

School's Out: Exploring Learning By Doing Methods In On-Site Design Build Architecture Workshops

NEAL LUCAS HITCH

Texas Tech University

BRENDAN SULLIVAN SHEA

Texas Tech University

Keywords: Architectural Education, Design-Build, Materials Research, Participatory Design, Community Engagement & Festival architecture

The paper details current endeavors by the authors to explore and expand notions of sustainable design through two design-build festivals hosted during the summer of 2022 that each re-engaged historical architectural sites in ecologically diverse contexts. The paper first outlines the history of design-build pedagogies in the United States, from the founding of some of the country's first colleges of design to contemporary manifestations of festival architecture as seen in pop-culture contexts. Next, the authors detail how this history impacts the site, structure, and organization of the two research projects presented in the paper: one in a temperate forest ecoregion of North America located on the historic site of the 1969 Woodstock festival, appropriating research into laminate wood construction previously conducted by the authors; and the other in the Błędowska Desert of Poland, an area of anthropogenic desertification in Central Europe, which aims to expand research in silt-casting conducted in labs at Arcosanti, Arizona, onto rapidly transforming sites across the Atlantic.

The following projects and observations provide a lens into the participatory research methods and engagement strategies unique to the design-build festival model and argue for the festival model's capacity to adapt to site conditions, transform contemporary forms of architectural production, and engender a framework of community resilience; all the while amplifying contact and collaboration among groups of interdisciplinary experts through hands-on exploration at a construction site. As an illustration of how festivals allow designers to rethink the materials that are used to build, the paper examines the development of generative material processes and robust construction systems (in particular, laminated wood and silt-cast composites) as both a pre-festival site of research and a means of hands-on, on-site design exploration, invention, and evolution. The paper specifically addresses the relationship between structure and infrastructure in the context of the design-build festival, describing the application of the aforementioned principles and prototypes as implemented in two

pavilion-scaled structures—in each case, a site-specific and environmentally-sensitive design—conceived as part of a larger communal infrastructure intended to galvanize resilient, even if temporary, communities of artists, architects, writers, researchers, and musicians during the festivals.

INTRODUCTION

The history of contemporary architecture education in the United States can, in some ways, be understood as a merging of European, modernist thought (as exemplified by the Bauhaus) with the rise of pragmatism in the United States (evolving out of John Dewey's model of learning-by-doing). The first Architecture programs in the country were opened at MIT and Harvard in 1868 and 1895, respectively—and while these programs were initially modeled after the Ecole Des Beaux-Arts in Paris, within decades, they would transform into the more pragmatic configurations that still influence architectural education today, with Bauhaus founder Walter Gropius joining the Harvard architecture faculty in 1937, and MIT Press publishing his classic *The New Architecture and The Bauhaus* in 1965.¹

Bauhaus teaching methodologies were by no means a monolith; however, they all did share a common through-line emphasizing an integrated model of theorizing/making—what could be understood from a Deweyan perspective as a pragmatic approach: not just supplementing theoretical knowledge with practical or professional skills, but conceiving of a holistic curriculum where abstract concepts are reinforced—or ingrained—in students through kinesthetic activities. These ideas flourished at the Bauhaus throughout the early 20th century until the school was shut down in 1933 due to pressure from the Nazi party, the time at which many European modernist educators and designers defected to the United States, where they subsequently took positions in various design and architecture programs across the country.

Moreover, while evidence that pragmatic thought directly influenced the Bauhaus curriculum is tenuous, once the emigrating members of the Bauhaus arrived in the United States, the two ideologies quickly amalgamated into a sweeping pedagogy fostering radical hands-on experimentation. Perhaps the best example of this was at Black Mountain College, founded by John A. Rice the same year the Bauhaus closed. "Born out of



Figure 1. View of Sand Lab wall prototype in Bledowska Desert, Poland. Roundhouse.

a desire to create a new type of college based on John Dewey's principles of progressive education"² and adopting at least a dozen former Bauhaus professors, Black Mountain College would come to symbolize the first link in a chain that would see the propagation of kindred institutions throughout the American design ecosystem—including Taliesin West in 1937, Harvard GSD in 1936, the Cosanti Foundation in 1965, the Yale building project in 1967, and many more.

