

# Long Distance Design-Build: Learning from the Challenges of Helping to Rebuild a Sustainable Community in New Orleans' 7th Ward

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## INTRODUCTION

Design/build pedagogy has long given preference to the directness of hands-on work with real materials and site-specific responses to localized conditions. Usually, there remains a high degree of latitude to adjust designs during the construction process in response to changes in circumstances or unforeseen conditions. This is especially true in projects that are aimed at community rebuilding, in collaboration with neighborhood groups in need of assistance. But what are the implications for design-build when working with a client and a site that are 1000 miles from the design and fabrication facilities?

Our recent efforts to assist New Orleans residents rebuild their damaged neighborhood represent an ongoing experiment in community-based design/build pedagogy involving architecture students working from a distance with clients and a site located in New Orleans. This paper addresses the challenges to collaboration, the uses of new digital design and fabrication technologies, and the development of new approaches to design-build and pre-fabricated systems resulting from this on-going project.

Unlike international programs that bring groups of student design/builders to work with communities in foreign locales for extended periods of time,

this project tests the viability of partnering with a neighborhood group to provide valuable community-building assistance from afar through the use of digital technologies both to share information and to fabricate building components. The three semesters of work completed to date have resulted in a series of community notice boards, a community garden with tool shed and shade pavilion, an outdoor classroom and a deployable mobile stage.

## BACKGROUND

This project is an ongoing collaboration between residents of New Orleans's historic Seventh Ward neighborhood and an academic design-build team based more than 1000 miles away. Although separated by more than even this great distance, all participants are united in the determination to revitalize this inner city New Orleans neighborhood, and to participate in the rich and challenging practice of socially-engaged architectural design-build. From the start, the design process has featured periodic face-to-face encounters, an ongoing electronic dialog and a series of targeted design/build interventions all funded by student-solicited individual and institutional donations totaling more than \$30,000 to date. An ongoing experiment in providing collaborative, community-centered design/build assistance without the benefit of proximity, the project is in its fourth semester, and

is expected to continue into the indefinite future. This paper explores the challenges and opportunities for design-build pedagogy when working with a client and a site that are 1000 miles from the design and fabrication facilities.

In late 2005, the design team made contact with a newly formed neighborhood association called "The Porch Cultural Organization" in the lower portion of the Seventh Ward, a majority African American district, (94% in 2000) rich in history and tradition but suffering from under-education, unemployment, disinvestment and numerous blighted properties even before hurricane Katrina. According to the 2000 census 77% of households were renters with a median income of \$12,459. Among adults over 25 years of age, 52% did not have a high school diploma. The destruction wrought by Hurricane Katrina highlighted numerous pre-existing neighborhood conditions including under-employment, drugs and lack of community resources. Residents also raised new concerns about the possibility of socially disruptive gentrification and a growing lack of community cohesion in the wake of the hurricane.

The initial design goals established by the community focused on the desire to re-knit the neighborhood's social fabric and to raise their level of self-sufficiency and neighborhood pride. There was a recognition by both the residents and the design team that the Seventh Ward is a neighborhood rich in cultural traditions including: jazz music, traditional Creole building crafts and Mardi Gras Indian culture. The efforts of the Porch organization are focused on the maintenance and promotion of these cultural traditions. In the initial phase, between January and May of 2006, the design team made four separate trips to the neighborhood and completed the installation of a series of public notice boards and a new community garden with a covered gathering space and a tool storage facility. In the fall of 2006 students constructed a Mobile Stage to assist the residents in hosting outdoor events in various locations throughout the neighborhood. Also in late 2006 the Porch teamed with Neighborhood Housing Services, a non-profit Community Development Corporation, to share facilities in an abandoned corner store building. The students' project for the Spring semester of 2007 was an outdoor classroom structure to allow for youth programs to be held

at the new community center immediately, while other projects to restore the building are under way. Future projects will focus on furniture and other installations to make the new community center building more useful for programs of all types.

## COMMUNICATION

Client interaction is primarily by email and telephone, along with a limited number of important trips to the neighborhood each semester. Both designers and clients must prepare thoroughly for these encounters as they are limited in number and duration. During these meetings, the participants are able to meet face-face, converse and gain an understanding of each others' point of view. Needs, wants and wishes are shared and a general understanding of the current project parameters is established. Following initial meetings in New Orleans, the design team returns home to begin work on design fabrication. In the design process, digital design and visualization are crucial tools for the design/build team to communicate ideas clearly through drawings and images sent to the clients for review. In addition, an open-source "wiki" site was established for design team and community members who have access to the internet. This site is a repository for project and neighborhood images, text and links to useful information from other websites. The wiki site has also served as a repository for all project data and has grown consistently larger since its inception. It has become the public face of the project; the primary means of communicating with the world what we've done and what we are doing.

