

Design/Build as Extension: Looking in and out to determine the “why, how and what” of University of Miami’s Design/Build Program.

Building in the Everglades National Park visitor camp in Flamingo is rough. Clouds of mosquitos, “no-see-ums,” the fear of pythons that may be sheltered by the tall grass, and the oppressive heat and humidity, are all reason to check ones motivations, and intentions of building in such a naturally resistant place. On the southern tip of Everglades National Park our latest design/build project tested our resolve and principals.

In spite of the difficulty of the site, we needed to erect in two days what we spent many weeks building on campus. The long commute to the site included a one hour drive to the park entrance and then another forty-five minute drive from the park entrance to the remote site more than fifty miles from the nearest town, underscoring just how “off-the-grid” our four person Eco-tent was going to be. This exercise was a gut-check of the fundamental assumptions about why, how and what we were doing.

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UM’s new design/build program, now in its fifth year, originating with my design/build partner Jim Adamson, has focused on modular, prototypical projects mostly for nonprofits in a regional context. Our mission has to date been well received, and our projects continue to be supported by generous contributions from the community. The success of the program has helped to generate additional funds to build our own design/build studio; making permanent what was initially a program supported by occasional donations and intermittent faculty and student efforts.¹ The real possibility of now having a permanent place for our activities is cause for reflection into our mission (looking in), and how we might accomplish it (looking out), and possible future collaborations that may take us off-campus and maybe out of the country.

This paper reviews the work to date of a new Design/Build program on the threshold of being a permanent part of a school’s curriculum. Riding the winds of student interest in building and digital fabrication, it is time to ask a fundamental question: the why, how and what of our program. This paper seeks to bring to discussion a detailed look at one program with questions that may assist in building a dialogue about what common ideas are guiding design/build as a discipline

and its growing interest in architectural education.

1. Why? The focus of a program is often something backed into rather than established apriori. Why does one do what they do and for whom? Should the focus of programs be local, regional, national or global and what are the motivations, risks and benefits?
2. How? How should a program be run? Questions about project size, duration, funding, place in the curriculum, or staffing are interesting questions that often determine what gets done.
3. What? What is design/build? Is it community outreach, scholarly research or both, and what should its products be: built work, research data, publications, awards. Can all things be done effectively?

In addition to showing the work of the program the presentation hopes to build a case for design/build work as scholarship not just service learning. The form of our new design/build studio building is setting our mission in the academy by showing how systematic investigations into modular, prototypical construction lead to learning and knowledge that feeds the school, the discipline and the community.

The Why:

Given the extended hours for program preparation and long overrun of hours to complete built projects, why would anyone want to start a design/build program? The “why” of our design/build program is for us the ability to demonstrate through prototypical design, the value of small, meaningful civic architecture that serves a broad audience? The “audience” whose composition to date is simultaneously the school, students and public, needs a compelling message to be self-sustaining rather than paradoxical. “Extension” is a working noun that assists in answering “why?”

Extension implies a stretching out, expansion of knowledge or going beyond limits - something all groups can engage and may embrace. Upon entering our studio students are asked: Why did you take design/build? The surveyed answers are initially inwardly focused. Often their comments frame the need to distance themselves from the computer, to be outside, to know tools-implying their interest in extending their skills, broadening the space of their engagement of architecture, with the hope of ultimately extending their effectiveness as designers. Some just want to be “better with their hands.” While the motivation is often self-serving, mutual benefits can arise when one sees that their work is useful to an audience other than themselves or their faculty. Students learn to extend their own expectations and learn that service to the community can have the same or higher rewards than what may have been anticipated in private practice.

Extension at the school level involves reaching out usually to the local community

as a lesson in civic engagement. Design/build faculty and students are conduits to the community, helping change the face of the university or college whom are often seen as removed from the life of the community in which they sit. Richard Hayes' wonderful article on Design/Build for the book: *Architecture School Three Centuries of Educating Architects in North America*, records snippets of interviews with luminaries in the field such as Steve Badanes of University of Washington who is quoted as supporting the idea of acting locally, to be "more productive, save energy, and build community credibility."² We believe this idea can be further leveraged with prototypical designs that although built locally, can be repeated in other contexts as a way of taking our work to a larger audience and extending our impact.

