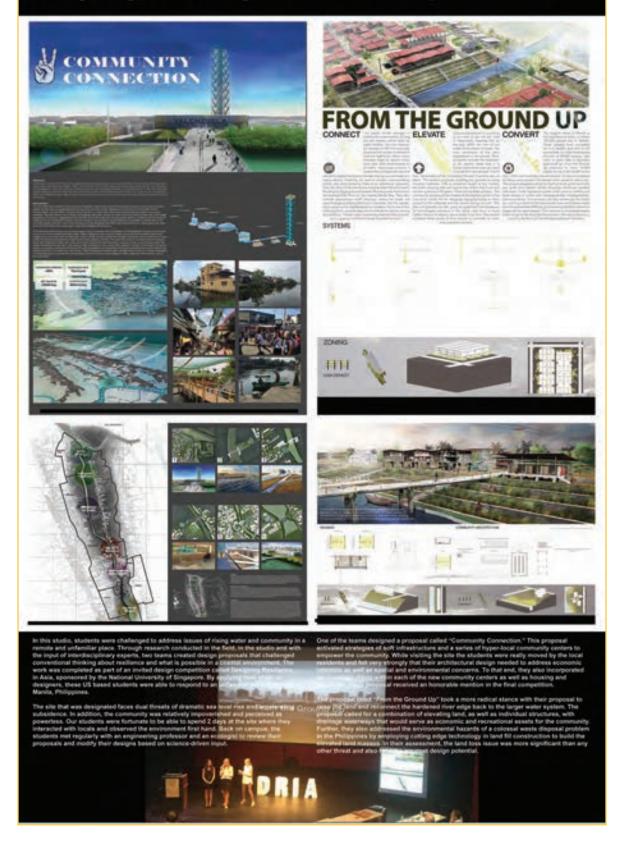
The site that was designated faces dual threats of dramatic sea level rise and accelerating subsidence. In addition, the community was relatively impoverished and perceived as powerless. Our students were fortunate to be able to spend 2 days at the site where they interacted with locals and observed the environment first hand. Back on campus, the students met regularly with an engineering professor and an ecologist to review their proposals and modify their designs based on science-driven input.

One of the teams designed a proposal called "Community Connection." This proposal activated strategies of soft infrastructure and a series of hyper-local community centers to empower the community. While visiting the site the students were really moved by the local residents and felt very strongly that their architectural design needed to address economic interests as well as spatial and environmental concerns. To that end, they also incorporated an economic driver within each of the new community centers as well as housing and education. Their proposal received an honorable mention in the final competition.

The proposal titled "From the Ground Up" took a more radical stance with their proposal to raise the land and reconnect the hardened river edge back to the larger water system. The proposal called for a combination of elevating land, as well as individual structures, with drainage waterways that would serve as economic and recreational assets for the community. Further, they also addressed the environmental hazards of a colossal waste disposal problem in the Philippines by employing cutting edge technology in land fill construction to build the elevated land masses. In their assessment, the land loss issue was more significant than any other threat and also held the greatest design potential.

The work presented here shows that design research in the studio context can push the boundaries of our thinking about how to address significant issues of environment and community.

### **Designing for Rising Water -- A Competition Studio**



## LuxMotus: Physics-based Form Generation in a One-to-One Scale Design Studio

SALEH KALANTARI Washington State University

This project examines how parametric modeling techniques can be integrated into the conceptual stage of design-build studios, and used as a basis for developing new digital fabrication techniques. Previous studies have shown that parametric modeling can have substantial benefits when used as a drawinggenerator for digital fabrication; most notably it can enable the designer to experiment with numerous new design and tooling possibilities (Jabi, 2013). The use of parametric modeling to inform these processes has also been described as initiating a "psychological change" in designers' approach to formcreation, and it is often seen as leading to a more adaptive and responsive design outlook (Achten & Kopřiva, 2010). In this paper, digital weaving is considered as a technique for linking parametric-modeling design processes with human-interactive design, and for developing a new tessellation technique in digital fabrication.

The project was developed based on a designbuild studio that was executed in four phases: inspiration through nature, parametric modeling theory, weaving technique, and fabrication. First, the studio participants examined mathematical analyses of naturally occurring geometric designs, which helped them to better understand the basic concepts of parametric theory. Rooted in this natural inspiration, they then sketched out a basic pavilion design using a coordinated parametric formula, and explored the possibilities of the design using 3D-modeling software (Rhino/Grasshopper).

After developing the basic form, studio participants employed weaving techniques using linear patterns and Spring-based computational modeling (Lienhard et al., 2013) in order to create tessellations in their pavilion designs. The results of the weaving processes were folded into the overall parametric designs, leading to advanced tectonic solutions. Ultimately, we fabricated the final designs using CNC milling and weaving machines, as well as a vacuumforming machine.

The most significant outcome of this project is to demonstrate that parametric modeling is not only useful for form-generation, but can also be a valuable tool to develop fabrication techniques. The project is a result of computational design thinking that includes elements of morphogenesis biology, algorithmic and mathematical approaches, and the cuttingedge translation of such approaches to physical fabrication. Potential applications include the creation of complex 3D mesh structures using weaving technology, and the use of such structures in reconfigurable material systems.

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### LUXMOTUS: PHYSICS-BASED FORM GENERATION IN A ONE-TO-ONE SCALE DESIGN STUDIO

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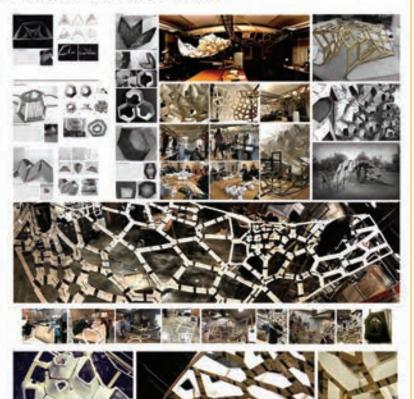
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## Infrastructural Opportunism I-11\_A Next Generation Infrastructure Case Study

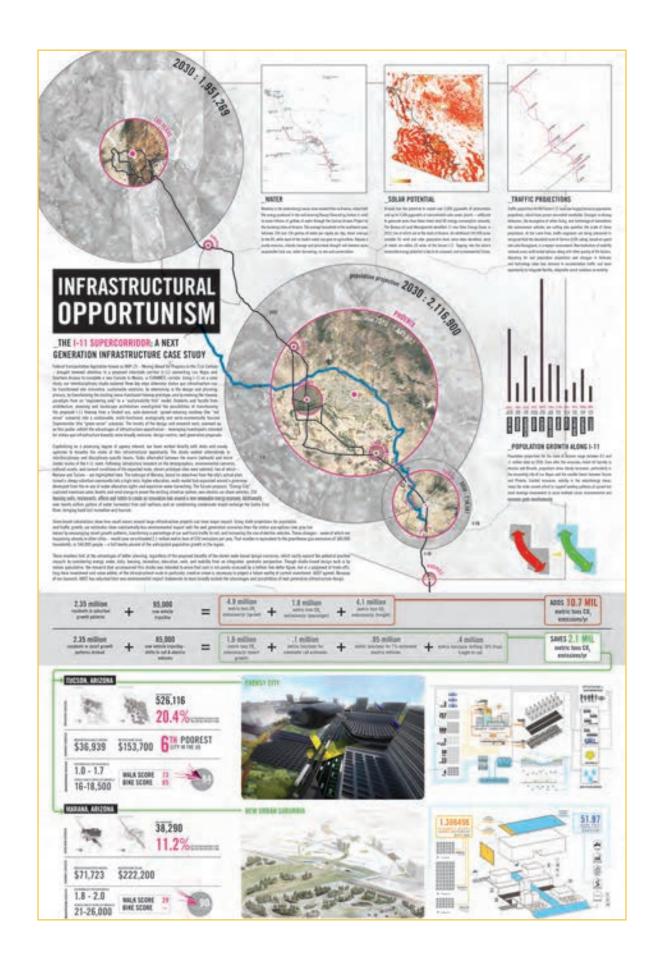
LINDA C. SAMUELS Washington University in St. Louis

BERNARDO TERAN Independent Scholar

The Mobile Craft Module proposes an architecture of deployable structures that can be reconfigured to serve a variety of functions. The twin modules can be arranged in multiple ways to facilitate exhibition space, event space, and work space, and they nest together to become secure at night.

The modules were designed and built by a team of thirteen students in eight weeks. The project served as the anchor pavilion for California College of the Arts (CCA) during the Market Street Prototyping Festival, a threeday event in San Francisco that explored new ideas for designing public space. Throughout the festival, the modules hosted a series of exhibitions and events showcasing work by students and faculty. Following the festival, the project returned to the school to serve as mobile workstations on the school's outdoor maker space. The intent is for the modules to provide an infrastructure for the construction of future design-build projects undertaken by students and faculty.

Each module is open on one side, providing access to the modular shelving and work surfaces on the interior. The reconfigurable plug-in shelving system includes removable caps, which double as stools once they are removed from the module. The structural frame is fabricated from welded steel tube, with angle iron members welded to the corners to serve as protective edges for the cladding. The cladding is fabricated from western red cedar boards, each of which is cut to size. A robotically-cut pattern carved into the cedar boards consists of abstract shapes that merge together to spell CCA's name as one moves around the module.







## The La' mella House Small Efforts: Big Impacts

AHMED K. ALI Texas A&M University

JAECHANG KO

Texas A&M University

"I remembered him, with a thick gray beard and several layers of clothes standing by the bus stop when it was freezing outside. I used to stop and pick him up in my toasty car, open up the trunk with a push of a button so he could shove his heavy duffle bag, he often sit in the back seat saying basically ... nothing. I tried several times to initiate conversations with him. But when he talked - hardly ever - he said jewels of wisdom. Library workers knew him as an avid reader who spent time at the library nearly every day. Teddy Henderson or Abdul-Shahid passed away on October 6, 2008; he was 62. He was born in Brooklyn, N.Y., in 1946. He graduated from high school and attended Hampton University in Virginia. In 1968, he enlisted in the U.S. Air Force and was stationed in Washington, D.C. The story of Abdul-Shahid is not much different than the story of thousands of homeless Americans who left us perplexed with mystery.

The interior space of the 145 years old Menomonee Street house in old town, Chicago always captivated us. Daylight beautifully penetrated the interior space through windows that were carefully inserted inbetween the gable roof trusses. How such a tiny footprint came to be so charming and inviting? The exposed roof structure and its play with light inspired our design. The La' mella House is approximately 290 square feet, is tiny in its footprint area but significant in its upward aspiration. We used the vaulted roof to increase the perception of the interior space and to free the end walls for high operable windows to allow for cross ventilation. The lamella roof structure acts as a reminder for us to the role of the individual in the society and the power of joining small efforts to create big impacts. The roof structure receives its rigidity from a tension steel tie and a tongue and groove pine boards below layers of insulation topped with a corrugated metal roof. The roof sits on Cross Laminated Timber (CLT) wall panels sized 3'X8' that are quickly erected and anchored to a concrete floor slab. The concrete slab performs as a heat mass to store heat drawn from a thermal well and through a circuit of copper pipes impeded in the slab, suggesting the floor to perform as a livable surface. The CLT walls need no interior finishes

and bring warm feeling to the interior. The house articulates Semper's Four Elements of Architecture: The Hearth, The roof, The Walls and The Floor by simply paying careful attention to the making of its elements and finding a balance between its structure, construction, and tectonic expressions.

The overall site plan creates a sense of community by including three small courtyards that are carefully inserted in-between the houses. The small courtyards give a sense of belonging and intimacy rather than one big courtyard for all. The communal space is composed of the same construction module of the house and carports utilized the lamella roof module. The layout can be easily adapted for various configurations to meet other sites conditions. By limiting windows to only one side of the house, expansion and attaching other modules are possible. All elements of the house meet both the construction and energy requirements.









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THE LA'MELLA HOUSE

## Housing the Urban Animal

**CAREY CLOUSE** University of Massachusetts, Amherst

CARYN BRAUSE University of Massachusetts, Amherst

The topic of housing design, interpreted in the broadest sense, could be conceived of as any space that hosts a living creature. Thus, in this entry-level design studio, students began by designing a dwelling space for an animal client. Animals were selected because our cohabitation with with them improves, supports, and sustains not only human life, but also our biosphere. These clients provide a range of productive services, such as their ability to pollinate, or to provide food, clothing, pest control, or fertilizer.

The intention of this project was not to replicate the shelter that a client would build for themselves but, rather, to use the otherness of a different species as a prompt to critically think about dwelling. In so doing, students were required to shed preconceived notions that might accompany the design for a human client as well as to intensely investigate geometries, morphologies, materials, and methods to create a module for animal living. Freed from relying on their own lived experience and typical professional norms, the students could grapple with the notions of idealized structure, necessary utility, and the contingencies of site, territory, and available material. Importantly, students considered how a "designed" shelter might differ from one produced by the client or natural forces.

STEPHEN SCHREIBER University of Massachusetts, Amherst

At the center of this inquiry was the question: Might an intentionally designed module repair or remediate an urban condition?

While it would be hubris to think that humans could design habitation for creatures that surpass those they produce for themselves, the intention of this design inquiry was to humbly pursue multiple pedagogical objectives. By exploring the geometries, materials, and methods of other creatures' habitats, students began to view human architectural precedents with a more finely tuned tectonic lens.. The diversity of responses is evidence that the strategy successfully challenged students to shed the derivative architectural forms that haunt many studio projects and develop a shared bank of design generators more relevant to their future design investigations.

We structured the project by pairing students with animal clients, which were randomly assigned at the very beginning of the assignment. The species offered included bees, bats, birds, oysters, tilapia, ducks, guinea pigs, and rabbits. In part these animals were selected for study because they have much to offer humans---but they also were chosen because, unlike typical household pets, they represent an otherness that requires students to move beyond their existing knowledge base. Students performed initial research on their animal client, using the unique characteristics of that species to stretch their design language and repertoire.

Through this 2-week process, students sought to repair or remediate environmental conditions, address habitat loss, and educate humans about their animal client. Heightened environmental awareness formed a natural learning outcome, as the project exploration prompted students to consider the impacts of urban development on animal habitat, to gain empathy for our planets' co-inhabitants, and to become advocates for other living creatures.



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## **Massive Passive** The Challenge of Incorporating Passive Energy Strategies in Developer Single-Family Suburban Housing

CRAIG S. GRIFFEN

Philadelphia University

Measurable success of sustainable energy systems in construction will require application on a sizable scale. However, wind and solar are still a very small percentage of building energy systems that rely heavily on fossil fuels. Single-family housing accounts for a huge amount of residential construction (the US Census Bureau reports levels of over one million single family home starts per year) yet passive houses make up only a tiny percentage of overall housing construction. With housing development companies producing the vast majority of new house construction, this segment of the market is prime for applying passive strategies that can affect major change in energy conservation. Yet developers typically design entire subdivisions with no regard to orientation to sun, wind and thermal efficiency. Why have developers stayed out of the passive energy housing market and what would it take to convince them of the feasibility of sustainable single-family housing? And why aren't architects more involved in suburban housing? Plenty of well-trained professionals who could lend their expertise have washed their hands of developer housing.

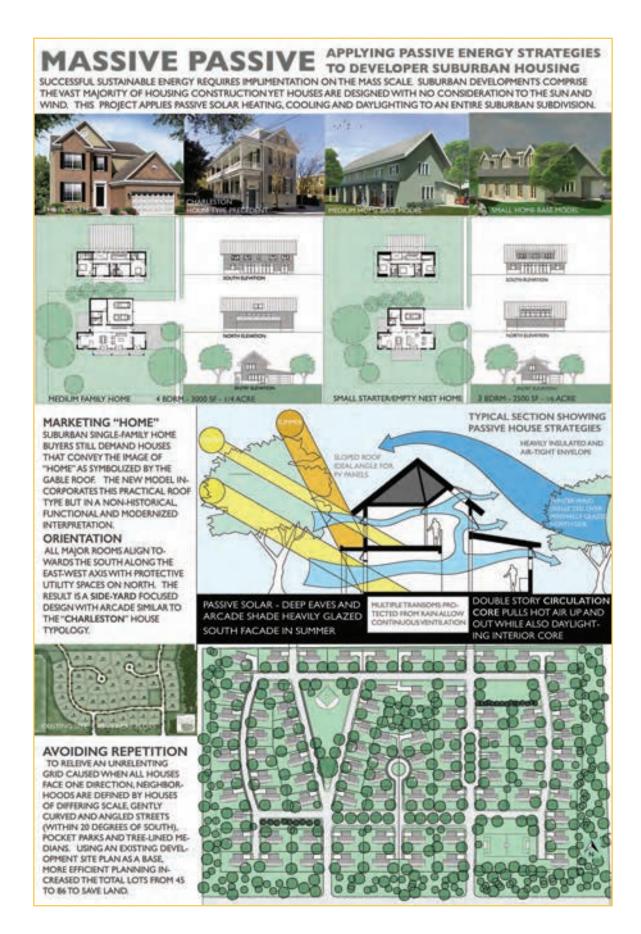
Research reveals surprisingly few passive single-family housing communities, and none on a vast scale. Passive houses have been around for decades so why haven't they made the leap in scale? This research/design project considers the biggest obstacles to passive developer housing then tests these ideas through potential design solutions of a prototypical house (based on the Charleston typology) and a neighborhood master plan. This objective, to reveal the major challenges and the potential for bringing passive energy to the massive scale of developer housing, produced two main questions; how do we apply passive energy strategies to the premanufactured suburban house and how do we make passive houses marketable in a wellestablished industry?

The Challenge to Making Developer Houses Passive - Current developer housing is designed with little to no relation to the direct sun, wind movement, daylight or thermal efficiency. Houses in a typical subdivision are oriented towards the street regardless of cardinal direction. How can we adapt these non-directional houses to maximize natural environmental benefits such as:

- Orienting Towards the Sun
- Increasing Natural Ventilation
- Bringing Daylight to the Core
- Creating a Super-Insulated and Sealed Envelope

The Challenge of Making Passive Houses Developable - None of the changes above will matter if the houses won't sell. The typical developer house is primarily concerned with presenting a nostalgic image of house as "home" because that is what their clients want, but most architects are not interested in reproducing repetitive, historical kitsch. So any design for passive suburban developments must be financially feasible and marketable and address the following issues:

- Conveying an Authentic Image of "Home"
- Making Passive Construction Cost Effective
- Avoiding Repetitive Communities and Houses



## Re-Thinking Vickery Meadow: A Case Study on Refugee Resettlement

**CRAIG S. GRIFFEN** Philadelphia University

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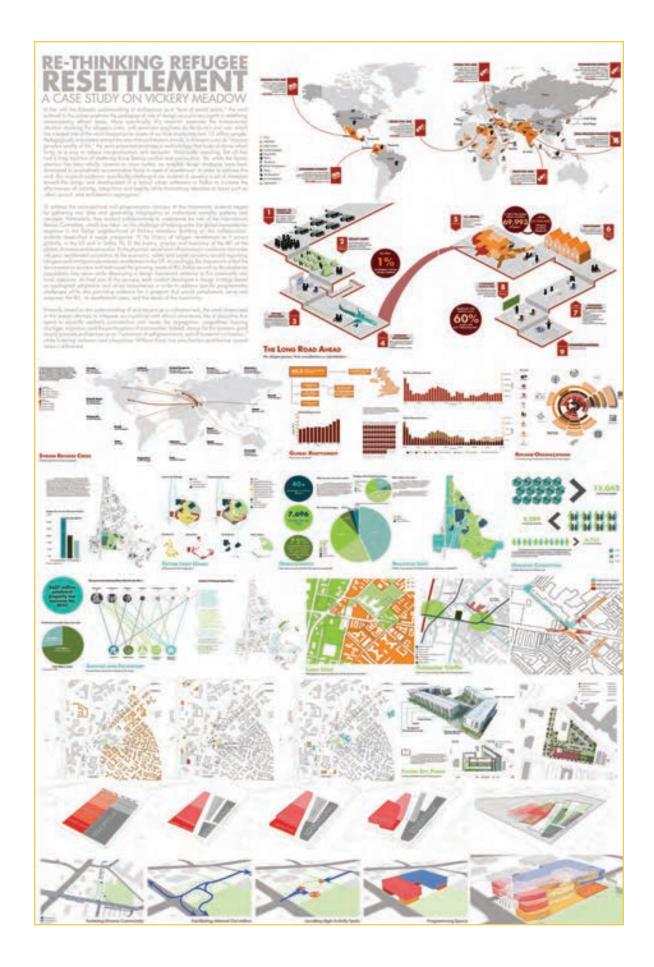
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## **Barn-House** Affordable House - Undocumented Immigrant Workers + Family

DENNIS CHIESSA University of Texas at Arlington

There are an estimated 11 million undocumented immigrants in the United States and housing for a large number of them is becoming a social problem that they themselves have to begin to solve. The political climate around the issue of immigration has made it more difficult for undocumented individuals to demand adequate housing from their landlords. Several cities have tried to pass laws that punish property owners that rent to undocumented tenants.

According to 'Build a Better Nation' (A report from Workers Defense Project in Austin) 50% of surveyed construction workers in the industry identified themselves as undocumented in Texas. They estimate that as many as 400,000 Texas construction workers are undocumented. In 2011 Texas accounted for 16% of all new housing construction permits in the U.S. which was more than Florida and California combined. This vibrant economy has continued to attract young professionals and continues to increase the price of available houses within the urban cores of major cities.

People are beginning to look further than the suburbs for affordable housing. Moving to rural areas to avoid city ordinances and the requirement to use general contractors is becoming more common. This is the case of the homeowners of this Barn-House.

The owners of this home are a young undocumented couple and their 6 year old son. By saving over a few years they were able to purchase two adjacent lots in a county with no city ordinance. Their property totaled about two and half acres. The trend in areas like this is to buy a prefabricated trailer home and place it on these large properties. Isolation seems to be a driving factor when looking for places to live. When the owners approached me (designer) they wanted to talk about the feasibility of building a home they could afford – something not much more ambitious than the trailer homes scattered across the landscape.

The limitations of the owners dictated many of the decisions that led to the final design as well as the phasing of construction. The clients saved enough money to get a substantial amount of the project done within a year. The rest will be done as cash becomes available through their business ventures. Because of their legal status, access to a construction loan was out of the question, although they never really wanted to get in debt to do the project.

The first few iterations of the house were considerably smaller, the final design is 1,200 square feet with a foot print of 17 ft. x 75 ft. and the goal is to build it for under \$90,000. The house has two bedrooms, one and a half bath, a lofty office space and roof deck. The

roof deck was the inspiration for the project as it serves as a space for the young child to look at the landscape and the sky.

To be within the projected budget, the building has been constructed through informal sub-economies - hiring contractors that are not registered (probably because they are also undocumented) and being flexible with construction schedules.

Construction started in October of 2015 and we expect the family to move in sometime in 2017.

## BARR N - HOUSE - UNDOCUMENTED IMMIGRANT WORKERS + FAMILIES

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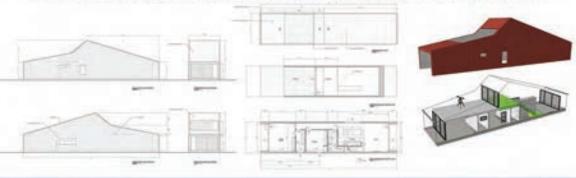
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Construction started in Online of 2015 and we expect the fairing to move it particulate of 2017

### \*50% OF CONSTRUCTION WORKERS REPORTED THAT THEY WERE UNDOCUMENTED"





#### **Application House**

FRED SCHARMEN Morgan State University

In 1994, technologist and cultural critic Stewart Brand commissioned an illustration[1] for "How Buildings Learn," showing different rates of disruption effecting architecture's component systems. This drawing, "Shearing Layers of Change," has since been adapted to model things like corporate business structures, software project management, website content, and, in an updated graphic by Brand for his current initiative, The Clock of the Long Now, human civilization itself.

This drawing type has been instrumental for Silicon Valley. Let us re-draw the smartphone in this mode. Stacked layers of material and information change at different rates. Unlike the house diagram, each layer foregrounds a distinct relationship with an economic system. Phone hardware price is usually subsidized, software applications are often free. Everything from the protective case to the user's contact list is a monetizable commodity, subject to forced obsolescence and upgrade cycles. Apps are conduits to continuously transfer information, breaking the layers' concentricity, creating tunnels from a small private interior to a broad diffuse exterior: "the moon." This scheme passes information through an almost invisible, unavoidable outer layer, recuperating exchange value from each transaction.

