Case Study:
Austin Resource Center for the Homeless

Kayla Lyssy

Editor
Werner Lang
Aurora McClain
Introduction

The work that Murray Legge had done with LZT Architects recognizes that issues of sustainability and issues of design are intrinsically related. Architecture must be holistically integrated with sustainable methods in order to successfully design sustainable buildings. This paper will begin by discussing the broader context and challenges to which sustainable architectural design must respond. One project by LZT Architects, the Austin Resource Center for the Homeless, will be used as a case study to demonstrate integrated design in a built work. In closing, ideas about the role that architects play in advancing sustainable lifestyles at a building level will be related to broader issues and challenges in the sustainable design movement.

“A culture of construction”

A discussion of sustainable architectural design must acknowledge the larger context of building and construction that architects must respond to. The culture created by construction practices has a direct impact on architectural design culture.

The influence of common practices is seen in the fact that drawings, the traditional means through which architects communicate, often explain ideas of how to build with abstracted representations. These techniques are readily recognizable across the fields that participate in the creation of a building. If taken at face value, a stud wall construction assembly would require extensive explanation. However, it is a common system of building and therefore can be described with minimal clarification. The use of practices that are embedded in the construction industry yields similar responses and results, which in turn inspire confidence. In this sense, architects must design with a consciousness of traditional systems and methods of construction. The challenge is that the sustainable design movement, even at a basic level, calls for changes that are resisted by an industry rooted in the way things have always been done.

The force for change

Architects are increasingly recognizing the need to change the way we build, but the process of change must exist within the existing relationship between architectural design and construction. Working with methods and systems that are on the well-worn path of construction assures a level of confidence that makes the construction process run smoothly. While in theory it is desirable to constantly challenge these norms in a quest for something better, architecture as a profession is rooted in business realities. Billing structures do not allow a great amount of time to be devoted to convincing people to try alternative
systems and methods, even if they may be superior. A flexible area next to the system of norms can handle a degree of invention, but working outside of this area produces work that is essentially untenable in the context created by the construction industry.

Change that will lead to sustainable practices in the building industry must use current conditions as a starting point. Reasonable steps in the right direction must push the conventional culture of construction constantly in an effort to modify it. While it may not be feasible to work exclusively using alternative methods, it is essential that architects act as the creative driving force needed to make the system veer from its prescribed path. These “visionary” projects play an important role in architectural practice and in leveraging the changes necessary. They play a different kind of role than projects that are attempting to inflect current construction practices directly. Architects must design in a manner that will make convention more flexible. In this sense, a tension exists between the systems that are “worn” and those that could be considered “visionary”.

Methods of change

This tension provokes two approaches to sustainable architectural design. One ignores convention and understood practices and completely challenges the system in the design phase. Working in this way ultimately leads to untenable and unaffordable projects that are really designed for an alternative world. While it is interesting to wonder about the alternative world that would accept these projects, the world today is not that world. Projects that fall into this category often make great leaps conceptually, but they are not necessarily completely resolved or viable. Thus, a second approach to sustainable architectural design must be must be considered. In this approach, the aspirations of sustainability work in the flexible areas next to the prescribed paths of current systems and methods. These projects make gradual changes that have a collective impact. The intention is to use existing systems and methods to create project that strive toward increasingly higher goals of sustainability.

Case study: the Austin Resource Center for the Homeless

An architectural case study that demonstrates innovative design within the framework of current practices is the Austin Resource Center for the Homeless (ARCH) by LZT Architects, completed in 2004. ARCH is a 26,820 square foot building that houses a resource center, clinic, and overnight shelter. The project met ambitious goals for sustainability, including the LEED silver rating requirement for City of Austin buildings, in spite of budgetary limitations stemming from public funding, which called for creative ways of providing sustainable measures that were often cost-intensive. Successful architectural projects, especially those that aspire to sustainability, require a systematic design approach to ensure that every aspect of the building serves as many functions as possible. The design team at LZT looked to the structure of the building as a key element because it is inherently integrated in the design. The process became an investigation of how to maximize the potential of the structure, the one aspect that could not be value-engineered out of the project.

ARCH: building information

Program: Homeless shelter with services including a resource center (day room, computer room, art studio, and offices for community support agencies), clinic, laundry and shower facilities, cafeteria, and overnight shelter

Client: City of Austin
Completion: May 2004
Budget: $5 million
Area: 26,820 sq. feet
Rainwater Storage Volume: 13,000 gallons

Building techniques

One of the driving sustainable design ideas that complemented budget constraints called for reducing the amount of finish material in the building by exposing the structure. While this can be accomplished with poured-in-place concrete, achieving a high degree of surface quality is difficult and expensive. Traditional methods of building site-cast concrete are also redundant, in that the structure must first be built out of wood to make the formwork, which is discarded in the end. At the time that this project began construction, the infrastructure for recycling debris created during the construction process did not exist in Austin, so this was not a favorable option.