One of the first needs faced by the community after Katrina was for communication tools to get the word out to neighborhood residents about new resources, activities and events. In response, the design team pre-fabricated and installed a series of distinctive outdoor notice boards. With the help of residents, these were installed in February 2006 at a time when many community members still did not have basic utilities or telephone service. Among the programs subsequently featured on the notice boards was a poster series highlighting neighborhood leaders. During that February visit additional meetings were held leading to the development of the community garden project.



Figure 1 - One of 6 community Notice Boards installed 4 months after the storm (L) and example of resident organized neighborhood Poster Project

In retrospect, it is clear that all of the projects undertaken so far have communication as one of their key programmatic activities. The Community Garden is primarily a place for neighbors to gather for conversation and other meetings; the Mobile Stage brings the words and sounds of the seventh ward arts and activities to various locations, and the Outdoor Classroom is intended for more formalized instructional communication. Further, the structures themselves are designed to communicate subtle messages ranging from the visual sturdiness of the Shade Pavilion to the delicate imagery, inspired by African textiles, that is incised in the Tool Shed's wall panels. Each element of this ongoing project embodies some form of patterning or visual message that speaks about New Orleans, the Seventh Ward and our clients, The Porch Cultural Organization.

### DESIGN AND FABRICATION STRATEGIES

From the start of the project the challenges of transportation led to research and design proposals that tended toward lightness and flexibility. At the same time, care was given that projects would be able to weather future storms and would be maintainable for the long haul. Some projects, like the Shade Pavilion, were designed to add a visual sense of security and permanence, while also remaining flexible and expandable in order to respond to changing community needs. Digital design plays a key role in allowing multiple scenarios to be developed, discussed, prototyped and tested. The use of SolidWorks assembly modeling software enables us to perform assembly testing, stress mapping of some key components and auditing of the overall weight of materials. The flexibility gained by working extensively in a digital medium is also an important part of the design process when working with a community partner.

For example: both the site and the scale of the initial project changed during on-going client consultation, and the adaptability of the digital designs, even at a late stage of development, made it much easier to accommodate the client's changes. Both manual and digital fabrication techniques are employed on all projects, and our ongoing work is generating a series of on-going case studies that compare how various construction techniques impact the portability, adaptability and durability of the structures.

One of the primary struggles of doing construction work with college students is their relative lack of skills at making. The students in our program have received rudimentary training in the use of power tools and shop resources for tasks like model making, but most do not have adequate construction skills to make permanent additions to the public infrastructure. They are much more skilled at designing than they are at manual fabrication. Given the chance, many of them would likely design things that they are not capable of making. For instance, there might be an expectation of extreme precision without anticipating material variability or recognizing of the necessity for assembly tolerances. There is a big leap between the certainty of the digital design environment and the uncertainty of the shop floor and construction site. In David Pye's words, "In a designer's drawing all joints fit perfectly.<sup>1</sup> Pye defines workmanship in the largest possible sense, meaning any human transformation of raw material into finished artifact, using any type of resource—machine or hand tool. He further defines good workmanship as "that which carries out or improves upon the intended design. Bad workmanship is what fails to do so and thwarts the design."<sup>2</sup> So design intentionality and fabrication are intimately tied to each other. Design and Build are in service to a common ideal.

Manual construction skills are critical even in a situation where digital fabrication is a primary means of making. The disparate parts still need to be assembled, tolerances respected, communication systems developed, and assembly and installation sequences imagined. So a certain amount of practice work is required at the beginning of the semester to get students into the proper mindset to develop effective collaboration skills and realistic craft expectations. In many

instances, these initial projects focus on making things for use in our own fabrication lab like shop tables, pin-up boards, and material storage racks. Students are expected to design the items, get feedback and approval from the users, prepare shop drawings, and use the shop drawings to communicate with each other. The shop drawings are then used to generate jigs for holding parts at an acceptable level of precision for welding or assembly. Students also use them to generate material take-offs for cost estimating and procurement. Everyone has access to the digital shop drawings via the project server and is able to develop attitudes and techniques for collaboration accordingly. Once fabrication is completed, a critique of the process is conducted to glean lessons from the process. This introductory experience with collaboration and fabrication allows the students to realistically— and optimistically— design something that they can actually build, and it is only after this introduction that the class is allowed to start work on a project for the 7<sup>th</sup> ward.

Even for the projects in which digital fabrication is the primary means of making, students engage in a lengthy process of getting to understand CNC fabrication processes through prototyping at small scale. The laser cutter allows fabrication of scale models in a fairly analogous simulation of the CNC router's pattern cutting capabilities. Additionally, elements like critical joints are isolated and fabricated at full scale in real materials to explore the impact of tolerances and assembly sequences on the designs' development. Detailed digital assembly models also serve as both a testing ground for various construction sequence options and as the basis for generating clear graphic instructions for final assembly and installation.