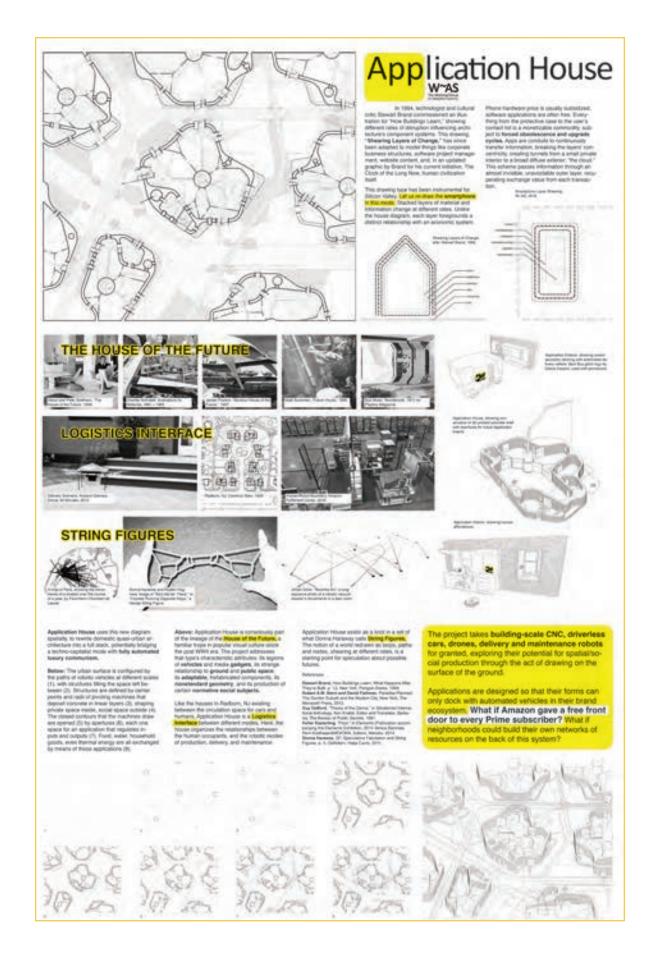
Application House uses this new diagram spatially, to rewrite domestic quasi-urban architecture into a full stack house of the future potentially bridging a techno-capitalist mode with fully automated luxury communism. The project takes building-scale CNC, driverless cars, drones, delivery and maintenance robots for granted, exploring their potential for spatial/social production through the act of drawing on the surface of the ground.

The urban surface is configured by the paths of these vehicles at different scales, with structures filling the space left between. Structures are defined by center points and radii of pivoting machines that deposit concrete in linear layers, shaping private space inside, social space outside. The closed contours that the machines draw are opened by apertures, each one space for an application that regulates inputs and outputs. Food, water, household goods, even thermal energy are all exchanged by means of these applications. Applications are designed so that their forms can only dock with automated vehicles in their brand ecosystem. What if Amazon gave a free front door to every Prime subscriber? What if neighborhoods could build their own networks of resources on the back of this system?

The notion of a world redrawn as loops, paths and nodes, shearing at different rates, is a starting point for speculation about possible utopian and dystopian futures. These drawings are like philosopher Donna Haraway's "sf," "... that potent material semiotic sign for the riches of speculative fabulation, speculative feminism, science fiction, science fact, science fantasy – and, I suggest, string figures."

[1] The diagram is by Donald Ryan, Brand credits the idea to British architect and RIBA President Stewart Duffy. Stewart Brand, How Buildings Learn, What Happens After They're Built. p. 13, New York, Penguin Books, 1994. Print.

[2] "In looping threads and relays of patterning, this sf practice is a model for worlding." Donna Haraway, SF: Speculative Fabulation and String Figures. p. 4, Ostfildern, Hatje Cantz, 2011. Print.



#### Sea-Level Hi-Rise: Or, How I Learned to Stop Worrying and Love Climate Change

GABRIEL KAPRIELIAN Temple University

The urban edge that defines the San Francisco Bay is a contested landscape whose boundaries are continually changing, both in form and in definition. Much like the tidal flux of the Bay wetlands, the urbanized waterfront can extend and recede. Over the years, the Bay Area has seen a large portion of the historic wetlands filled or leveed off for residential, commercial, and industrial land uses. With current sea-level rise projections, it appears that the water will once again reclaim the bay lands that have been filled.

To combat sea-level rise, many are calling for bigger and better levees, while still others claim that urban development in areas at risk of inundation should be removed to allow for tidal wetlands to migrate to higher elevations with the rising sea levels. I propose that both may be accomplished by a staged retreat of existing development, enabling a wetland migration with the rising sea-level, while introducing a resilient new development and infrastructure that is uniquely defined by the region's ecological characteristics. My proposal blurs the lines between the shoreline and the city. The new development would be built on "finger" levees that are horizontal to tidal action, allowing for wetlands to coexist between the buildings, acting as a native habitat and a buffer against storm surges. Mid-rise and hi-rise buildings would replace the current low-density suburban development and industrial parks, creating a significantly smaller footprint, while providing twice as much housing for a growing Bay Area population.

I have chosen waterfront sites at risk of inundation from sea-level rise in three counties around the San Francisco Bay to demonstrate how a study of the past and present can better inform a plan for the future. In each site, I illustrate the long-term benefits of a staged retreat and resilient redevelopment strategy that creates a new set of relationships between urban life and ecology, ultimately redefining the boundary of the city.



## Housing Prototypes for a Landscape of Change

JENNIFER LEE MICHALISZYN Wentworth Institute of Technology

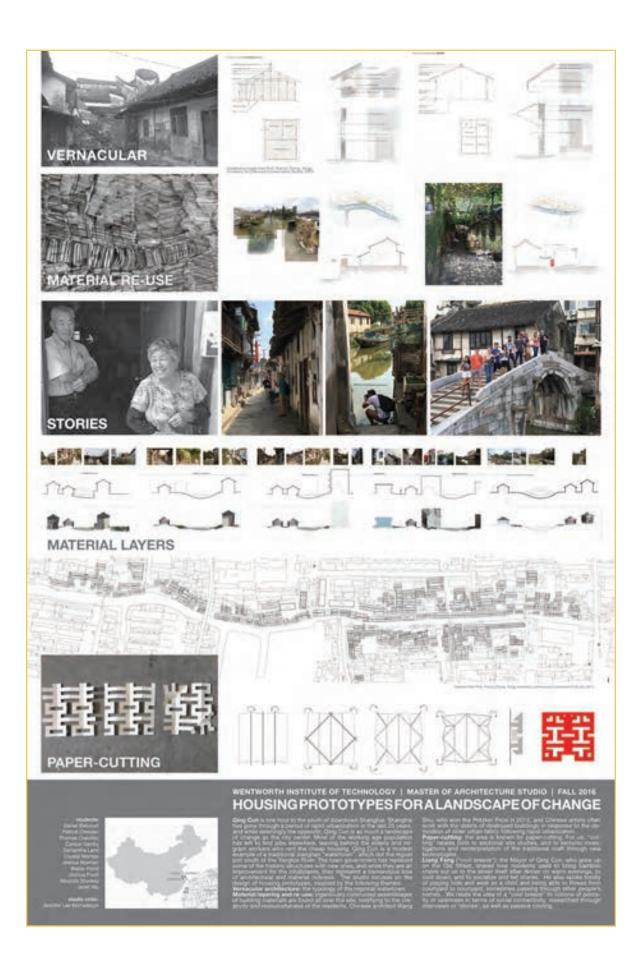
Qing Cun is one hour to the south of downtown Shanghai. Shanghai has gone through a period of rapid urbanization in the last 25 years, and while seemingly the opposite, Qing Cun is as much a landscape of change as the city center. Most of the working age population has left to find jobs elsewhere, leaving behind the elderly and migrant workers who rent the cheap housing. Qing Cun is a modest example of a traditional Jiangnan "watertown", which dot the region just south of the Yangtze River. The town government has replaced some of the historic structures with new ones, and while they are an improvement for the inhabitants, they represent a tremendous loss of architectural and material richness. The studio focuses on the design of housing prototypes, inspired by the following themes:

Vernacular architecture: the typology of the regional watertown.

Material layering and re-use: ingeniously contructed assemblages of building materials are found all over the site, testifying to the creativity and resourcefulness of the residents. Chinese architect Wang Shu, who won the Pritzker Prize in 2012, and Chinese artists often work with the debris of destroyed buildings in response to the demolition of older urban fabric following rapid urbanization.

Paper-cutting: the area is known for papercutting. For us, "cutting" relates both to sectional site studies, and to tectonic investigations and reinterpretation of the traditional craft through new technologies.

Liang Feng ("cool breeze"): the Mayor of Qing Cun, who grew up on the Old Street, shared how residents used to bring bamboo chairs out on to the street itself after dinner on warm evenings, to cool down, and to socialize and tell stories. He also spoke fondly of playing hide and seek as a child and being able to thread from courtyard to courtyard, sometimes passing through other people's homes. We relate the idea of a "cool breeze" to notions of porosity or openness in terms of social connectivity, researched through interviews or 'stories', as well as passive cooling.



### Urbanism of the Air

DAVID KARLE University of Nebraska-Lincoln

LIZ SZATKO University of Nebraska-Lincoln

With housing demands rising in already dense urban environments new housing typologies must be tested. In the seventeenth century the medieval version of the London Bridge addressed issues of a growing city by coupling infrastructure with acts of domesticity included a central chapel, shops, and housing. In 2003 the Porter House by SHoP Architects challenged conventional housing typologies in New York City with their air rights proposal. The Porter House functions on multiple levels and challenges historic conservation and current zoning code. In 2009 twenty-five luxury villas were illegally built by developers on the roof of the multi-story shopping mall in Hengyang, China. These examples challenge normative building practices and provide a foundation for further investigation of housing typology and urbanism of the air. In order to increase density in land-poor modernizing cities, the architectural discipline must balance the opportunities of air rights proposals over historic buildings by challenging the nostalgic notion of preservation.

Historic buildings are situated in the middle of the dense modern world of skyscrapers and commercial business districts. The relationship between old and new city fabric clearly **KEVIN BUKOWSKI** University of Michigan

can be seen spatially, materially, and aesthetically. The large footprint and short stature typical of historic landmark buildings conflict with a modern city's demands to maximize buildable space. The question then arises of what should be done with a building we wish to preserve, but also wish to advance with us into the modern world?

If a desire exists to preserve our historic built environment, we must look beyond the untouchable sanctity of our preserved historic buildings. The use of air space allows the opportunity to increase density while preserving history. This reutilization allows the original building to be preserved as a cultural hub for the modern city

The above considerations were tested as a design-research proposal on a prototypical 1920 historic building. "Grand" in both name and materiality, The Grand Manse is a stately concrete and glass building currently listed on the United States National Registry of Historic Places. The air rights proposal makes contextually conscious use of valuable air rights space above the historic Grand Manse by providing a unique architectural solution that accommodates the needs of a growing urban density. This proposal frames a critical and timely issue – historic preservation (past) and urban density (future). As the idea of preservation in dense urban environments is revisited by each generation of architects and developers, we must ask ourselves "not what to keep, but what to give up, what to erase and abandon." (Venice Biennale 2010: Cronocaos, Italy, Venice, 2010" Office for Metropolitan Architecture) This essay will situate the often under used but widely available opportunity of urbanism of the air with the growing housing demands of cities.



#### Detroit Types/All Together Again Speculation Over Detroit's Existing Landscape

RICARDO SANZ Independent Scholar

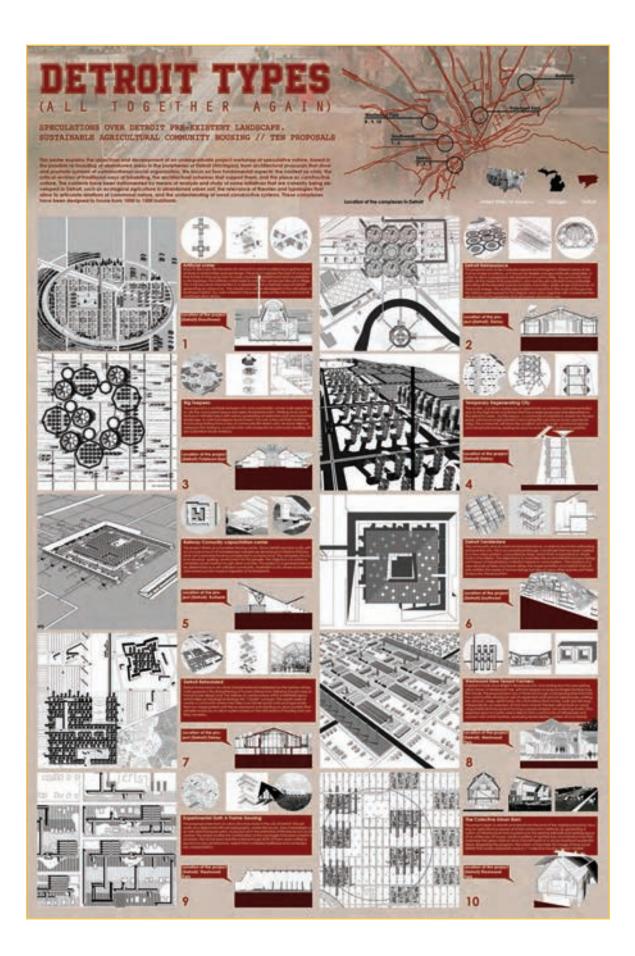
#### SUSTAINABLE AGRICULTURAL COMMUNITY HOUSING // TEN PROPOSALS

#### TOWARDS THE COLONIZATION OF THE URBAN LANDSCAPE

This is an experimental academic experience based on Detroit that starts from an urban context on the verge of depopulation and, through the creation of a new partially sustainable community, promotes exploration of the architectonic program over diverse extents on the ways of inhabiting and their relation with productive activities that differ from traditional forms of social organization. This abandoned city is the starting point for a work that explores the possibility of refounding the urban territory on a speculative ground, from the study of preexisting models of alternative social organization that are found on a thin frontier in between an urban apocalypse, and the study of diverse ways of understanding the social contract. To achieve this, the experience proposes the refounding of the city's peripheries through enclaves of families or communes over a mostly inhabited urban space that once was one of America's most industrialized town centers.

#### HOW WERE IMPLEMENTED THOSE THEMES ON THE EXPERIENCE?

- Through the gathering of information about the Detroit phenomenon in order to open a series of discussions about Detroit's current situation and the excersie's aims.
- A series of short excersises allowed to elaborate initial schemes that lead to the social organization system and opened way to the initial idea of the communes
- Studies on diverse social systems over types and time that could be referenced on the planning proposals.
- Other references that could nourish the architectonic solution, like standardized constructive systems on wood and their technical specifications in the USA, the use of clean energies and urban architecture as a possibility.





# MATERIALS

#### Soft States: Experimental, Highly-Textured Concrete Architectural Panels

AMMAR KALO American University of Sharjah

While digital fabrication techniques have the potential to automate processes and increase material efficiency, there are very few examples that produce complex highly-textured concrete surfaces without requiring countless hours of explicit modeling and CNC milling. The pedagogical decision to not use any computer controlled milling machines was to distance the students working on this Design-Build project from relying on the direct information transfer from CAD models to CAM software, and invest more time into exploring material potentials. Using this experimental approach, students spent the first half of the semester developing over 15 methods, before narrowing them down to three. In each cases explored, digital models are used to generate instructions for manual tasks. In addition, they all are meant to produce molds for spraying glass reinforced concrete (GRC), which results in panels that are lighter, thinner, and stronger that traditional concrete panels. Every variable in the process was carefully cataloged and documented to ensure reproducibility. As the prototypes got more developed and refined, students gained an intuitive knowledge of material behavior and tweaked their process variables with confidence to produce predicable results.

The first method utilizes a basic pin mold that is covered with a flexible fabric. Each of the pin heights are adjusted based on outputs from a digital model. After casting concrete in the molds, or spraying GRC, the panels are lifted and the fabric film is peeled off revealing the final surface texture. The amount of sag in the final panel surface is controlled by the amount of material used during the casting process as well as the type of fabric used. Both the fabric sheets and the pin mold are entirely reusable and could be rearranged to form new pieces.

The second method involves shaping doubles curvature surfaces in large boxes of wet sand. Waffled structures of digital surfaces are placed in the molds first and the gaps are sealed with EPS foam to reduce the overall weight. Afterwards, a thick layer of wet sand is added. The digital models take this addition layer of material into account. Once the concrete is cured, the sand is simply brushed off the surface, and the clay plugs are easily pulled out. Most of the sand and clay used in these molds can be reused in other formwork as well.

The third method involves methodically manipulating a chaotic process to produce un-programmed, but somewhat predictable results. The bulbous formations of these panels are created when pouring cold water onto hot liquid wax in a shallow container. Concrete is cast into the mold once the wax cools down, and later the wax is melted off the cured concrete panel to be reused again for another mold. The pouring paths are roughly planned based on the understanding of how water and wax interact to shape particular features. These pouring patterns are mainly used as a guideline to control density, size of wax patterns, and overall wax flow direction rather than a precise deterministic pattern.

As a proof of concept, all the final panel prototypes from the three different mold making methods were arranged in a monolithic totem form. This totem displays the various surfaces generated, but also allude to the ways in which multiple panels could aggregate as an architectural skin.







## **Single Point Incremental Metal Forming**

ANDREW BERES University of North Carolina at Charlotte

MARLENA MCCALL University of North Carolina at Charlotte

Single Point Incremental Metal Forming (SPIMF) is a process that allows architectural panels to be incrementally formed from sheet metal into doubly-curved complex shapes using a robotic arm and a stylus-like end effector. SPIMF leverages industrial robots' precision and strength by gradually pushing the end effector into vertically supported sheet metal. This work was inspired by Anmar Kalo and Michael Jake Newsum's Incremental Sheet Metal Forming and CITA's Stressed Skins project. SPIMF examined how different materials, forming tools, and tool path generation methods impact the finished quality of completed pieces along with applications for the formed metal parts. Once an understanding of how SPIMF worked, focus was put on how to accurately program the robotic arm to produce repetitive geometries that correspond with a digital model. By creating a feedback loop that studies how the sheet metal deforms and how accurately the robot performs the forming task, new and more accurate geometry can be used to program the arm.

PAUL STOCKHOFF University of North Carolina at Charlotte

CHRISTOPHER J. BEORKREM University of North Carolina at Charlotte

The process of creating routines for the robot up until this point was noncyclic, as the geometry would be created using a set of points and a plan drawing using the plugin Kangaroo. From there that geometry was fed into another Grasshopper script that would produce the robotic routine. Afterwards, a panel would be produced on the arm and that was the end of it.

Now, a feedback loop is being utilized that has the ability to control the geometry being fed into the software. While this locks in the overall nature of the input geometry being formed it allows the software to gradually manipulate a geometry and test how well the formed panels match the digital model. Tests are conducted by robotically forming a new metal panel and then creating a 3D scan. Verification for how well the panel matches the input geometry is done using a Kinect to make a 3D point cloud by 3D scanning the object. The scan is then compared to the forming geometry. A comparison done in Grasshopper matches up points that have the same XY coordinate and compares their Z value. From there a heat map is also generated, so that users of the software can see where corrections to the forming geometry are needed. With that information the points used originally to create the form can be moved vertically to allow for a more accurate digital model to be fed to the Grasshopper script that generates the robot routine.

Ideally, by running enough panels through the system an adjustment factor can be created based off of how much the Z value must be modified. The adjustment factor would replace the need to verify the panels by 3D scanning them. This adjustment factor would allow a designer the ability to create a series of surfaces within the design environment and have those be correctly translated into a robot routine. The adjustment factor allows for the knowledge gained through the experiment phase of this project to be implemented into a design tool.



#### Matter of Material Labor: Eladio Dieste and Ruled Surfaces

FEDERICO GARCIA LAMMERS South Dakota State University

The resistant virtues of the structures that we are searching for depend on their form. It is because of their form that they are stable, not because of an awkward accumulation of matter.<sup>1</sup>

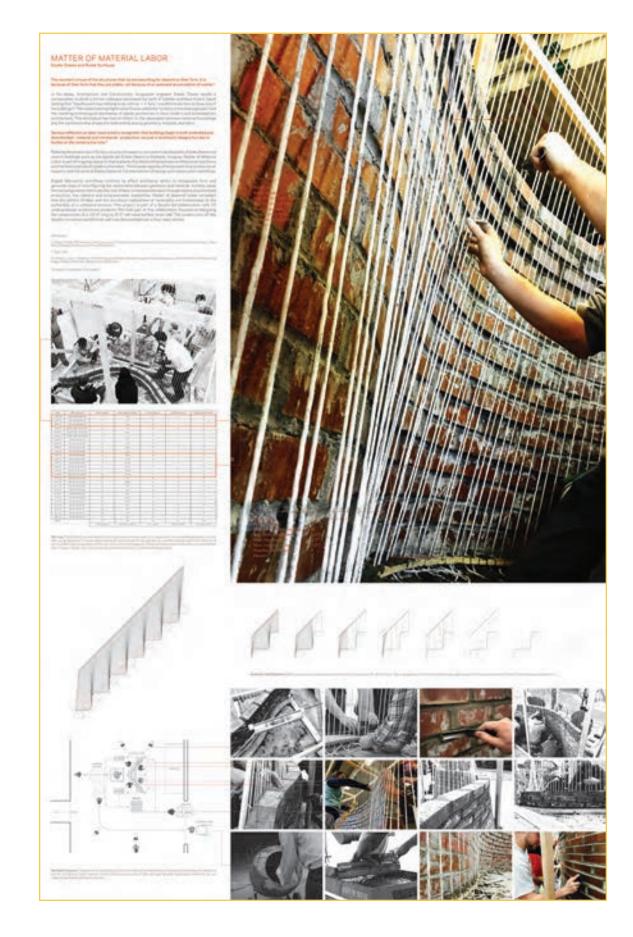
In his essay, Architecture and Construction, Uruguayan engineer Eladio Dieste recalls a conversation in which a former colleague dismissed the work of Catalan architect Antoni Gaudí stating that "Gaudi's work has nothing to do with us — in fact, I wouldn't know how to draw one of his buildings".<sup>2</sup> This statement highlights what Dieste called the "tyranny of the drawing board" and the resulting technological dominance of planar geometries in most modern and contemporary architecture. This dominance has had an effect on the separation between material knowledge and the conditions that shape the relationship among geometry, material, and labor.

Serious reflection on labor must entail a recognition that buildings begin in both embodied and disembodied - material and immaterial production, not just in architect's designs but also in bodies on the construction site.<sup>3</sup> Ruled surfaces are one of the four structural masonry innovations developed by Eladio Dieste and used in buildings such as the Iglesia del Cristo Obrero in Atántida, Uruguay. Matter of Material Labor is part of ongoing research that explores the relationship between architectural workflows and the historical role of collaborative labor. The broader agenda of this project is to position brick masonry and the work of Eladio Dieste at the intersection of design and construction workflows.

Digital fabrication workflows continue to affect architects' ability to manipulate form and generate ways of reconfiguring the relationship between geometry and material. In many cases this reconfiguration minimizes the role of labor or reinterprets labor through means of automated production, like robotics and programmable assemblies. Matter of Material Labor considers how the politics of labor and the structural implications of materiality are fundamental to the authorship of a collective process. This project is part of a faculty-led collaboration with 15 undergraduate architecture students. The first part of this collaboration focused on designing the construction of a 10'-0" long by 8'-0" tall ruled surface brick wall. The construction of this doubly-curved sinusoidal brick wall was documented over a four-week period.

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- 2. Ibid, 183.
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#### Concrete Lattice | Unitized Architecture of Assembly

RYAN GOOLD University of Michigan **TSZ YAN NG** University of Michigan

DANIEL FOUGERE University of Michigan

Concrete Lattice, a project produced for the graduate thesis studio Concrete Labor(1), seeks to challenge our normative association with this building typology by developing a lattice system of prefabricated units using Glass-Fiber Reinforced Concrete (GFRC). Lattice systems are porous, lightweight, and deployable; terms that are not typically associated with concrete structures. The design of parametric units rather than linear components (typical of lattice systems), highlights issues of assembly in precast building systems using integrated components. While design workflows and CNC fabrication aided in efficiently manufacturing the units, the assembly is posttensioned during the construction process to limit the amount of scaffolding necessary. Our goal was to explore the development of a complex lattice system using digital technology to explore formal and manufacturing processes.

Building on the work of Maciej Kaczynski, et al, in his 2013 project "Crease, Fold, Pour", which used thin sheet plastics for formwork, our work moves away from a cast-in-place construct to working with a set of self-similar precast units as a comprehensive building system. The advantages of precast enabled us to control the concrete mix and casting process more consistently and to also explore the logistics of mass-customization and fabrication. Grasshopper was used to develop the units and Kangaroo informed the structural performance through simulation and optimization.

While folding techniques of origami patterns made possible the efficiency of production and cost-savings for formwork production, PETG as a material proved insufficient for concrete casting due to hydrostatic pressure and susceptibility to cracking from chemical reaction to the concrete. As such, an external adjustable jig was designed to help both support the mold during the casting process and ensure accuracy and precision across all unit types at joints. The reconfigurable jig accounts for all the various parameters of both the unit types and the overall lattice design. The complexity demonstrated through Concrete Lattice argues for the use of computational design in both informing design decisions and managing the myriad of contingencies involved in the production of new modes of architecture. Complexity in this respect addresses not only formal and experiential concerns, but also structural performance and manufacturing constraints. Our Concrete Lattice makes explicit the role digital technology plays in the integration of design, engineering, and building construction. While this discourse is not new, our design aims to take full advantage of lessons from precedents and offer a unique project uncharacteristic of what we've come to expect of concrete as a material.

 Concrete Labor was taught by Assistant Professor Tsz Yan Ng during academic year 2015-2016. This thesis section was linked with the course Advanced Digital Fabrication taught by Assistant Professor Wes McGee.