While our local or regional focus is admirable if one reads about the work of individuals such as Sergio Palleroni and Christina Eichbaum Merkelbach and one cannot be impressed enough with their work and mission at a global scale. Their book: *Studio At Large: Architecture in Service of Global Communities*, should be required reading for anyone thinking about the larger message of design/build as an instrument of social change. Palleroni and Merkelbach are advocates of "addressing issues that seem beyond the impact of design or building, such as education, health, employment, self-empowerment and cultural identity."³ The work of the University of Washington's School of Architecture BASIC Initiative not only contributes to the local Seattle community but also works globally in on other continents and impressively applies lessons learned in both contexts with great effectiveness. Their "why" is nobly stated as "improving the human condition" period.⁴ This should be an overarching goal of any new program. We are working toward this goal and fortunately, Miami, with its diverse immigrant population, is a place where the world often comes to our front door mixing local and global issues in one place.

The How:

Our school offers both accredited bachelor and master level professional degree programs and design/build is open to both programs. Design/build is lodged in our upper-level, elective studio offerings available to 4th and 5th year undergraduates and second and third year graduate students after they have finished their core academic requirements. The students are enrolled in their respective studios through a lottery system based on seniority and in case of a tie, grade point average. Design/build has consistently proven to be one of the most popular studios offered with on average of 25-33% of all students choosing it as their first choice. While having a studio filled with advanced students is desirable in terms design maturity, because they are often graduating, we retire our labor force each semester, making it difficult to finish projects if we run over on time. We try to do it all in sixteen weeks - start to finish.

After introductions and the completion of a questionnaire, the studio starts as a series of short in-class construction exercises in paper to test student's ability to think through doing. The students are asked to build the longest self-supporting



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bridge, the tallest tower and strongest 4" high foundation. With the exception of the bridge, students can use nothing more than the paper and scotch tape. For the bridge they may also use staples. Each student is given approximately 45 minutes to complete each problem after which the designs are tested to failure. After the project fails, students and faculty discuss the success of techniques of construction, logic of details, and choice of form. The reasons for these exercises are to get students to interact with materials and build something immediately, (first day of class). This flipping of the typical "drawings to form" of conventional studios is often liberating for students. To date, the longest bridge is 58' long, the tallest tower 63 ½", and the strongest 4" foundation has supported 21 lbs. - each made from a single 8 ½" x 11" sheet of paper.

This exercise is followed up in the next class by dividing the studio into two groups and having them list both the pros and cons of working together followed by a third session where students must list how they would bridge the divide between pros and cons. From here we are ready to begin a series of in-class charrettes of student teams of no more than three members working in short forty-five minute design sessions. This is done by students drawing numbers to determine which team they are on. These sessions are conducted mostly with freehand drawings after which students present the work and the membership on the teams are randomly shuffled to ensure no individual or team dominates the design discussion. This process usually lasts no more than two weeks. Only after a design is collectively settled upon is the computer introduced and more finished drawings and models produced.

The production of the construction drawings is an exercise in drawing every piece to scale as a coordinated and comprehensive "working out" of the building. These drawings may also involve shop drawings and always a detailed cost estimate. A one inch to one foot model is also produced to underscore that the

Figure 1: Students extend paper bridge in exercise 1.

drawings and model are a dry run in construction – Jim is fond of saying if they can build the model they most likely can build the building, I say the same thing about the drawings. Often what happens in this exercise (which always goes on longer than we would like), students find out how complex a simple design really is and the myriad of decisions that must be made. Students feel a bit overwhelmed, but the exercise is essential in order to arrive in the field with a clear idea of what you will build. Of course there are always design decisions made on-site with students learning that some decisions are best tested and made in the field.

The University of Miami Program started and remains a fast-paced, one semester design/build program. While there are obvious benefits to this length of time there are also drawbacks. The drawbacks are that the scale of the projects must be small, primary design time is limited to no more than two weeks although we like to reinforce that design never stops, (even during construction), and learning more of the real process of construction such as pulling permits is out of the question. The benefits are that all students have both design standing and build their own design. Students learn to be more reflexive in their design thinking, rather than overly reflective, a change from conventional design studios of equal duration.

