The Analog-Digital Design Studio

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Abstract

The ***Analog-Digital Design Studio*** is an open laboratory to explore, reflect and act on *the implications of the media revolution which are deeply transforming our civilization and architecture*. The studio utilizes the interface of analog and digital media as the vehicle to address, study, and advance contemporary cultural and architectural discourses.

The goal of the studio is to develop not only a theoretical and procedural foundation for a diverse utilization of media in architectural practice but also essential attitudes, awareness and skills for succeeding in today's media driven civilization and professions. The studio uses a pedagogy based on *play* and *interpretation* that is implemented by (1) establishing a simple yet strict framework within which playing may occur, and (2) defining interpretive iterations through progressive media shifts. This methodology fosters (A) a progressive realization of the *relationship* between different media and thus an understanding of their differences and strengths; (B) an experimental and exploratory attitude towards learning new technologies; and (C) continuous translations and reformulations of what is being developed, thus deepening and advancing the design process.

Finally, the Analog-Digital Design Studio also attempts to (D) develop and test new design methods and media techniques that are directly applicable to architectural practice and education at large (research objective), and (E) build and teach the theoretical links between media, design process and contemporary civilization (theory development objective).

The studio is regularly taught at the University of Utah Graduate School of Architecture, but has been also offered at two institutions in Argentina. Plans to teach the studio at three other universities in Argentina, Uruguay and the UK are now underway.

Note 1: ***Analog*** *media involves the manual use of material such as paper, vellum, graphite, balsa wood, cardboard and ink.* ***Digital*** *media include scanning, image manipulation, visualization, solid modeling, and computer aided drafting, animation and rendering.*

THE STUDIO

The Analog-Digital Design Studio is one of 4 thematic design studio choices that first and second year graduate students may select from every Spring Semester. These "topic" studios provide advanced students with the opportunity to focus in a particular area of architectural inquiry during a full term.

During the past three years, the ***Analog-Digital Design Studio*** has been the University of Utah Graduate School of Architecture's official testing ground for logistical, pedagogical, technical and theoretical experimentations aimed at guiding the full integration of computers into all the design studios by Fall 1999. This school-wide transformation follows the guidelines of *Vision 2000*, a faculty approved plan led by the nominee.

Condensed versions of the Analog-Digital Design Studio have been offered at two universities in Argentina (the Universidad Nacional del Litoral, at Santa Fe and the Universidad Nacional de Mar del Plata, at Mar del Plata) where they obtained similar results. This suggests the applicability of the studio's premises, pedagogy and procedures across curricula and cultures. Other versions of this studio were offered at the Universidad Nacional de Tucuman (Tucuman, Argentina) and again at the Universidad Nacional del Litoral and the Universidad Nacional de Mar del Plata in the Summer of 1999. Invitations to teach the Analog-Digital Design Studio at the Universidad de la Republica (Montevideo, Uruguay) and the University of Strathclyde (Glasgow, UK) are now being considered.

Note 2: *Class materials and work are posted on the World Wide Web. The Internet has been utilized to show studio activities. The site address is: http://www.arch.utah.edu/people/faculty/julio/studio.htm*

PHILOSOPHY & OBJECTIVES

The Analog-Digital Design Studio is an open laboratory to explore, reflect and act on the implications of the media revolution which are deeply transforming our civilization and architecture. This transformation may be summarized as a radical shift from a material-based to a media-based culture. In architectural practice, this change is manifested in the shift from analog to digital modes of making and thinking. The studio utilizes the interface of analog and digital media as a vehicle to address, study, and advance contemporary cultural and architectural discourses.

The studio objectives are framed within the three educational responses architectural curricula have been giving to the technological mutation under way. On one extreme is the revolutionary approach, fully committed to the new digital world and trying to leave behind any reminder of the analog ways of doing architecture (i.e., hand drafting and model building). On the other extreme is the increasingly weak conservative response that sees no reason to abandon the proven, centuries-old analog methods. Between these two poles is an intermediate third position that incorporates computers in ways that mirror traditional work, except that they are reserved for use only ***after*** the design process, to deliver faster and more seductive results (e.g., drafting, renderings, walk-throughs). This third approach is a response taken by default and not by an informed understanding of the digital.

None of these responses is appropriate considering the nature of today's media and available analog methods. At the same time, given the transitory period in which we live, it is also apparent that we need an intermediate position. However, this middle response must investigate and be informed by the nature of contemporary architectural making, that is, the complex production space where the digital and the analog meet. For it is in this space of betweenness where the dialectic processes unfold and therefore new techniques, knowledge, and ideas first arise.

Based on this rationale, the objectives of the studio are to:

(1) *explore how architectural concepts and design are informed by iterative media processes;*
(2) *introduce fundamental intellectual and making methods associated with the mastering of media;*
(3) *give students a solid foundation in a non-traditional, hands-on, systematic and integrated use of analog and digital media during the design process;*
(4) *foster an experimental attitude towards learning new technologies;*
(5) *broaden and deepen students' design process and learning of architecture; and*
(6) *engage students with larger conceptual and theoretical issues that transcend architectural concerns.*

As personal and professional survival in the new civilization increasingly demands knowledge and skills of media technologies and applications, the class is also geared toward developing basic media awareness, attitudes and skills. In this sense, the studio offers a glimpse at the opportunities underlying media-based alternative practices of architecture.

The belief underlying the Analog-Digital Design Studio is that the architectural practice and education of tomorrow is not ***ahead*** in the digital but ***between*** the analog and the digital; and not in ***one*** medium/approach but in ***many*** media/approaches. In other words, dialogue and diversity are the way to the future.

