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# AIRING RENOVATIONS: THE ATMOSPHERE OF PAUL RUDOLPH

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Increasingly, adaptive reuse has become an innovative practice, meeting new challenges with economically feasible and inherently sustainable solutions. Now, schools of design need to become leaders in this shift of attention, finally embracing our existing building stock as a valuable and renewable resource. Traditionally, renovations update and renew, adding amenities while uncovering a past. Renovations ground us in a tumultuous world of change. Looking to the future or anticipating change—proliferating new potentials—is typically the privilege of new construction. New ideas would seem to need new structures. In fact, methods and motivations for adaptive reuse are largely absent from discussions of design innovation, especially in schools of architecture. For over thirty years, however, design in urban centers has privileged context through increasingly sophisticated techniques of analysis, assessment and intervention. The complexity of cities demands such a bold and prudent investment. Could renovations, likewise, be seen as interventions in a complex field of relations? Entirely new experiential potentials lie in maximizing effects with a minimum of resources: more change for less change. This new sensibility may assume less formal invention and more careful consideration of small but profound environmental effects.

This paper will present an Interior Architecture studio that repositions the renovation of a little known building by Paul Rudolph as an innovative solution to a new fraternity house. Architecture/Interior Architecture (ARIA) is a dual degree program within the Auburn School of Architecture, Planning and Landscape Architecture leading to a Bachelor of Interior Architecture and an accredited Bachelor of Architecture. Attending to physical and professional seams between interior and exterior, the program prepares students as leaders in conceiving and shaping a more integrated built environment. Summer Thesis is the culmination of the Interior Architecture degree, and it combines design, research, professional practice, history and theory into an intensive 10-week course of study. A distinct advantage of this integrated curriculum is the convergence of effort around a single design project. Recently, Summer Thesis has embraced adaptive reuse as an innovative practice. A proposed renovation of the Kappa Sigma House on Auburn's campus serves as a case study in maximizing effects with minimum resources. This resource-effective approach benefits from a broadened curriculum, suggesting renovation is an expansive practice.

Curious to the interior, and especially renovations, drastic changes in effect can result from decisions that show few traces in typical architectural drawings. Paul Rudolph makes an excellent case study. His drawings are memorable, especially the large pen and ink section perspectives detailing interpenetrating space and light. They are exacting but suggestive; the precise cross-hatching almost renders the air with presence. This pervasive yet elusive presence, or atmosphere, is the subject of the studio. Here, air is proposed as an aesthetic and performative medium. It is also introduced as a pedagogical tool to structure research, analysis, programmatic distribution, formal invention, material choice and visualization.

## **PAUL RUDOLPH AND THE KAPPA SIGMA HOUSE**

Paul Rudolph is a graduate of Auburn University (1940) who then studied under Walter Gropius at Harvard University (1947). Upon graduating at 29, a young Rudolph quickly made a name for himself with a series of modern houses in Sarasota, Florida.<sup>1</sup> Their particular character is formal, but it is a formalism based on structural clarity and climatic responsiveness. His work in Florida established his reputation as a leading architect of his generation, leading to his appointment as Dean of the Yale School of Architecture in (1958-65).

Designed in 1960 and completed in 1963, the Kappa Sigma House is situated at a transitional phase in Rudolph's career. The house was one of several projects designed from his new office in New Haven that were moving away from the climatically responsive buildings of his early Florida work. These buildings, including the Yale Art and Architecture Building and the Milam Residence, proposed a more monumental building form that structured a sequentially rich interior environment. Air conditioning powers this change. The advancement of building systems and the need for larger buildings in mid-century America introduced new formal possibilities. For Rudolph, the shift is from a passively cooled interior immersed in fluid air to a choreographed interior of fluid space. As this generation of buildings, the first to abandon passive heating and cooling, requires renovation, new strategies are needed to re-imagine their possibilities.