RECLAIMING THE FESTIVAL FORMAT

This was, for example, the context in which Paolo Soleri founded and built the Cosanti Foundation in 1967—as well as that in which Bill Ward and Ron Liis fabricated the art installations and infrastructure for the 1969 Woodstock Festival while teaching at the University of Miami. Soleri, who had apprenticed with Frank Lloyd Wright for just over a year, started experimenting with what he would eventually call “Arcology” in the late 1940s.³ Over the course of four decades, these investigations would culminate in the construction of the would-be utopia, Arcosanti, in the Arizona desert. Conceived as an urban experiment in integrated living/working, Arcosanti was erected over the years through community workshops designed within a pragmatist framework intending to disseminate tacit knowledge through hands-on education outside of the classroom.

On the other hand, with their work for the 1969 Woodstock Festival, professors Bill Ward and Ron Liis leveraged the pragmatist playbook to effectively establish modern art-festival culture. Tapped by Woodstock Ventures for their success

building art installations at the 1968 Miami Pop Festival, the team—consisting of University of Miami professors and students—began constructing the monumental sculptures for Woodstock during the summer of 1969. As Bill Ward says in his book *Work'n on Woodstock*, it marked their “first experience with sculpture that people interacted with... People climbed on the sculpture, sat and rested, or took each other's pictures posed against the piece.”⁴ Thus, a contemporary festival culture was born.

The penetration of the festival aesthetic in the culture at large is evidenced by the popularization of music festivals such as Coachella, Bonnaroo, and Burning Man, which all, if not explicitly, implicitly emulate the model of Woodstock. However, while critiques of varying validity have been lobbed at installations and semi-permanent projects in recent years, our research attempts to revive the festival format—not as a commodity—but as a test lab for sustainable modes of living and building.⁵ The two projects discussed in the duration of the paper thus aim to reconnect to the rich histories of their sites and contexts—reclaiming design-build pedagogies by way of the festival format as incubators for research forging new technological, social, and material partnerships across the globe.

PROJECT 1: SAND LAB

Context

Sand Lab was realized as a prototype constructed in the Błędowska Desert (a Polish ecological preserve and military testing ground) and was constructed during OASIS 2027 (a



Figure 2. View of exhibition in Magdeburg, Germany. Roundhouse.

trans-national research residency sponsored by the onEarth Foundation) as part of a workshop led by Brendan Sullivan Shea in 2022. The project was invited as a site-specific installation and workshop to complement a micro-festival of music and art called Sharing of The Fruits. The festival was the finissage of a month-long Art-of-Ecology residency programme, in which artists, architects, climate activists, scientists, and writers were invited to live and work in a holacracy—a self-sufficient and self-organized encampment with decentralized governance in the desert for the duration of the month of July.

The project was executed within the larger context of OASIS 2027, a residency that started in Mallorca, educating participants about sustainable urban and agricultural practices on an island increasingly experiencing the effects of desertification. Then, after the second phase in the Błędowska Desert of Poland, the residency concluded with an exhibition and activation to present the outcomes from the previous phases in Magdeburg—a post-industrial town in Germany that previously served as a critical connection point between Eastern

and Western Europe, and Northern and Southern Germany, and will soon be the home to a large-scale industrial operations center for Intel microprocessors.

The project specifically seeks to engage the unique attributes of its construction site, the Błędowska Desert, which is itself the result of a Medieval ecological disaster. In the Middle Ages, deforestation and over-exploitation of groundwater for intensive agriculture and ancient metallurgy rapidly depleted reservoirs and lowered the water table, exposing 40m thick deposits of silt and sand which had previously been dropped on the site by retreating glaciers at the end of the last Ice Ages. This rapid transformation quickly pierced a previously forested landscape with one of Europe's largest accumulations of loose sand. Since the early 20th century, the northern portion of the site has been maintained by the Polish armed forces, while since the early 2000s, the southern portion has been preserved for recreation and as a nature preserve as part of the Natura 2000 programme of the European Union. As a testing grounds, the site has two unique and proximate conditions: the desert and the forest, which were used as inputs into thinking about how we could run a design-build workshop in sympathy with resilient ecological systems—leaning on the analogy of the dune and the forest to drive forward the thinking of the project.

Process

The OASIS 2027 residency was motivated by the need for increased awareness of the phenomenon of desertification. Desertification is slated to affect the majority of Europe by 2027, and as such, the Błędowska Desert stands in as a testing grounds for deriving lessons which can be applied in imminent future scenarios.

From an architectural point of view, the project was motivated by ongoing research being conducted by Roundhouse Platform (Brendan Shea and Noémie Despland-Lichtert) at Arcosanti with students in the School of Architecture, intersecting digital modeling of 2.5D forms, PLA 3D printed molds, and silt or sand cast panelization systems. These techniques, workshoped on the historic grounds in Arizona, were then transposed to a culturally-divergent yet environmentally-similar location across the Atlantic.