## **They Grow Without Us**

JOSEPH DAHMEN University of British Columbia

AMBER FRID-JIMENEZ Emily Carr University of Art and Design

They grow without us is a temporary public furniture installation grown from mushrooms. The project builds upon transdisciplinary research at the intersection of material science, mycology, and sustainable building technology. To fabricate the furniture, damp sawdust was sterilized and inoculated with a blend of Pleurotus ostreatus mushroom spores and nutrients and poured into aerated hexagonal molds. While in the mold, the fungus produces mycelium, a cross-linked matrix of polysaccharides in the pore spaces between sawdust particles. The process produces solid mycelium bio-composites objects that can be removed from the mould as little as five days. The white coating at the exterior is a hydrophobic material called chitin produced naturally by the mushrooms.

Mycelium bio-composites suggest a future in which biodegradable architectural components are grown rather than manufactured, adding valuable material to local ecosystems at the end of their life. Most architectural materials are discarded long before their useful life is over, spending longer in landfills than they do in the form of a building. Sustainability in the context of rapid cycles of demolition and construction calls for flexible and radically biodegradable materials. The installation encodes organic decay into its basic structure, anticipating future demolition and using it as an opportunity to provide valuable material to local ecosystems. In contrast to relentless cycles of extractive consumption, the project suggests an alternate future in which regenerative architectural materials transform over their lifetime, adapting to change and serving needs that are simultaneously structural, aesthetic, and visceral.



## LWS - Light Weight Shutter

ANE GONZALEZ LARA University of New Mexico

LWS is a ventilated facade system specifically adapted for installation with rope access techniques, removing the need for scaffolding or auxiliary structures.

Developed within the European framework of sustainability programs, LWS system is the product of an investigation project carried out through a period of 3 years. This innovative investigation started when looking for alternatives to the more traditional techniques that currently exist in the market for multi-housing construction. The existing construction methods in Europe, and in Spain particularly, require a complex scaffolding structure. These structures add more time, noise, blocked windows... to the construction process. Once these problems were identified, the search for alternatives started.

After evaluating different options, the rope access industry offered the greatest advantages to the installation process. In this moment, a local rope access company from Spain was added to the research team and the development of LWS started.

Technology, prefabrication, and efficiency are the three fundamental pillars of this project, whose aim is to create a high-quality product resulting from a complex industrial development process. LWS is a system with a high degree of prefabrication, which allows for an additional time reduction at the job site. Additionally, the mechanical assembly of the pieces provides a greater guarantee and durability to the façade system, reducing imperfections or installation errors.

The installation of the facade is one of the most revolutionary aspects of it. This process can be divided into five different steps:

**Step 1:** Attaching the vertical tracks to the structure of the existing building

The first step consists of installing the vertical tracks in a perfect vertical line. These should be fixed, preferably to the structural floors of each plant, providing a continuous cavity behind the ventilated facade.

Step 2: Installing the thermal insulation

Once the vertical aluminum tracks are placed the thermal insulation layer is installed. The insulation must be placed continuously, to avoid thermal bridges.

Step 3: Assembling the shutters into panels

The facade panels arrive at the site assembled in smaller sections. They are then joined together with an automatic seamer and they are then stacked. **Step 4:** Raising the shutter panels along the tracks

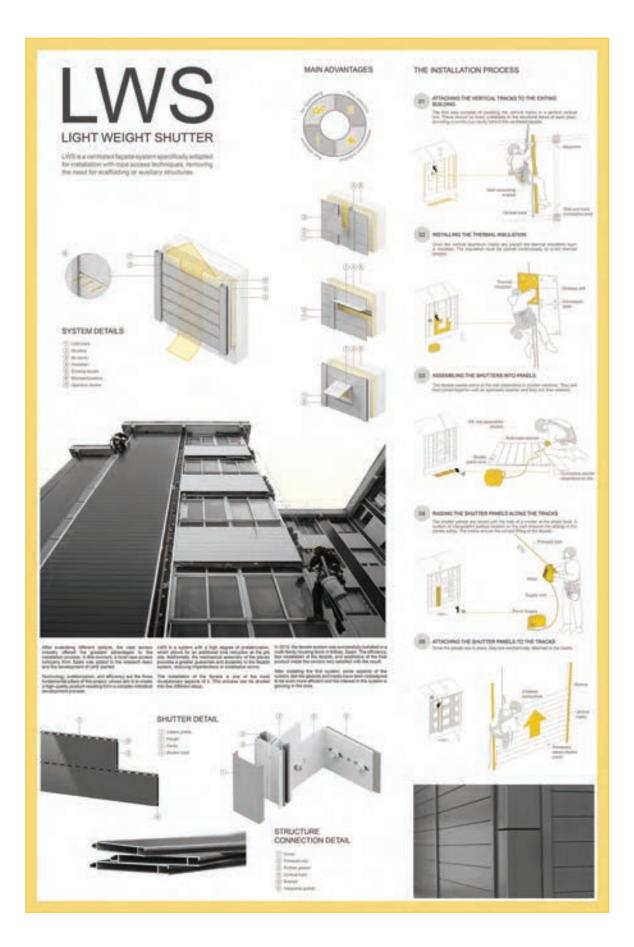
The shutter panels are raised with the help of a worker at the street level. A system of triangulated pulleys located on the roof ensures the sliding of the panels safely. The tracks ensure the correct lifting of the facade.

**Step 5:** Attaching the shutter panels to the tracks

Once the panels are in place, they are mechanically attached to the tracks.

In 2015, the facade system was successfully installed in a multifamily housing block in Bilbao, Spain. The efficiency, fast installation of the facade, and aesthetics of the final product made the owners very satisfied with the result.

After installing the first system, some aspects of the system, like the gaskets, and tracks have been redesigned to be even more efficient. Since then, the interest in the system is growing in the area.



### **Ductile Empiricism**

JEREMY FICCA Carnegie Mellon University

Evolving modes of representation and communication continue to redefine the flow of information between designer, fabricator and manufacturer, while nimble means of fabrication recalibrate customization. As various types and scales of design practice reveal, opportunities for strategic collaboration between designer and fabricator abound. The work illustrated is the result of the first phase of a university - industry partnership with a global manufacturer of metal facade systems. Our industry partner sought to capitalize upon the alternate perspective the students and by extension the academy afforded to reconsider the standard metal facade panel that has served as the core of their business. We sought to structure a collaboration that strategically leveraged the material expertise of our industry partner while encouraging structured experimentation by the students, that was initially unconstrained from the myriad of technical and economic considerations associated with building cladding systems. The resultant sponsored course relocated the design process from the studio to the labworkshop, moving design decisions upstream to include considerations of tooling and material processing as inputs for design experimentation. This first phase of the partnership decontextualized the work from the building

façade and the technical challenges of enclosure systems, to provide student teams with sufficient opportunities to develop and refine processes of robotic metal forming.

Our partner was motivated by a desire to use the collaboration to stimulate a broader discussion within their organization about the business model and corporate culture of standardized production. Engaging future architects (students) in processes of procedural and material experimentation provided a means to understand generational values while also providing fresh perspective and vision to products that are often seen as conventional and pedestrian.

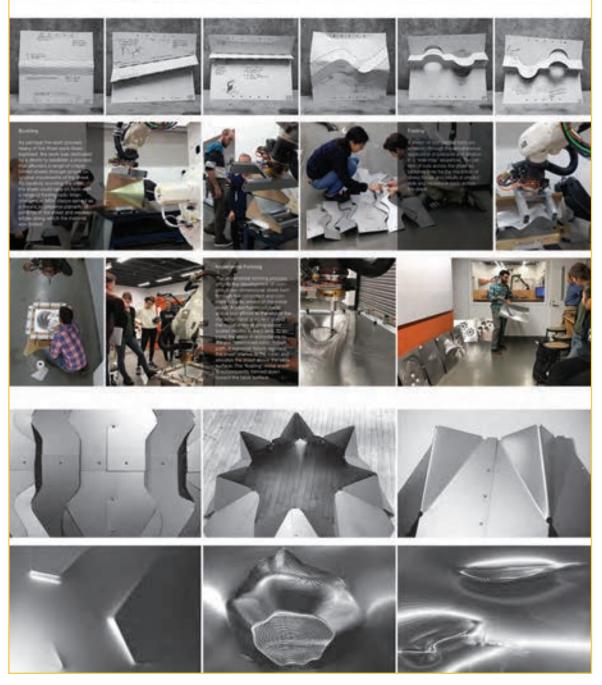
Our collaboration relied upon the robotic fabrication facilities at our university to develop workflows that afforded versioning processes to explore alternative ways of forming metal sheet. Our partnership sought to leverage the robustness and precision of industrial robots to explore a limited number sheet metal forming techniques that, by virtue of their recalibration, afford a subset of formed panels. Simple adjustments in robot tool position, rotation, force, etc. informed the behavior of the material and contributed to a range of possible outcomes or versions. Three distinct trajectories of research emerged that can be described through techniques of folding, buckling, and incremental forming. Each sought to reduce the need for material preprocessing, such as cutting or drilling of the sheets, in order to economize the workflow through the least number of tools or actions while yielding a range of potential versions.

The collaboration provided our student cohort with the perspective and rigor of industry and challenged the frequent desire for ultimate design freedom and its association with complete customization. The fabricated results and dialogue with our partner centered on the establishment and negotiation of constraints that were informed by the design motivations of our students and the seasoned expertise of industry. The partnership served as a means to explore alternative trajectories of design and fabrication that leverage material behavior and high fidelity fabrication to reveal a spectrum of possibilities.



#### DUCTILE EMPIRICISM: Industry sponsored coursework at Carnegie Mellon University Javany Fota

Exploring modes of representation and communication contisous to institute Ten Rise of Internation between designer, fabrication and manufactures, while rentate impacts of biblication resultance calcebrication. As anoises proper part to calce of design primitive transf, reportunities for interace) collecoration between designer and literation observed. The work Reported is the result of the subinary partners data with the result of the subinary partners data with a state of the subinary partners data without mean-ten-ten-or of mult facture optimisting. The resultant counters intoched the design process from the lands of the lab-workshop, moving darged between partners and the state of the subinary partners data if ding approaching the design experimentation. The life partner is reported to design experimentation. The life partner is partners and the subinary diverged and another the landship factories and mitting processes of indication approaching to introduce and the subinary diverged and approximate to develop and mitting opposes of notices and approaching the subinary and the subinary diverged and approaching the subinary diverged means the subinary of pactor reprinters. Distrigues with use including partner transmitté à shared éterent et leveraging the tradicatives and particular de la shared eterent et leveraging the tradicatives and particular de la description of the tradicative star partner de la control toron de resonance part de la control toron de la control toron de memory de la control partner de la control toron de memory de la control partner de la control toron de memory de la control partner de la control toron de memory de la control partner de la control toron de memory de la control partner de la control toron de memory de la control partner de la control de memory de la control partner de la control de memory de la control partner de la control de memory de la control de memory de la control de memory de memor

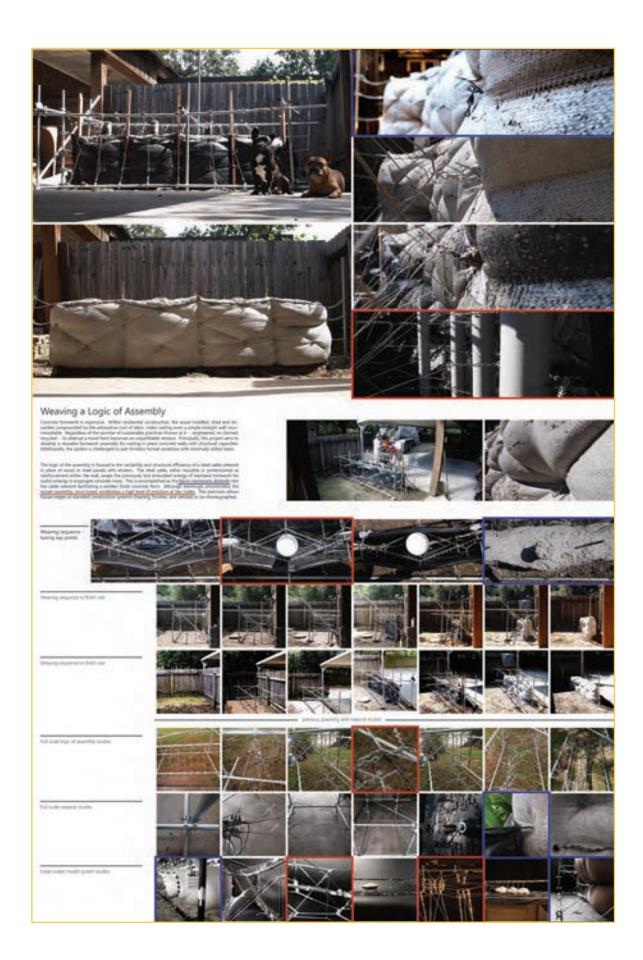


#### Weaving a Logic of Assembly

KRISTOPHER PALAGI Louisiana State University

Concrete formwork is expensive. Within residential construction, the wood installed, shed and discarded compounded by the exhaustive cost of labor, make casting even a simple straight wall insurmountable. Regardless of the number of sustainable practices thrown at it -- engineered, re-claimed, recycled -- to attempt a novel form becomes an unjustifiable venture. Moving away from wood, prefabricated formwork can minimize the cost but drags along baggage of its own. Metal panels demand a strict adherence to standardization for efficiency, while foam blocks only allow the structural integrity to blend with heavenly thermal results by completely masking the poetics of a concrete finish. And digital fabrication's tolerances shine bright but we are lying to ourselves if we believe it will illuminate the other 99% of construction. Principally, this project aims to develop a reusable formwork assembly for casting in place concrete walls with structural capacities. Additionally, the system is challenged to pair limitless formal variations with minimally skilled labor.

The logic of the assembly is housed in the variability and structural efficiency of a steel cable network in place of wood or steel panels with whalers. The steel cable, either reusable or pretensioned as reinforcement within the wall, swaps the previously lost embodied energy of standard formwork for useful emergy in engorged concrete mass. This is accomplished as the fabric membrane distends into the cable network facilitating a swollen finish concrete form. Although seemingly uncontrolled, the woven assembly, once tuned, establishes a high level of precision at key nodes. This precision allows future stages of standard construction systems (framing, finishes, and utilities) to be choreographed.



#### **Metabolic Tectonics**

SALLY MILLER University of British Columbia

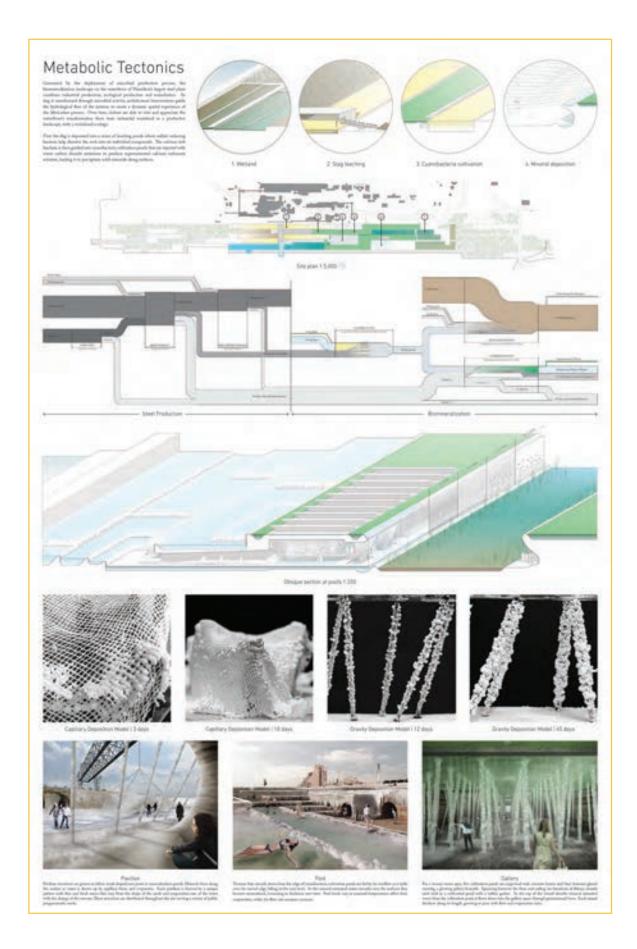
Historical conceptions of architecture view buildings as static artifacts within the everchanging global network of natural, economic, and social processes. In most cases, our built environment resists rather than accommodates these ever-changing conditions, necessitating intensive renovation or redevelopment. More fundamentally, the realm of design is thought to neatly conclude with the completion of the building, thus rendering off-limits processes of subtraction, reconstruction, succession and change.

Modern industrial processes, and the static, standardized, mass-produced nature of the building materials resulting from them, further accentuate this paradigm. While modern industry gained its vitality by destructively and carelessly externalizing ecological and social harms, new paradigms in industry—ecological paradigms—instead seek to participate in ecologies in a conscious and intentional manner.

A dynamic tectonic approach is one architectural analogue of this fundamental shift in industrial production. This approach looks beyond the form and properties of building materials to the systems in which they participate, harnessing metabolic processes to open new realms of design. Consequently, architecture must be reconsidered as a continuous process, rather than an artifact with a designed end state. By doing so, processes of change and renewal could be inhabited, making construction process an integral and ongoing part of spatial experience.

In this strategy, the role of the architect is repositioned as historically understood. By engaging and orchestrating the agency of a diverse field of both human and nonhuman entities; new ecological impacts, new modes of practice, and new aesthetic expressions can be generated, ones that change and evolve with the life of the city, the site and their processes. Metabolic Tectonics is this synthesis of industrial, ecological and architectural processes. Through the lens of de-industrialization in North American cities, a metabolic tectonic approach is explored through the potential relationships between industrial byproducts and metabolic processes. Inspired by the global natural processes cycling nutrients through the interaction of biotic and abiotic factors, a dynamic material system is developed transforming steel slag and carbon dioxide into a biomineralization landscape, where ecological production processes serve as spatial generators of architectural experience.

Explored at scales ranging from the urban, to the body, to the molecule; physical models of material deposition behaviour led to the development of architectural interventions that guide the hydrological flow of the systems to create a dynamic spatial experience of the fabrication process. Over time, visitors are able to visit and appreciate the waterfront's transformation from toxic industrial wasteland to a productive landscape, with a revitalized ecology. Generated by a tectonically focused design process, the architect's role is redefined as a generator of systems with particular capabilities rather than just a spatial artifact. Design agency is shared, as natural forces intervene in the system, providing opportunities for selectively relinquishing portions of control to other entities and processes. Thus, architecture is reconceptualized as a system of tectonics capable of generating dynamic spatial experiences over time, fostering a new understanding of production: industrially, ecologically, and-ultimately-architecturally.





## MEDIA INVESTIGATIONS

#### Synthesizing the Gaseous State: Mapping the Geographic Convergence of Knowledgee

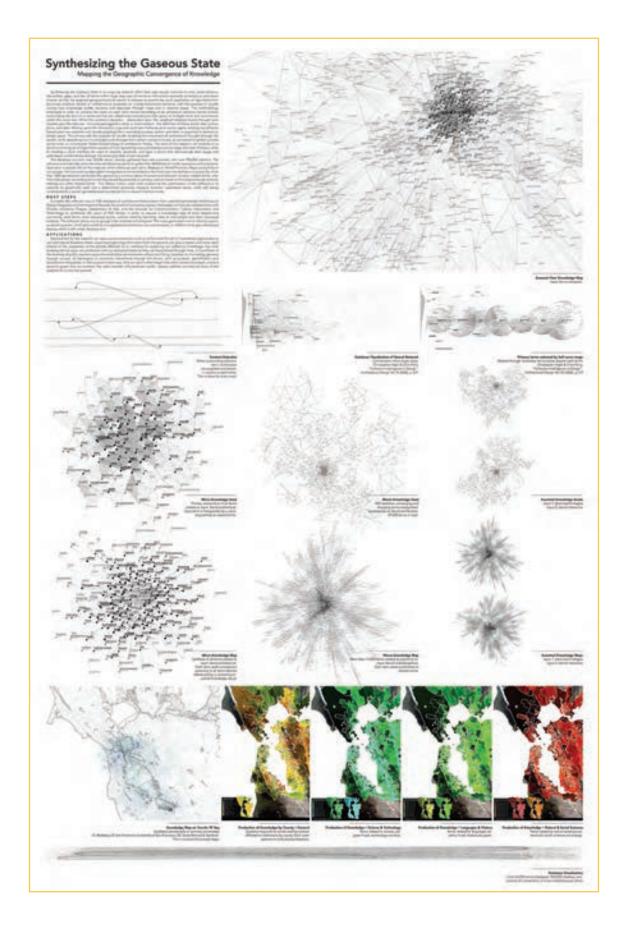
#### ALEJANDRO MIESES

Pontifical Catholic University of Puerto Rico

Synthesizing the Gaseous State is an ongoing research effort that uses neural networks to map word relations, hierarchies, gaps, and foci of terms within large data sets of architecture and urban theory, as they are graphed geographically by epoch. It chooses to extend the usual application of algorithms from structural, physical, spatial, or mathematical purposes, to include theoretical concerns. The methodology employed in order to achieve this relies on each term stored according to its contextual relations (words directly surrounding the term in a sentence) that are referenced according to their place in multiple texts and occurrences within the same text. While this context is dynamic, as dependent upon the weighted relations traced through texts loaded upon the data set, it is balanced against a static or fixed context - the definition of these words, their author, place, and date. Relying upon the information acquired, each term behaves as an active agent, seeking out relations based upon new contexts and visually graphing them according to place, author, and date, as opposed to abstract or empty space. This comes with the purpose of visually revealing the movement of architectural thought through the terrain, while describing how it converges and diverges from certain concerns locally, as compared to global currents across time, as a Computer Aided Epistemology of architecture theory.

The fitness criteria used while evaluating the optimization of the software is its capacity to graphically seek out a determined proximity measure between associated terms, while still being constrained to a certain latitudelongitude range in position, associated with the author's affiliated institutions.

Currently the software uses a 1GB database of architecture theory taken from assorted periodicals (Architectural Design Magazine and Architectural Record), for proof-of-concept purposes. Next steps will include collaborations with Charles University, Prague, and the ICCIT University of Toronto, to synthesize 20+ years of PhD theses, in order to acquire a knowledge map of most related and commonly used terms, most discussed topics, authors cited by hierarchy, sites of intervention and least discussed subjects. The software allows any language to be entered and analyzed. Applications for this can span various scenarios, such as: a) the need for aid in traumatized regions due to war and natural disasters where, acquiring/organizing information from the ground, can give a clearer and more rapid picture of the necessities of the people affected, as these are instantaneously built into a database b) an interface for exploring our collective knowledge, the most pressing stimuli upon our profession and our obscured topics as they are hierarchized through time, c) a synthesis of the diversity of public opinions upon the built/urban environment without sacrificing variables, or channeling opinions through surveys, d) ideological or economic movements through the terrain, such as protests, gentrification and educational inequalities, in data-substantiated ways, that can give further insight into other statistical analysis, and e) a dynamic graph that can connect, the user's interest, with particular places, authors, or historical facts, of the subjects he or she has queried.



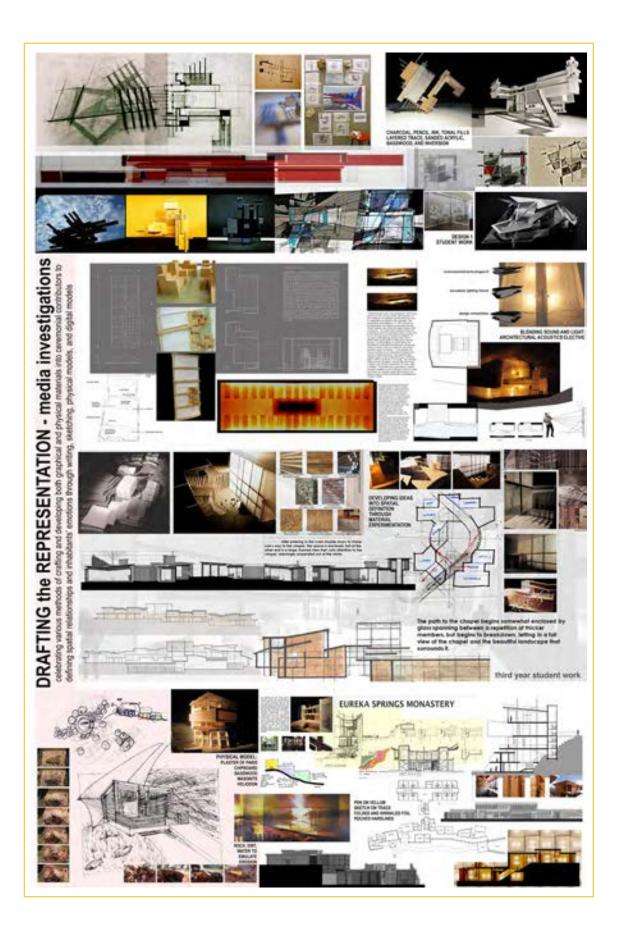
### **Drafting the Representation**

**DANIEL BUTKO** University of Oklahoma

Architecture is experiential, allowing human interaction within the inhabitable space between materials. The sensory qualities of space and materials are intrinsically linked to the medium of representation during design phases. Selection of pen, pencil, layering, color, contrast, and texture are the result of design concepts manifest into physical and tangible decisions which influence aesthetics, acoustics, and haptic qualities of the built environment. Millennial students can be challenged to expand the experience beyond the computer screen with physical materials, manipulate those materials, and synthesize physical constructs into digital variations and iterations. Simple exercises like smearing graphite on various types of paper, altering contrast of black and white photography, manipulating translucency of colors, juxtaposing grids to discover hierarchy, or flipping between plan and section can quickly help students see immediate results from intentional interaction. Continued experimentation with physical materials such as mixing various sizes

of aggregate, adhesive, and water to visualize and graphically represent erosion; experimentation with wood species and trace paper to develop lighting and acoustical diffusion; or pouring Plaster of Paris into forms vs. coating materials with joint compound to create surface texture exposes students to the sometimes messy yet creatively productive process of physically working through material selections. Drafting is merely the draft; it takes physical built constructs to convey the full vision of the concept. As Marshall McLuhan popularized, "the medium is the message."