In the Spring of 2000 the Kappa Sigma house caught fire. There were no injuries, but the house was condemned due to smoke and

water damage. The house remained unoccupied, steadily deteriorating from weather and vandalism. Kappa Sigma has recently started an ongoing renovation with the goal of reoccupying the house as a Lodge. The fraternity is actively addressing life safety concerns and slowly upgrading finishes and fixtures as well as mechanical, electrical and tel-data systems. Paul Rudolph was a Brother of Kappa Sigma while at Auburn, and the fraternity has embraced this legacy. At the same time, a renovation is a cost-effective solution for an organization competing to recruit members. In fact, a recent feasibility study for a new building underscores the desire to consider new possibilities for the life of the fraternity.<sup>2</sup> More than a restoration, the fraternity understands renovation as an opportunity to explore potential reconfigurations of the interior as well as an addition to the original building. As such, the proposed renovation attempts to reimagine an active institution while respecting the original building.

The house, symmetrical in plan and partially embedded in a small hill, presents a semi-monumental façade to a south lawn. Behind this elevation, a double-height living room and suspended ceremonial stair organize a set of smaller interior and exterior spaces. A corridor on the main floor structures formal activities and rituals around a dining room, kitchen, president's room and house mother's suite. Approached from the west along a more formal path, the entry is on axis with the toplit stair and overlooks the tall living room and a lush exterior court to the east. The third floor, comprised of two person bedrooms and a common bathroom, features rooms with inverted bay windows. These self-shaded operable windows recall Rudolph's early interest in ventilation. Initially, these window bays were similar to the inventive frames of the Milam House. Also reminiscent of early studies for the Yale Art and Architecture building, the broad third floor of the Kappa Sigma House is lifted on tall exterior piers to frame generous openings. At Kappa Sigma, these covered wings funnel air around the building.

In fact, the symmetrical plan belies the variety of micro-climates structured by the interface of building and landscape. Through incremental changes over 40 years of daily life, the fraternity has inflected the building to these atmospheric nuances. While the building has an atmosphere, or psychological character, environmental information in the air—including heat, light and sound—promises a more reliable design technique. Understanding the house as a vessel, or chamber of air, redefines atmosphere as an index of persistent information flux registered bodily.<sup>3</sup> Atmosphere is physical and changing rather than psychological and fixed. The exact manner in which architectural surfaces structure a reactive atmosphere is highly complex. Renovations intervene in such a field of relations. However, working within an existing atmospheric structure promises more calculated results than new construction. For a renovation, the range of information in the air can be more precisely identified and modulated to produce profound effects through modifications to the existing fabric. Because such ephemeral effects are rarely drawn, the studio focused on describing spatial thinking and material imagination not evident in traditional architectural drawings.

### STUDIES IN ATMOSPHERE

#### Site-Seeing

Initial studies were prompted by an interview with Paul Rudolph in which he describes his experience of the Barcelona Pavilion: "The reality of the Pavilion, to me, is totally unlike what I expected it to be after seeing all those photographs, models, and drawings, for it demonstrates the inadequacy of our studies."<sup>4</sup>

Perplexed by this discrepancy, Rudolph produced a set of analytic sketches to examine his profound encounter with the building. Likewise, the studio developed drawings that probe the complexity, and joy, of several Paul Rudolph buildings. Following a traditional measured survey of the Kappa Sigma house, students returned to record layers of ephemeral information. Differences in temperature and humidity associated with the relationship of the building to the ground and sky were particularly noticeable. For example, the double-height living room is carefully shaded by deep piers. This large chamber is bright and reverberant. Where dug into the hill, this floor is darker, cooler and more humid. Beer hangs in the air. Students noted other airborne effects including acoustic reflectivity and ambient natural light reflected onto the ceiling from the adjacent landscape. These effects, variable across even intervals, require obstinate observation; the detection of subtle differences and variation require an investment of time spent *seeing*.

