One Project at a Time: Service and Learning Applied in Appalachian Communties

"We saw hundreds of mountain peaks all around us, presenting a spectacle like ocean waves in a storm."[1]

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BOOTSTRAPPING EDUCATION

Against a geographically isolated and economically – if not culturally – impoverished backdrop, brothers B.B. and D.D. Dougherty founded Watauga Academy, a forerunner of Appalachian State University, in 1899 to provide educational opportunity for the region. Its founding ethos reflected the character of its community: a self-reliant and self-sustaining institution with a pioneering and nimble spirit. From these humble beginnings, Appalachian State has emerged as a nationally-recognized regional university characterized by a commitment to sustainability and innovative education. It is an institution that appreciates a bootstrapping sensibility.

The Building Science program at Appalachian State University originated as a degree concentration in Construction Technology within the Industrial Arts and Technology program in the 1980s. Because Appalachian State University began as a college "to improve the education of teachers" in northwestern North Carolina; the Industrial Arts department, particularly the Construction Technology concentration, focused on training future high school and middle school drafting and wood shop teachers.[2]

As the university gradually transformed "from a single-purpose teachers college into a multipurpose regional university," so too did the Industrial Arts and Technology department.[3] By the late 1990s, the Construction Technology concentration developed a more professionally-based program of study, preparing students for careers in the construction industry in addition to vocational education settings. In 2006, the concentration became an official Bachelor of Science in Building Sciences degree program. Built upon a unique diversity of faculty expertise and encouraged by a high level of student interest, the applied-learning, sustainability-centric program organized two concentrations: one in Construction Management, the other in Architectural Technology and Design.

The Architectural Technology and Design concentration began in modest circumstances with only a few students occupying a small studio space – the proverbial one-room schoolhouse. Although the concentration was not developed as a NAAB program by

intention rather than circumstance in order to preserve pedagogical adaptability, student numbers grew quickly because of the hands-on, interdisciplinary structure of the program curriculum. Within just a few years, the concentration expanded to accommodate approximately 100 majors, with students not only finding employment in architecture, construction, and engineering firms after graduation but also pursuing Master of Architecture degrees in programs across the southeast.

Today, the concentration in Architectural Technology and Design is an integral component of a comprehensive degree program that explores the building industry holistically. Now boasting three distinct yet convergent concentration tracks focusing on building design, building construction, and building performance, students in the Building Science program are exposed to an integrated and systemic approach to sustainability in the built environment. The program curriculum as a whole and the Architectural Technology and Design concentration in particular embrace systems thinking as a pedagogical variation of design thinking toward recognition and implementation of the interrelated flows of material, forces, and information in the design of buildings.[4]

This type of synthetic academic environment leans on the university's philosophical underpinnings to develop self-sustaining educational processes rooted to a sense of both place and craft as critical architectural values. As Richard Buchanan notes: "The significance of seeking a scientific basis for design does not lie in the likelihood of reducing design to one or another of the sciences … Rather, it lies in a concern to connect and integrate useful knowledge from the arts and sciences alike."[5] Thinking in this way involves not only the mechanics of design but raises specific inquiries about intention, about relevance, and about engagement.[6] It presents a set of hairy – yet enjoyably challenging – problems both academically and professionally whose epicenter may be found in asking (and re-asking) one vital and enduring question: how do you teach someone to function on their own *and* as part of a team?[7]

BOOTSTRAPPING PRACTICE
"Proceed and be bold."[8]

All too often, the commonly eviscerating critique goes, the primary disconnect between architectural education and architectural practice is akin to a supposed disconnect between the head and the hand, between thinking and making. The academy is not doing, the profession is not instructing, and so on. It is a tired yet persistent issue, one that cannot be dismissed easily or resolved singularly. A common sense approach of blending architectural education and architectural practice seems both obvious and necessary.

This is by no means a new idea, of course. It is instead a concept of abundant and rapidly increasing permutation, stretching from the rocky shoals of Nova Scotia (Ghost Lab) to the plains of Kansas (Studio 804) to the foothills of western Alabama (Rural Studio). These models have served to inform and inspire a professional trajectory toward jointly researched public interest architecture projects delivered from within the academic curriculum rather than working in parallel from without. The roots of this professional shift, however, stem from problem seeking within a rural cultural context that values above all else a problem solving capability to accomplish things competently and expediently with often limited means: in other words, bootstrapping.