In the initial workshop stage, our team discussed their relationships to sand and collectively constructed an affective cartography—describing both spectacular and mundane experiences drawn from our time living in the desert. After speaking about the sand, the workshop asked Participants to locate particular moments in the landscape which were compelling in their form, material, or texture and to cast impressions of these otherwise ephemeral moments into a more durable format. The catalog of captured moments contained a range: impressions from body parts and shoes, imprints from machines or tools, and detritus from industrial and military uses of the desert.



Figure 3. Aerial view of Peek-A-Boo in Woodstock, New York. i/Thee.

In the next phase, the design-build prototype used the materiality of sand in two ways: as a readily available mold-making material (for onsite casting) and as a component part of a composite panel (when mixed in small quantities with supplementary store-bought gypsum). The panels were cast in place in an armature that would serve, upon tilting up into a vertical position, as the tectonic support structure. This wooden frame was designed and assembled from left-over scraps and off-cuts from the construction projects of the music festival and was constructed with minimal access to power tools. Once erected, the project served as a prototype silt-cast wall construction system and featured nine conjoined panels arranged in a three-by-three grid. The object was constructed directly on site (lowering transportation costs and energy) and archived the site itself—capturing the landform site condition where the barren dunes of a well-trodden path meet the growth of bushy vegetation and grasses. The prototype performed as a wall and a sign, serving sometimes as a monument for participants to gather around but also as a kind of map—inspiring reading and misreading of the topography of the desert on both micro and macro scales.

Lastly, after the phase in the Polish desert, the Sand Lab team worked to prepare an exhibition based on their workshop outcomes in Magdeburg, Germany. The exhibition was conceived

as an opportunity to first, refine the one-to-one techniques, and second, expand the scope of the research to other scales through a series of speculative physical models. Ultimately, a series of eight sand-cast panels were produced through a three-part on-site workshop and displayed with the support of a system of tension cables. The sand-cast panel prototypes were presented alongside fifty-two stereolithographic scale-models, each one imagining a different architectural or landscape condition as informed by the design language of the sand-cast panels.

PROJECT 2: PEAK-A-BOO

Context

Peak-A-Boo was constructed in conjunction with Bethel Woods Art & Architecture Festival as part of the traveling seminar Architecture IRL (in real life) taught by Neal Lucas Hitch for Texas Tech University during the summer of 2022. Endeavoring to merge tacit and implicit forms of knowledge acquisition, the class was split into three parts, each of which intended to delineate specific objectives and outputs. The first week of sessions took place in Lubbock, Texas, where students spent several days conducting design charrettes and brainstorming site-specific solutions to the class brief. Then, the class shifted modalities to Bethel, New York, at the historic site of the Woodstock festival, where we were hosted by Bethel Woods



Figure 4. Interior view. i/Thee.

Center for the Arts for a two-week residency. During this phase, students fabricated and installed the aforementioned design at full-scale as part of Bethel Woods' inaugural architecture festival. Lastly, once the residency was completed, the class traveled back to Lubbock, where students produced as-built drawings and other documents detailing the project.

The project brief specifically aimed to re-engage the historic Bindy Bazaar woods—a craft fair and marketplace that sold food and other goods during the 1969 festival and that acted as the main entry gate for attendees. Over the last three years, Bethel Woods Center for the Arts has been restoring the Bindy Bazaar trails, which opened to invited guests this July. Our installation, erected alongside Gentle Path (one of three paths that run through the Bindy Bazaar), was meant to facilitate this opening and stands as the first piece of programmable infrastructure in the Bindy woods since 1969.

Process

Design of the structure started offsite, in a studio setting at Texas Tech University, where students investigated responsible material allocation through the use of bending-active plywood systems. Explorations began with the modeling of various formal and programmatic studies using scaled materials—out of which one design direction was chosen based on

its latent potential to accommodate the criteria mentioned above and service the program of a small stage and pavilion. The chosen design was then translated into a parametric script that allowed us to rapidly iterate various manifestations of the design using specific parameters; then, out of those iterations, we chose one final solution based on its ability to fulfill the material, budgetary and programmatic constraints. Once the design direction was set (an undulating wave that would simultaneously act as covering and seating), we began to engineer the structure—developing a secondary system of site-built, glue-laminated timber arches to supplement the bending-active shell. Consisting of over 180 pieces, with 50 unique shapes, these arches were designed to mimic the natural bending of the sheets and to embed within the permeable, wood-laminate structure to form a cohesive tectonic system.