This presentation celebrates various methods of crafting and developing both graphical and physical materials into ceremonial contributors to defining spatial relationships and inhabitants' emotions through writing, sketching, physical models, and digital models.



## **Unfinished Business**

**ERIK HERRMANN** University of Michigan

Drawing implies leaving out.
Max Liebermann

"Unfinished Business" is a forensic investigation of incompleteness in canonical architectural representations.

Representations are - by their nature - particular in vantage, technique and content. While much can be said of what a drawing or model shows us, it might be more productive to consider what they omit, occlude or obscure. What exactly is happening behind that wall, around the corner or just out of frame?

The course began with the gathering of building 'fragments' - existing documentation in the form of plans, sections, elevations, axonometrics and oblique projections. These fragment were then collaged in incomplete compositions that interrogated representational "gaps," in the documentation. Following this step, elements and details were added back into the fragmented composition, while carefully maintaining a balance between completeness and incompleteness. Finally, the space of these two dimensional compositions was remapped to 2 1/2 dimension relief models. While translation of major elements from the drawings occurred, students ultimately speculated on ways to "fill in" representational omissions.

As analytic and projective constructs, these works explore strategies of omission, deletion, redaction and fragmentation in representation. The drawings and models produced in this course work consider incompleteness as a productive tactic in architectural representation, acknowledging that any representation of an architectural work that is not necessarily deficient or inadequate, but simply incomplete.







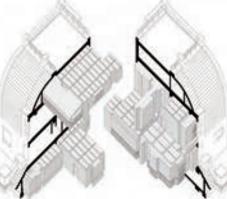


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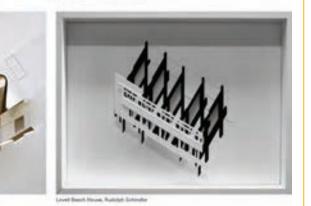
"Littrated Burness" is a foresso meetigeture of

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mine theme. Adult Look, Drawn



### Born to See, My Task Is To Draw: Cultivating Architecture Intelligence Through Observation and Hand Drawing

HENRIQUE M. HOUAYEK Clemson University

The process of graphic transformation of the environment onto a two dimensional page, acts for architects and students as an explicit and remarkable analytical and design tool, and as a way to develop a higher sense of details and architecture sensibility, architect Michael Graves in his 2012 New York Times article Architecture and the Lost Art of Drawing,<sup>1</sup> explains processes of hand drawing in design as "most powerful means of conceptualizing and representing architecture" and how today it has become an generational gap. As interesting as new design technologies are, and important to the overall evolution of architecture teaching and practice, there are important aspects of cognition, creativity and tactile design processes which may be improved with observation, Attention and hand drawing, moreover develop in architecture students a strong design potential, what we shall refer as Architectural Intelligence, this concept can be described as the mental projection of form and space which occurs cognitively when we clarify the mind and thought while in the explicit act of creation and design process.

This class looks at architecture observational drawing as a tool and method to develop attention and creativity. It raises the hypothesis that extensive hand drawing exercises will improve the students' ability to observe the world, understand architecture and act upon it with design creativity, when tactile overcomes virtual. Such experience is enriched with a real time building sites and places, not via virtual images, but by traveling, walking and discovering new environments, all important aspects of an architect's education and its aesthetic discovery.

If we can define concepts of what constitutes intelligence, and how it relates to creativity within the realm of architecture design, perhaps we may be able to understand how to cultivate Architectural Intelligence within students and, redefine and re-envision different methods for designing and teaching architecture.

Instead of just a statement of technique, artistic value or culture, sketching explores and helps students justify a proper project choice, an approach, or argument, a way to set a commitment within the realm of architectural choices. A significant part of the students learning process: to understand all together tectonics, space, history and theory trough this aesthetic practice. Drawing potentiates a narrative which improves Architectural Intelligence, drawings specially on site observation activates the subject into a memory driven exercise because subjects engage visually and verbally in a set of multiple components, this process can be broke into these iterative cyclical steps: (a) Being in Place, (B) Observing, (c) Attention, (D) Mentalizing, (E) Sketching and (F) Understanding.

The class methodology requires from students that they must draw nearly every day, these drawings can either be very detailed or more free hand: a process which with time and practice builds confidence and skill in observation and graphic representations towards the understanding of context, scale, and space. The exercises start with students identifying the building/place main visual characteristic, to walk and engage in their space they are encouraged to observe for a long time the same object in detail or depth and then start to record their thoughts into graphics.

#### NOTES

 GRAVES, Michael. 2012. "Architecture and the Lost Art of Drawing." New York Times, September 02, page SR5.



Media Investigations

## **Primitive Drawings**

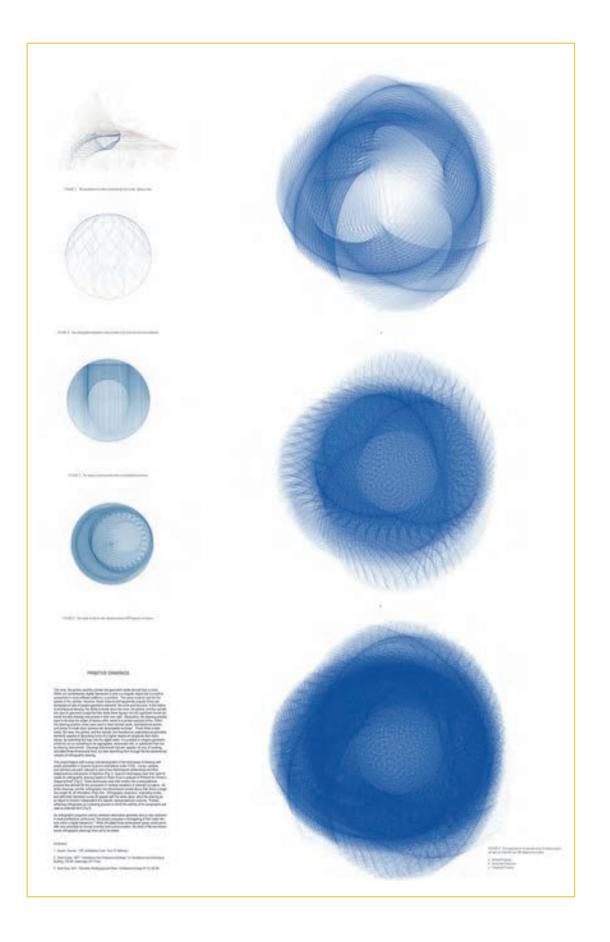
MARK ERICSON Woodbury University

The cone, the sphere, and the cylinder are geometric solids derived from a circle. Within our contemporary digital framework a cone is a singular object that is a built-in component in most software platforms, a primitive. The same could be said for the sphere or the cylinder. However, these massive and apparently singular forms are composed of sets of simpler geometric elements: the circle and the point. In the history of architectural drawing, the ability to break down the cone, the sphere, and the cylinder into specific geometric properties has made these figures not only significant formal elements but also drawing instruments in their own right. Stereotomy, the drawing practice used to develop the shape of stones within vaults is a central example of this. Within this drawing practice cones were used to draw toroidal vaults, hemispherical domes, and simply to break down spheres into developable surfaces. These three simple solids, the cone, the sphere, and the cylinder can therefore be understood as geometric elements capable of describing forms of a higher degree of complexity then themselves. By extending this logic into the digital realm, it is possible to imagine geometric primitives

not as something to be aggregated, intersected with, or subtracted from but as drawing instruments. Drawings instruments that are capable not only of creating simulated three-dimensional form, but also describing form through flat two-dimensional variants of orthographic drawing.

This project begins with the study and development of the techniques of drawing with solids exemplified in Guarino Guarini's Architettura civile (1735). Cones, spheres, and cylinders are each reduced to sets of two-dimensional relationships and then redeployed as instruments of distortion. Guarini's techniques were then used to create an orthographic drawing based on Robin Evan's analysis of Philibert de l'Orme's chapel at Anet . These techniques were then written into a computational process that allowed for the production of multiple variations of distorted curvature. All of the drawings, are flat, orthographic two-dimensional constructions that utilize a single line-weight for all information. Orthographic projectors, originating circles, and deformed nameless curves all appear with the same value, allow the drawing as an object to function independent of a specific representational outcome. Thereby reframing orthography as a drawing process in which the entirety of its components are read as potential form.

As orthographic projection and by extension descriptive geometry face a near extinction in most architecture curriculums, this project proposes a reimagining of their basic tenants within a digital framework. While simulated three-dimensional space continues to offer new potentials for formal invention and communication, the limits of flat two-dimensional orthographic drawings have yet to be tested.



### Ashammalexia

KIMBALL KAISER University of Michigan

BRADFORD WATSON Montana State University

The American Indian Culture as Design project seeks to take a detailed ethnological/anthropological study of the Crow Tribe's traditional culture and identify opportunities for an alternative mindset in terms of architectural design and planning. The project aims to discover multiple aspects of traditional culture more rooted in the region of Montana that can similarly be applied and used to generate a more appropriate current context for design in the region. Accomplishing this task includes leveraging more appropriate uses of passive strategies, site planning, community planning, and regional cultural significance to persuasively address existing strategies that may be misplaced. The tools used to accomplish these goals were a series of literature and systematic drawings and analysis.

The drawings included are connected bodies of study in a series. While most of the line work and imagery are done by hand, the digital supplements the work by representing itself in acetone transfers, custom laser cut templates, and stickers.

The decisiveness of the chosen mixed medium leads to a certain set of advantages. The thought process can be erratic since one side of the page can be worked on and then later be left incomplete to jump to another opposite side of the page. This also changes the way the scale of the drawing is constructed since the operator can then jump to a different layer of information that may cover the entire sheet. Therefore, a drawing can piece together slowly or all at once. This dynamic process also leaves interest in how things are potentially constructed due to the fact that pieces and parts do not necessarily end up being what they originally intended to be. Additionally, some pieces could be left unfinished for various reasons and actually mean something else than its imagined purpose, changing the way things relate to each other compositionally.

There are three drawings in the study set: History of the People/Land, Driftwood Lodges: Social Structure, and Application to the Grid.

#### History of the People/Land

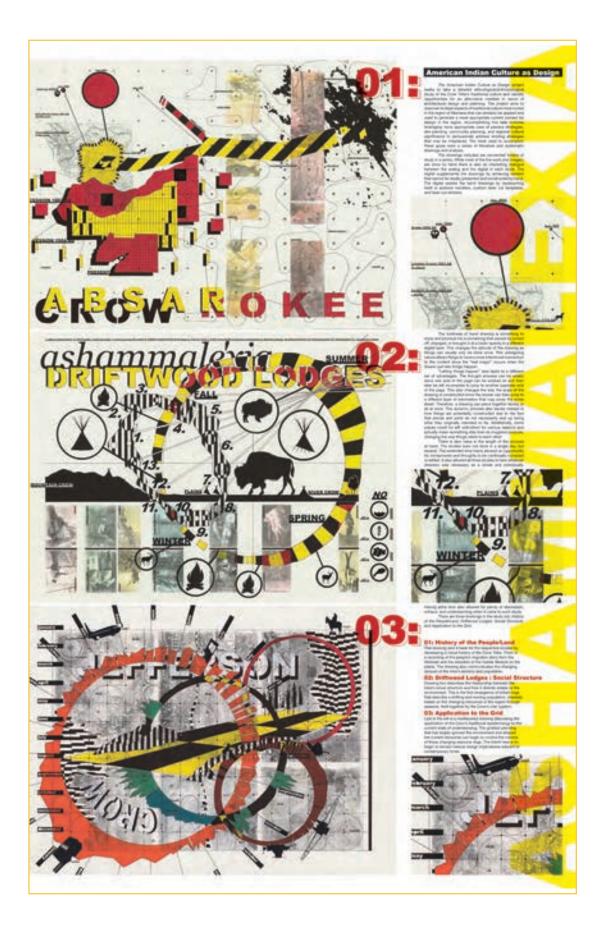
This drawing sets a base for the sequential studies by developing a visual history of the Crow Tribe. There is a recording of the people's migration story from the Midwest and the adoption of the mobile lifestyle on the plains. The drawing also communicates the changing amount of the tribe's territory and population.

#### Driftwood Lodges: Social Structure

Drawing two describes the relationship between the tribe's social structure and how it directly relates to the environment. This is the first emergence of linked rings that describe a shifting and moving population, intensely based on the changing resources of the region through seasons, held together by the Crow's clan system.

#### Application to the Grid

Last in the set is a multilayered drawing discussing the application of the Crow's traditional epistemology to the current state of understanding. The gridded planning that has largely ignored the environment and shaped the current discourse can begin to involve the notions of these changing resource rings. The intent here is to begin to extract various design implications relevant to modern times.





# URBANISM

### Safety Not Guaranteed

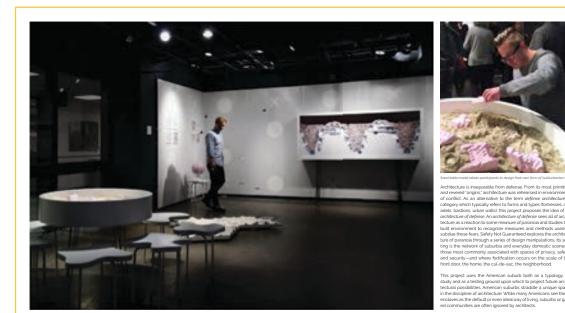
ASHLEY BIGHAM University of Michigan

Architecture is inseparable from defense. From its most primitive and revered "origins," architecture was rehearsed in environments of conflict. As an alternative to the term defense architecture, a category which typically refers to forms and types (fortresses, citadels, bastions, urban walls), this project proposes the idea of an architecture of defense. An architecture of defense sees all of architecture as a reaction to some measure of paranoia and studies the built environment to recognize measures and methods used to subdue these fears. Safety Not Guaranteed explores the architecture of paranoia through a series of design manipulations. Its setting is the network of suburbia and everyday domestic scenes—those most commonly associated with spaces of privacy, safety, and securityand where fortification occurs on the scale of the front door, the home, the cul-de-sac, the neighborhood.

This project uses the American suburb both as a typology for study and as a testing ground upon which to project future architectural possibilities. American suburbs straddle a unique space in the discipline of architecture. While many Americans see these enclaves as the default or even ideal way of living, suburbs or gated communities are often ignored by architects. The ubiquitous nature of the spaces leaves little room for imagination or provocation. It is for this very reason that this project sought to tackle the American suburb as a site, to mine the generic typologies of suburbia to its advantage. In addition to observing the defensive stances of individual houses, gates and circular cul-de-sacs, suburbs offer specific examples of contemporary fortification. Residents in suburbs clearly mark their territory with fences, often battling with neighbors over inches. Front porches have been replaced with backyard decks which offer increased privacy and a socially accepted method of interacting with (or avoiding) neighbors. Large gated communities host a network of distributed centers-club houses, golf courses or swimming pools—and clearly defined but physically weak periphery boundaries, such as gate houses, fences and security checkpoints.

Since its development in the 1820s, the American suburb has been embedded with social aspirations about the nuclear family, gender norms, religion, inclusiveness and maybe most importantly, exclusiveness. As of the year 2000, more Americans live in suburbs than in either central cities or rural areas combined. American suburbs have slowly developed into enclaves defined by gates, fences, berms, and other forms of defensive origin. In most cases, gated communities provide only the illusion of protection. Public space has been replaced by the shopping mall, a type which feels public but precludes many by its location removed from the urban centers, inaccessible by public transportation or in areas where vehicular traffic makes walking or cycling dangerous, or at the very least, unpleasant. Suburban enclaves are spreading throughout the world as cities co-opt forms of American suburbanization in response to local socio-economic shifts and perceived or real physical threats.

The three models in this exhibition project possible pasts, presents and futures in order to understand through subtle distortions how paranoia shapes our world. Rather than offering a single solution to the problem, it offers a new lens through which suburban fortification can be understood and "hacked" by designers. The project offers a glimpse into the world of military tactics deployed in the most typical environs.













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### SAFETY × NOT GUARANTEED





### Site Spectacle Seed Sprout

ELISE DECHARD Cranbrook Academy of Art

SY BODSON Cranbrook Academy of Art

Site Spectacle Seed Sprout is a conceptual proposal to initiate a more socially conscious approach to deconstruction and urban renewal in the city of Detroit. The project provides an alternative response to the current city-center based system with its traditional top-down, trickle-down development models, inadequate demolition program, and slow, scattered blight beautification.

Site Spectacle Seed Sprout starts from the field condition of empty houses and lots interspersed with inhabited homes that characterizes many Detroit neighborhoods. We contend that these scattered "voids" are not vacuums, but a collection of resources ready to be reused-first: space, empty or available; second: material, in various degrees of re-usefulness and salvageability; third: potential energy, the first two combined with the energy of existing community and momentum towards a new future. Similar to a log cabin built from the trees around it, or the ecology of that same forest repurposing decaying elements as fertilizer for new growth, we believe that the future of the city can be planted from materials already existing.

We propose a simultaneously orchestrated deconstruction of houses across the city, an urban plan in action, a continuum from site to spectacle to seed from which the new city will sprout. The process of removal is not a fixed end but a series of beginnings—techniques and tactics for manipulating existing built forms—that can be repeated continually to create a dynamically changing urban landscape. The programmatic seeds aim towards sustainable self sufficiency and a dispersed network of urban activity to maintain the city's current size as viable. Throughout the process, Site Spectacle Seed Sprout transforms a labor usually taboo and hidden into a scattering of house-shaped luminaires, glorifying the process of the city's metamorphosis. The houses metamorphosed juxtapose new use with physical memory, collapsing time in a single place.

Traditional development models involve local residents only as fodder for planning charettes while actual decision making is done from above. Site Spectacle Seed Sprout instead puts the city's renaissance directly in the hands of the community. The project takes form as a manual for community enfranchisement, a series of instructional documents straddling the line between IKEA and Sol LeWitt that give neighborhoods the tools to build their own futures.

Six seed typologies—ranging from social to sustainable to entrepreneurial—each entail a specific unbuilding process and resultant form. Residents are trained and supported by the city as they perform deconstruction. The remaining structure, materials, and proceeds from any salvage or scrap sales are theirs with which to rebuild. Local ownership of redevelopment promotes ongoing stewardship. Dependence on Detroit for utilities, social services, and even transportation is reduced as individual communities are strengthened and reinvigorated.

We contend that by reconsidering normative renovation and creative deconstruction happening in the city, the two can be combined to increased polemical effect and greater community good. We propose that through a system of acupunctural seeding and rhizomatic planning, we might invent a form of urban renewal that strengthens existing communities to resist both peripheral atrophy and choking gentrification. Lastly, we believe that the most effective and responsible way to revitalize a city is through its people. We present Site Spectacle Seed Sprout. It is not ruin porn, and it is not historic preservation. It's a future in which regrowth and healing go hand in hand through a process of decompositional regeneration.



## **Dimensions of Urbanism: Urban Blocks**

**CHRISTOPHER M. PIZZI** Academy of Art University

#### AN INCREMENT OF URBAN GROWTH + REPAIR

At the intersection of architecture, urban design and master planning, the urban block forms the most useful increment of urban growth and simultaneously urban repair. The urban block is flexible and resilient, one of the oldest and most important elements of city building. In a city plan the urban block is a semi-private domain that defines the quality, shape and character of urban public space on all sides. For this reason, the dialogue between the design of the private realm and the public realm is of critical importance to the future of cities, and the design of the urban block sets the rules, boundaries, and parameters for this exchange. The urban block creates a formal and spatial system which is complex and dynamic. The urban block is architectural in scale and solution, and is one of the twenty-first century's great design challenges. Understanding urban blocks is a key to unlocking the puzzle of the responsible design, development, construction, and operation of cities.

#### COMMUNITY STRUCTURE

Urban blocks express a formal approach to structuring community and society. From the English garden cities to the German seidlungs. From the Standard blocks extracted from the National Land Ordinance of 1785's Continental Grid to the courthouse squares of Texas, to the California mission towns that followed the Laws of the Indies. Urban blocks provide a framework for design expression while limiting the extent of any single expression, as lamented by Rem Koolhaas in Delirious New York.

#### THIS TYPOLOGICAL STUDY

This is hardly a collection of city planning's greatest hits, comforting standards, and onehit wonders. Rather, this comparative study of precedent is a working tool for understanding existing places and designing new ones. It forms an open set or questions, a graphic introduction to the built environment's response to the potent contemporary issues of density, housing, floor area ratios, open space access, and mobility choices. How has land planning contributed to the housing crisis? What building types work well with onsite parking? Can common open space be safe and secure?

#### PRELIMINARY FINDINGS

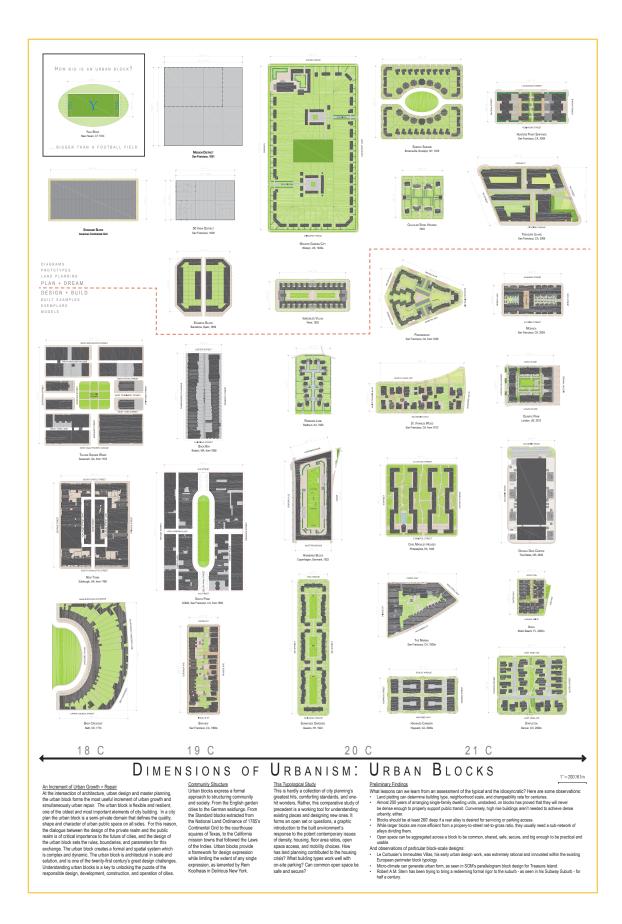
What lessons can we learn from an assessment of the typical and the idiosyncratic? Here are some observations:

- Land platting can determine building type, neighborhood scale, and changeability rate for centuries.
- Almost 200 years of arranging singlefamily dwelling units, unstacked, on blocks has proved that they will never be dense enough to properly support public transit. Conversely, high rise buildings aren't needed to achieve dense urbanity, either.

- Blocks should be at least 260' deep if a rear alley is desired for servicing or parking access.
- While larger blocks are more efficient from a propery-to-street net-to-gross ratio, they usually need a sub-network of alleys dividing them.
- Open space can be aggregated across a block to be common, shared, safe, secure, and big enough to be practical and usable.

And observations of particular block-scale designs:

- Le Corbusier's Immeubles Villas, his early urban design work, was extremely rational and innovated within the existing European perimeter block typology.
- Micro-climate can generate urban form, as seen in SOM's parallelogram block design for Treasure Island.
- Robert A.M. Stern has been trying to bring a redeeming formal rigor to the suburb as seen in his Subway Suburb - for half a century.



### Ungrounding the Rural: Four Grids for the Great Plains

**ROY C CLOUTIER** University of British Columbia

NICOLE SYLVIA Independent Scholar

Beset by intense forms of flux and indeterminacy—from climate change to dramatic population shifts, from rapid technological change to intense economic restructuring—the contemporary challenges of global hinterlands profoundly challenge inherited conceptions of control and order in architecture and urbanism. Ever-more subject to urban processes yet too often left out of theorization on the urban, the rural today can act as a potent site of architectural and urbanistic speculation taking its intense forms of environmental and demographic change as new grounds on which to expand disciplinary understandings of order, indeterminacy, and systems.

Thus, the question becomes: what are the new grids—new diagrams of control, new structures for reconciling intention and indeterminacy? How might we conceive urban and spatial orders that go beyond merely tolerating to actively harnessing changing conditions, opening themselves to an ongoing becoming and self-redefinition? How might architecture open itself to the multitude of other agencies at play in any system, beyond those of the architect-as-author?