The majority of projects completed thus far have a healthy balance of manual fabrication and digital fabrication. Transportation constraints have generally led to a "flat pack" approach. Strength, durability and rapid assembly have tended to lead to solutions featuring frame and panel construction, held together with threaded fasteners. Our CNC router is equipped to cut wood and plastics fairly readily, but is not capable of any metal fabrication. So any elements that are made of metal need to be fabricated manually: pieces are cut with horizontal band saw or plasma cutter



Figure 2 - Fabrication of the Mobile Stage (L) and CNC cut Jig for laying out and welding the trapezoidal frames (R)

and then manually welded to each other. But CNC technology has proved extremely valuable in this endeavor as well. Jigs are essential for holding the metal pieces in the proper relation to each other for welding, assuring exact 3-dimensional placement, and preventing heat-generated movement in the pieces while welding. One important application of digital technologies in our shop environment is for the CNC production of jigs to accurately support elements during manual fabrication.

Beyond precision, the major aspects of CNC fabrication to influence our work are the concepts of repeatability and variation. Our approach to wood framework construction is based on the ability to confidently produce custom laminated veneer members glued-up from multiple layers of plywood. For both shop lamination and field assembly purposes, the identity and precise registration of numerous layers is crucial as is the ability to quickly generate repeatable variations within

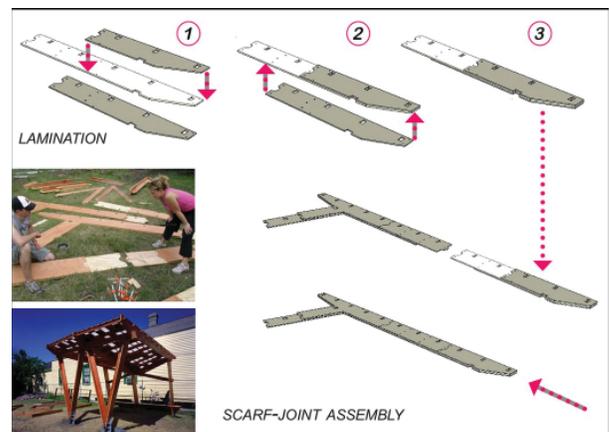


Figure 3 - Shade Pavilion: Diagram of the lamination process, scarf joint assembly and completed view



Figure 4 - Community Garden Tool Shed (L) and African Textiles that inspired the patterning of the wall panels (R)

a family of members. This customized lamination technique also allows for the design of individual members that are larger than the typical four by eight foot dimensions of plywood sheets. By staggering joints in internal and external laminations, large pieces of complex shape can be fabricated, and thick structural members can be quickly glued-up with no post-processing required to create precise mortises and tenons. Long spanning members customized for different loading conditions and frames or L-shaped pieces for transferring moment forces are easily produced. Finally, a system of complexly-layered scarf joints capable of interlocking for structural continuity was developed to allow large pieces to be broken down for shipping and then quickly and confidently assembled on site.

Another important aspect of CNC fabrication exploited in almost all of the projects to date is the capacity to imprint them with text and texture in order to engage the visual vitality of our clients and their city in the physical fabric of our projects for them. In the tool shed for the community garden, students digitally incised patterns based on African textiles in the wood skin panels.

Custom perforation patterns were cut in thin plywood panels for the second shade pavilion, and in opaque shading panels for the outdoor classroom. And a lively pattern of different colors of opaque and translucent acrylic roof shingles was produced for the original shade pavilion by cutting various materials to the same pattern on the laser cutter. Words identifying the projects with the Porch Cultural Organization and the Seventh Ward have also been digitally imprinted on most of the projects in prominent locations.

## CATALOG OF PROJECTS UNDERTAKEN TO DATE

### Notice boards:

The Notice Board project was the first trial run of our long-distance design-build experiment. The community felt the need to have some means of communicating with each other, and highlighting neighborhood projects and initiatives following Katrina. Pedagogically, the notice boards were a good warm-up and skill builder and a test of initial prefabrication and transportation ideas. The boards were completed in February 2006 and since then, the Neighborhood Story Project at the University of New Orleans has developed a series of posters highlighting the creative and cultural contributions of residents of the Seventh Ward for installation on the notice boards. Two of the notice boards have also been moved around the neighborhood to support a mobile art exhibit.

### Community Garden:

In the spring of 2006, six months after the hurricane, The Porch Cultural Organization still lacked a physical site to call home. A local community garden group, Parkway Partners, offered use of a derelict site on North Robertson Street, and residents and students focused on making useful structures for gardening, social and educational activities. A tool shed and shade structure were decided upon as the best use of available resources. A group of third-year students studied and adapted vernacular Caribbean wood framing techniques and developed the Shade Pavilion using primarily digital design and CNC fabrication. Meanwhile, a group of fourth-year students examined African vernacular and textile precedents as they designed the steel-framed, wood-skinned tool shed using a hybrid of digital and manual techniques. Both projects were prefabricated and installed in New Orleans in early May 2006. A second version of the Shade Pavilion was constructed in the spring of 2007 for eventual installation in a new community garden space planned for the Porch Cultural Center.

