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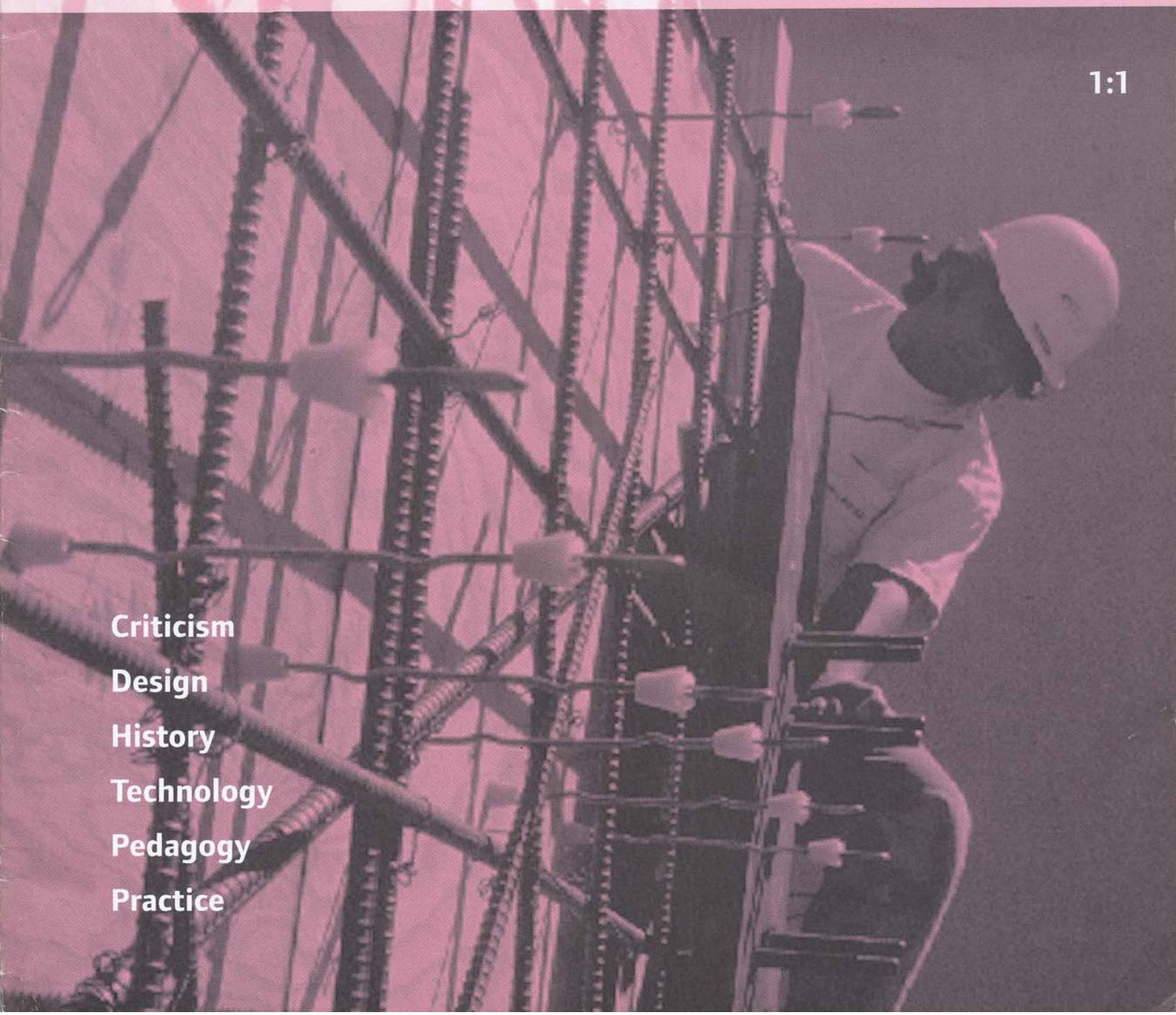