This project is a speculation on four such New Grids, each of which directly cues architectural and territorial order to intense forms of change—on one hand, environmental conditions in dramatic flux due to climate change; on the other, the spatial practices of emergent social collectives—stitching them together to speculate on new modes of inhabitation and alternative urbanisms in the Great Plains.

#### I. SATURATED ARCHIPELAGO

The first Grid cues itself to the shifts in precipitation caused by a warming climate: increasing drought, violent storms, and intensified flooding. The project reorients settlement around a massively-decentralized network of water-retention landscapes, distributed along the many tributaries of the region. These aggregate to form a thick, saturated territory that captures and stores floodwater prior to flow formation—in the process providing an infrastructure for new patterns of inhabitation and alternative economies.

#### **II. 'BELT-TIGHTENING**

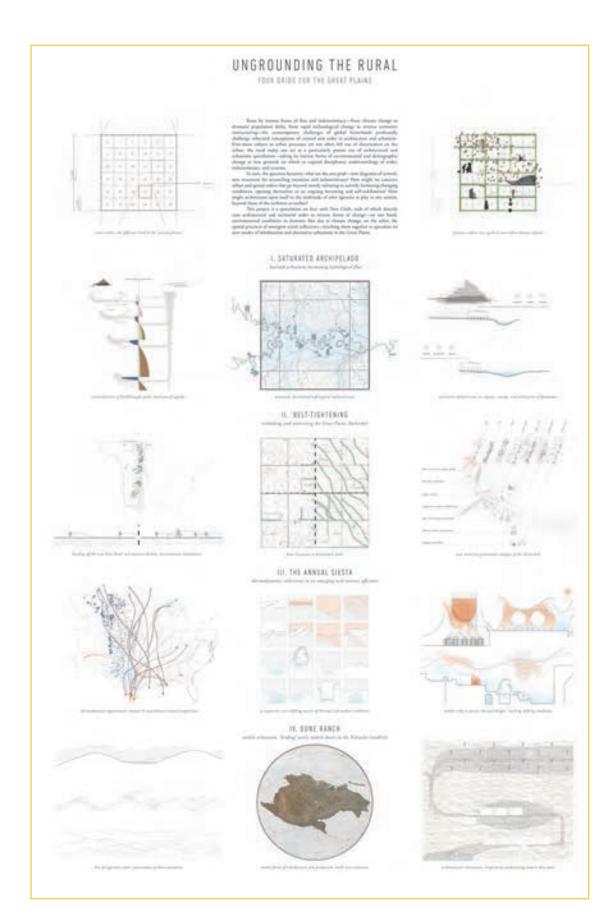
The second Grid reimagines the Great Plains Shelterbelt of the 1930s—just as rising temperatures and declining soil moisture threaten the viability of the region's farms and the first round of trees begins to fail. This project reorients and intensifies the Shelterbelt concept: rather than aligned to the abstract order of the Jefferson Grid, cued directly to its bioclimatic effects; rather than as a singular intervention, a self-sustaining process of planting, harvesting, and reorientation; rather than merely trees, an open-ended platform for a host of timber-oriented uses.

#### **III. THE ANNUAL SIESTA**

The third Grid operates in the temporal territory of the 'growing-season gap': an emerging mid-summer offseason in which high temperatures are higher than cash crops can withstand. In an inverted miniature of winter offseason migrations, the project takes advantage of abandoned quarries to create a distributed network of passively-cooled spaces, serving as ritualized refugia of collective gathering during this time.

#### **IV. DUNE RANCH**

The fourth Grid inhabits the Nebraska Sandhills—a territory soon in flux again, as the warming climate stresses to failure the fragile mat of grasses holding the dunes in place. Dune Ranch is a triple-entendre: one part the ranching and herding of dunes themselves by a network of architectural devices, one part sustaining and transforming the region's existing cattle-ranching practices in the context of newly-mobile dunes, and one part a play on the idea of a 'dude ranch' as a place where urbanites in search of 'authentic' proto-rural life can indulge in the rugged pleasures of agro- and eco-tourism.



### FARMLINE: A Hub for Urban Agriculture in Detroit

GABRIEL KAPRIELIAN Temple University

MARISHA FARNSWORTH Independent Scholar ANDREA GAFFNEY Independent Scholar

JONGHOON IM Independent Scholar

The farm line envisages a different type of urban renaissance for Detroit. With more than one third of the land lying vacant or underused, Detroit has witnessed an inversion of urban and rural conditions. The hinterlands have reclaimed parts of the city, and with it, a strong return to rural agrarian practices has rooted in the communities of Detroit. The Detroit Works Project proposes a new future for Detroit as a region of neighborhoods and productive landscapes. As the saying goes, "All roads lead to Rome." In Motown, all roads lead to the central waterfront.

Embracing the region's rich agricultural history and industrial urbanism, we propose a Central Market Place that serves as the regional agricultural resource center to support the growing urban agriculture movement in Detroit. The Central Market Place will re-purpose existing buildings and parking structures along the waterfront, and underutilized transit infrastructure to build a new place for the region to connect to each other and the waterfront. The Detroit People Mover becomes the Farm Line. The UAW building becomes the Farm House. The Renaissance Center parking structure becomes the Barn.

#### FARM LINE CONNECTIONS

Formerly known as the Detroit People Mover, the Farm Line re-purposes the elevated track into a grazing pasture that winds through Downtown. Rotational grazing provides a constant nutrient re-charge for this unique system of animal husbandry. The stations function as loading, herding, feeding, watering and composting areas. The animals winter in the "barn" and the pasture can be used as a winter walking trail. An extension of the elevated pasture connects the Farm House and the Barn and serves as a gateway to the site.

#### **REGIONAL URBAN AG CENTER**

Program for the Central Market Place includes: a feed store, farming equipment supply center, seed bank, slaughterhouse, grain silo, butcher shop, bakery, flower shop, locallyproduced goods, an apiary, farm-to-table restaurants, a milk bar, a cooking school, demonstration farms and gardens for all scales of the urban farmer. The seed bank specializes in propagating seeds to support the diverse food and cultural landscapes of Detroit.

#### THE NEW MOTOWN: GROWN IN DETROIT

Locals and tourists alike can enjoy the seasons of the Central Marketplace; it will be a great resource for urban farmers and an entertainment and educational venue for everyone. Where else in the world can you walk out of a convention center into fields and orchards? In what other city can you eat at a restaurant overlooking the fields where the vegetables were grown? In what other city can you see cows grazing above the streets of downtown?



### Form-based Code v. Social Segregation in Latin America: The Case of Bogotá

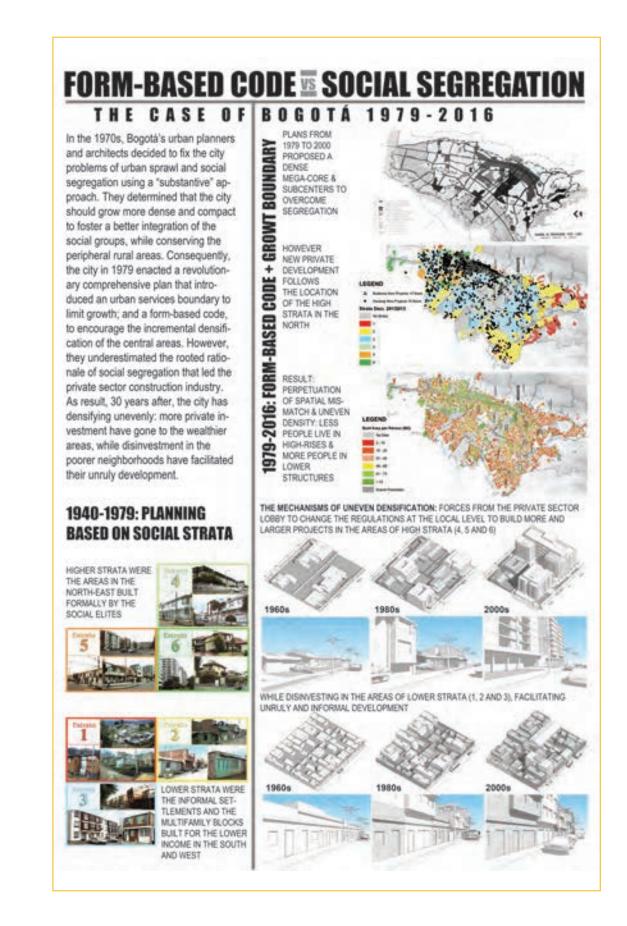
JUAN GUILLERMO YUNDA University of Texas at Austin

From the 1950s to the 1970s, Bogotá, Colombia was one of the fastest growing cities in the world due to extensive migration from the countryside. Because of a lack of development control during this period, Bogotá became characterized by extreme social and geographic polarization between rural migrants and urban elites, which in turn exacerbated the traditional uneven development of the city. Elites primarily located in neighborhoods in the north of Bogotá, well served by municipal infrastructure and enjoying easy access to services and employment opportunities. Low-skilled rural migrants settled in neighborhoods in the south that had poor municipal services and were located in environmentally polluted areas far from the central business districts.

These patterns of social and geographic polarization and uneven development translated into differences in built form, including different sized lots, building footprints and heights, differences in facade elements and materials, and different street, sidewalk and park dimensions. The elite areas distinguished by suburban housing while low-income areas were defined by dense neighborhoods of informal origin and self-help housing. These neighborhoods of informal origin are today home to more than half of Bogotá's population and occupy about a third of the urban area.

Faced with the prospect of continuing, ungovernable urban sprawl led by both the formal and informal sector, in 1979 the city implemented a from-based code and a growth boundary intended to control sprawl, alleviate residential segregation, and densify the central city. However, 35 years later, these policies have failed to halt or reverse the uneven development of the city. This uneven development is manifest in continuing 1) residential segregation, 2) uneven built form patterns and 3) uneven distribution of services and employment.

This research argues that the unintended outcomes of the form-based code are due to private sector interests and actions, which in turn are influenced by the traditional social divisions in the city, institutionalized by equity policies. I focus on the so-called Stratification policy, which is not a planning mechanism but rather a national social policy developed to distribute cross-subsidies from high-income to low-income groups for utility payments. As a social equity tool, Stratification is based on the classification of urbanized land in six different levels, or "Strata," based on building characteristics at the block level. My investigation documents how private sector developers respond to the incentives and disincentives provided through the Stratification system, working also towards influencing planning regulations. For example, Stratification prompts developers to invest more in areas of higher strata, attempting to influence planning processes in order to increase height restrictions in these areas, or in neighboring zones of lower strata. Because of this complex articulation of planning and social policies with private sector interests and actions, Bogotá's low income residents close to the wealthy are in effect experiencing gentrification and dislocation; or opposite, disinvestment and overcrowd when they are away from the high-income areas.



### Front Bay

MARC A. ROEHRLE University of Wisconsin-Milwaukee

The North Avenue Bridge in Boston exemplifies the current discourse relative to infrastructure and urbanism. One which is pertinent to both the academy and the profession. Built in 1908, the utility of this structure has slowly deteriorated over the course of 100+ years. In 2015, the U.S. Coastguard notified the Army Corps of Engineers that its existing structural condition presented a public safety concern. This prompted the city to explore ideas that would improve mobility, currently the bridge links downtown with the quickly developing Fort Point Channel neighborhood, honor its history and create a destination. Our proposal, instead of concentrating on only the bridge, suggests that the entire waterway, the "Cut", be infilled and that a new vibrant neighborhood be built in its place – Front Bay. This development typology is relevant to the morphology of Boston's historical growth patterns where over the course of centuries successive rings of infill have allowed the city to grow. 29 blocks with over 5,000,000 square feet of housing and commercial space on 58 acres of land will knit together Downtown with Fort Point Channel. Where there was once an antiquated waterway, will now be a thriving neighborhood with a distinct character of its own. Because this neighborhood will be developed by the city. it will not have the same financial constraints as if it were privately developed. It will be

economically feasible to develop it with a fabric similar to that of Back Bay where tree-lined streets lined by 4-5 story walk-up buildings work in concert to create a walkable environment. Just as Back Bay has Comm Ave, a linear natural park in an urban setting, Front Bay will have its own linear Park - a one-mile long river walk that recalls the watery history of the site, provides a place for leisure and creates an engineering amenity that addresses storm water issues and rising sea levels. Additionally, this development will tie together the harbor walk that rings the shore of the city. This new 575' Harbor Promenade will include outdoor seating adjacent to commercial space for events and other public activities and provide a new home for the Boston Tea Party Ship, giving it a prominent site on the harbor. This new development will provide much needed workforce housing which aligns with the needs and goal of the city to bring 8000+ people into the heart of the city, while addressing hydrological concerns of a changing global condition. Why build a bridge when you could build a neighborhood?



### URBAN PLAY: An Architecture Studio as Agent in Public Discussion for Minor League Sports in a Medium-sized City

MARLEEN KAY DAVIS University of Tennessee-Knoxville

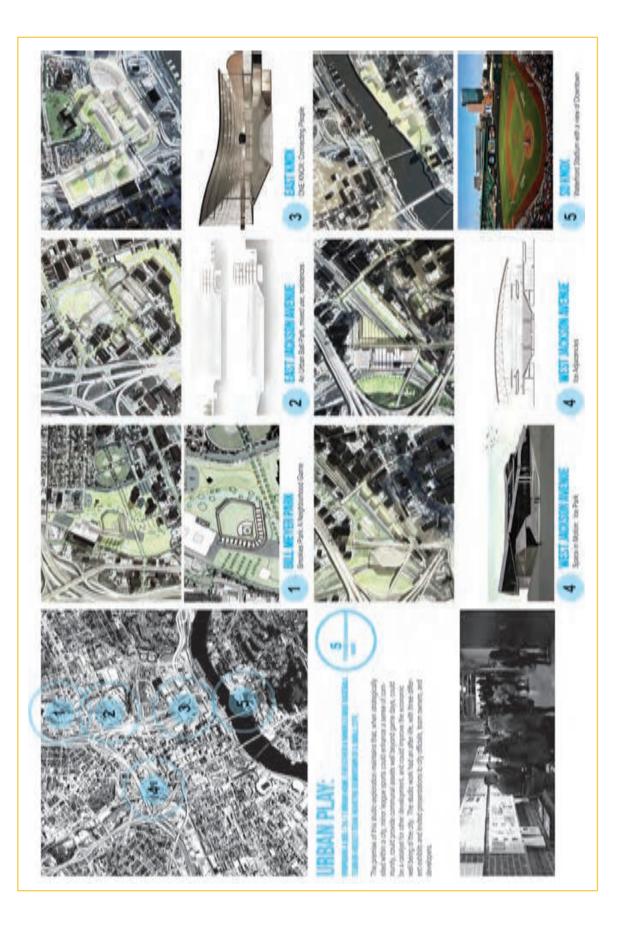
The political agendas of sports scale to different communities. Sports are much more than a "game" and no where is that more apparent than studying access to sports, as a participant or spectator, along the spectrum of youth leagues to professional sports. Local government, in fact, negotiates a difficult terrain in addressing the needs of both sports fans and players. The local level must prioritize infrastructure demands for facilities, arenas, playing fields, parks, parking, and transportation access.

The premise of this design studio is that, when strategically sited with a city, minor league sports could enhance a sense of community, could provide communal assets well beyond game days, could be a catalyst for other development, and could improve the economic well being of the city.

Youth leagues, regional schools, sports clubs, minor league teams, a flagship state university in the SEC, and a nearby county with a robust tourist economy, all compete for limited resources, limited infrastructure and a limited fan base. Decision-making is further influenced by the agendas of a county major, a city mayor, the university, a vibrant "creative class" committed to the revitalized downtown, a nearby African American community that seeks investment but is suspicious of gentrification, "the chamber" of business interests, the nearby tourist region with its lobbying efforts, property owners, not to mention the sports leagues, the teams and team owners themselves. Within the context of a low-tax state, the university, county, and city budgets strain to meet needs, desires, and priorities. A minor league hockey team plays in non-regulation and outdated facility owned by the city and struggles to find a fan base. Since 1909, the local minor league baseball team has had a series of locations, names, and owners, including the family of the former city mayor and now governor. The current owner is the state commissioner of economic development.

Within these numerous conflicting political dimensions, an architectural design studio exploration provides a neutral ground for discussion and debate.

In the context of suspicion and cynicism about hidden agendas in local development, the work of an architecture studio can advance, if not direct, the public debate. As a premise, this studio determined it would investigate potential sites for two different minor league teams (baseball and hockey) within a ten-minute walk of the city's downtown. The teams are perceived as a community asset, located in the heart of the city, not in an island of parking in a preferred suburb. As a challenge, the proposed use of the facilities extended well beyond the limited number of game days, leveraging the investment in facilities as a way to promote community use. The studio work was part of two different exhibits, reaching a broad cross section of interested parties, including the team owners. Outreach grant funding supported part of the studio work.



### A Third Logistical Regime: The Ecological Succession of Industrial Ruins

WILLIAM HUCHTING makeArchitecture Co

PAUL MOSLEY Independent Scholar

The City of Chicago is foremost a logistical node. Incorporated in 1837 at the confluence of the Chicago River and Lake Michigan, the City boomed with the construction of the Illinois and Michigan Canal that linked the Gulf of Mexico to the Great Lakes. This first regime saw raw materials, grain and other agricultural goods shipped from Chicago, seat of the rich midwestern farmland, to hungry eastern markets. The second regime was the introduction and development of the railroad. Chicago was the nexus where railroads from the east and west met. Warehouses and factories were built adjacent to the railroad yards and Chicago emerged as a transportation and manufacturing colossus. The Midland Warehouses are one such example. Built on what is now a Union Pacific railroad vard, the Midland Warehouses allowed rail cars to enter the building and unload their cargo.

During World War I, the nearby Montgomery Ward warehouses—mail order giants second only to Sears and Roebuck—were coveted by the military as a means to store goods on their way to the fight in Europe. Thus, the logistical genome or DNA of the enterprise came full circle and returned to its military roots. As Susan Nigra Snyder and Alex Wall pointed out in their seminal essay "Emerging Landscapes of Movement and Logistics," these nineteenth century distribution centers are being supplanted by new, much larger ones at the outskirts of urban areas. Amazon, UPS and Federal Express have emerged as giants of the twenty-first century order. They have built large state-of-the-art distribution nodes centering around moving shipping containers. Far-flung Romeoville is the new 15th Street and Western Avenue.

Their inter-city forebears are too small to handle the volume of traffic necessary today. Thus, the question is what to do with nineteenth century distribution nodes like the Midland Warehouse and its railroad yard?

Rather than just create more urban infillhousing and strip malls-we endeavor to create a new kind of Urbanism that heals and cultivates rather than colors in more of the grid. These nodes function like Roman precedents in that sit forward on the grid.

We propose a twenty-first century network. A server farm fills the top 98,000 sf floor of the warehouse. Waste heat is used to heat a rooftop greenhouse in winter to grow produce for restaurants and those who desire a fresh, sustainable high-end product. The railroad yards can be farmed with asparagus and tomatoes, two crops that have rate of financial return, or planted with bamboo to sequester carbon and create raw material for furniture and flooring manufacture on one of the warehouse floors.

Bicycling replaces trains—not in a "Rails to Trails" way—but as a distribution system for same day delivery that is central to the Third Logistical Regime and a twenty-first century way of life.





#### A Third Logistical Regime: The Ecological Succession of Industrial Ruins

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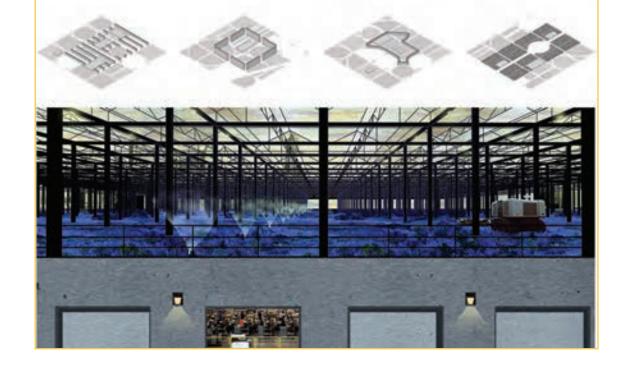
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### Back to the Countryside! Recovering China's Landscapes-Designing Village Acupunctures for Xixinan, Anhui Province, China

SHANNON BASSETT University At Buffalo, SUNY

The issues in which designers and scholars must address, with respect to urbanism, are increasingly global and complex in both context as well as in magnitude. Arguably, concepts such as "smart growth" and "new urbanism" were initially theories and strategies applied to Western cities and conditions, aimed to counter, for example, the shrinking of cities. Detroit epitomizes this phenomena, for example, where "white flight" to the suburbs, enabled by the Federal Highway act and subsidized mortgages to returning Second World War GI's created ensuing suburban sprawl and the eating up of valuable rural and agricultural lands beyond former defined urban and rural boundaries.

How are these trends playing themselves out in other parts of the world such as Asia and notably China?

In 1949 with the Founding of the People's Republic of China, China's urban population was at 10% urban and 90% rural. With the opening up during Reform in 1978, under Deng Xiaoping, China was then at 20% urban and 80% rural. In an inversion, it is predicted by the UN that in 1945 China will be 85% urban and 15% rural.

However, contrary to prevailing urban patterns, there has been a recent attempt towards movement back to the countryside in China, and a reconnecting with the agricultural landscape as intellectuals, artists and the elite seeking retreat from the ills of the industrialized Chinese cities. What are the ways in which we can engage, through design, sustainable solutions and hybrid interventions with this rediscovered agricultural landscape? We must start looking to areas undergoing similar trends of rural reconstruction, through the lens of smart growth and new urbanism.

Featured here, are two studios, representing studies and proposed interventions for the village. One was run in the US and their counter run in Summer 2015. Studies Abroad students lived on the site, where they conducted field surveying, making proposals for a series of interventions in this Village.

Students had the opportunity to engage first hand in many of the pressing current issues facing China today, as it continues to modernize at a rapid rate. The current rural-urban divide continues to grow and continues to create massive challenges. At the same time, however, many of China's noted elite are now moving back to the countryside for its clean air and food. Other villagers are seeking innovative and entrepreneurial economic ways in which they can remain in their villages without having to travel long distances to work. The studio engaged a strategic plan which might engage sustainable tourism in an area undergoing pressure for modernization. Other strategic plans included keeping villagers living full-time in the village as opposed to migrating to large cities for work.

Students began their zoomed-out understanding of the site through the lens of its landscape, by conducting a series of mappings of its landscapes. These included hydrological, infrastructural, and agricultural mappings, which allowed them to learn about the interdependence of the village to its ecologies. At the intermediate scale, students began to learn about the relationship of these landscapes to its morphological landscapes, which include architecture and the site's natural landscape.

The student proposals featured here offer robust solutions which promote concepts of social scaffolding and infrastructure, new programming, landscape recovery, and social and community building. Intervention into the existing fabric and infrastructure are all aimed to ameliorate existing ancient infrastructures.



# Horizontalism - Housing the Next 100,000

ANTJE K. STEINMULLER California College of the Arts

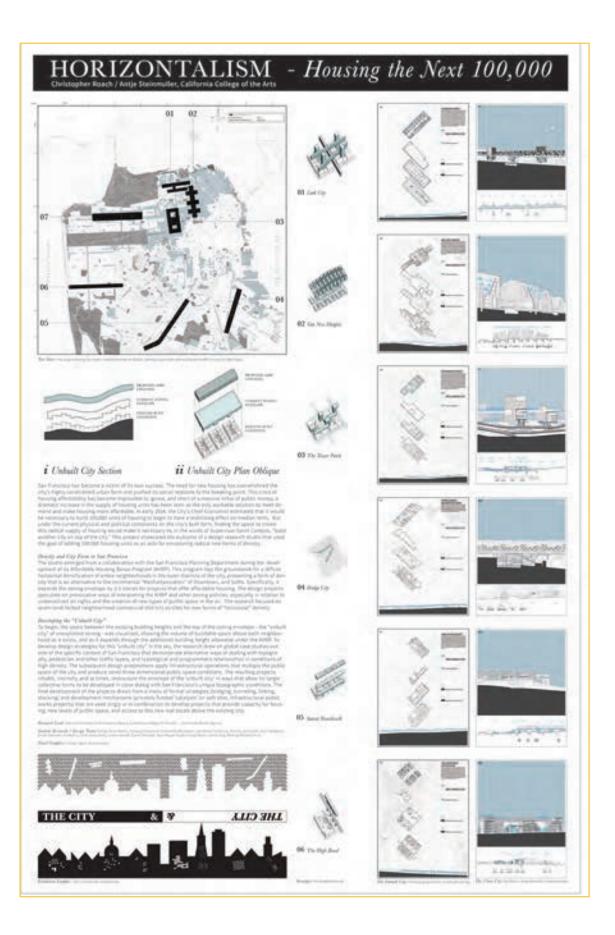
CHRISTOPHER AUSTIN ROACH California College of the Arts

San Francisco has become a victim of its own success. The need for new housing has overwhelmed the city's highly constrained urban form and pushed its social relations to the breaking point. This crisis of housing affordability has become impossible to ignore, and short of a massive influx of public money, a dramatic increase in the supply of housing units has been seen as the only workable solution to meet demand and make housing more affordable. In early 2014, the City's Chief Economist estimated that it would be necessary to build 100,000 units of housing to begin to have a stabilizing effect on median rents. But under the current physical and political constraints on the city's built form, finding the space to create this radical supply of housing would make it necessary to, in the words of Supervisor David Campos, "build another city on top of the city."