At Appalachian State, what began with Industrial Arts faculty teaching a variety of subjects, including drafting and design courses, evolved into employing local architects as adjunct instructors teaching architectural design studios in the late-1990s. As the Building Science program grew in majors and student interest in the study of architecture increased, more permanent faculty positions were created. Chad Everhart and Jason Miller work

as tenure-track faculty in the Building Science program and professional architects in the mountains of North Carolina. With each year, the connection between their professional and academic work deepens. In fact, it is increasingly difficult to delineate where each begins and ends relative to the other; however, this now delightfully blurry confluence was not always the case.

While the greater region of Appalachia is recognized as one of the poorest areas in the United States, many highly affluent pockets reside in the region around Boone and Watauga County, North Carolina – a microcosmic comingling of the so-called 99% and the wealthy. It is not uncommon to find multi-million dollar homes shoulder to shoulder with dilapidated single-wide trailers lacking basic utilities. Architectural services are viewed and consumed as a luxury product.

Because of these perceived limitations to activating professional relevance, both Everhart and Miller have positioned their practices in a manner that is responsive both to local inhabitants and the mountain context. Within their respective one-person firms, projects have been primarily small, sustainable, contextually-sensitive, and affordable, in direct contrast to the architectural self-indulgence inherent to the resorts dotting the mountainsides. Rather than scratching a living from a migratory population not unlike the Canada geese whose honking call seasonally fills the air, the authors elected to reposition the market of their architectural work.

Shifting professional focus toward the academy afforded Everhart and Miller an opportunity to design like they give a damn, to paraphrase Cameron Sinclair, by pairing the unfiltered ideas of students with a receptive audience of community organizations well-stocked with need for design and construction services. With projects of modest requirements, modest means, and modest aspirations, Everhart and Miller have organized the architectural studio as an incubator of inspired design solutions because of, rather than in spite of, the constraints or limitations of a particular design problem.

ON EXPERIENTIAL SERVICE-LEARNING
"Pragmatism is the best teacher; learning is accelerated by purpose. We learn best when we need to know."[9]

While real-world application has intertwined frequently with the Building Science program through various projects and initiatives, the Architectural Technology and Design concentration's commitment to service-learning throughout its first nine years began with an impromptu phone call to the Blue Ridge Parkway, which resulted in students developing

Figure 1: Everhart (left) and Miller (second from left) with students at the Alleghany County Farmer's Market job site in Sparta, North Carolina.

Intersections Between the Academy and Practice

proposals for a new visitor's center. The project validated service-learning within the context of architectural studios, established a studio culture within which to deploy similar projects, and facilitated a nascent educator/practitioner model for the architectural faculty.

Since this initial project with the Blue Ridge Parkway, numerous service-learning projects have occurred within the concentration's design studios. Projects completed to date range in scope from feasibility studies and master planning to integrated design and full-scale Design-Build. Clients or project partners have included a variety of non-profit organizations, government agencies, and other academic units or organizations at Appalachian State University. Students have worked variously as individuals and in collaborative groups, with certain projects lasting only a few weeks while others spanned multiple semesters. From 2007 to the present, the following service-learning projects have been executed in full or in part by Architectural Technology and Design students at Appalachian State:

This substantial list of service-learning projects demonstrates, in a relatively short period of time, a wide variety of building typologies, site conditions, and scopes of architectural

YEAR	PROJECT TYPE	CLIENT	SCOPE OF WORK	[2]
2007	Visitor Center	Blue Ridge Parkway	Design; Master Planning	
	Bass Lake Comfort Stations	Blue Ridge Parkway	Design	
2008	Comfort Facilities	Daniel Boone Native Gardens	Design	
	Dining Hall and Housing	Holston Presbytery Camp	Design; Master Planning	
	Community Housing	Watauga Habitat for Humanity	Design; Master Planning	
2009	Duncan Hall Renovations	Appalachian State University Dept of Theater and Dance	Feasibility Study	
	Community School	Two Rivers Community School	Design	
	Conference Center	Holston Presbytery Camp	Design	
	Mobile Performance Stage	Valle Crucis Community Park	Design-Build	
2010	Learning Lodge	Grandfather Mountain	Design	
2011	The Solar Homestead	US Department of Energy Solar Decathlon	Design-Build	
2012	Teaching Barn	Appalachian State University Sustainable Development	Design-Build	
	Central Park and Pavilion	Spruce Pine Main Street	Design; Master Planning	
2014	Maison Reciprocity	CSTB Solar (France) Solar Decathlon Europe	Design-Build; Urban Planning	
	Composting Privies	Appalachian State University Sustainable Development	Design-Build	
2015	Farmer's Market	Alleghany County and Town of Sparta	Design-Build	
	Welcome Center	Valle Crucis Community Park	Design-Build	
	Farmhouse Adaptive Reuse	The Summit at Lost Ridge	Design; Master Planning	
	Tiny Home Community	Appalachian State University Center for Entrepreneurship	Feasibility Study; Design	