Criticism

Design

History

Technology

Pedagogy

Practice

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CONTENTS

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Volume 60, Number 2

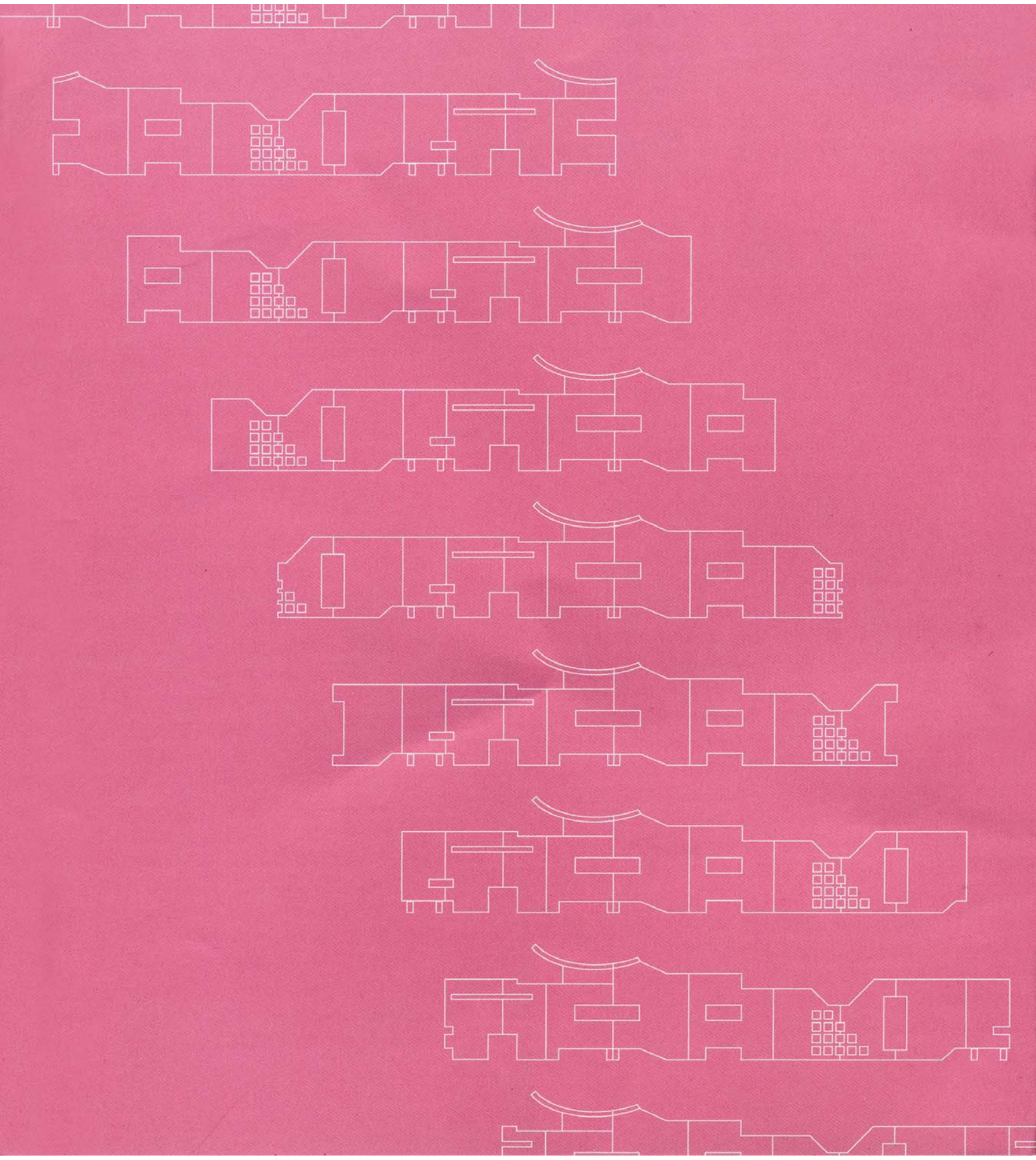
Cover: Garden Wall Fabrication, The Joy House, Michael Hughes.