The What:

What we do are the products of our effort. Our projects are prototypical, modular, off-the-grid, small and experimental. We have resisted large, expensive, and the one-off projects believing that the smaller works contain many of foundational lessons their larger counterparts such as learning about building tolerances, thinking on-site, etc. While pursuit of craft often nudges us toward the one-off solution we are interested in tackling ideas that may sacrifice some craft in final execution for the notion that what is built may be refined when repeated. While we have yet to repeat a project, some of our designs have generated repeat projects for other clients (mobile kitchen). What we have built to date follows, with some explanation of what was gained by the choice of program and resulting experience.

Orchid House

Built in 2009 for a world renowned horticulturalists Martin and Mary Motes the Orchid House was our first project. Designed and built in six weeks out of reclaimed cypress the structure necessitated modular construction so that it could be built at the university and transported to the site in three sections. The structure was a simple design and adequately reflected its context as mentioned by its owner, Martin Motes: “The Sales-Display Pavilion built by the UM Design/build class is a structure perfectly matched to its site and use. The light airy design, providing ample air flow and visual interest reflects the best atmospheric qualities of the greenhouses where the flowers being displayed and sold

have been grown. Similarly the choice of materials, predominately native cypress, mirrors the wooden baskets in which the plants are rooted and the slat roofed growing house where they have been cultivated.”

Mobile Organic Kitchen

Infinitely more complex and ambitious was our second project a mobile organic kitchen built in 2010 for a not-for-profit called Earth Learning. While satisfying to have built and inspiring a second project of the same program, the mobile organic kitchen convinced us that our interest in prototyping could be possible. Off-the grid and built on an old mobile home chassis the kitchen employed salvaged wood and steel, a solar hot water heater, solar panels for the electrical and a low-tech homemade freezer to support a demonstration kitchen. The project’s most unique feature is a pair of drop-down doors that create a stage and viewing platform for cooking demonstrations. While severely over in our construction time the success of the project generated a second commission from a hospital in Virginia that wanted one to help them promote healthy eating habits in underserved communities around neighboring cities in Virginia.



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Eco-tent

The Eco-tent for Everglades National Park at Flamingo, Florida facilitates Everglades conservation and education of the Everglades by providing overnight accommodations on a remote camping site where past accommodations were lost since hurricane Andrew destroyed them in 1992. Like the previous projects the Everglades Eco-tent was self-contained and off-the-grid tent structure.

Figure 2: Mobile Organic Kitchen being opened for event 2010.

Designed to sleep four, the project is a prototype developed with industry partner and shade architecture company Tuuci. As a prototypical project it would need to be tested and refined. One of the biggest challenges was to design it a season structure that could be taken down during the hurricane season when mosquitos and inclement weather make the site mostly uninhabitable. The project needed to be able to be deployed by park staff and taken down within a few hours to be a practical solution. While the project was immensely popular its first season (rented every day for eight months), some poorly functioning zippers and pesky mosquitos have rendered the design in need of better bug control with tent ingress and egress.

The national park ultimately intends to lease the site to an outside vendor to build nineteen more Eco-tents and with our help, revise certain design flaws. This project was possible through a grant from the South Florida National Parks Trust and Everglades National Park. This project more than any past project, tested our ability to design for and in a remote and unforgiving site. Design tolerances needed to be exact to control environmental factors and build something that could withstand high winds, flood waters and clouds of mosquitos. One detail we learned from park staff was to string monofilament between finials to keep turkey buzzards and other birds from perching on the tent ridge poles.



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Figure 3: Eco-tent installed at Everglades National Park in 2011.



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RFF composting toilet & shower

The agricultural fields of south Miami-Dade are populated by thousands of migrant workers who are both seasonal and permanent employees of a more than two billion dollar a year agricultural industry. The RFF or Rural Farm Facility is a much needed program that satisfies the problem of providing off-the-grid sanitary facilities for farm workers who, given the remote location of their work, lack these basic needs. While our project was for a specific farm and client the students were asked to design and build an inexpensive facility that could be repeated and used in remote locations. The narrow building footprint no longer than an automobile, was designed to be delivered to the site by tow-truck and once on site, capable of being moved by tractor to field or farm as needed. The structure also needed to catch and store water for showering, hand washing, and if needed irrigation. Within the group of projects built to date this one is intended to deal with less glamorous but perhaps more significant global issues of lack of sanitary facilities for much of the world's population.