This set of conditions led the project team to consider alternative methods of concrete construction that are more efficient in terms of cost and material usage. An idea evolved that combined concrete tilt-wall construction with cast-in-place methods. A series of structural frames 12” deep were formed on the ground using a “stack-cast” method. Because there
was not enough room on the site for conventional tilt-wall assembly methods, the frames were cast one on top of the other, with plywood between each pour layer. Formwork was reused when possible to reduce the amount of material waste from the pouring process. The concrete was made with 45% fly ash, which replaced a portion of the energy intensive cement in the mixture. The main disadvantage to this method was the amount of steel required, since the concrete frames had to be designed for the loads they experienced while being lifted into place. These frames became integral to the wall system, which used wall panels of white glazed Elgin brick and metal (both locally-sourced materials) as infill. The stack-cast method of pouring the frames also allowed both sides of the structure to have a high quality degree of surface finish. Light-colored materials on the exterior walls and roof reflect radiation from the sun, which helps to reduce the heat island effect created by the building’s mass.

Program as a design tool

The nature of the program as a homeless shelter housing a variety of functions provided design requirements that became integrated with the goal of creating sustainable architecture. Even the program provides a resource that should be used to its fullest extent in the design process. Because the building would be in constant use, it was essential that materials be durable and fixed in place. Using concrete and brick as finish materials satisfied this requirement.

For security reasons, the design required a high degree of openness to allow visitors to be monitored. The use of repetitive open structural frames allowed the interior spaces to become a series of interpenetrating volumes. It was also important that occupants have a sense of orientation and connection to the outdoors when they were in the building, as the facility would be housing people dealing with issues of mental illness on a regular basis. Providing natural light throughout the interior to facilitate this connection and enhance interior environmental quality was another key design consideration. With the exception of the entry sequence, the frames run in the north-south direction with spacing based on the program housed inside. This orients the program in the correct direction for daylighting, and the plan was carved out to bring more light into areas where it was desirable. A light well "void" was cut through the center of the building, and a corner was left open to allow light inside in anticipation of construction on the adjacent site. The building admits direct sunlight only when the sun is at its highest point in the sky. Natural light is usually diffuse throughout the building. The desire for natural light on the interior must be balanced with the increased energy usage of a building with extensive exterior surface area in order to achieve sustainability. Because of the importance of daylighting in this program, the energy strategy in the ARCH building focuses on using natural light to minimize the need for artificial sources, therefore reducing the internal heat gain and electricity loads. This design took into account the intense sun conditions in Austin, where eastern and western exposures create heat gain problems. The adverse effects of exterior glazed surface area were also partially mitigated by overhangs and shading elements on the south facade.

Integrated design

Using the structural frame as an opportunity to incorporate sustainable measures recognizes that sustainable design should be inherent in the overall design. The integration of the design is achieved because programmatic considerations, structure, daylighting, minimal and appropriate material usage, and relation to the exterior are all interrelated.
Water conservation

When considering issues of sustainability in the Texas climate, reducing potable water usage is a key strategy. Because the program included functions that require significant water use, including restrooms, showers, and laundry facilities for the area’s homeless population, it was appropriate to creatively consider how to collect water to minimize the building’s usage impact. Obstacles to overcome included code restrictions that did not allow rainwater usage in the building, and limited area on the site for building traditional underground water storage tanks. The project team managed to obtain a variance to bypass the code restrictions. The challenge was then to devise a system of collecting and storing water that was economical and effective for the building’s needs.

Since available area on the site was an issue, the most efficient space for the storage tanks was in the structural system, which used beams that were 12” wide by 36” deep. Rather than having tanks specially fabricated for the project, the team looked to alternative sources. The solution was found in oil industry infrastructure, which regularly uses large diameter pipes. A company in Dallas was able to construct the 24” diameter tanks for a much lower price than that offered by companies that considered the tanks a specialized construction.

The end result was a 13,000 gallon water storage system that collects rainwater and condensate generated by the air conditioning units. The collected water allows a reduction of water usage for landscaping of 50% per year and a 30% reduction in indoor water usage. The water strategy is supplemented by technology that reduces the energy use typically associated with water systems. Solar hot water heating preheats the water used in shower rooms, and point-source hot water heaters are triggered by water flow to heat water only when it is needed. Using thought processes that searched for alternative ways of doing things allowed the project to incorporate water collection as an integrated design component.