Rudolph is well-known for his provocative drawings, but he openly acknowledged their limit in describing the complexity of a building in the world:

I searched for a technique of drawing which would allow my personal vision to be illustrated and arrived at the systems I have used. The renderings are merely a formulation to indicate the general scope of the project, but only the imagination finally determines the character of any building. One can only imagine unbuilt buildings. They can never be truly drawn and so no model or drawing can ever show their ultimate nature.<sup>5</sup>

#### Interventions In Air

In addition to existing conditions and atmospheric field surveys, the studio installed full-scale interventions in the Kappa Sigma House to test information in the air including internal pressure, velocity at openings, acoustic transmission and ambient light. Prompted by a discussion of *Thermal Delight in Architecture*, these initial studies focused attention on the mutable pleasures of air as an inherently reactive but precise set of synesthetic phenomena. Regarding thermal detection, Heschong explains:

To enjoy being warmed or cooled we need some awareness of the process..yet, most of the processes of heat flow take place below our level of conscious sensation...Clues from other senses can help make us more aware of thermal processes, enabling us to derive more enjoyment from them.<sup>6</sup>

By extension, additional information in the air rewards actively searching and mutually reinforcing senses.<sup>7</sup> In this way, subtle spatial effects are detectable as multi-sensory phenomena. Seeing such phenomena can require diligence, but full-scale interventions amplify specific effects of an existing interior. A large polyethylene curtain hung by students next to the suspended stair, for example, responded to unanticipated changes in internal pressure from breezes and the periodic opening and closing of doors. By registering a highly reactive atmosphere, the interventions in the Kappa Sigma House recorded meaningful variety as a prerequisite to proposing it. As its own precedent, a renovation affords the luxury of probing an existing building as a sensitive chamber of air.

The interventions also proved drastic changes in effect can result from decisions that show few traces in typical architectural drawings. Rather than accept that ephemeral effects are imprecise or impossible to draw or visualize, the studio attempted to develop methods of seeing air. Combining first-hand observations and conventional sketching/drawing with advanced simulation tools, students were asked to develop a means to visualize atmosphere. Through atmospheric visual-ization, then, each student developed a thesis that sets forth a hypothesis regarding a potential interior atmosphere for the Kappa Sigma House.

### Atmospheric Visualization

Visualization tools including computational fluid dynamics (CFD) simulations were introduced during the design process to help visualize the possible atmospheric effects of each proposal. Aware that environmental phenomena are often ignored or evaluated via anecdotal evidence during the design process, the studio sought to investigate

such phenomena as potential agents in the configuration of spaces, selection of materials, furniture and surfaces. A shift in attention to a potent background has also resurfaced in current discussions of sustainability. Inaki Abalos has recently described sustainability as a:

...Phenomenon [that] has been accompanied by growing social, political, and media interest...that—based on new regulations and popular and political demand—is transforming architectural practice and design techniques once focused on tectonic aspects into “thermodynamic” comprehension of the design object...This comprehension requires the assistance of new experts such as physicists and ecologists as well as new ways of approaching projects.<sup>8</sup>

Underlying this description of shifting architectural attitudes is a rather provocative assertion; namely that the manner in which architecture might be envisioned has little to do with how it is seen or read. These ambient (thermodynamic) conditions — radiation, conduction, convection, evaporation, pressure, luminosity — are more often considered variables of engineering calculations. Measurable factors that define a system or set the condition of its operation (parameters) are familiar to those involved in the design and building profession. Normative parameters that inform a building project range from the legal description of a site, zoning requirements, building and energy codes, material availability, skill of local trades and cost. Any building, however, also provides a potential site for a focused engagement of energy flows and their contingent spatial effects. It is in this spirit that a projective investigation of these flows is undertaken using simulation tools to visualize atmospheric behavior.

Utilized for decades in the air and space industry, Computational Fluid Dynamics software (CFD) is being deployed by a growing number of architects and engineers in an effort to better predict the perfor-



Figure 1. Shaking of Air—Student design proposal.

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Figure 2. Touch of Air—Student design proposal.



Figure 3. Luminosity of Air—Student design proposal.

mance of building forms and systems.<sup>9</sup> However, there is a necessary abstraction of the actual in any act of representation, including simulation. CFD software, designed to model fluid dynamics, are based on formulae developed through sophisticated human observation, measurement and calculation of natural phenomena; these formulae have changed little since the first analog studies of fluid dynamics.<sup>10</sup> The visualizations offered in CFD software still model these initial assumptions, a necessary compromise in new construction. In renovation, however, first-hand observation can be used in

tandem with predictive modeling. In this case, potential approaches for re-inhabiting the Kappa Sigma House were based on initial findings formed on site via interventions and modulated by visualizations provided via simulation and computational analysis (figures 4-5). As a result, architectural solutions include carefully considered openings, curtains and ventilation to create meaningful thermal variety. In some cases, activities are proposed to occur in thermal zones rather than rooms. In many cases, materials including lighting are proposed to engage additional sensory potentials of air (figures 1-3).