Due to the remote nature of the site and budgetary constraints, the use of digital fabrication techniques like laser cutting or digital milling to cut the arched pieces was deemed unfeasible; instead, students cut the pieces out manually—by doing so critically questioning when and where to implement digital vs. analog fabrication. As such, construction of the arches started onsite by transferring one-to-one templates printed on 48-inch roll paper onto plywood. Next, students manually cut out the various pieces using standard power tools such as hand-held

jig-saws. Pieces were then laminated together to create curving two-inch by six-inch arched beams and transported by foot into the woods, where they were secured into low-impact foundations. Plywood sheets were finally secured along the laminated arched members with screws and tied together with rivets.

The result is a lightweight yet robust structure that uses a small amount of material to span a considerable distance. Furthermore, as minimal alterations were made to the sheets upon installation, they can be reused once the structure's life-cycle expires—in this case, an estimated two to three years. In this way, the project dialogs with economic material usage in two ways: (1) leveraging the efficiency of bending-active structural systems to produce maximum spans with minimal materials; and (2) utilizing uncut sheets in order to extend the material lifecycle beyond that of the installation.

Finally, after the festival had concluded and the residency was over, the class traveled back to Lubbock, where we embarked on a thorough documentation process: creating as-built drawings of the installation, constructing a scale model, diagramming key concepts, and editing photos and videos. Upon completion, the materials were compiled into a press release, circulated, and published across various digital magazines, thus bookending a comprehensive curriculum that took students all the way through the designing, planning, fabrication, installation, documentation, and publication of a singular piece of architecture.

CONCLUSION

Learning-by-doing pedagogies, born from pragmatist and Bauhausian frameworks, are not necessarily rare in architecture schools and, in fact, tend to be the baseline from which design curriculums are modeled. Even so, these programs tend to focus more on the doing associated with drawing and modeling rather than applied construction techniques, engineering, or administrative activities; rarer still do they engage holistically with multiple phases (conceptual, schematic, developmental, and construction) of the design ecosystem constructively. In this way, as demonstrated in the projects presented in this paper, the festival format—in both curricular and extracurricular settings—has great potential to catalyze more productive relationships between the ever-widening dichotomies of the discipline: professional vs. academic, digital vs. analog, research vs. practice, etc.

The architectural festival, predeceased by histories of scholarly apprenticeship and pioneered by organizers across the country in the late 1960s, has been diluted in mainstream culture as a mass-consumer, exclusive event. Our goal with this paper is to make a case for the festival as an opportunity for experimentation: as the test labs for new material and construction techniques. With the whole of the projects presented in the paper, our goal is to demonstrate a more robust design-build curriculum through the creation of tactile experiments at a one-to-one scale, testing the viability of sustainable material applications and spatial propositions. In this way, the projects

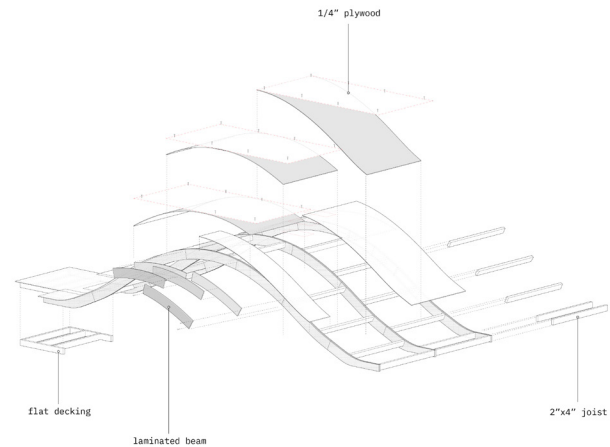


Figure 5. Constructive Diagram. i/Thee.

work twofold: as experiments with novel sustainable building techniques in low-stakes settings and as educational platforms teaching responsible building skills, together creating the testing grounds for more resilient futures.

ENDNOTES

1. Walter Gropius, *The New Architecture and The Bauhaus* (Cambridge: MIT Press, 1932).
2. "A Brief History," Black Mountain College, accessed November 6, 2022, <https://www.blackmountaincollege.org/history/>.
3. "The Arcology Concept," Arcosanti, accessed November 6, 2022, <https://www.arcosanti.org/arcology/>.
4. Bill Ward, *Work'n on Woodstock* (B. Ward Press, 2013). ASIN: B00BUCCWHQ
5. Aaron Betsky, "'The Biggest Problem With Coachella Is That It All Goes Away After Two Weeks,'" (Dezeen, 26 Apr. 2019), <https://www.dezeen.com/2019/04/26/coachella-festival-installations-waste-aaron-betsky-opinion/>.