Back cover: Final Project from the (Digital) Craft Studio, Catholic University, Luis Boza.

Inside cover: Drawing of Joint Maneuvers from Matias Creimer.

Page 2: Detail from Shadow Box by Shara Castillo, University of Texas, Austin.

1:1



MATIAS CREIMER
Otis College of Art and Design
and Woodbury University

Joint Maneuvers

Diversity as an Asset in a Community College Exercise

With half the students seeking a transfer degree to five-year design schools and the other half looking for basic vocational instruction to pursue careers in the construction industry, teaching at community and junior colleges presents a unique opportunity to combine design and construction issues in a single assignment. This article documents a class taught in the Architecture Department at Pasadena City College. Working in groups of three for an entire semester, students with different backgrounds and interests merged their skills to produce a single structure that was both conscientiously designed and properly constructed.

This project was conceived as the ''hands-on'' component of a class on materials and methods. The objective of the class was to teach the inherent relationships between the architectural forms and the properties of materials. To integrate these, the assignment had both a design and a construction component. The class was divided into a series of chapters with lectures on the different systems that constitute a building (floors, walls, windows, roof systems, etc.). Students were asked to design and construct a structure that would progressively incorporate the content of the lectures.

First Semester: Eight Independent Structures

The first class had a total of twenty-four students working in groups of three. In order to maximize the level of enthusiasm, students were given ample freedom to design their structure in whichever way they wanted, as long as it complied with the following guidelines: the structures needed to have a floor, a wall, a window, and a roof; they could not exceed a maximum ''buildable'' envelope of $3 \times 5 \times 8$ feet to ensure transportability. The final structure had to be built according to standard framing practice, using full-scale construction details.

The design phase covered five weeks.

Students first produced sketches, drawings, and massing models, and then built one-inch to one-foot foam board models of their structures showing all framing members ''to scale.'' This model became a tool for the following ''woodshop'' phase as it allowed students to visualize the location, size, and spacing of all joists, studs, and rafters, as well as the connections between all structural members. The final wooden structures were built in eight weeks in the school's woodshop (Figure 1).

The final review took the shape of an outdoor installation. Students presented their projects by group, and jurors reviewed the work both conceptually and from the point of view of construction. They evaluated the final outcome vis-à-vis their initial design intentions and judged the framing choices in relation to the architectural forms that were presented (Figure 2).

Second Semester: Nine Segments of a Collective Structure

The structures from the first semester served as a starting point for the second group of students that took the class the following term. Those structures were available as a reference for what the students were expected to produce, which lowered

1. Structures from the first semester at different stages of construction.

Journal of Architectural Education,
pp. 58–62 © 2006 ACSA

the level of uncertainty and left room to incorporate an additional requirement: all structures had to be set in line and all of them had to read as one larger entity. In order to achieve this, each group had to design a segment and then meet with its two neighboring teams to figure out a way of ''stitching'' the segments together in a seamless way. Students first drew their structures in plan and elevation to work out the adjacencies (Figures 7, 8, 9), and, like in the first semester, they built massing models and more detailed framing models (Figures 3, 4, 10). Then, they built the full-scale objects in the woodshop and these, too, were reviewed in an outdoor installation (Figures 6, 11).

In general, the process of achieving continuity between two given structures started by placing both elevations together and redrawing them collectively by both teams. In the redrawn version, only continuous segments run across the vertical plane dividing two structures. In all cases, those segments are the top and bottom edges of the structures while some teams share a window or a canopy to reinforce the ''stitch.'' (Figure 5)

Subsequently, an identical process was carried out with the roof plans and the massing models.

Meetings with neighboring teams were conducted throughout the entire semester. When the massing issues were resolved, the framing issues started. In looking for ways of constructing a smooth transition between structures, students soon learned that matching their framing choices was the easiest alternative. In this phase, the contribution of the students with construction experience was crucial. They first passed their knowledge on to their teammates and then to their neighboring teams and, in a domino effect, information rippled across structures from several sources.