service; however, more informative to a study of academic and professional intersections are the project delivery methods employed. The following case studies compare projects sharing similar scopes, similar clients, and/or similar geographic locations while highlighting their differing objectives and execution strategies. In addition, each project reveals a sequence of architectural ethics instilled, rather than dictated, by Everhart and Miller's professional experience working in and for a rural Appalachian community: to value the importance of context (and its many unique layers); to understand the logic of local construction; and to implement the possibilities of sustainable technology and prefabrication.

Single Semester vs Multiple Semester

Most design projects within the Building Science program over the previous eight years have been developed as single semester activities. Within individual semesters, many service-learning projects have accounted for fifty percent or less of the total coursework in the studio. Since these projects are executed quickly, their design intention and community effectiveness is often conceptual; however, several single semester projects have been investigated more thoroughly and detailed in a manner similar to the program's limited portfolio of multi-semester endeavors. The first case study compares a single semester Design-Build project with a multi-semester Design-Build project for the same client: Valle Crucis Community Park in Valle Crucis, North Carolina.

In Valle Crucis, a small, historical crossroads within a rural landscape, the Building Science program has engaged in two significant projects for the same client: Valle Crucis Community Park. The privately-funded, non-profit park has a very small operating budget but large facility needs due to its popularity with local and non-local community members.

Figure 2: Views of Design-Build projects for Valle Crucis Community Park: *Mobile Performance Stage* (2009) and *Welcome Center* (2015)

The first project, a mobile performance stage, was a single semester effort in the fall semester of 2009. Fifteen students from the senior-level architectural studio began the semester by analyzing the larger context of Valle Crucis – a National Historic Rural area – as well the park itself. Upon completion of the analysis, several critical constraints were identified, including a 100-year floodway designation, which informed locations, floor heights, and construction techniques. As a result, the final scheme was really a collection of vehicles – rather than buildings – that combined to create a performance stage and pavilion. To circumvent the floodway issue, the stage was assembled upon robust flat-bed utility trailers that could be moved easily in case of flooding. This design strategy also proved valuable as a means to bypass the planning and inspections process, which would have

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inevitably slowed or halted a single-semester Design-Build project. In addition, the three-trailer mobile design strategy provided the ability to prefabricate components and fully assemble a final product on-campus with one-day delivery and set up on site.

Following the success of the mobile performance stage, the park engaged the Building Science program again in 2014 to aid with more a substantial project: a small visitor's center. With desperate need for additional restrooms, an office for the executive director, and indoor meeting space, it became clear that this permanent structure would be a multi-semester project. Building upon previous contextual analysis, research into the site and programmatic constraints – including the recurring floodway issue and historic preservation standards – informed the building's site position, foundation system, and exterior appearance. These constraints were intended to be addressed fully during the fall semester of 2014, which served as the "design" semester; however, bureaucratic complexities and inadequate time management by the student team prolonged the design process until midway through the spring semester, thus delaying the beginning of construction. Ultimately, the intricacy of the project and a (non)collaborative dynamic of the eight-person student team resulted in delays that impacted the completion date. A two-semester project transformed in to a three-semester project.

DESIGN-ONLY VS DESIGN-BUILD

The Building Science program has benefited from both design-only and Design-Build sponsored studio projects. One of the greatest factors in determining the architectural scope of services provided for a client is the amount of funding available to the project. While funding is tied, by default, to construction activities, challenging design problems require financial commitment from those requesting work from the studio. The second case study evaluates a funded design-only studio against a funded Design-Build studio which occurred simultaneously with the same cohort of students.