This project showcases the outcome of a design research studio in collaboration with the San Francisco Planning Department's efforts to develop its Affordable Housing Bonus Program (AHBP). This program lays the

groundwork for a diffuse horizontal densification of entire neighborhoods in the outer districts of the city, presenting a form of density that is an alternative to the incremental "Manhattanization" of Downtown, and SoMa. Specifically, it expands the zoning envelope by 2-3 stories for projects that offer affordable housing. The design projects speculate on provocative ways of interpreting the AHBP and other zoning policies, especially in relation to underutilized air rights and the creation of new capacity in the air. The research focused on seven land-locked neighborhood commercial districts as sites for new forms of "horizontal" density.

To begin, the space between the existing building heights and the top of the zoning envelope - the "unbuilt city" of unexploited zoning - was visualized, showing the volume of buildable space above each neighborhood as it exists, and as it expands through the additional building height allowable under the AHBP. To develop design strategies for this "unbuilt city" in the sky, the research drew on global case studies outside of the specific context of San Francisco that demonstrate alternative ways of dealing with topography, pedestrian and other traffic layers, and typological and programmatic relationships in conditions of high density. The subsequent design propositions apply infrastructural operations that multiply the public space of the city and produce novel three-dimensional public space conditions. The resulting projects inhabit, intensify, and at times, restructure the envelope of the 'unbuilt city' in ways that allow for larger collective forms to be developed in close dialog with San Francisco's unique topographic conditions. The final development of the projects draws from a menu of formal strategies (bridging, tunneling, linking, stacking) and development mechanisms (privately funded 'catalysts' on soft sites, infrastructural public works projects) that are used singly or in combination to develop projects that provide capacity for housing, new levels of public space, and access to this new real estate above the existing city.



### **GrOwING GREEN: A Mobile Greenhouse**

TIMOTHY GRAY Ball State University

GrOWING GREEN is a prototype for a fully automated mobile greenhouse designed to address the unique conditions of the urban farm. While different economic models have been tested to support local and regional urban farming efforts, few innovations have been made relative to facilities that support grass roots farming operations which make use of vacant or underutilized urban land. These types of farms are often small in scale, economically challenged, and are often located on marginal sites where conventional structures might not be allowed.

This project, designed and built by a group of fourth year architecture students at a cost of \$40,000, is shaped by these contemporary urban conditions. The greenhouse is designed to function year round and can be reconfigured to grow starts for a wide variety of crops. Mobility allows the facility to be shared between farming operations which are often small in scale, and mobility also amplifies the potential for community engagement, education and outreach by actually taking the farm into the community. The project incorporates automated heating, cooling and ventilation systems as well as a four zone irrigation system. All building components were rigorously researched, prototyped and fabricated to maximize durability, flexibility and efficiency while minimizing cost.

The mobile structure is well suited to the often onerous legal constraints of marginal urban properties, such as flood prone areas, where farming operations often exist. Mobile structures navigate within the seams of the building codes which distinguish between the temporary and the permanent, allowing mobile structures to be installed legally on properties where more conventional facilities might not be allowed. Mobile structures also lend themselves to the temporal nature of the urban farm, which can be subject to frequent dislocation through shifting patterns of urban development. When the farm moves mobile facilities move with the farm!

GrOwING GREEN is the first fully automated and fully mobile greenhouse. The project was designed and built to address the needs of a specific client, but simultaneously offers an innovative prototype for a unique and emerging building typology shaped by our contemporary urban condition.



GrOwING GREEN a mubile greenhouse

Project Type: mobile generationer protetype Popet Address: Carmo for Urban Ecology Submenia' Completion: May 2014



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### Community Listening Room and Record Shop

WILLIAM JOSEPH DORAN Louisiana State University

Urban revitalization cannot be predicated on top-down interventions, which focus primarily on sweeping physical redevelopment and universal solutions to very complex issues. Jane Jacobs famously states in her seminal work, The Life and Death of American Cities, that "There is no logic that can be superimposed on the city; people make it, and it is to them, not buildings, that we must fit our plans." This project explores a bottom-up approach to urban revitalization that focuses on building relationships with people and creating experiences that nurture an identity intrinsically tied to culture and place. Before any significant investment from the top can gain traction in our communities, it is critical to cultivate relationships, identity, and vision with existing residents, local businesses, and organizations – and to learn from them and include them. They are the experts.

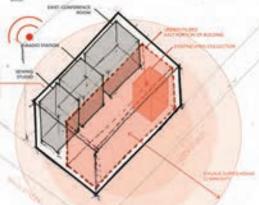
The concept for this project was to transform the unused portion of a local radio station into a community-oriented hub – beginning with a temporary installation to activate the space and engage the community. Long-term, the goal is to build community consensus and the capital to implement a full renovation of the space into a creative place for everyone. The first phase transformed the 300 square foot storefront space – which was being used to store supplies and donated records – into a pop-up listening room and record shop. The shop's goals were to bring people together through music and re-activate the building's corner space for the community. The shop serves as a creative way to utilize the station's extensive vinyl collection, which is for sale at \$1 per record to support the radio station's operations and future phases of this project. We hosted a coffee social in the record shop at the end of March 2016 to unveil it to the community and activate the space.

Since that time, the radio station has been opening the listening room and shop once a month to share its music collection and invite the neighborhood into the building. Every other month, a listening-based performance is held in the space. So far, acoustic music performances, spoken word poetry, and panel discussions have activated the space. This also provides an opportunity to engage residents and find out what they would like to see in their neighborhood and the community space at the radio station.

Long-term, the goal is to use the empty spaces around the record shop to house local artists

and creative-centric organizations and businesses – while also transforming the record shop into a flexible space that can still be used as a record shop, but can also accommodate classes, workshops, and other arts and community-focused events such as exhibitions, lectures, artist talks, and social events. The space could also be rented to generate revenue for the radio station and to support the continued development of this project.

### COMMUNITY LISTENING ROOM + **RECORD SHOP**



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# Adaptive Reuse of Specialized Industrial Buildings and Structures

ANNA SIGMUNDOVA Université Laval

Post-industrial era has brought new appeals in fields of culture and society, economy and environment. The industrial restructuring is proceeding from the sixties in countries of the developed world. Yet, many questions still remain unanswered and majority of the society has not accepted the complex change with its consequences.

The potential of industrial heritage is gaining special urgency in the context of economical crisis, search for cultural identity and favored principles of sustainable development. An important part of the sustainability is regarded as the quality of our environment.

The aim of this research is to fill one of the gaps in the knowledge about industrial heritage, to uncover difficulties and possibilities of new utilization of specialised industrial buildings.

Specialised industrial buildings are described as spatial structures, characterized by previous processes that ran in them. Space, structure and technological flow are key words for these objects or complexes. Thanks to these qualities, it is possible to classify and describe individual types of specialised industrial buildings, and perform the research based on a recognition of the potential of each type. The objective of this attitude is to express under what conditions the conversion and subsequent integration would be successful. In a broader perspective, we can imagine that the research will not only uncover an image of potential, possibilities and limits of industrial heritage, but also a general knowledge transferable on another typological species and broader range of historical architecture.

Most of the special industrial buildings originates in the 19th or 20th century, a lot of them represents parts of infrastructure - objects that aren't commonly seen as monuments. Therefore, the topic also touches on issues difficult to define, such as breadth of cultural heritage protection, the value of heritage.

The strength of the testimony of specialised industrial buildings is often enhanced by unusual size and uncommon position in a city structure or landscape composition. Successful conversions of special industrial building proven that these elusive objects are important elements or even dominants in the urban structure and landscape and therefore often are bearers of the genius loci. The unusual character of specialised industrial buildings, which often represent the dehumanizing machines, huge statues of unusual scales, enhances the power of the symbolism of the new use of industrial buildings. In connection with objects, whose conversion and regeneration is extremely difficult, moreover, the question arises whether it is possible, wise - and sustainable - again to return all in life? This reasoning opens up for us again the actual issues of refinement of resources, and sustainability of human (building) actions on the planet.

In this optics, it is important to perceive the industrial sites as potential initial areas for solving and mitigating environmental and social problems they had caused in the past. It seems appropriate to set sustainable principles of adaptive reuse of (special) industrial buildings, which will lead to integration of industrial sites to local socioeconomic and urban structure, so that projects of adapted - previously unused - industrial complexes would represent the flagships of sustainable building production.

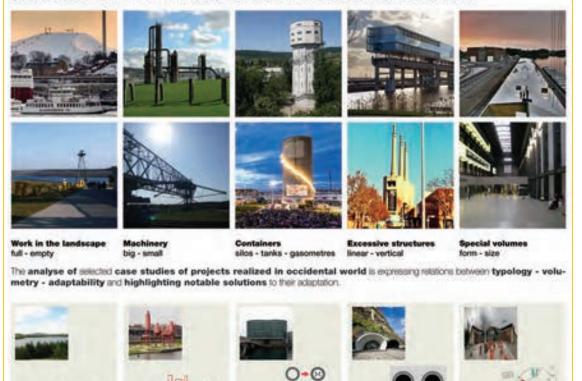


The research for solutions to redudant industrial heritage sites forms an important part of the concept of sustainability. The purpose of this interpretation is to explore typological factors that may effect the adaptibility of specialised industrial buildings. The adaptability of industrial building will be generally defined as an ability of construction to undergo a change of use.



Specialized industrial buildings are constructions, which have served heavy industry, transportation or urban infrastructure. Their form was shaped by the movements of medias or machines, not by human uses - their scale is often huge, their typology and volumetry is often unusual. Their form follows the function...

The main challenge for adaptive reuse projects of these structures is finding is way how to design an adaptation to a new function (mostly based on a human scale) for a construction with inhuman characteristics. In the process, it is necessary to emphasise historical and social value of the building / structure, its architectural and industrial legacy, while performing the project at a reasonable cost and in accordance with the concept of sustainability and respect for the environment.



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# **Tonle Sap Sustainability Education Center**

**CAMILO CERRO** American University of Sharjah

Worldwide sea level has been rising at a rate of 0.14 inches per year. Increases of this magnitude will have devastating effects in coastal habitats. As the land mass decreases, the already enormous population of the planet will be forced to cohabitate in smaller areas. To deal with these problems, architects and designers need to start understanding the need for typological developments in floating and amphibious architecture.

The precedent for this type of architectural development exist all over the world in water based communities in Peru, Cambodia, Vietnam, Myanmar and many other places. Where, existing typologies of architecture have been evolving for centuries to adapt to life over water. It is within these typologies, that we can find solutions that when hybridized with; sustainable materials, smart energy systems and advanced food production techniques will develop a better quality of life for the different communities and their environments. Solving in this way, some of the problems faced by a large population in a planet with a decreasing land mass.

The development of a new water based system of architectural typologies has the potential to help humanity transition and adapt to changes produced by global warming. As the sea level rises and the land mass diminishes, communities will need to develop sustainable ways to produce energy and food, filter water and manage waste. And all these will have to be done in a local and economical way. The developing world will be the most affected by an increase in the water level, but it is also much more adaptive than the first world, change can happen quickly.



# Data Sensing in Living Wall Architecture

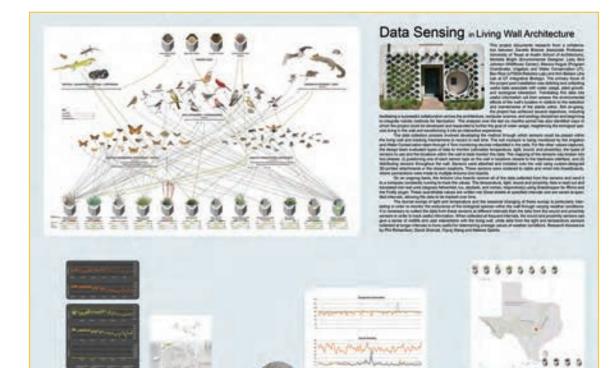
DANELLE BRISCOE IE University - Instituo de Empresa

This project documents research from a collaboration between Danelle Briscoe (Associate Professor, University of Texas at Austin School of Architecture), Michelle Bright (Environmental Designer, Lady Bird Johnson Wildflower Center), Marcus Hogue (Program Coordinator, Irrigation and Water Conservation UT), Ben Rice (UTSOA Robotics Lab) and Kim Ballare (Jha Lab at UT Integrative Biology). The primary focus of the project post installation was defining and collecting useful data associate with water usage, plant growth, and ecological interaction. Translating this data into useful information will then assess the environmental effects of the wall's location in relation to the selection and maintenance of the plants within. Still on-going, the project has achieved several objectives, including facilitating a successful collaboration across the architecture, computer science, and ecology disciplines and beginning to integrate robotic methods for fabrication. The analysis over the last six months period has also identified ways in which the project could be developed and expanded to further the goal of water usage, heightening the biological species living in the wall and transforming it into an interactive experience.

The majority of the data collection process involved developing the method through which sensors could be placed within the living wall and used to track data that would be recorded in real time. The soil moisture is being monitored by the Irrigation and Water Conservation team through 4 Toro monitoring devices imbedded in the cells. For the other values captured, the design team evaluated types of data to monitor (ultimately temperature, light, sound, and proximity), the types of sensors to use and the locations within the wall to best monitor this data. The mapping of the sensors was broken into two phases: (i) positioning one of each sensor type on the wall in locations closest to the hardware interface, and (ii) distributing sensors throughout the wall. Sensors were attached and installed onto the wall using custom-designed 3D-printed attachments in the chosen locations. These sensors were soldered to cable and wired into breadboards, where connections were made to multiple Arduino Uno boards.

On an ongoing basis, the Arduino Uno boards receive all of the data collected from the sensors and send it to a computer constantly running to track the values. The temperature, light, sound and proximity data is read out and translated into real units (degrees fahrenheit, lux, decibels, and inches, respectively) using Grasshopper for Rhino and the Firefly plugin. These quantifiable values are written into Excel sheets at specified intervals and are saved at specified intervals, allowing the data to be tracked over time.

The diurnal swings of light and temperature and the seasonal changing of these swings is particularly interesting in order to monitor the endurance of the biological species within the wall through varying weather conditions. It is necessary to collect the data from these sensors at different intervals than the data from the sound and proximity sensors in order to track useful information. When collected at frequent intervals, the sound and proximity sensors can give a sense of wildlife and user interactions with the living wall, while data from the light and temperature sensors collected at longer intervals is more useful for determining average values of weather conditions. Research Assistance by Phil Richardson, David Sharratt, Yiqing Wang and Melissa Sparks.



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# The Sound of Shaped Space – Architectural Acoustics Defining Spatial Function and Experience

**DANIEL BUTKO** University of Oklahoma

Sound is ever present, yet not all designers devote much thought toward how a space will sound once it is inhabited. What can educators do to inform not only society but also future architects about the importance and intensity of the auditory environment?

Do students listen to their surroundings? Do they consciously acknowledge aural conditions? All too often, the architects of tomorrow are wearing earbuds today. They appear to be constantly listening to music or talking on the phone - which is preventing, restricting, and diminishing connection to the natural aural environment. If these students are generally not experiencing and paying attention to the sounds that surround them, why would they consider acoustics necessary in experiential design? Students must be introduced to the importance and integration of architectural acoustics. As educators encourage students to consider the acoustical nature of designed space, they begin understanding materials, shapes, room volume, and programmatic adjacencies in a fresh approach. When acoustics is taught and physically demonstrated as a vital part of architectural design, students explore both the science and artistry of acoustics. Subsequently, their curiosity leads to further discovery.

The upper division undergraduate course entitled "The Sound of Shaped Space – defining what we hear" is an introduction to basic acoustical principles, which allows opportunities to interact with acousticians and acoustical design professionals, offers field trips to performance halls and recording studios, and challenges students to produce comprehensive projects that primarily incorporate natural acoustics.

The images assembled in this presentation depict separate projects as the final products of various students' work within the one semester course. The images depict a variety of designed and built projects; ranging in size, scope, and adjacencies of supporting spaces. Regardless of the actual assignment or list of deliverables, students are taught to consider function and occupancy as the defining factor of room acoustics and the result of material selection, layering of materials and components, shape and volume of the proposed space, and mechanical systems. The results of the projects demonstrate how students understand the ramifications and consequences of cumulative design decisions. Students quickly recognize the acoustical nature of programmatic spaces begins in the schematic design phase through evaluation

of occupancy type, material selection, and specified control systems. Every design and construction decision contributes or detracts from acoustical isolation, absorption, reflection, diffusion, and overall perception of the finished space(s). Conceptual thoughts of materiality and functional space develop into the tangible manifestation of inhabitable space through the meticulous attention to materials and physical connections.

Consequently, this poster presentation is not merely documenting what has been accomplished in previous courses, but it exemplifies possibilities of acoustics courses being an integral part of architectural design for future academic projects and professional practice. Students become inclusively-minded architects when they understand the future potential of functional, sustainable, resilient, and productive space is interwoven with and codependent upon acoustics.



# The Glow of Grime

ELISE DECHARD Cranbrook Academy of Art

We do not dislike everything that shines, but we do prefer a pensive luster to a shallow brilliance, a murky light that, whether in a stone or an artifact, bespeaks the sheen of antiquity. ... Of course this 'sheen of antiquity' of which we hear so much is in fact the glow of grime.

## - Jun'ichiro Tanizaki, In Praise of Shadows

The Glow of Grime explores our cultural fascination with traces of history and our assumptions of the richness and character they embody. What is this illusive character comprised of? How much of a trace is required to serve as a register of a place?

Drawing on the current popularity of "ruin porn" within Detroit culture and critique, the project asks us to consider what it means to embark on a tourism in which the primary souvenir is a photograph of someone else's dirt, though disembodied and reframed to read as a haze of beauty. What can a further the decontextualization of these records of illuminate, and how can it inform our interventions in the urban context?

In response to current rehabilitation and blight removal efforts, the Glow of Grime questions whitewashing and power washing as the preferred methods of urban renewal and architectural renovation. While solid architectural volumes tell one side of history, residual vestiges maintain a chronicle of the everyday. The research posits that, instead of polishing back to an idealized state, we might analyze and extract the subtleties of existing environments to maintain the allure of historical continuity. The investigation does not aim to glorify dirt nor render it consumable, but rather to understand the specific phenomenologies of decay and abandonment in Detroit's building stock and how these material fragments might be extrapolated to elucidate a richer collective history of the life of a city.

The Glow of Grime began as an installation of paper cones inhabiting the puddles of a disused transmission shop in Detroit, among gears and grease and forgotten tools, mirroring the ethereal light filtering in through the skylights above. Coated with 90% isopropyl alcohol, the cones were designed to absorb the sludge that was left behind, creating a chromatographic record of each micro-environment over the course of a week. The cones become a new technology for translation, a means by which to take a record not of image, but of darkness. Backlit on a light table, the filters reveal hidden hidden human and chemical stories, as flecks and stains cast shadow and high water marks are edged by the thin luminous line of the float of oil.

A collaboration with nature rather than a commentary or a dictation of it, the Glow of Grime allowed the sludge to draw its own patterns. Likewise, through future architectural projects, we might devise tactics for working with these subnatures, as David Gissen termed them in the book of the same name, to allow space to record and reveal its own stories.

# the glow of grime

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# Thermodynamic Conditioning Surface

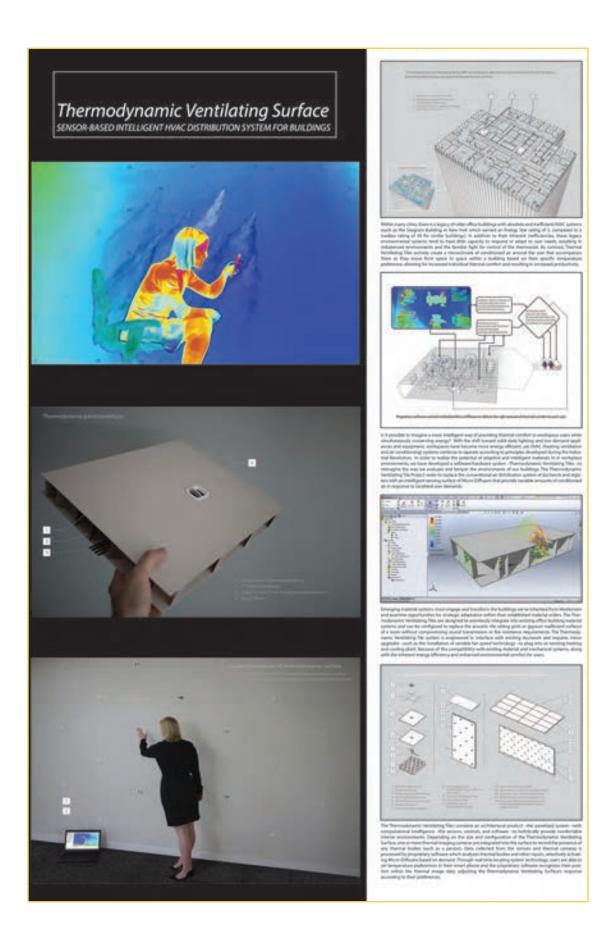
ERIC OLSEN Woodbury University

The Thermodynamic Conditioning Surface is an ongoing project that imagines the possibility of a materially integrated building air distribution system coupled with thermographic sensing technology and closed loop intelligent control systems to produce a demand based response to human thermal comfort requirements. The system operates within the Modernist ideal of modularity and is compatible with conventional construction practices allowing existing building systems to be adapted and retrofitted. The benefits of the system include greater user control over environmental conditions and reduced overall energy consumption in buildings. The Thermodynamic Conditioning Surface proffers a model for communicating air in buildings in which multiple differentiated atmospheres are privileged above a centralized, uniform standard of thermal comfort.

Innovative building skin systems have emerged as a recent obsession for architects. Perhaps because, in the context of the digital project, a building's skin provides near ideal conditions for exploring the parametric qualities of form and performance; it modulates sunlight, engages structural systems, and regulates the exchanges between interior and outside. As a result, the leitmotif of skin as architectural production tends to privilege geometry and shape. While it is difficult to describe architecture without referring to its delineated boundaries -- its walls, its floors, its envelopes, its skins -an important, and perhaps neglected, aspect of one's sensorial experience of buildings is the result of invisible exchanges, such as the exchange of heat between the body and its environment. This system of heat transfer defines a thermodynamic boundary that operates at the relatively small scale of the human body, yet most contemporary practices in building design seek to enlarge this thermodynamic system so that it is commensurate with the architectural wrapper; to condition the entire volume within the building envelope to the ideals of human comfort.

In differentiating between the tent and the campfire, Reynor Banham offers two distinct models of environmental behavior; that of the tent which provides an enveloping membrane and a materially explicit separation between inside and outside, and that of the campfire with an invisible radiant field that sponsors a gradient of human activities. From early examples, such as the Roman hypocaust, to the modern central heating ventilation and air conditioning (HVAC) system, building design tends to privilege the creation of interiors with uniformly conditioned spaces; Banham's tent persists as the dominant metaphor for how we imagine thermal comfort in buildings.

The Thermodynamic Conditioning Surface (TCS) project explores Banham's campfire as a conceptual model for imagining materially integrated sensing technologies that produce differential environmental behavior within buildings. It engages standardized building material systems and implicates relationships between locative media, machine cognition, and conventional HVAC systems. The Thermodynamic Conditioning Surface is deployed as a thermotropic field that sponsors the creation of multiple co-isolated climates within a building.



# Nebraska's Wood Products Tradition: Understanding Available Skills and Resources

JASON GRIFFITHS University of Nebraska-Lincoln

RACHEL PLAMANN

University of Nebraska-Lincoln

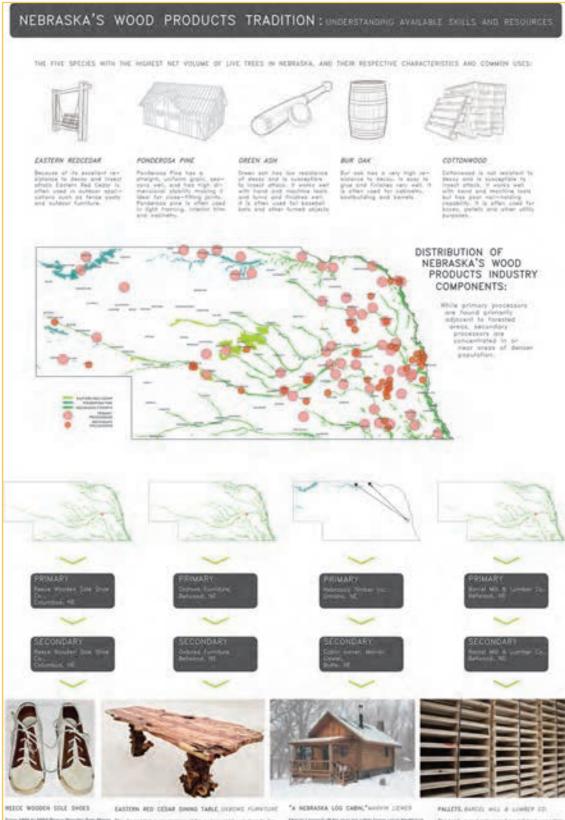
The purpose of this research is to better understand the available timber and woodworking resources that can be found in Nebraska. The availability of a particular species for harvesting, its woodworking characteristics and the availability of the tools or skilled professionals necessary to create a final product should all be considered to achieve this understanding.

