

## **Introduction**

This report summarizes the activities of the Cal Poly Pomona team from July 2011 to July 15, 2012. As described in our proposal to the Getty in June 2011, the work entailed research leading to an exhibition on the subject of the role of technology and environment in the development of the post war southern California house. The research and analysis included visits to most of the houses studied (in some cases, multiple visits), analysis of drawings and photographs, preparation of study models to analyze structural and construction systems and review of advertisements depicting the integration of the modern house into a middle class life style. Along with more conventional research in archives and published sources, our team made climatological measurements and analyses of selected houses and explored new digital display exhibit formats that will help to explain some of the technological and environmental concepts and conditions to the public.

## **Overview of activities**

The entire team (Lauren Bricker, Judith Sheine, Philip Pregill, Pablo La Roche, Tim Sakamoto), along with several of the student researchers, met at least once a month to discuss research findings and directions. Sakamoto conducted a class at Cal Poly Pomona in fall 2011 to explore digital display techniques and Bricker and La Roche each held classes in winter 2012 at Cal Poly Pomona, focusing on their individual areas of research. In addition, Dr. Jose Manuel Almodóvar, Professor of Architecture at the Universidad de Sevilla, joined us on some of our site visits in summer 2011 and worked with his students in Seville on day-lighting analyses of selected houses. At the end of the winter quarter, a joint review was held at Cal Poly with the Universidad de Sevilla faculty and students presenting and participating via Skype. Bricker and Sheine made several visits to Berkeley to meet with our project advisor Marc Treib and to examine materials in the UC Berkeley Department of Architecture archives. They also made several trips to examine material in the Getty Research Institute Special Collections in order to confirm availability of drawings and photographs needed for both research and for the planned exhibit. As research progressed, the original group of ten houses evolved to a final selection of nine houses, designed and built between 1940 and 1975 that we proposed for inclusion in the exhibit. Many discussions led to the formulation of the exhibit described in the proposal we submitted to the Getty Foundation in May 2012 and, subsequent to the feedback we received on that proposal, we focused on revising and restructuring the exhibit proposal for our submission in June 2012 (which we have recently learned was successful).

We worked with the College of Environmental Design to confirm the use of the W. Keith and Janet Kellogg University Art Gallery at Cal Poly Pomona for the proposed exhibit from April through mid-July 2013. A new curator, Quinton Bemiller, was appointed just before the beginning of fall 2011 and we had a series of productive meetings with him about holding the proposed exhibit in the Kellogg Gallery. He worked with us on a facilities report to assess whether the Gallery meets AAM standards and the best way to meet those standards if that is required.

Our colleague in Spain, Jose Manuel Almodóvar of the University of Seville, has been in contact with two venues in Spain that have expressed interest in hosting a portion of this exhibit subsequent to its tenure at the Kellogg Gallery. The Foundation for Research and Information Architecture in Seville, an initiative

of the Official College of Architects of Seville has agreed to sponsor the installation of the exhibition in October 2013. It will be installed at Junta de Andalucia. The second possible Spanish sponsor is The Institute of Building Sciences Eduardo Torroja (IETcc), in Madrid; it is a center of Spain's National Research Council, part of the Department of Science and Technology of Materials. Its basic function is to conduct scientific research and technological developments in the field of construction and materials.

#### Exhibit Concept:

The central concept for the proposed exhibition is the presentation of construction technology of the post war southern California house in a clear manner comprehensible to a general as well as professional audience. In the post war period, innovative architectural ideas and forms were realized through new and adapted construction technologies, which architects hoped would be the means to respond to the huge demand for housing after the war. Construction has rarely been given its due in an architectural exhibition, especially as the vehicle by which architectural ideas take concrete form. While in most exhibitions construction technology is more or less assumed without much attention, here it will be a focus of the exhibit. Models showing structural framing, sequences of construction photographs, and of course, original drawings and explanatory captions will be the primary means of display. We intend to create presentations that make these techniques lucid even to an audience without architectural training.

We have selected nine houses by which to present the thesis of the exhibition: construction technology defined or supported the designers' architectural ideas, and the patterns of living in Southern California. The houses designed by architects in post war southern California demonstrate a wide variety of forms and construction systems. We will begin our timeline in the year preceding America's entry into the hostilities, 1940, and end in 1975, by which time the supremacy of modernism had been challenged by a new, more inclusive approach to residential design—postmodernism—that admitted the influence of history and vernacular architecture along with popular culture. A goal of the exhibit is to create a shift in the paradigm of thinking about the post war house. By extending the timeframe into the 1970s we will address the commonly held view that postmodern house designs of the late 1960s and early 1970s represented an abrupt break with modern design ideals. Instead we will demonstrate through framing models and their spatial effects that significant continuity existed between the variety of house designs of the post war period and post-modern houses.