In the spring semester of 2012, Everhart and Miller embarked on two distinct service-learning journeys with two different sections of the senior architectural design studio. One section, led by Professor Miller, engaged a community group from nearby Spruce Pine in Mitchell County, North Carolina for a design-only experience, while the other section, led by Professor Everhart, participated in a Design-Build experience with another academic unit at Appalachian State. Both projects might be best classified as "out-of-town" work, with Miller's studio designing for a downtown infill site one hour south of campus and Everhart's studio working on a rural and historic farm property thirty minutes east of Boone.

Miller guided a collaborative team of ten Building Science students and twenty Interior Design students through the complete range of architectural services on behalf of the sponsored studio's client, Spruce Pine Main Street, a non-profit organization in Spruce Pine, North Carolina. The programmatic need was simple enough: provide design proposals for a small pocket park and office space on an infill site fronting one of the two main streets in the community's downtown district. Not so simple was the community need for the project to mend the physical and emotional scars left by a devastating act of arson in 2007. The studio first "unpacked" the Town of Spruce Pine through analysis, research, and interviews in order to understand its anatomy and establish a "we-based" communication strategy with community members.[10] This contextual research shaped a predesign phase of program development, site documentation, and precedent analysis which, in turn, informed the design phases for the ten project teams (composed of one Building Science student and two Interior Design students). These ten teams presented their final design proposals to gauge community interest and response. Based upon community feedback, a small team of students prepared and documented a final design scheme approved by the Spruce Pine Main Street board for implementation when fundraising efforts concluded. For a meager

$2,500, the studio provided the client and the Town of Spruce Pine with: [1] a four-hundred page analytical document including proposed design and development guidelines; [2] a three foot x seven foot presentation site model; [3] promotional, branding, and fundraising materials for Spruce Pine Main Street; and [4] a student-designed, student-built project information kiosk installed on the downtown site.

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Figure 3: Views of *Main Street Central Park and Pavilion* in Spruce Pine, NC (2012) and *Teaching Barn* in Ashe County, NC (2012)

A smaller group of eight Building Science students were shepherded by Everhart to design and build a Teaching Barn for the Sustainable Development Teaching and Research Farm in Ashe County, North Carolina. With a very small construction budget of $10,000 and a single-semester timeline, each of the eight students analyzed the farm as a context and developed individual schematic designs for the building at the beginning of the semester, which informed a final collaborative scheme. After synthesizing client comments from the individual projects as well as revisiting the budget, site constraints, and programmatic needs, the students collaboratively designed an "off-the-shelf" structure of built-up dimensional lumber clad in planking harvested and milled on site. Because the project was located on an actual working farm, roads and other infrastructure were very limited. To address these issues as well as a quick four-week build schedule, the structure was prefabricated into panels and components in the program's high-bay construction lab. After dry-fitting the structure on campus, it was disassembled and reassembled on a minimalist concrete pier foundation system in a meadow adjacent to the farm's principal access road and gardening areas.

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PROBLEM-SOLVING VS PROBLEM-SEEKING

The Building Science program has worked primarily with community groups with predetermined project scopes, which is often how service-learning is identified or categorized; however, some of the program's pursuits have been more speculative than reactive in addressing community needs. The third case study investigates a community-initiated, problem solving project and a problem seeking, community-partnership design proposal. Both projects were Design-Build ventures, although one was heavily grounded in its local context while the other suggested a mass customizable prototype solution.

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In the spring of 2014, the Town of Sparta and Alleghany County contacted the Building Science program regarding their need to construct a permanent farmer's market facility. Operating with pop-up tents in a gravel parking area, the new farmer's market structure was considered by the two collaborating government entities to be an economic catalyst and visible landmark in the small, rural, and historically impoverished community. After thorough context analysis and precedent research, the eight-student team developed collaboratively three conceptual schemes in the fall of 2014, which they presented to the Town Council and County Commissioners for feedback. Working directly with the County Manager and Town Manager as their primary clients, the students integrated feedback into a final design, which was again presented for review by the two governing bodies. After receiving approvals from the community, the design was used to acquire additional grant funds and detailed for construction through late winter of 2015 when prefabricated construction began. The project included significant community collaboration not only

Figure 4: Views of A*lleghany County Farmer's Market* in Sparta, NC (2015) and Mixed-Use *Quartier Reciprocity* in Winston-Salem, NC (2014)

during the design phase, but during construction as well with county and town employees assisting with excavation, grading, and pre-fabricated component erection.