In order to gain more qualitative information on the subject, this study goes into specific precedents of applications of timber grown, harvested and/or processed in Nebraska. To give a more general understanding of what types of timber are available and what their applications may be, there is also information included stating the physical properties of the wood species most commonly found in Nebraska, as well as common uses for each of these wood species. In this way the scale of understanding starts with general wood species' uses, narrows to the wood products industry of Nebraska, and finally looks at individual processes.

Because a very small percentage of Nebraska's land mass is forested, there is limited qualitative documentation about the outcome or potential outcome of Nebraska's forest industry beyond harvesting statistics. Several of the examples found in this research show a fully sustainable cycle from live tree to processor to final product which does not rely on resources outside of the state.

A map is included in this study to illustrate the distribution of wood processors and forests throughout Nebraska. Although no overarching patterns have been found in regard to the type of wood products that are being manufactured here, the processes of these manufacturers, or the path from the live tree to the final product, what can be found is a cross section of wood crafting throughout Nebraska. Secondary processors include pallet manufacturers, while primary processors prepare timber for uses such as custom furniture or log cabins.

This research begins to prove that although Nebraska has one of the smallest timber industries in the United States, it is capable of being efficient and self-sustaining. The small scale of the industry means that many of the wood products processed here are of a custom nature. For some specialty processors each piece of lumber is considered for its individual characteristics before being crafted into a final product. The next phase of this research would include a more in-depth study of the processes of one or more local wood processors. This information would illustrate the highly personal and specific nature of Nebraska's traditions in woodworking. Many of these processes, skills, tools and in some cases lumber, have been passed down through generations of craftsmen, making quantitative information about each processor insufficient to tell their story.



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# **Tectonic Painting 02: Domes**

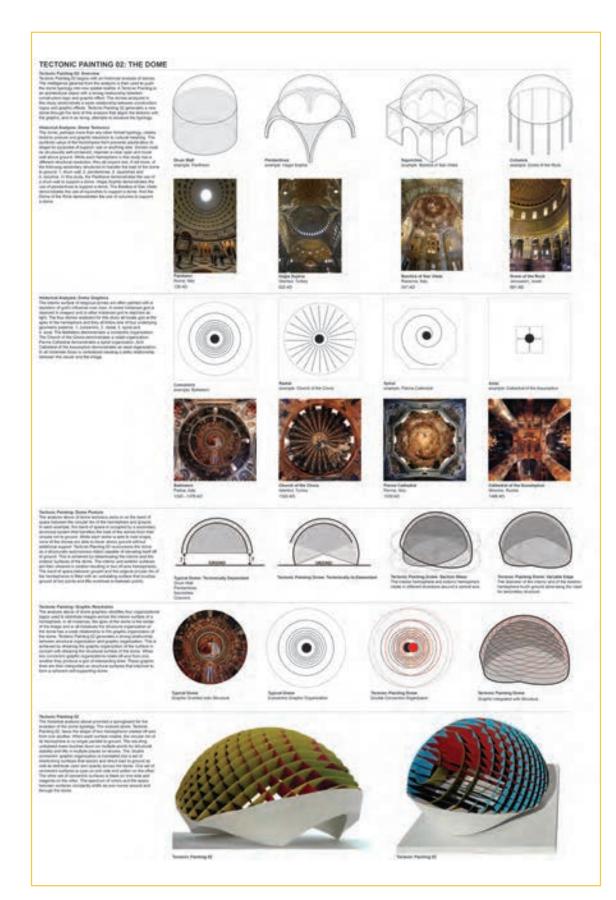
HEATHER FLOOD Woodbury University

Tectonic Painting 02 begins with an historical analysis of domes. The intelligence gleaned from the analysis is then used to push the dome typology into new spatial realms. A Tectonic Painting is an architectural object with a strong relationship between construction logic and graphic effect. The domes analyzed in this study demonstrate weak relationships between construction logics and graphic effects. Tectonic Painting 02 generates a new dome through the lens of this analysis that aligns the tectonic with the graphic, and in so doing, attempts to advance the typology.

The dome, perhaps more than any other formal typology, relates tectonic posture and graphic resolution to cultural meaning. The symbolic value of the hemisphere form prevents adulteration to shape for purposes of support, use or anything else. Domes must be structurally self-contained, maintain a clear span and hover well above ground. While each hemisphere in this study has a different structural resolution, they all require one, if not more, of the following secondary structures to transfer the load of the dome to ground: 1. drum wall, 2. pendentives, 3. squinches and 4. columns. In this study, the Pantheon demonstrates the use of a drum wall to support a dome. Hagia Sophia demonstrates the use of pendentives to support a dome. The Basilica of San Vitale demonstrates the use of squinches to support a dome. And the Dome of the Rock demonstrates the use of columns to support a dome.

The interior surface of domes are often painted with a depiction of god's influence over man. In some instances god is depicted in imagery and in other instances god is depicted as light. The four domes analyzed for this study all locate god at the apex of the hemisphere and they all follow one of four underlying geometric patterns: 1. radial, 2. concentric, 3. spiral and 4. axial. The Church of the Chora in Istanbul demonstrates a radial organization. The Battistero in Padua demonstrates a concentric organization. Parma Cathedral in Parma demonstrates a spiral organization. The Cathedral of the Assumption in Moscow demonstrates an axial organization. In all instances focus is centralized creating a static relationship between the viewer and the image.

This project leverages the analysis above to produce a tectonic painting in the form of a dome. Tectonically, the new dome appropriates the concentric graphic organization of the Battistero in Padua and interprets it structurally. The resulting structure is formally continuous from apex of dome to ground. It does not require a secondary system. Graphically, the new dome doubles the concentric organization of the Battistero producing multiple centers that are dislocated from the apex of the dome. The polycentric organization distributes incremental shifts in color and openings across the dome. The resulting dynamic range of graphic effects emerge from the structural logic of the form.



# Dynamic Façade Unplugged Snapping Façade

JIN YOUNG SONG University At Buffalo, SUNY

Snapping Facade explores a sustainable building envelope design strategy that utilizes elastic instability to create dynamic motion at the building envelope.

The building envelope controls heat gain and loss, allows views for visual comfort, and provides natural light. Advances in the high performance glass industry have made the use of glass ubiquitous. The reflection and refraction of glass represents the dynamic, bustling activities of our cities while diverse lifestyles and programmatic functions are expressed through the façade of our buildings. However, in the United States, buildings account for 41% of energy use and 38% of CO2 emissions. The increasing need for high performance buildings and advancements in manufacturing industries have facilitated the design of dynamic building envelopes to replace traditional, uninspiring shading controls. Built dynamic facade systems such as Abu-Dhabi Investment Council Headquarters by AHR Architects, dynamic roof shading at Aldar Central Market by Foster + Partners, Hoberman Associates and Adaptive Building Initiative and Kiefer Technic Showroom by Giselbrecht+Partner are based on mechanical actuators which need additional energy consumption to operate and require complex maintenance.

Advances in material science and engineering have also contributed to the mission of smarter building envelope. For instance, electrochromic glass uses voltage to change light transmission property. Other Smart glass such as Suspended Particle Devices can provide the similar function and form-changing polymer sheet can be installed in the glazing units. Compared to the mechanical dynamic shading, these glass systems can efficiently provide substantial energy saving with low cost, however the façade design becomes independent gears added to the irrelevant building design.

Snapping Facade suggests an alternative approach for the design of dynamic facade systems that use a "snapping-induced motion" to open and close apertures, providing shading for the building. The prototype explores using weakening-induced bands tied within the elastic threshold which, produce "snap" deformation with minimal stimulus. Traditionally, unstable movement within the building construction is considered as an undesirable occurrence but, the Snapping Facade aims to harness the characteristics of elastic instability by applying it as an opening and closing mechanism using the embedded energy within the materials. Without complicated maintenance, users can participate in the dynamic movement of the building

envelope for play, fun, and energy saving.

This elastic instability is already utilized in kids' products such as Rubber ball poppers and Snap Bracelets. Foldable car window shades also use the property of snapping. As for building, the snapping bands will be explored with patterned metals, plastics, and/or wood veneers. The engineering of intentionally applied weakening building components will be also tested. The membrane between the bands need be tested through metal origami, fabric, and other hybrid methods to find optimal folding mechanism.

## Dynamic Facade Unplugged

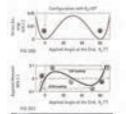
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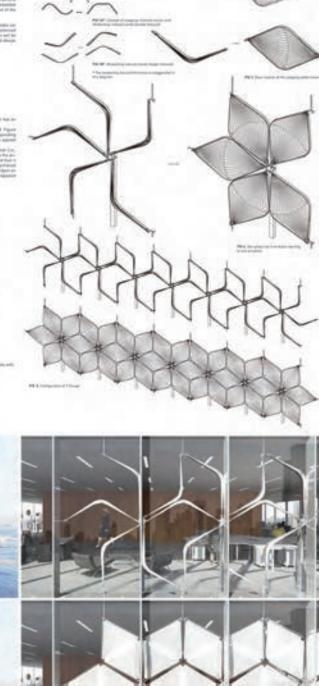












# inter[face]: Athenaeum Redux

MO ZELL University of Wisconsin-Milwaukee

MARC A. ROEHRLE University of Wisconsin-Milwaukee

Richard Sennett in The Private Realm offers, "the difference between public and private lies in the amount of knowledge one person or group has about others; as in a family, one knows others well and close up, whereas in a public realm one does not; incomplete knowledge joins to anonymity in the public realm." This idea of access to knowledge can also be applied to the content of private institutions. The Athenaeum, a private, members-only, library and museum collects and displays world-class artifacts to its members. To invert this private/public condition, we propose to move the interior spaces to the exterior thus blurring the border (as Sennett would call this condition) between inside and outside knowledge is made accessible to the public. While pushing the knowledge to the periphery we also pull public conditions to the interior of the building.

In an age of forgery, plagiarism, and the accessible image (via mobile devices), private storage is replaced with public display – EVERYTHING is put out for public consumption. The accessibility of images of artifacts paradoxically reduces the artifacts significance. The artifact, not its image, is relevant because of its authenticity. Its physicality is

as important as its meaning. With our inversion, the artifact again becomes relevant for it (not its replication) can be viewed by the public. Storage facilities are not private and internalized, but rather are relocated to the building's facade thus shifting edge to center and engaging public space as part of the building. Antiquated, cloistered library spaces are replaced by spatially accessible systems.

Similar to Nolli's registration of Rome's public spaces, we interject public space into the Athenaeum. This interface is facilitated through transparent, two-sided vitrines. Wrapping the first floor, through the second and third, culminating in an outdoor public space on the roof, the vitrines prominently display the Athenaeum collection to the public. Exposure to Athenaeum artifacts and private spaces democratizes this private collection, eliminating physical and cultural barriers to knowledge. The vitrine allows the Athenaeum artifacts to become the interface between public and private entities facilitating the active and passive interaction between the institute and the city of Philadelphia.



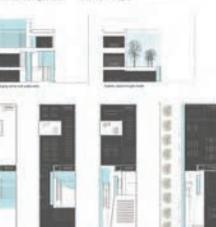


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# WaterLines: RiverBank, Chestertown, Maryland

**RONIT EISENBACH** University of Maryland

CASSIE MEADOR Choreographer, Dance Exchange

Ephemeral works employed as part of creative placemaking efforts can enhance and catalyze a community at critical junctures to create a sense of possibility, spark imagination and stimulate public discourse. WaterLines: RiverBank was an installation and performance that transformed a vacant bank into a "world of rippling light and sublimely meditative sound" evoking the connections, interdependency and exchange between river and town. At a moment when the historic town of Chestertown, Maryland was grappling with the potential impacts of sea level rise, ecological degradation, economic inequality and social fissures, the project sought to strengthen community by offering shared opportunities to surface and celebrate connections between residents and local identity. exploring changes that have reshaped each.

WaterLines: RiverBank was the culmination of a yearlong residency at SANDBOX, Washington College by an architect, composer, visual artist and choreographer. Public engagement events built relationships between individuals from parallel communities who shared their knowledge and shaped the final work. Connecting the vacant Chestertown Bank building and the Chester River, WaterLines fused art, science, and social history to create an immersive art experience that reflected the town's river setting and cultural history. The work transformed a rigid, formal space originally designed to reassure investors into a place that questioned our relation to natural systems.

ALEKSANDRA VREBALOV Composer

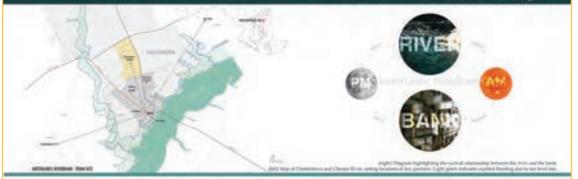
JENI WIGHTMAN Visual Artist & Biologist

In place of the valuables once secured in the bank's abandoned vault, participants encountered small bowls of river water and video interviews with residents describing their connections to their river and what they value now. In the banking hall, luminous images of the river and microbial life within its sediments were brought to life through video projections upon the banks' walls and floor while a sonic composition made from local natural and man-made sounds infused the space. A dance performance concluded with a public procession from the bank to the river's edge led by community members who provided stories about life along and upon the river. Water collected earlier in the day by local children was returned to the river, reinforcing the town's deep connection to the water, encouraging a greater understanding and sense of responsibility for this natural resource and the worlds it supports.

Upon experiencing the work one participant, Andrew Case wrote of *WaterLines'* impact upon the community, as it "brought people together who, although they live and work in very close proximity, rarely share cultural events... like many places with a history of segregation, most of the town's events are divided, but this one was decidedly not." Mary McCoy, another resident noted the impact on restoring the bond between town and river while raising the visibility of environmental concerns: "For those of us who have lived in this area for many years, *WaterLines* was saturated with memory and love -- memory of the buildings, businesses, people and seasons that have come and gone, and love for the river and its marshes, shorebirds, shifting tides, and halcyon days of sunlight on the water. Such feelings are warm and joyful, but also fraught with anxiety as the ecological challenges to our beloved home become more obvious."

WaterLines was made possible through the tremendous generosity and vision of Alex Castro and Sean Meade of SandBox, Washington College. It success was only possibly by the many talented people who joined us: Leslie Raimond, Kent County Arts Council, members of the design and production team: Debra Gilmore, Lighting; Shane Meador, Projection Designer; Austin Raimond, Design Assistant; Ian McClain, Video and Lighting Systems Engineer, Margaret Campbell, Stage Manager; Performers: Dante Brown and Matthew Cumbie, Dance Exchange; Irene Moore, Gospel Singer, and the participation of Chestertown residents and Washington College faculty, students and staff.

# Chestertown, Maryland WaterLines: RiverBa



Process: unearthing connections between community and the river

Installation: exploring the relationships, exchanges and tension between the natural and built environments



VIDEO VAULT + SOUNDSCAPE + PERFORMANCE



Impact: strengthening community, sustainability, and restoring the bond between town & river

N, and Labor





## Afterhouse

**STEVEN Y. MANKOUCHE** University of Michigan

Using the constant temperature of the earth Afterhouse is a new urban typology that transforms the concrete foundation of a derelict house into passive solar subterranean greenhouses allowing crops to be extended and moderated in temperate climates. By using readily available materials and techniques while maintaining the scale of the neighborhood, Afterhouse empowers a community to transform a blighted home into productive spaces for growing and celebrating food during the winter.

With 3,400 homes facing demolition in 2016 alone, Detroit is radically changing the way we understand postindustrial urbanity. The typical 1600 square-foot residence has nearly 70 tons of concrete in its foundation that is land-filled in during demolition. In addition to losing the embodied energy of the concrete, the foundation removal is energy and labor intensive. Afterhouse is an alternative to this demolition.

Like too many Detroit houses irreparably damaged by disuse, vandalism and fire, the house at 3347 Burnside must come down. Rather than razing it and leaving fallow land, the house will be deconstructed and the foundation reused to build a semi subterranean, passive geothermal greenhouse called Afterhouse . Using just the heat of the sun and the constant temperature of the earth, Afterhouse requires no artificial heating in the winter or cooling in the summer and provides an environment where it is possible to raise crops that grow in climates far warmer than Detroit's.

The footprint of the original house is maintained, and vernacular materials used, so that Afterhouse can blend into residential neighborhoods honoring stories of its home's history. Distinct from large-scale urban agriculture projects that require a lot of space, Afterhouse is discrete, almost hidden, making it appropriate for denser urban settings where conventional hoop houses and greenhouses are not. A derelict house transformed from a hazard to a thing of beauty and of use, drawing from what once was to become a part of what Detroit is now, Afterhouse will serve as a prototype for other abandoned houses in post-industrial communities.



# Affecting Change Through Insurgent Architectures

TIMOTHY GRAY Ball State University

As pointed out by Wes Janz and Olon Dotson in their paper "Distress Road Tours", like many rust belt cities, Indianapolis is a place of extremes. Tremendous investment has led to a resurgence of the downtown, and affluent suburbs thrive and grow. In stark contrast the historic neighborhoods that ring the city, the fabric of the place, continue to struggle with significant challenges. There is too much crime and too little neighborhood organization. High drop-out rates lead to low incomes. Poor access to health care exists alongside easy access to low nutrition foods. Like many cities in the region and throughout the world, an eroding manufacturing base, marginal public schools, high crime rates, among other pressures, have all contributed to significant attrition.

While many see only the challenges in the blighted neighborhoods, others see opportunity as a range of interesting energies are emerging. Among these, a growing number of urban farmers are beginning to create a new urban economy putting vacant property to use and making temporary improvements. Income is derived through farmer's markets, CSA (community supported agriculture) shares, and sales to restaurants dedicated to a farm-to-table fair. Community members are empowered to participate, to benefit, to learn from, and often to expand these efforts. In many "rust belt" cities, including Indianapolis, urban agriculture has emerged as a productive reuse of vacant land resultant from economic decline, population loss and home foreclosures.

These types of farms are often small in scale, economically challenged, and are often located on marginal sites where conventional structures might not be allowed. The urban interventions required to support the expansion of farming operations on borrowed or vacant land present certain challenges, requiring development to find creative and diverse avenues of approval. Neither guerrilla architecture (operating completed outside the law) nor fully legal, our insurgent architectures navigate within the seams between the temporary and the permanent and populate the voids left through attrition and abandonment.

This poster presents three student design build projects completed over the last six years on urban farms in inner city neighborhoods involving a range of community and professional partners which respond to these conditions. The projects bring together business, school and community around the concept of reclaiming impacted urban space and turning it into a working farm and urban greenspace. The projects provide facilities to support farming operations, but also provide classroom and lab space for working tours and education and outreach initiatives. Each of the projects use repurposed materials and incorporate a range of sustainable building strategies intended to extend the discussion of sustainable food and sustainable lifestyles to that of the built environment.



### AFFECTING CHANGE THROUGH INSURGENT ARCHITECTURES: STUDENT ENGAGEMENT IN SUPPORT OF URBAN FARMS

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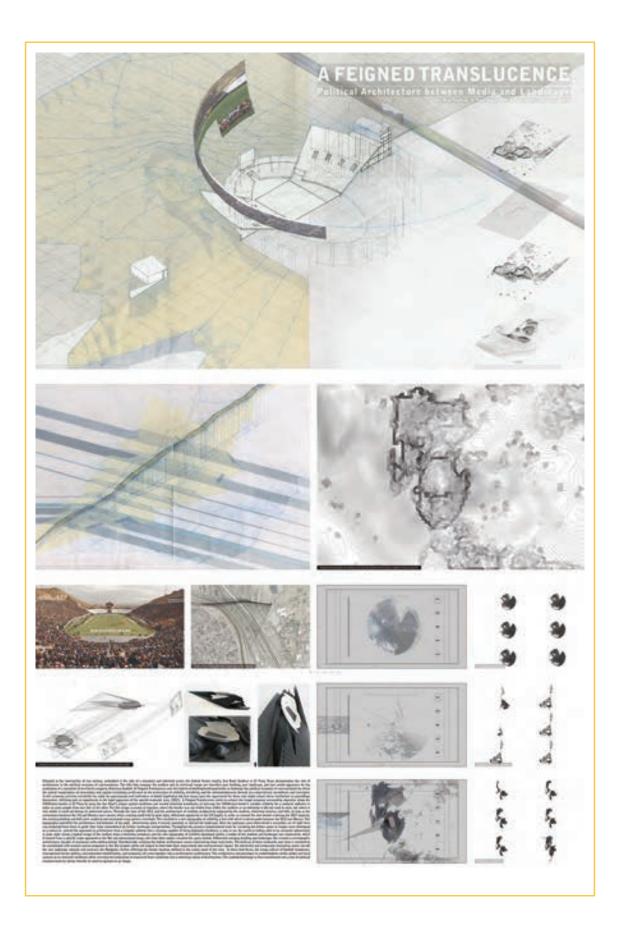


# ARCHITECTURE IN AN EXPANDED FIELD

# A Feigned Translucence

AARON TOBEY Rhode Island School of Design

Situated at the intersection of two nations, embedded in a mountainside and televised across the US, Sun Bowl Stadium in El Paso, Texas demonstrates the role of architecture in the political economy of representation. The hills that compose the stadium and its televisual image are part building, landscape, and media apparatus. A Feigned Translucence builds on this hybridity to challenge the discrepancy in social, political, and economic agency the US/Mexico border creates as well as the imaginations of sovereignty and capital circulation embedded in who/what is (in)visible from the stadium, to whom it is visible, and to what end. In the existing economy of representation, the selective invisibility of the border from the American side allows for the materializing, normalizing, and concealing of exploitative power structures that deny Mexican citizens both acknowledgement and agency while images of their countryside are captured from across the border and transformed into capital. However, this selective invisibility also provides the opportunity for those who might subvert this economy or representation to camouflage themselves. Utilizing such an opportunity in the legal apparatus of the special economic zone, (SEZ), A Feigned Translucence amplifies/augments the Sun Bowl's unique spatial conditions and weekly television broadcasts, transforming it into a tool for countering the transmission of visual capital from Mexico to America with the free movement of Mexican citizens. immigrants, and workers. For this new image economy to function, where the border is not visible from within the stadium or on television it is functionally non-existent, but where it is visible it cannot betray its subverted nature. Interpreting the pseudo-laws of the SEZ within this image economy, so long as the connections between the US and Mexico are unseen, those crossing effectively enter the US legally. In order to conceal these new border crossings, the existing stadium and hills are analyzed and excavated using camera viewsheds. This results in a new topography of visibility; a tool with which to control the architecture and behavior of paths between the SEZ and Mexico; determining when they tunnel or skirt the landscape. Sight lines are projected from these pathways, ensuring their total concealment by further landscape manipulations. This process is enabled by computational tools for revealing hidden spaces in images which also extend the play of visibility into a strategy capable of being deployed elsewhere; a way to see the world as hollow and subversively occupiable. Using an image of the stadium from a television broadcast and the new topography of visibility, a model of the stadium and landscape is constructed. From a specific angle the model appears as the flat two dimensional image, but from other angles reveals the space behind. Effectively merging building and landscape, this creates a hollow scenographic architecture. Paradoxically, realizing this hollow architecture requires constructing large landforms. The build-up of landforms over time is intended to be coordinated with erosion control programs in the Rio Grande valley and staged to limit experiential and environmental impact. In these landforms, the image economy of television, international border politics, and environmental rehabilitation come together to create a performative architecture that acknowledges its embeddedness within global and local power relations. Taking the stadium/ landscape's need to operate as an image literally A Feigned Translucence transforms them into tools of political empowerment.



# **Urban Syncopation**

MARCELLA DEL SIGNORE Tulane University

STEVEN BEITES Ryerson University

'Urban Syncopation' temporarily inhabits the existing spaces of the city with a performative skin that functions as a responsive, dynamic interface. As in the encryption of data that underlies the invisible orgware of the city's systems, the patterned and faceted surface of this installation acts as an infrastructural device and living thickened topography that collects, transcodes, and re-transmits-in a rhythmic syncopated fashion—the collective 'heartbeat' of the city as this is interwoven with the reflected movements of its immediate environs. The work is a repository of urban information that renders visible the unseen traces of the city's occupation while simultaneously weaving them into a new architectural and spatial network.