The 20' long structure is built on wood skids supporting a louvered, five-bay structure that houses a shower at one end and a composting toilet on the opposite end. Built at bench height, the floor provides a shaded refuge from the noon-day tropical sun. The client grows organic produce and wanted untreated wood that would age well and be naturally resistant to insect devastation. Built of western red cedar with louvered walls in a Dog-trot type, the structure also has a pleasant aromatic quality appropriate for its program. This mostly complete project was our first project built to be delivered to the site with minimum set up time. After delivery we added tank storage and piping for the water collection system and attached pre-made stairs.

Figure 4: RFF facility being delivered to farm with flatbed tow truck.

Looking Out:

Looking out for us means taking stock in our experience and also trying to project where we may be heading with future work. Our near future holds the potential of a new building (most of the fund raising complete), with some permit and design issues still outstanding. The new building will be a single open air room 36' square in plan and 18' high supported by containers parked around its perimeter. The containers allow us to free up the construction space by allowing us to store materials and tools outside the space. Because the containers can range in size so can our accommodation of material and storage needs.



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The building space is a simple nine-square grid formed by concrete columns and louvered openings that encourage growth and expansion. There is one large opening sized to the dimensional clearances required of the road, allowing for a flatbed truck to back in and load a building in part or whole no more than 8'-6" wide or 13'-6" high from grade. These maximum dimensions are specified by the Florida Department of Transportation FDOT for transporting anything down the road without a special permit. The building as a whole is in some ways like a mold or jig built to check dimensions of all we send out of it. In short if it can leave the building it can go down the road.

The commitment to modularity is fundamental to a process of design that is: being able to assemble and take apart what we conceive in our heads, on our drafting boards, and in this case in our building. It is a building that encourages nomadic work. In this way we are very connected to the architecture of the region from the Seminole "Chickee" to the railroad camp structures of Henry Flagler that were meant to be seasonal or occupied for a time maybe months

Figure 5: New design/build studio concept.

maybe years but eventually abandoned or packed up and moved to another site. Miami is also a port city a point of entry or exit. The perimeter of containers is a reminder that much of what happens here is transitory. Our design/build studio is very much a work in progress and hopes to be a permanent part of our school and we hope will continue to contribute to communities outside our local context.

Our future will also be heavily shaped by our students and the lessons they take into the communities they will land in. All past graduates who I see in the community who did not go through our design/build program all tell me the same thing; “I wish we had that when I was in school.” In order for it to continue to exist however, it needs to address basic global questions of need and impact and disseminate not only its products and lessons in the form of buildings but also in the form of published work. Publishing the work in the form of small booklets or more extensive monographs is important to building a base of knowledge from which to build support for the work.

As design/build grows nationally it is a conference like “Working-Out” that assists in creating a building culture that supports the efforts of those doing the work. Long, tired discussions of architecture’s loss of relevance, or importance in the community, or standing with regard to other professions, finds its best chance for regained respect by reflecting and acting upon, the possibilities of design/build in the local, regional and global community as agents of change and extension. The activity of design/build, builds community.

Our next design/build project at UM is for a student owned and operated café on our campus at the school of architecture. While this may seem self-serving literally and figuratively, it underscores one last point: we also need to make what we do visible and essential within the academic community we are part of. This underscores how architecture facilitates collaboration and community in a place that needs to support it most, the academy. But this is a topic for another time.

ENDNOTES

1. *Although our latest efforts are really the start of a sustained design/build program we have benefited by past studios offered by other faculty over the years such as Steve Badanes, Richard Shepard, and Elizabeth Plater-Zyberk who all have made significant contributions to initiating and running design/build studios in Miami.*
2. *Hayes, Richard W. Design/Build: Learning by Constructing. ACSA, MIT Press 2012, editor: Joan Ockman “Architecture School Three Centuries of Educating Architects in North America” page 289.*
3. *Palleroni, Sergio. & Christina Eichbaum Merkelbach. Studio at Large: Architecture in Service of Global Communities, Seattle and London, University of Washington Press, 2004, page xi.*
4. *Ibid.*
5. *In our school upper level studios have a total enrollment of about 85 – 100 students. Studio membership is generally never more than 12 students to one faculty. In design/build we always have two faculty teaching the studio to ensure work is produced safely and expeditiously.*