From 2012 to 2014, students from the Building Science program participated as part of an interdisciplinary, transatlantic team in the Solar Decathlon Europe 2014 with its entry Maison Reciprocity. Unique to the Solar Decathlon Europe is a dual responsibility to solve problems and seek problems: to design, build, and commission a high-performance building prototype for the international competition; and to develop a comprehensive design proposal addressing housing needs in an urban environment. The requirement to look at urban housing issues led the integrated design team of undergraduate and graduate students to ask an important if somewhat obvious question, "What does it mean to live well?" In Winston-Salem, North Carolina, a mid-sized city at the foot of the Blue Ridge Mountains, the team identified a community in transition from its founding tobacco industry roots to biotech and medical research with a specific need for affordable mixed-use housing in the heart of downtown. After developing research partnerships with two local agencies, the Goler Community Development Corporation and the Housing Authority of Winston-Salem, the team developed a market-centric urban design proposal. Quartier Reciprocity explored a model for fine-grained urban development and economic generation by restoring the centrality of mixed-use, mixed-income neighborhoods within the urban fabric. The plan offered a framework, or systems-based approach, for neighborhood design to create a socially and economically diverse mix of housing units, commercial spaces, and communal outdoor areas. The team's proactive, pro-city business and master plan was well-received by its partner agencies and the Winston-Salem community, leading to ongoing discussions on implementation of the proposal into HAWS strategic planning initiatives and licensing the Maison Reciprocity row house design for speculative social housing development and mass production.

SINGLE DISCIPLINE VS INTERDISCIPLINARY
While the initial service learning projects executed by the program were only with students in the Architectural Technology and Design concentration, many projects have since incorporated students from other disciplines. The interdisciplinary approach has proved incredibly effective not only with complex programmatic or site issues, but also when dealing with issues of sustainability. The fourth case study compares two projects – one single discipline and the other interdisciplinary – whose primary objective was to be net zero in regards to energy consumption.

In the spring semester of 2010, fifteen students worked with the Grandfather Mountain Stewardship Foundation to develop individual design options for a potential project called "The Learning Lodge." In an effort to consolidate disparate research endeavors on Grandfather Mountain by various academic and non-profit organizations, the Foundation desired a facility to house researchers under one roof. Besides acknowledging the inherent view shed issues and rugged landscape, the client mandated one major thesis: a self-sufficient, sustainably constructed, net-zero energy facility. While the Architectural Technology and Design students spent considerable time researching and developing sustainable strategies for their individual design proposals, the final schemes ultimately were more architecturally focused. The Foundation was able to use the semester's work as a pre-design exercise, which assisted the crafting of a competitive Request for Proposals (RFP) document.

From 2009 to 2011, students from the Building Science program participated as part of an interdisciplinary team in the US Department of Energy's 2011 Solar Decathlon in Washington, DC, with its entry The Solar Homestead. The 2011 competition, like each occurrence of the biennial event, asks student-led teams to design, build, and commission