Although the nine structures are arranged in line, they could conceivably close a circle: the first and last segments can also connect. This means that there is no predetermined beginning or end to the sequence. This was initially established as a way of ensuring that all teams were required to deal with two neighboring structures, but it unexpectedly added a level of complexity to the design process. After the implementation of this requirement, each segment could be designed, evaluated, and improved at four different levels: on its own, between two segments, and as the first one or the last one of the row. Students switched back and forth between these modes of operation until their segment performed satisfactorily at all four levels.

2. Examples of structures from the first semsester.

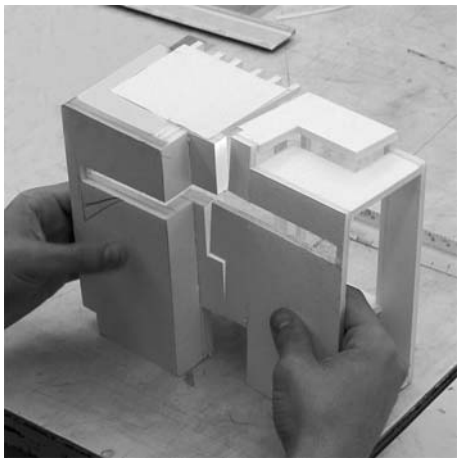
Precedents

As a way of tracing the historical lineage of the work that the class was about to produce, introductory lectures covered the work of architects who have approached architecture from nonfunctional angles.

Those lectures included the Cooper Union tradition of building wooden structures as established by John Hejduk. Students were also exposed to the latest trend in small building design and mobile architecture.[1]

Classroom-Woodshop Coordination

The textbook used for the class was *Building Construction Illustrated* by Francis D.K. Ching and the lectures followed the sequence of its chapters.[2] The basic lectures on foundations, floors, walls, and roof systems were covered in the first weeks while



3. Massing models of two different structures.

4. Students working on their one-inch to one-foot scale formboard models.

5. Example of two structures designed and built by two different groups of students.

the students were designing their structures in the classroom. The rest of the lectures (on subjects that did not apply directly to the design component of the class) was covered later in the semester when the students were already working in the shop.

The decision to have an assignment that focused intensively and exclusively on wood, in a class on ''materials and methods,'' was made under the belief that studying one material in depth can be more beneficial than a series of quick assignments on all the materials used in construction. The wood framing assignment gave students a clear understanding of what can and cannot be done in wood, but it also became a reference to understand other materials and their properties. For example, students tried to frame ''moment connections'' in wood, which is only possible in steel or concrete, and they thus learned about the properties of steel and concrete precisely because they were not available. These other materials were further covered in lectures organized and scripted using wood construction as a reference.

Pedagogical Objectives

In addition to being wood frame construction workshops, both assignments were embedded with larger goals.

The first semester was intended to provide an opportunity for students to tackle the problem ''in miniature'' of the freestanding ''sculptural'' building at a different scale and from a different angle than they normally do in their design studios. For

6. The structures as they looked the day of the final presentation.

most students, it was also the first time they were forced to find a balance between their design intentions and the limitations and potentialities of standard construction.

The second semester introduced the idea of the ''zoning impediments'' and immersed students in a fictional scenario analogous to that of a city block or urban setting, where forms need to be negotiated between the architect and the set of external forces that operate on a given site.

At the end of the semester, each structure reflected both the authors' initial intentions and the formal dialogue that placed it in compliance with its neighboring segments created by other classmates.