Four of the houses we will present are among the earliest of those designs utilizing the flat roof, steel construction (or the appearance of steel construction), and large areas of glazing. These are the 1939-40 VDL Garden House by Richard Neutra, the 1952 Schrage house by Raphael Soriano, the 1954-55 Case Study House #17 house by Craig Ellwood, and the 1959 Case Study House #21 by Pierre Koenig. Yet even within this one section we will point out differences in building techniques and how these affected the spatial idea of the house and life within it. The second group of houses used construction systems that were less pure, more composite and sometimes more expedient, in realizing the architectural ideas behind the design. They are the 1946 Kallis house by R.M. Schindler, the 1948 Carling house by John Lautner, and the 1966-69 Kappe house by Ray Kappe. These houses demonstrate that while for some architects, the construction system dictated the form of the house, that for others construction was a means to an end rather than the basis of architectural expression. The last two houses, Frank Gehry's 1968-72 Davis studio/residence in Zuma Beach and Charles Moore's 1972-74 Burns house in Pacific Palisades, relied on conventional building techniques that accepted, and even exploited, vernacular building systems and imagery, using them to fashion High Style products. In the Davis studio/residence the exposed cheap wood frame and corrugated steel construction was a key to the building's

architectural expression, while at the Burns house stuccoed wood stud walls provided a neutral medium to be fashioned, cut, and shaped.

The construction systems of all nine case studies will be presented using original drawings and photographs, physical models and digital models, but each will differ in the specific form of its display. We plan to construct four models, each one showing the complete framing of one of the houses and each demonstrating a different construction system and a different spatial configuration. The Schrage house by Raphael Soriano is a flat-roofed box with a straightforward steel frame system. Schindler's Kallis house employs the architect's modified wood-frame system (the "Schindler Frame") on a sloped site with sloping roofs and walls. The Carling house by John Lautner features a steel-framed roof suspended by three steel pylons over the living room, while the rest of the house is framed in a variety of materials, largely wood, used both conventionally and unconventionally. The fourth house is Ray Kappe's own house. Its construction combines poured-in-place concrete towers that step up and down the sloped site with glued laminated wood beams spanning between them creating spaces at many levels. We also plan to show sequences of photographs of two of the houses under construction: the steel-framed Case Study House #17 by Ellwood and the conventionally wood-framed Burns house by Charles Moore, contrasting the differences between these construction types.

Construction literally frames views to the exterior and permits the wider openings and non-bearing walls necessary for the mythical "seamless" link between house and garden. In the near environments for these houses we find two basic approaches. The first attempts to maintain or replicate a pattern of vegetation as it was, or as the designer wished to be, in nature, e.g., the Kappe and Carling houses. The alternative tactic looked at the garden as a designed element corresponding to the house, e.g., the Schrage and Koenig houses. Interestingly, although the "modern California garden" as formulated by Thomas Church and Garrett Eckbo was broadly disseminated in the postwar years, in the case studies presented in the exhibition all of the landscapes were designed by the architects themselves. Since design culminates in experience, several of the landscapes will be presented in time-lapse photography that shows the patterns of light and shadow as they change through the day—with their implication of use and pleasure.

As a means of linking construction technology and materials to the living patterns within the house we will feature—throughout the exhibition—reproductions of building product advertisements drawn from journals such as *Sunset*, *Architectural Forum*, *House and Home*, and *Progressive Architecture*. These advertisements not only give a period flavor to the presentation of each house but are critical in demonstrating the connection between building products and techniques and the proffered lifestyle. Over time, for example, one witnesses larger areas of glass, most dramatically in the immediate postwar years after restrictions on building materials were lifted. The sliding door, innovative insulation materials and structural components, new heating and air conditioning systems, and the swimming pool all contributed to the making of the postwar house in Southern California. In addition, the advertisements illustrate changes in the use of domestic space over time: spaces become larger and less cluttered with furnishings and objects. Appliances become more compact and certain features are built in. We plan to scan and enlarge these advertisements and brand them with a large date visible throughout the gallery, to collectively serve as a sort of time line running through the exhibition.

In order to better understand what it is like to live in these modern houses the exhibition will feature contemporary environmental analyses of five of the houses. Some will be examined in terms of the solar day, i.e., how the daily movement of the sun affects the qualities and uses of the rooms within the house. Among other devices, such as interactive displays, we will feature a heliodon, a device used to

test the impact of solar angles on building design. Like the exhibition's presentation of construction, energy performance will be demonstrated in a simplified and engaging form to reveal the relationship between construction and environmental performance. While less discussed than other technological aspects of modern house design through the 1960s, energy performance has garnered greater prominence over time; in the exhibition it will be presented through a discussion of relative comfort rather than numerical statistics or graphs.

The closing section, essentially an epilogue, will trace the modifications made to several of the houses since the time of their construction, some of them designed to achieve relative comfort in houses with large glazed openings. In some cases, walls have been moved, open-air spaces have been enclosed and the landscapes have changed. Modest modifications such as replacing single glazing with double, or adding insulated curtains to retain heat, will also show the changes not only in what we demand of residential construction today - for example, higher insulation values—but also how our notions of comfort have made greater demands on both the square footage of the standard house and the way the building is constructed. In all, we plan to tell a complex and diverse story of construction technology, spatial planning and use, environmental conditions – internally and externally - and the associated lifestyle as represented in these nine houses spanning 1940 to 1975.