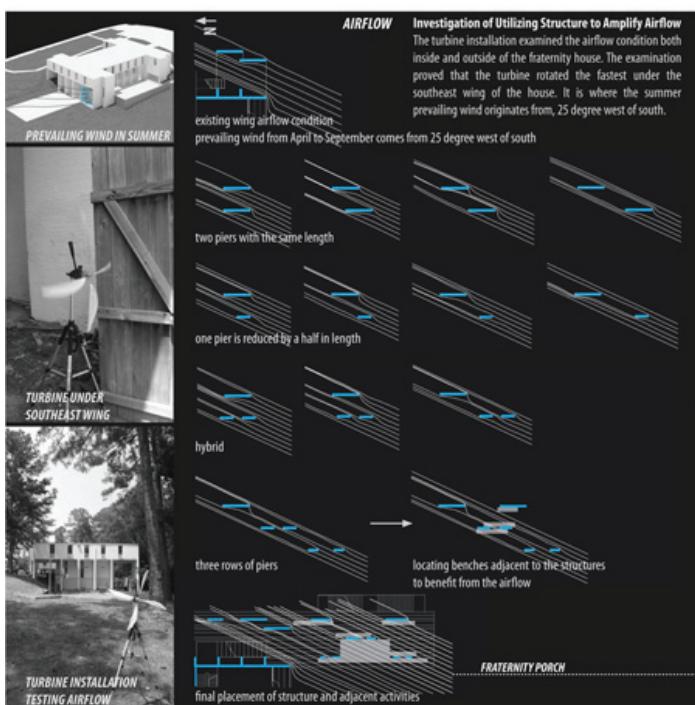


Figure 4. Student study of air flow at proposed addition using field observation and hand drafted prediction of air flow.

## CONCLUSION

As the dean of Yale School of Architecture, Rudolph was committed to teaching principles, or a theory of architecture. As an architect, however, his buildings are highly personal.<sup>11</sup> Because of this, Paul Rudolph was and remains both influential and controversial. Committed to the possibilities of architectural form, his work is distinc-

tive across a diverse range of projects. In fact, his work is memorable for its dizzying variety—one with an identifiable character.

Later in his career, Rudolph describes this unifying variety as the primary goal of architecture:

People, if they think about architecture at all, usually think in terms of the materials. While that's important, it's not the thing that determines the psychology of the building. It's really the compression and release of space, the lighting of that space—dark to light—and the progression of one space to another. Because one remembers in that sense. Architecture is very much like music—just as you remember the introductory themes of any great symphony; architectural themes are experienced throughout the space from within. And that's what unifies it.<sup>12</sup>

Again and again, Rudolph claims a preeminent psychological dimension for architecture. In his later work, this quality emanates from a spatially rich interior choreographed as a sequence. For Rudolph, architecture structures meaningful variety, creating a psychological atmosphere. His criticism of Modernism, in fact, is its stark homogeneity: “Indeed, the whole so-called international Style has, with a few exceptions, simply said ‘let’s have light’ without controlling it psychologically. We need ‘caves’ as well as ‘goldfish bowls.’”<sup>13</sup>

Later in the same essay, Rudolph enunciates the type of variety he proposes by describing the Walker Guest House (1952) in some detail:

Each side of this square house is made up of three equal panels—one of fixed glass, the other two of upswinging, counterbalanced panels which act as: first, the infilling wall in inclement weather, second as the ventilation elements, third as the overhang, and fourth as the hurricane shutter. Thus, with all the panels lowered, the house is a snug cottage, but when the panels are raised it becomes a large screened pavilion. If you desire to retire from the world you have a cave, but when you feel good there is the joy of an open pavilion.<sup>14</sup>