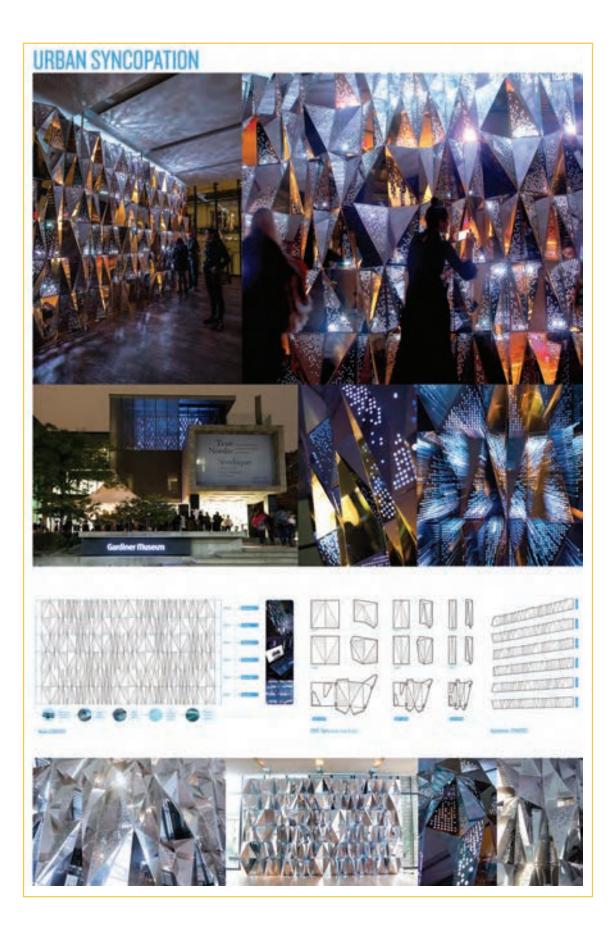
The patterned surface of 'Urban Syncopation' is defined through a series of faceted, mirrored, and perforated "pixels" that are rhythmically arrayed according to rules that modulate their width, depth and triangulated surface topography. These variations in the pattern, perceived as lateral compressions and expansions of the folded undulating surface, emphasize the tracking and directionality of the way in which the information is redeployed across the thickened skin as it MONA EL KHAFIF University of Virginia

ILA BERMAN University of Waterloo

captures and spatializes temporal and aural inputs. The pattern is an interdependent repetitive system generated through operations of folding, scaling, stacking, and weaving so that multiple elements are integrated into a new visual, spatial, and tectonic configuration.

Each individual pixel is constructed out of a perforated aluminum composite surface. The tracery of inscribed lines, that traverse this surface, are CNC-cut and scored to allow the stiff material to bend, enabling it to capture space through its own enfolding. The resulting interlaced pattern—an undulating triangulated surface of peaks and valleys-generates continuities across the skin while emphasizing its interwoven logic. The rhythmic series of faceted pixels, which passively fragment, and reflect surrounding motion, are organized into six horizontal strata, each of which receives data from a different remote downtown site and that collectively refer back to the layered streets that constitute the downtown fabric of Toronto. Sound sensors located along commercial east-west urban corridors from King to Bloor Street, along with those situated within the immediate environment of the piece, are employed to track urban activity levels throughout the day and night and

transcode this data into a rhythmic series of pulsing lights that undulate and move laterally across and within each of the strata. This layering of passive and active systems productively recircuits the movements of collective urban life while weaving them into a single syncopated surface.



# Viaduct Architecture

DAN ADAMS Northeastern University

MARIE ADAMS Northeastern University

Highways are a web-like surface that convey materials and people across territories. When elevated as viaducts, these two-dimensional surfaces are transformed into three-dimensional spaces. These spaces are dually characterized by large physical artifacts- columns, walls, decks- as well as dramatically altered atmospheric conditions, like expanses of shadow. In cities, the complexity of this twopart space, physical and atmospheric, is compounded by a third dimension – the sectional interface between local flows of urban life and the region scaled flows of the highway.

This project undertakes the study of the spatial relationship between the viaduct and the city in two parts. First, the physical architecture of the viaduct was analyzed to decipher the atmospheric conditions generated by it. Second, a collection of inter-related installations and retrofits were designed to re-shape its landscape, atmosphere, and programming. The intent of this design research is to understand how the often neglected spaces created by large scale infrastructure can be designed to simultaneously mitigate the infrastructure's impact while also translating its operating logics and spatial particularities into new urban use and performance.

Presented here are studies of four dimensions of the relationship between viaduct and city:

## Water, Shadow, Maintenance, View

## ABSORBING AND FILTERING VIADUCT RUN-OFF

The expansive surface of viaducts collects large volumes of water that dissolve and emulsify roadway chemicals and particulates. The polluted run-off drops through storm-grates and downspouts to pipes that discharge unfiltered into nearby waterways. This project analyzed the pitch and flow of the roadway to quantify existing roadway catchment zones. The design incorporates a new 'catch and dissipate basin' retrofit that is inserted midstream in a downspout to re-route run-off into constructed wetlands for evaporation and filtration, prior to discharge into waterways.

## VARIABLE DAYLIGHT AS LANDSCAPE FRAMEWORK

Elevated viaducts cast highly differentiated patterns of shade and sunlight onto the ground. This project used daylight simulations to identify spatial volumes capable of sustaining different types of plantings under the viaduct. Plantings are distributed based on hours of daylight, and coordinated with the functions of the constructed wetlands - resilience to flooding, salt tolerance (from highway run-off), and storm-water filtration. The shaded areas under viaduct ramps are left as maintenance access and recreation zones.

## MAINTENANCE SPACE AS COLLECTIVE SPACE

Viaduct structures, tasked with safely transporting people and goods, require regular maintenance inspections from man-lifts for signs of structural fatigue. This project analyzed the maintenance regiment of highway inspectors and the specific reach and turning radius parameters of their man-lift machines. The design translated these machine parameters into paved pathways and zones that simultaneously provide machine access and support public open spaces - basketball court, dog park, and event space - within the wetland landscape.

## FILTERING VIEWS THROUGH THE VIADUCT

The viaduct filters sunlight from above, as well as views from below. This project catalogued the apertures that the viaducts' deflections and overlaps create towards the city. A new elevated boardwalk allows pedestrians access through the storm-water landscape. The boardwalk's undulations orient walkers to the apertures framed by the viaduct.

## VIADUCT ARCHITECTURE

This project undertakes the study of the spatial relationship between the violatic and the only in two parts. First, the physical architecture

## ABBORRING AND FETERING VIADUCT RUN-DPT













## BANTENANCE BRACE AN DOLLECTIVE SPACE

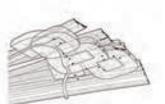
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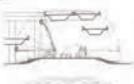














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## Solar Water Disinfecting Tarpaulin

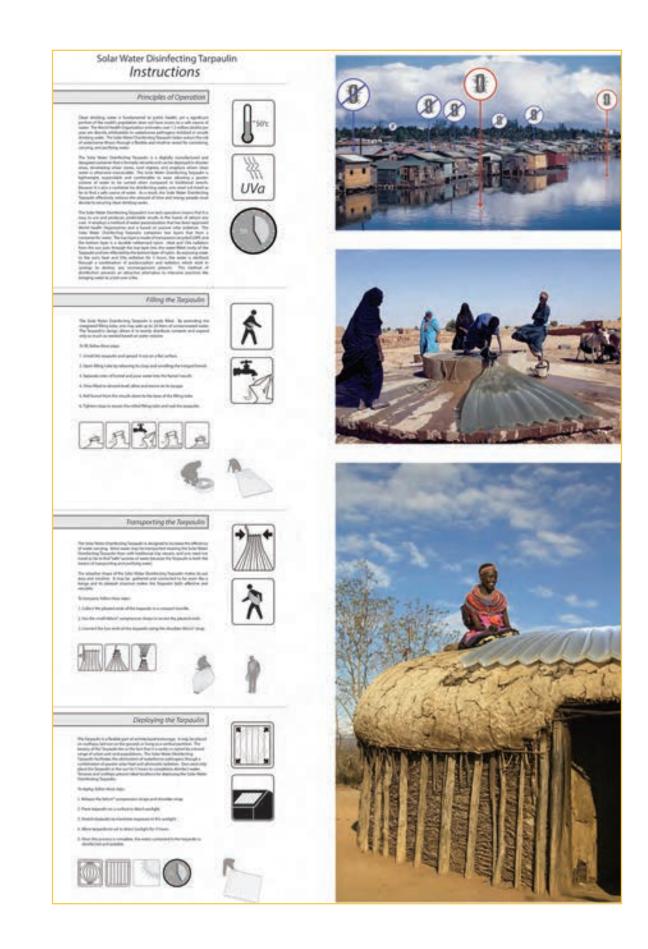
ERIC OLSEN Woodbury University

Clean drinking water is fundamental to public health, yet a significant portion of the world's population does not have access to a safe source of water. The World Health Organization estimates over 1.5 million deaths per year are directly attributable to waterborne pathogens imbibed in unsafe drinking water. The Solar Water Disinfecting Tarpaulin project addresses the problem of unsafe drinking water by imagining the possibility of a flexible and intuitive vessel for containing, carrying, and purifying water.

The Solar Water Disinfecting Tarpaulin implicates the current paradigm of water infrastructure in developing urban and rural regions around the world. In many places, individuals (especially women) must travel up to four hours to a safe source of drinking water. The Solar Water Disinfecting Tarpaulin is lightweight, expandable and comfortable to wear, allowing a greater volume of water to be carried when compared to traditional vessels. Because it is also a container for disinfecting water, one need not travel as far to find a safe source of water. As a result, the Solar Water Disinfecting Tarpaulin effectively reduces the amount of time and energy people must devote to securing clean drinking water.

The Solar Water Disinfecting Tarpaulin's lowtech operation means that it is easy to use and produces predictable results in the hands of almost any user. It employs a method of water pasteurization that has been approved World Health Organization and is based on passive solar radiation. The Solar Water Disinfecting Tarpaulin comprises two layers that form a container for water. The top layer is made of transparent recycled LDPE and the bottom layer is a durable rubberized nylon. Heat and UVa radiation from the sun pass through the top layer into the water-filled cavity of the Tarpaulin and are reflected by the bottom layer of nylon. By exposing water to the sun's heat and UVa radiation for 5 hours, the water is sterilized through a combination of pasteurization and radiation which work in synergy to destroy any microorganisms present. This method of disinfection presents an attractive alternative to intensive practices like bringing water to a boil over a fire.

The Solar Water Disinfecting Tarpaulin is fabricated to be flexible and robust. Layers of rubberized nylon and high performance LDPE are radio-frequency welded to produce durable, water-tight cells. The cellular construction of the Tarpaulin, morphologically inspired by the saguaro cactus, is designed to conform to the body and varied volumes of water. The digitally designed pattern for the Solar Water Disinfecting Tarpaulin lends itself to mass variation and is designed to be easily appropriated for a variety of situations: from carrying water to creating a sun shade; from urban rooftops to rural huts.



## A Walk In Africville: Visibility Strategies in Contested Heritage Landscapes

JAMES C. FORREN Dalhousie University

A Walk in Africville adopts strategies to counterbalance visibility asymmetry in contested heritage landscapes. Contested heritage troubles the North American landscape where people have lost land rights on the basis of ethnicity, skin color, and economic or political status. A walk in Africville pilots new methodologies which blur the boundary between past and present, creating activity in contemporary landscapes that is historically situated.

#### CONTEXT

Africville is a community hailing from black British Loyalists, colonial slaves, early Jamaican immigrants, and other early immigrants to Canada of largely African descent. The land - in what is today Halifax, Nova Scotia - was settled by British Loyalists over 200 years ago. However, during Halifax's industrialization and modernization this land was degraded by the location of an abattoir, prison, infectious disease hospital, shipping port, hazardous waste disposal, rail line, and city dump in its environs. Also during this period Africville was denied basic city services like sewer, water, electricity, plowing, garbage, and building permitting. Despite these prejudices the community developed kinship and economic ties, skilled trades, education,

and their own civic infrastructure. Ignoring these advancements, during the 1960s the City of Halifax relocated Africville's residents under a campaign of 'integration,' developing the land for a shipping port and highway. A 2003 report by United Nations cited the historic activities of Halifax as racist and recommended reparations (Tattrie 2010).

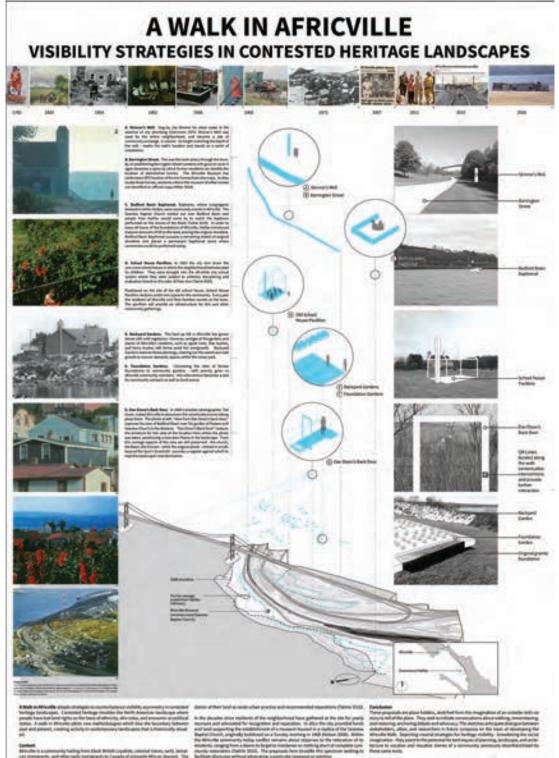
In the decades since, the residents have gathered at the site for yearly reunions and advocated for recognition and reparation. In 2011 the city provided funds, land, and the establishment of a museum housed in a replica of a church bulldozed on a Sunday morning in 1968 (Nelson 2008). Within Africville today there is conflict about the battle for legacy ranging from forgetting to complete community restoration (Tattrie 2010). The proposals here straddle these responses, facilitating discourse without ascribing to any particular path.

#### METHODOLOGY

The proposals were developed through historical research and conversations with the Executive Director of the Africville Museum. They recognize events, experiences, and place with operative interventions. They host activities like witnessing a forgotten view or a restored domestic garden, working a productive garden, receiving baptismal rites, or gathering for annual community reunions; situating lived experiences in a historical context without relegating the site to history. By amplifying Africville's visibility in the social imagination of the city they disrupt contemporary efforts to minimize or erase the Africville story.

#### CONCLUSION

The proposals here, however, are place holders. Sketched from the imagination of an outsider with no story to tell of the place, they serve simply to set up a conversation about walking, remembering, and restoring. They anchor debate and advocacy and anticipate dialogue between stakeholders, allies, and researchers in future symposia on the topic of developing the Africville Walk. They emblematize visceral strategies for heritage visibility to broaden the social imagination and the platform for our conversations within it. And point to the opportunity for the techniques of planning, landscape, and architecture to vocalize and visualize the stories of a community previously disenfranchised by these same tools.



### MaterialNature: An Opportunistic Paradigm of Architecture & Landscape Ecology Based upon Influences of Shipping Industry Waste, Small Scale Coastal Erosion and Natural Growth

MARCUS FARR American University of Sharjah

An opportunistic paradigm of architecture & landscape ecology based upon influences of shipping industry waste & coastal erosion

In "Material Nature: An opportunistic paradigm of architecture & landscape ecology", the influences of shipping industry waste, small scale coastal erosion and natural growth become the vehicle for architectural speculation. It leverages the material waste gathered from industry and creates a new material trajectory based upon need and the aesthetic of ecology. Material Nature is a series of architectural pavilions made from a mixture of residual, off-cast materials designed specifically to be weatherized. Its design is intended to provide a useful architectural community amenity in an area of high recreational activity, while simultaneously realizing a potential for architecture to be born from waste, and to return to nature without providing further waste.

In coastal Atlantic communities, soft rock formations along the shore are transformed by wind, water, and subsequently taken over by plants. The rock here is a porous mixture made of shells and sand & accepting of spontaneous, opportunistic landscapes. Plants themselves are able to germinate in the rock surfaces and grow year round, creating a surface of landscape on the outlining layer. This is a mutual relationship that is fostered between the landscape and the local stone which is leveraged by MaterialNature to create a localized architectural prototype. The life span of this architecture is multi-variate. It begins as a series of pavilions and recreational beach shelters, and as time progresses and the natural processes of beach ecology take their course, the pavilions develop into a landscape, completely natural to the environment. The architecture is a singular transgression between the meta-morphosizing effects of wind currents (smooth, circular forms), landscape (germination, pollination, growth), and waste (bringing back discarded sand from the shipping and packing industry that is removed from beaches and left on factory floors, along with wax that is discarded)

#### **PROBLEM:**

1. Coastal erosion & non-vernacular beach shelters

2. Coastal areas are plagued with a surplus of waste due to manufacturing adjacencies spurned by the proximity of oceanbased shipping facilities.

3. Additional waste surplus is created in the form of by-product wax use as a sealer in the shipping industry.

#### WHERE:

Placement of MaterialNature pavilions are based on areas of coastal erosion along shorelines caused by beach dredging, manufacturing & recreation. These areas indicate a need for the introduction of architecture as a civic amenity, but also present an opportunity for public knowledge and enlightenment

#### ARCHITECTURE/LANDSCAPE ECOLOGY:

The architecture of MaterialNature is timesensitive and privileged by natural selection, wind, and sun. The initial formation of pavilions are originally created from round re-claimed cast stone "host" structures common to the area. Some of these are filled with a core of re-used sand and soil. The exterior is multi-layered in landscape seeds which are local to the area and support local economies, and coated in re-used wax from local factories.

Over time, the architecture becomes landscape. The landscape becomes garden. The garden becomes beach.

MaterialNature is presented as an architectural scenario, but it is a result of an attitude of creative problem solving based on multivariate need and embodies a forward thinking agenda respondent to the overlooked forces of neglect and waste forged upon coastal communities as a result of years of manufacturing and the transient industry of ocean going shipping.



## Nature Play: An Outdoor Learning Environment for Head Start

PAMELA HARWOOD Ball State University

At Nature Play a 1.5-acre field has been transformed into a nature-based outdoor learning environment for the 300 preschool children at Head Start. Beyond simply getting children to play outside, we are taking play, which is culturally thought of as a recess time for teachers, into a learning environment. The central area of Nature Play is a large certified outdoor classroom called the Habitat Hub. It has room for two classes and acts as the starting point for the children's outdoor adventures. This timber frame structure is made of diseased ash trees re-harvested, milled down, with hand cut mortise and tenon joints to form an undulating tree like canopy under which the children learn.

Habitat Hub leads to other less-structured play areas with names like Fort Fun, Timber Time and Hideaway Hill that are constructed within four Indiana habitats: prairie, meadow, wetlands, and woodlands. The children learn through play with natural elements, native plantings, and traditional building materials in an unstructured, creative, and innovative way as their gross physical motor skills, fine motor skills, and cognitive and social learning skills are developed. The benefits of providing a high-quality, natural outdoor play and learning environment for Head Start preschoolers are particularly important because research links socioeconomic disadvantage with compromised physical health and wellness.

Regular physical activity in natural environments can lead to reduce childhood obesity, fewer health concerns, increased energy, and gains in children's cognitive development.

Co-Creative design processes using simulations and prototyping of activities and components was instrumental in testing ideas of children's scale, safety, and use and responding to changes needed as actual construction evolved. While the children interacted with the full-scale mock-ups, the students had to observe, take notes, and document the play while identifying the successes, problems, and insights from these activities, and make appropriate design changes.

The Habitat Hub is a timber frame structure that uses ash trees as well as oak and hickory as framing members. Additionally, these diseased trees reveal the effect of the ash borer to children by debarking and then using the trees as uprights in the construction of Melody Meadows and Crazy Climbers. Whether using local stone from a cemetery for a crawl-through tunnel, salvaged timbers for a series of small bridges in the wetlands, or re-harvested wood for the bird and butterfly blind, sustainable construction and environmental education is the goal of this naturebased preschool environment.



# Waterfront Ecologies: Redefining the Urban Edge of the San Francisco Bay

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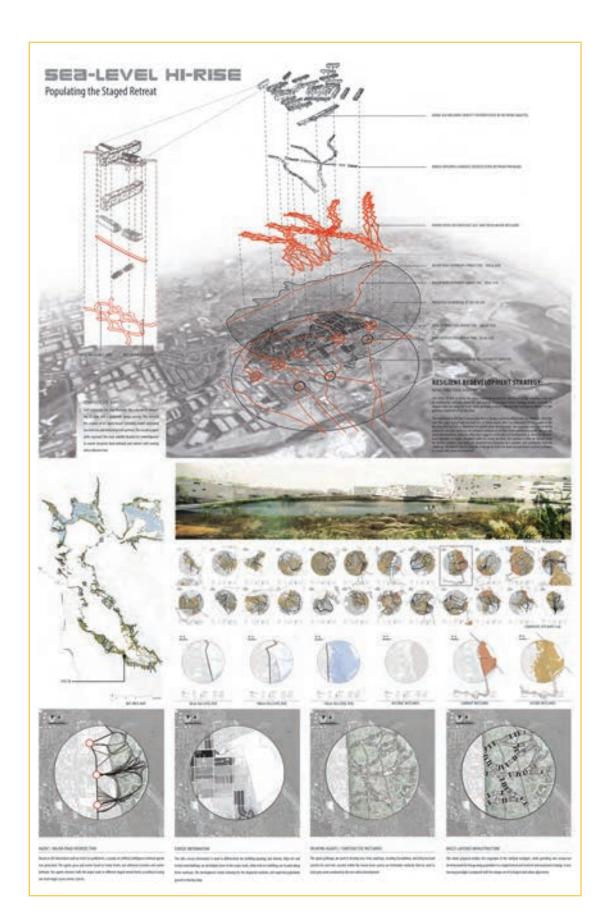
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Waterfront Ecologies re-envisions the edge condition around the San Francisco Bay, creating a new set of relationships between urban life and ecology. In 24 sites along the contested shoreline of the Bay Area, our redevelopment strategy illustrates a new methodology to design holistically as we face challenges posed by climate change and a growing population.

The waterfront of the San Francisco Bay Area is facing a growing threat from sea-level rise. By the end of the century, a projected sealevel rise of 140cm would affect an estimated 270,000 people in the Bay Area and over 331 sq. kilometers of current urban development. Two opposing solutions are being proposed; one plan that envisions an extensive network of fortified levees protecting public and private urban development and the other plan suggests a relocation of development to allow for the wetland migration to higher elevations with the rising sea level.

We propose that both may be accomplished by a staged retreat of existing development, enabling a wetland migration with the rising sea-level, while introducing a resilient new development and infrastructure that is uniquely defined by the region's ecological characteristics. The new development would be built on "finger" levees that are horizontal to tidal action, allowing for wetlands to coexist between the buildings, acting as a native habitat and a buffer against storm surges. Midrise and hi-rise buildings would replace the current low-density suburban development, creating a significantly smaller footprint, while providing twice as much housing for a growing Bay Area population.

Our design strategy involves the creation of an "agent-based" model to simulate sea-level rise and wetland growth patterns around the San Francisco Bay. GIS mapping data on sealevel rise, wetlands, demographics, and urban infrastructure was integrated with parametric modeling software to allow the site conditions to directly inform the design outcome. Our research demonstrates that through the use of new technologies in mapping and modeling, we can better utilize interdisciplinary knowledge to inform a design approach, mitigating the relationship between ecology and urban development.



## Catalyzing the Commons - Inverting the Participatory Process in the Production of Public Space

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The role, form, and locus of public space in urban environments has changed. Indoor entertainment spaces often replace the urban exterior as places of collectivity and chance encounter; austerity measures and rapid densification alike are factors in the proliferation of Privately Owned Public Open Spaces (POPOS); and in cities across the globe, the public itself has changed as a consequence of multifaceted migration patterns. At the same time, there has been a widespread resurgence of interest in the 'urban commons', understood as collectively appropriating and regulating urban resources. This trend has altered the relationship of citizens to architects in the production of urban collective space. The diversity of stakeholders in traditional public space design has led to complex design and planning processes for architects that offer only intermittent citizen participation in the process of constructing a final outcome. Urban commons projects, in contrast, are based on local citizen initiation, direct negotiation between stakeholders. long-term involvement of citizens, and the evolution of public space over time. In commons projects, the involvement of architects takes on the form of intermittent participation, using acupunctural interventions to catalyze the next steps in the commons' evolution, thus inverting the role of citizens and architects in the production of public space.

This project serves as a case study to examine the specific role of architects as participants in urban commons projects. It outlines a crossdisciplinary and interconnected set of tasks that enable short-term interventions to act as catalysts that set in motion longer-term processes for improvement of urban commons needs. Specifically, the project documents a 3-week summer intensive studio with a design-build component. Led by two architecture professors, it brought together an interdisciplinary group of students, an architecture collective, and an educational nonprofit in Berlin, to shape critical next steps for an urban garden - cum - refugee school whose grant-based funding was running out. The collaborating team rejected final, form-oriented outcomes in favor of the design of a process and a set of 'devices' that enable future development of the commons. It focused on interconnected proposals for the physical site ('hardware'), their use and programming ('software'), a business plan that leveraged these physical interventions towards the economic sustenance of the garden/school going forward ('orgware'), and a set of garden products ('brandware') whose sale supported the maintenance of the commons. The outcomes of this short-term intervention constitute an integrated set of forces whose social and economic impact will support the continued survival of the garden and refugee school,

and will strengthen the visibility and connection this commons has to the surrounding community.

Beyond the specific circumstances of the case study, this project highlights the need for considering the four interrelated platforms of 'hardware', 'software', 'orgware', and 'brandware' as critical components of catalytic interventions: formal design projects in close connection with opportunities for future use, an integrated plan that organizes stakeholder interaction and resources in a process towards a shared goal, and a visual identity that informs and strengthens the commons' visibility and perception.