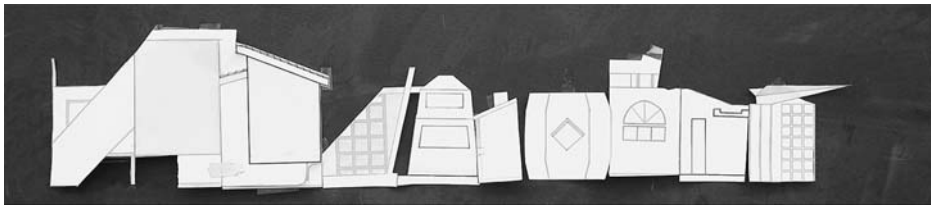
Later in their careers, these forces will take the form of the typical zoning constraints (height limits, setback requirements, design guidelines, etc.); the idea behind this assignment was to set a precedent where restrictions were engaged creatively as part of the design process and led to more intricate results.

Conclusions

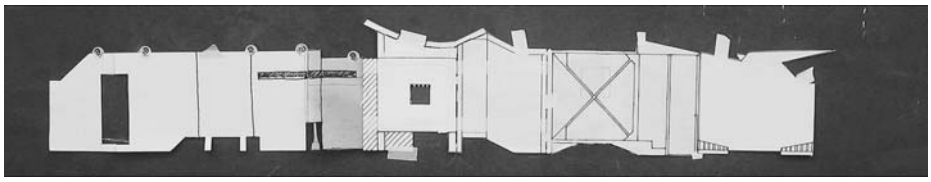
Whereas the first semester offered each group of students the chance to work independently on their structure, the second one gave rise to a communal design and construction environment. This led to noticeable differences in the work between the classes. In the first semester, each group was able to make its own internal decisions without consulting its neighboring teams. This allowed them to establish their own goals and work at their own pace. There was also a higher level of competition to make the best structure of the class, perhaps related to the competitive transfer process that lay ahead for some of them.

In the second semester, the level of production was more consistent and no group stood out significantly over the rest. On the positive side, the collective aspect of the project required all teams to follow a similar schedule and to deliver a structure that was compatible with the rest in terms of design, quality, and craftsmanship. This commitment to the rest of the class is something that occurred spontaneously, and students developed

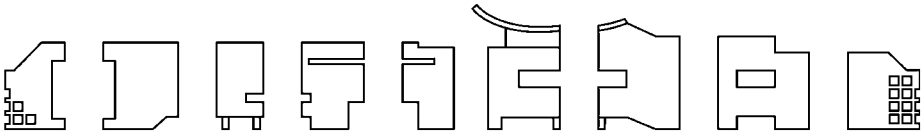
7. Initial charrette to produce sketches, tape them to the wall, and work out adjacencies between all structures.



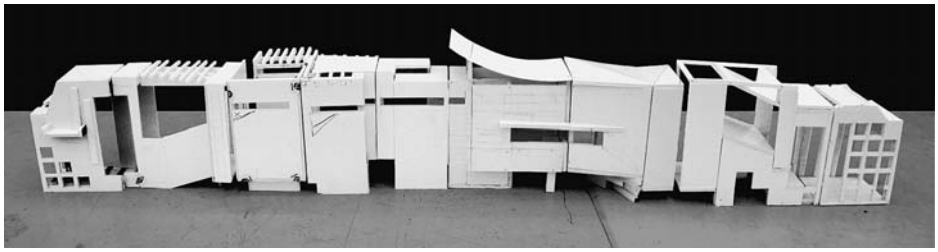
8. Progress drawing showing continuity between segments.



9. Line drawing showing all structures separated.



10. Massing models to design transitions between structures in a three-dimensional way.



11. View of the back of the structures.

their own ways of making sure no team fell behind in any sense. As a result, no structure in the second semester was noticeably below average.

Students enrolled in the architecture program led their teams through the design phase, while students who took the class to learn how to build concentrated on the construction component. Working in teams, they taught one another and joined forces to produce a level of work that was only possible because of the diverse make up of the student body, an inherent aspect of community colleges nationwide.

Acknowledgments

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Notes

1. Readings included: Phyllis Richardson and Lucas Dietrich, eds., *XS: Big Ideas, Small Buildings* (New York: Universe, 2001).
2. Francis Ching and Cassandra Adams, eds., *Building Construction Illustrated* (New York: John Wiley & Sons Inc., 2000).