The joy of this open pavilion is atmospheric. The iconic photographs of the house by Ezra Stoller suggest a nomadic existence. Perched on the sand, a guest is immersed in a low oceanic roar, salty breezes, afternoon showers and even the occasional hurricane. The passively-cooled vacation home delights in a tumultuous world—modulated within limits by its architecture. Precisely as the Kappa Sigma House is being designed, however, Rudolph shifts his attention to more complex and monumental building forms permitted by air-conditioning. By the time Yale Art and Architecture is completed in 1964, Rudolph is designing interpenetrating spaces of great variety and sophistication. Given our present predicament, however, one could propose a partial reversal of Rudolph's career. Currently, we are more comfortable with a shifting world; to embrace environmental flux is now to take delight in a complex and immersive environment. By shifting attention back to the mutable pleasures of environmental phenomena, architectural character (atmosphere) can be redefined as information in air (atmosphere).

Partially unburdened by architectural image, renovations can focus on small but profound atmospheric pleasures. Attending to the physical-

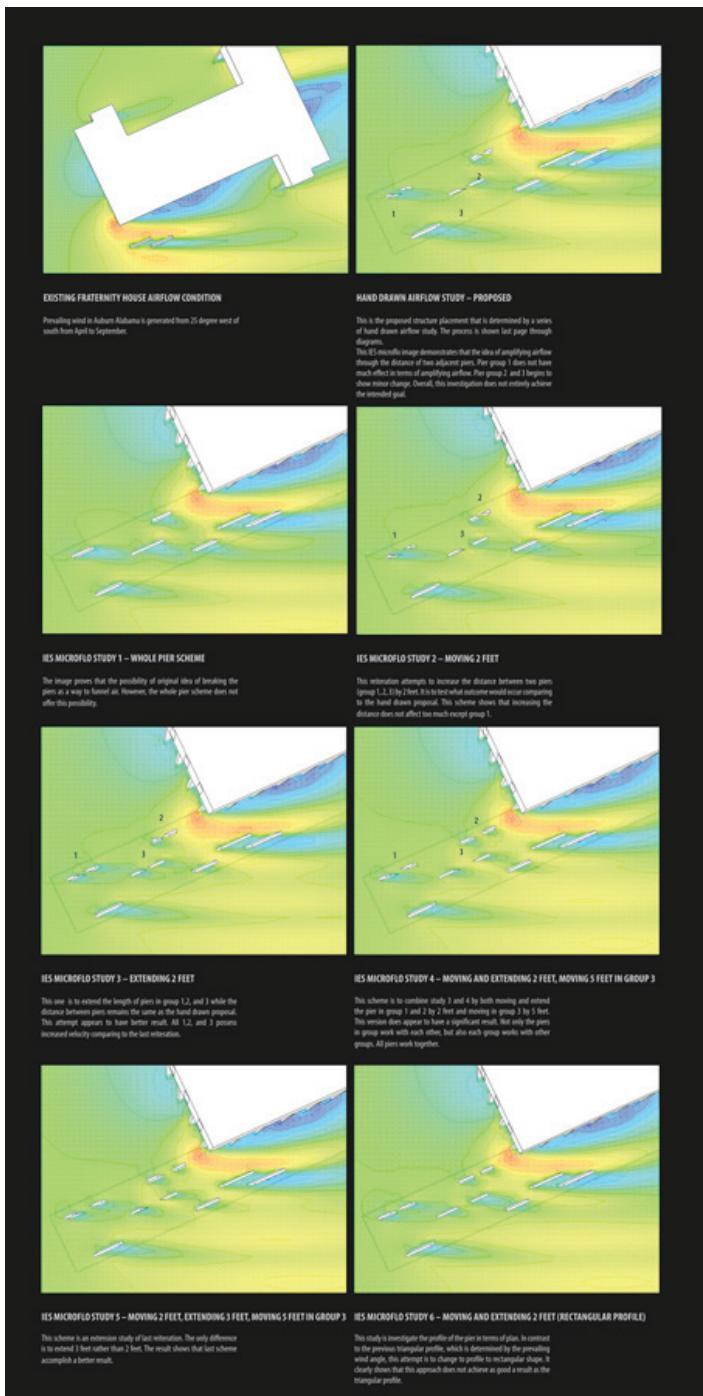


Figure 5. Student study of air flow at proposed addition using CFD studies to visualize nuances in air flow based upon modification of wall position.

ity of air locates psychological effect more precisely in environmental phenomena. Again, the complexity of structuring an atmosphere suggests renovations are better suited for such a task than new construction. At the Kappa Sigma House, for example, the brothers inflected the house to take advantage of the verdant eastern courtyard. An added door, stage and patio are not necessarily deficiencies of the original building, but adaptations that have gained relevance over the life of

the building. Renovation is able to embrace such nuances, adding richness to an existing structure instead of simply renewing a past.