## **Documentation and Analysis**

### **Construction:**

Beginning in fall 2011, Sheine, working with a group of student researchers began the process of examining the structural innovations and construction systems of the selected houses and looking at the relationship between these systems and the specific forms of the houses. Some changes to the original list of houses occurred due to the availability of materials for study. For example, we chose Craig Ellwood's Case Study House #17 instead of our original selection of Case Study House #16 because of the availability of a large group of slides of the construction process of CSH #17 in the ENV Archives-Special Collections. We ultimately decided to focus on six of the nine houses in more detail, as described above in the exhibit proposal. We have produced digital 3D models of the framing, as well as ¼" =1'-0" study models, of three of the houses: Schrage, Kallis and Kappe. We are waiting to receive jpegs of the construction drawings of the Carling house, which we have ordered from the Getty Research Institute, to complete the digital and study models of the framing systems of these four houses. (J, maybe we eliminate the last sentence) Construction of large scale framing models is scheduled for the fall; the models will be constructed as part of a class Sheine will be conducting.

### **Graphic Representation:**

In fall 2011, Bricker met regularly with a number of students researchers to study the presentation and working drawings for each house, with the goal of better understanding the graphic traditions employed by each designer. From January-July 2012 the student researchers shifted their attention to advertisements published in a wide range of popular and professional journals, i.e., *Popular Science*, *Sunset*, *House Beautiful*, *House and Garden*, *House and Home*, *Progressive Architecture*, *Architectural Record*, *Architectural Forum*, *A.I.A. Journal*. The goal was to identify the changing depiction of the "modern" house in America, and more specifically in California. Largely placed by product manufacturers, these ads illustrate an array of materials that ranged from steel frame construction and sliding glass windows to specific finishes and construction details. More broadly, the advertisements illustrate the "selling of the modern lifestyle" which evolved from better-lit/less cluttered interiors to

ones where there was virtually an indistinguishable relationship between the interior and exterior; and again, in the postmodern period, to an effort to reconnect with natural materials while retaining an open interior.

### **Environment:**

The environment and landscape studies included site visits, site research, and the development of a vocabulary for assessing and ultimately conveying site qualities. Pregill made site visits with two graduate assistants to the Schrage, Kallis and Carling sites. The Kappe House will also be part of the final study; a visit is planned for the third week in August, 2012. The three house visits afforded the group the opportunity to begin formulating a visual strategy for the exhibition. The components of the approach will include context, connection and time.

Based on the criteria of context, connection and time, the exhibit will consist of a video presentation of the selected residences accompanied by pertinent photographic images, historical and current. As a result of team meetings during winter and spring, 2012, the video concept evolved to include a site transect sequence that links the three criteria. In response to the transect concept, a storyboard was developed that includes a series of visual stages for the video. The images begin with aerial and street views of the sites, followed by the transect from the interior of the residences outward through the site, with diurnal and seasonal images functioning as moments of introspection in the film. The objective of the upcoming visit to the Kappe house is to enable the team to construct a video mock-up based on the storyboard.

In order to understand the sustainable performance of the houses, several analytical methods were explored and tested by La Roche and his student assistants. Data loggers were placed in the Schrage, Kappe and VDL houses and temperature and relative humidity data was logged and collected. The documentation process included research on construction methods and materials, verification of dimensions as indicated on architectural drawings; when possible, interviews were conducted with the residents to gain some insight into how they operate their houses to achieve thermal comfort and what they think about how the houses perform in terms of energy efficiency and thermal comfort. The students analyzed water and energy bills as part of the assessment of the energy-efficiency of the houses and looked at how the owners may have changed their houses over time to achieve greater comfort.

Digital models of several houses were created and used for daylight analysis with Radiance, a state of the art daylight simulation tool developed by Lawrence Berkeley National Labs. In addition, Almodóvar, worked with his students on a detailed analysis of the daylight levels inside the Schrage, Kappe and Kallis houses. Daylight studies, energy analyses and videos of interviews were produced of the VDL Garden, Kallis, Schrage and Kappe houses.

### **Digital Exhibition Techniques:**

Students working with Sakamoto researched and experimented with methods for combining interactivity and digital technologies to create engaging and immersive exhibits. Four promising techniques surfaced: Augmented Reality, Model Simulation, Photo-Rendering, and Interactive Display. Team discussions led to a number of specific interactive displays planned for the exhibit, including a heliodon, described above, the transformation of digital framing models into fully clad buildings and

linking photographs to architectural drawings through the use of iPads.

### **Summary of Expenditures**

Please see statement below from Cal Poly Pomona Foundation. Expenditures are recorded through August, 2012, although all funds were expended by July 15, reflecting the budget extension we received from the Getty Foundation. Estimates for expenditures on benefits and supplies turned out to be lower than expected, but these were offset by slightly higher costs for student researchers.