Long-term success

One of the lessons to be learned from the Austin Resource Center for the Homeless is that sustainable design does not stop when the building construction is completed. The true measure of sustainability is found in how the building is used. Two buildings with identical designs have the potential to perform very differently based on the habits of their occupants. Because the success of sustainable...
architecture relies on the building’s users, it is important to recognize the tension between sustainable design and user knowledge and culture. Even seemingly simple changes like the use of automatic faucets or motion sensors rather than light switches interfere with intuitive cultural ideas of how to inhabit a space. Building occupants have to learn new systems and patterns of usage if the building is to perform as it was intended. Given the option, occupants tend to override automatic systems in order to control their environments, for better or worse.

Daylighting reduces the need for artificial light, but users often turn on light fixtures even when they are not needed, simply because that is how they would normally occupy a space. Complicated issues of human behavior often inhibit sustainable design measures. For example, natural ventilation was an early strategy incorporated throughout the ARCH building. With the exception of operable windows in the third-floor sleeping quarters, more comprehensive natural ventilation was removed in part because its effectiveness depends on coordinated user behavior. This is difficult in a building such as ARCH, which experiences a constant influx of occupants who are unfamiliar with the building’s performance needs.

Questions of maintenance are also crucial if sustainable designs are to remain sustainable for 50 or 60 years after their initial occupation. One strategy for dealing with maintenance is to essentially design the human interface out of systems that could potentially be neglected in the long-term. Computerized systems monitor how the building is performing, and back-up facilities such as a connection to the City of Austin water supply allow the building to be self-sustaining. Big questions about long-term maintenance require a higher degree of expense and coordination in the design stage, which ultimately necessitates a move toward detailed design at a much smaller scale.

The success of the Austin Resource Center for the Homeless is a testament to the value of designing holistically by integrating architectural considerations with sustainability considerations so that they eventually become one set of issues. ARCH benefitted from Austin’s interest as a city in moving toward more sustainable lifestyles. The requirement that all city buildings be LEED silver rated served as a catalyst for thinking about architectural design in a new way. The merging of a creative and ambitious design team with a community of supporters interested in finding new and better solutions to common problems made progress possible.

Conclusion

The role of the architect is crucial in creating a broad vision of sustainable living, because the built environment serves as a framework for everyday life. Architects have the ability to improve the performance of buildings for the greater good, providing one component of the infrastructure that is necessary to encourage sustainable living.

Unfortunately, it is not enough to simply encourage sustainable living. Individuals must reach consciousness of the broad issues that affect our consumer/user-based society in order to change the whole. General awareness (which may be facilitated in part by architecture) is the first step toward changing the pattern of consumptive living. Sustainable living in the end is a choice that may be guided by societal factors, but is ultimately decided at a personal level.

The solution rests in the idea of integration and ingenuity at many different levels. While architects must embrace their role by designing more efficient buildings that motivate people to change the way they live, the movement toward sustainability will not advance if it is only addressed by a small group of people or one field of work. It requires a collaborative, interdisciplinary effort to successfully implement the tools we need to adopt forward-thinking sustainable lifestyles.
Notes


Figures

Figure 1: McConnell, Thomas.
Figure 2: Legge, Murray. LZT Architects.
Figure 3: McConnell, Thomas.
Figures 4-9: Legge, Murray. LZT Architects.

Further Reading


Biography

Murray Legge, a licensed architect, is a graduate of the Cooper Union School of Architecture in New York City. Recipient of the 2006 AIA Austin Young Architectural Professional Award, his work ranges from architecture and landscape design to public art. Mr. Legge has won many competitions and design awards including local, state and national AIA awards for his design work. Winner of the prestigious Lyceum Fellowship, he was also a finalist (twice) in Van Alen Institute competitions, including the Paris Prize. For the past 10 years, he has been based in Austin, Texas practicing as a design and project architect with the firm LZT Architects, Inc. His work at LZTA includes the design and management of several multi-use sustainable urban buildings, such as the Austin Resource Center for the Homeless (ARCH) and the Donald Haynes Performing Arts Center. The recently completed ARCH project was awarded a National AIA award for green building. Murray Legge’s work has appeared in Architectural Record, Art in America, Texas Architect, The Journal of Architectural Education and was profiled in the Austin American-Statesman and Houston Chronicle. Mr. Legge has taught workshops, lectured, and been a visiting critic and lecturer at the University of Texas at Austin.