a net-zero energy building prototype; however, unique to the 2011 competition was the inclusion of affordable housing and cost estimation. Rather than beginning the conceptual design phase with only Architectural Technology and Design students, the faculty assembled an interdisciplinary, multi-generational group of eight students as the core design team. The students included two Architectural Technology and Design undergraduates, three Interior Design undergraduates, and three Appropriate Technology graduate students with undergraduate backgrounds in construction management, architecture, and communications, respectively. As the conceptual design evolved to a more concrete design solution, the interdisciplinary team grew as well. By the end of the two year event, over one hundred students from disciplines across campus participated and a core Design-Build-test team of thirty made the trip to the National Mall in the fall of 2011. The Solar Homestead, winner of the coveted People's Choice Award and a finalist in four of the ten juried and measured contests, was an embodiment of seamless renewable energy integration into a buildable, architecturally expressive project. This project not only transformed the program's approach to student team composition, but fostered interdisciplinary faculty research and pedagogical approaches via applied design and construction projects.
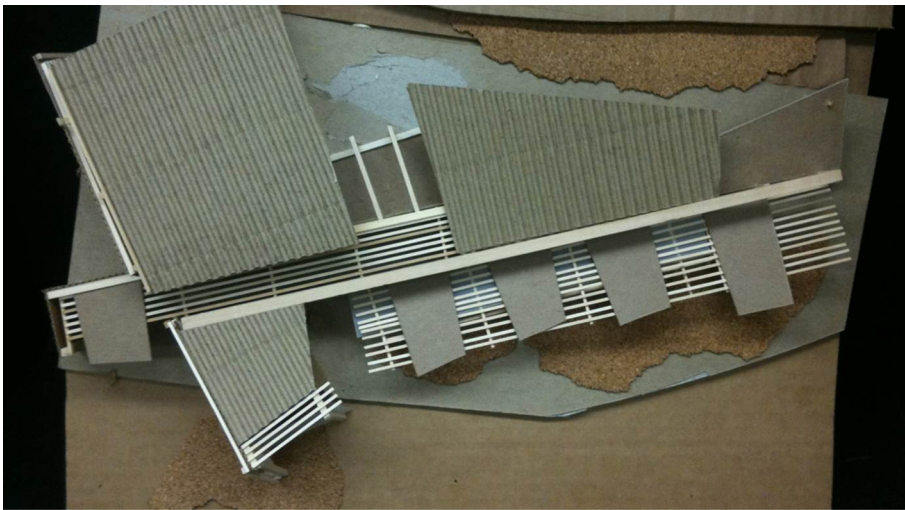
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BOOTSTRAPPING EDUCATION WITH PRACTICE

A term usually deployed in reference to a self-sustaining process or an unorthodox yet effective action, the interpretation of bootstrapping as an architectural approach for the educator/practitioner reflects both the cultural context of the southern Appalachian region and of a Building Science program that traces its origins to an academic department focused

Figure 5: Views of *Grandfather Mountain Learning Lodge* (2010) and *The Solar Homestead* (2011)

on manual training (c. 1918). While this approach does not suggest nor have interest in a universal solution to conjoin the academy with professional practice, it does present an interesting point of intersection for these parallel architectural trajectories and offers some useful observations about how professional "real-ness" might intertwine effectively with a service-learning pedagogical model.

The case study projects completed through the Building Science program and its Architectural Technology and Design concentration have been professionally instructive precisely because they eschew dogmatic philosophies and narrow scope of work definitions. Both design-only and Design-Build studio projects bring value to the community; the legacies of each are simply measured on different temporal scales. Projects executed across multiple semesters prove to be more critically and constructively engaging for students, faculty, and community members. Team dynamics and communication are consistently the most challenging issues in the studio environment; interdisciplinary groups often engender a stronger team culture and better calibrated project solutions economically, systemically, and architecturally.

The academic and professional synthesis embedded in these service-learning projects reaffirms the idea that problem seeking and problem solving cannot stand on their own, that the essential service of architecture is to provide both for its community.

ENDNOTES

1. Donna Gayle Akers and Brian Lambeth, *Images of America: Watauga County* (Charleston, SC: Arcadia Publishing, 2008), 7.

2. Dorris Perry Stam, *Mountain Educators: The Dougherty Family and the First Fifty Years of Appalachian* (Boone, NC: Watauga Press, 2010).

3. "History," Appalachian State University, accessed April 15, 2015, http: /www.appstate.edu/about/ history.

4. Leonard R. Bachman, *Integrated Buildings: The Systems Basis of Architecture* (Hoboken, NJ: John Wiley & Sons, Inc., 2003), 18.

5. Richard Buchanan, "Wicked Problems in Design Thinking," in *The Idea of Design* by Victor Margolin and Richard Buchanan (Cambridge, MA: MIT Press, 1995).

6. Dell Upton and John Michael Vlach, eds., *Common Places: Readings in American Vernacular Architecture* (Athens, GA: University of Georgia Press, 1986), xxii.

7. Andrea Oppenheimer and Timothy Hursley, *Rural Studio: Samuel Mockbee and an Architecture of Decency* (New York: Princeton Architectural Press, 1992), 3.

8. Andrea Oppenheimer and Timothy Hursely, *Proceed and Be Bold: Rural Studio After Samuel Mockbee* (New York: Princeton Architectural Press, 1998).

9. Brian MacKay-Lyons, *Ghost: Building an Architectural Vision* (New York: Princeton Architectural Press, 2008), 138.

10. Andrew Pressman, *Curing the Fountainheadache: How Architects and their Clients Communicate* (New York: Sterling Publishing Co, Inc.), 34.

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