Finally, atmospheric shifts are triggers for other meanings. In the case of a fraternity, social unity is forged from rituals intimately tied to daily and seasonal rhythms; parties and dinners are memorable acoustic and thermal events. It's traditional role as a leadership and service organization for young men, although in dispute, could be renewed by embracing an expanded understanding of environmental stewardship as suggested here. A renovation of the Kappa Sigma house simultaneously extends the legacy of Paul Rudolph while proposing a more cost-effective and environmentally sophisticated solution. Here, the Kappa Sigma house is reconsidered as an atmosphere, inherently unstable and reactive. It shifts with time and responds to moving bodies. It is moody. But it is also precise. The attempt to understand a building as a complex immersive vessel defies clear distinctions between visible and invisible realms and complicates what can be drawn with confidence. But this challenge may restore renovation as an innovative design practice, one that promises to transform existing structures into sensitive containers—buildings to *look with* rather than *look at*.<sup>15</sup>

## ENDNOTES

1. Rudolph practiced with Ralph Twitchell from 1947-1952. By 1952 Rudolph had established his own pool of clients and began his own independent practice. Rudolph's practice expanded with larger projects such as the Sarasota High School, yet these early buildings were responsive to the specific climatic conditions of the south Florida coast both in form and material logic. Rudolph was an early and important proponent of modern Regionalism.
2. A recent proposal for a new Kappa Sigma House on a new site assumes more private bathrooms and a more traditional architectural style.
3. James J. Gibson, *The Senses Considered as Perceptual Systems* (Boston: Houghton Mifflin Company, 1966), 14.
4. Roberto De Alba, *Paul Rudolph: The Late Work* (New York: Princeton Architectural Press, 2003), 217.
5. Paul Rudolph, *Paul Rudolph: Architectural Drawings*, ed. Yukio Futagawa (New York: Architectural Book Publishing Co., 1981), 11-14.
6. Lisa Heschong, *Thermal Delight in Architecture* (Cambridge, MA: The MIT Press, 1979), 25.
7. Gibson, *The Senses*, 4.
8. Inaki Abalos, "Beauty from Sustainability?," *Harvard Design Magazine* 30 (Spring/Summer 2009): 14-17.
9. Architectural firms such as Sauerbruch Hutton Architects, Foster Associates, SOM and engineering consultants such as Transsolar, Arup, and Atelier 10 have made use of a range of simulation software in the design process.
10. Michelle Addington, "The Phenomena of the Non-visual," in *Softspace: From a Representation of Form to a Simulation of Space*, ed. Sean Lally and Jessica Young (London: Routledge, 2007), 48-49.
11. Paul Rudolph, "Paul Rudolph Cites Old Principles as Bases for Analysis of Today's Work," in *Writings on Architecture: Paul Rudolph*, ed. Nina Rappaport (New Haven, CT: Yale School of Architecture, 2008), 84. Originally published in *Architectural Record*, v. 131, January, 1962.
12. John Zinsser, "Staying Creative; Artistic Passion Is a Lifelong Pursuit—and These Mature Masters Prove the Point. (Otto Luening,

- Elizabeth Catlett, Paul Rudolph)." 50 Plus 25 (December 1985): 49-55.
13. Paul Rudolph, "Regionalism In Architecture," in *Writings on Architecture: Paul Rudolph*, ed. Nina Rappaport (New Haven, CT: Yale School of Architecture, 2008), 35. Originally published in *Perspecta* 4 (1957).
  14. Paul Rudolph, "Regionalism In Architecture," 36.
  15. Michael Benedikt, "Coming to Our Senses: Architecture and the Non-Visual," *Harvard Design Magazine* 26 (Spring 2007): 88.