### Mobile Stage:

The idea for the Mobile Stage grew out of the desire for the Porch to have a community outreach

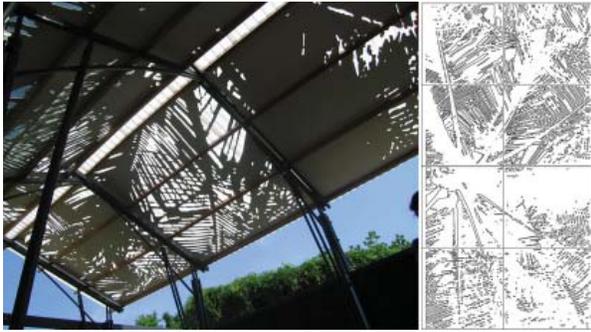


Figure 5 - Outdoor Classroom roof (L) and abstracted pattern of palm fronds used to perforate the shading layer (R)

tool for public events like block parties, neighborhood festivals and parades. Built on the platform of a common 14' utility trailer, the stage's 8.5'x 16' fixed deck features hinged panels that can open to make a flat stage surface of 13'x16'. The panels can also be fixed in a vertical position for parades. An overhead frame structure provides support for backdrops and overhead shading in a variety of configurations. The stage can be fully deployed by two people in about 10 minutes. Completed by a group of fourth-year students in the Fall of 2006, the Mobile Stage was delivered to New Orleans in January 2007. Since then, The Porch organization has used the stage for numerous events and has also lent it out to community organizations in other neighborhoods.

#### Outdoor Classroom:

The Outdoor Classroom is the first permanent construction at the site of the Porch Community Center, located at Urquhart and Pauger streets in the Seventh Ward. The building will be shared by the Porch Community Organization and Neighborhood Housing Services of New Orleans. The classroom encloses a space of about 10' x 20', and consists of 5 steel structural bents covered by a roof constructed of wood purlins and clad with a perforated layer of CNC cut palm frond patterns beneath a top layer of corrugated polycarbonate panels. Walls feature fold-out benches, chalkboards and patterned metal mesh panels with rolling gates. It was designed and constructed by fourth-year students and installed in May 2007. The classroom is seeing immediate use for a children's summer art program that began in June 2007.

## CONCLUSIONS

The overall goal for this project is to promote community empowerment and participation through a series of projects that work collectively as a sort of infrastructure to flexibly serve the needs of a neighborhood cultural and civic organization. Unlike most academic design-build programs that work locally, or international programs like Basic Initiative that bring students to work with communities for weeks or months at a time, this project tests the viability of collaborating with a neighborhood group remotely by leveraging digital design, communication and fabrication in conjunction with other, more standard, approaches. One outcome of the project so far is that students and neighborhood residents alike find themselves bound in an expanded sense of community that breaks down the barriers of distance to unite them in a sense of common purpose.

A key aspect of the design research being pursued focuses on communication strategies, both within the neighborhood and between the residents and the student design-build teams. This has taken physical form in the projects like the notice boards and mobile stage that are directly intended to serve the neighborhood's communication needs. In our design processes, communication has been aided by combining digital visualization and open-source internet strategies with a clear commitment to hold rich and productive face-to-face meetings at the beginning and end of each phase of the project.

Another area of investigation is the development of intelligent construction systems that combine digital and manual fabrication techniques to explore pre-fabrication strategies efficiently for deploying community infrastructure in New Orleans as flexible elements capable of responding to changing neighborhood needs. The robust steel frames of the Tool Shed, the delicate metal tracery of the Outdoor Classroom and the laminated mortise and tenon joinery of the plywood Shade Pavilion represent different approaches to 'flat-pack' construction that address different needs and generate unique aesthetic responses. In this on-going pedagogical experiment, the issue of craft is constantly being explored and refined in terms of digital, manual and hybrid modes of production. Students are exploring and extending their own

horizons in terms of collaboration, fabrication and the social and cultural dimensions of design while the overall project continues to test the capacity for a design-build practice to effectively learn from and serve communities a thousand miles or more from the design studio and fabrication shop.

#### ENDNOTES

1. David Pye, *The Nature and Art of Workmanship* (Cambridge: Cambridge University Press, 1968) ., p. 31. David Pye was an English woodworker and design teacher who originally trained as an architect. *The Nature and Art of Workmanship* gives us an important and useful set of principles regarding craft and workmanship.
2. Ibid.