PEDAGOGY

General Approach

The studio utilizes a pedagogy based on *play and interpretation*. ***Play*** is the most fundamental way in which humans learn, especially when they have to confront totally unknown environments and situations. Play instills and integrates many kinds of skills and teaches how to move from an initial discovery-driven approach to more sophisticated interactions based on hypothesis testing and theory development. ***Interpretation*** is relevant from both professional and public perspectives. Architectural design is a value-added process that requires intentional filtering, a biased act of interpretation. In our era of information and media overload, interpretation is a survival skill that all citizens must possess to assess the value of the worlds of simulacra we are bombarded with. In our contemporary civilization the interpretive act is an essential design act.

This pedagogy is embodied in the studio methodology by (1) establishing a simple yet strict framework within which playing may occur, and (2) defining interpretive iterations through progressive media shifts. The main working conditions used to frame the learning experience are:

A. The studio places students in the space laying *between* manual and electronic media and guides them in the use of both media as design tools. The studio teaches students to keep a critical attitude towards selecting the right medium for the right job for the right situation.
B. The studio emphasizes the shift between digital and analog media. Requiring multiple iterations between media helps students (1) realize the *relationship* between different systems and thus understand their differences and strengths; and (2) clarify what is being developed. Translating something requires a re-formulation that sharpens understanding.
C. The studio develops a broad theoretical knowledge base. By making students study the nature of media culture and then design buildings that are being impacted by that same culture, the students engage in larger conceptual and theoretical issues that transcend architectural concerns.
D. The studio organizes students in teams of 2 or 3 individuals so that they face and deal with a diversity of interpretations and communication styles. This arrangement also makes possible the collaboration between students with varying degrees of computer experience and provides enough critical mass to work in various media simultaneously.
E. Software training and content learning

take place in parallel. Students train as they work in their design assignment. The students' learning curve is astonishingly fast and guarantees the accomplishment of the studio objectives. This is a direct result of peer support and skill sharing, software ease of use, and the interest raised by a content-dependent pedagogy.

F. The studio rejects the traditional hygienic computer lab atmosphere. Rather, the drawing and cutting boards, working materials, music, food, and drinks are all welcomed in the studio. The physical environment wherein designers work has to permit states of mind, behaviors and interactions that support and not inhibit design production. Thus computers are brought into the traditional studio. The result is an extended productive space that foster unconstrained media dialogue and therefore new design opportunities. Please, refer to photos of students at work (this and previous pages).

Inventiveness of Curriculum

The *media-based play and interpretive* pedagogy the studio employs is not common in architectural curricula. Architecture studios are usually framed within typology, context, theory, and/or technology oriented pedagogies.

Neither are the studio's teaching and research goals ordinary. The Analog-Digital Design Studio attempts to *(1) develop and test new design methods and media techniques that are directly applicable to architectural practice and education at large (research objective), while (2) teaching these very same methods and techniques to students (pedagogical objective).* The studio also seeks to *(3) construct and teach the theoretical links between media, design process and contemporary civilization (theory development objective).* Traditional architecture studios are different. They are not research oriented environments aimed at the development of disciplinary knowledge.

Dissemination of Knowledge & Collaborative Work

The work produced in the studio has elicited considerable amount of knowledge that has been documented in over 10 refereed research papers, shared through invited lectures and taught at Utah and other foreign universities. Disseminating the ideas, findings, methods, and technics elaborated in Arch.602/702 over the past 3+ years have proven to be one of the most rewarding aspects of this experiences and definitely an act of teaching.

The Analog-Digital Design Studio has also permitted the development of successful inter-institutional and international educational collaborations. For instance, working with Associate Professor Bennett Neiman (University of Colorado at Boulder) during 1996 and 1997 resulted in the creation and teaching of the *1998 AIA Education Honors Award winning* ***Spatial Manipulation Media Workshop***. At the international level, collaboration with Professor Alfredo Stipech (Universidad Nacional del Litoral, Argentina) has resulted in over US$ 12,000 in grants to support the teaching of this studio at several schools of architecture in Argentina (Universidad Nacional del Litoral 1997 and 1999; Universidad Nacional de Mar del Plata 1998 and 1999, and Universidad Nacional de Tucuman 1999).

TEACHING EFFECTIVENESS

Following are the most important learning outcomes resulting from the Analog-Digital Design Studio. This list is based on 3 years of experiences. Students that took this course demonstrated:

A. significant growth in their media/representation toolbox regardless of previous media background (motor skills and cognitive outcome — procedural and contextual knowledge);
B. higher architectural productivity. This is a good indicator of how media technology and appropriate pedagogical methods speed up architecture students' ability to create, find, develop and














present design ideas and products (performance outcome);

C. increased levels of creativity and exploratory attitude. The wide range of results and the fact that most of the produced designs would have never been attempted by traditional means demonstrate the power of the educational use of media to expand the intellectual and making horizons of students' design production (affective and higher levels of cognitive outcomes —problem solving and creativity);
D. expansion of the students' theoretical breath and critical awareness of the contemporary challenges facing the architecture profession and culture in regards to the digital revolution (cognitive outcome — declarative, procedural and contextual knowledge)
E. higher levels of awareness in the students' own design and decision making processes (meta-cognitive outcome);
F. improvement in the collaborative attitude among students regarding technical and critical support (affective outcome);
G. a change in attitude towards perceiving the computer as a design-friendly tool/environment (affective outcome);
H. ability to transfer learned attitudes, skills and knowledge to other classes and studios;
I. high satisfaction with the class teaching methods and their learning outcomes as reported in student course evaluations.

The 15 plates that follow document the studio production and illustrate how the students applied the instruction. The selected work represent a wide sample of student efforts over the past three years. It includes examples of work done at other universities (plates 10 and 11-12)

As the focus of the studio is in the relationship between design process and media, nine plates present this methodology. Six plates (4, 8, 9, 13, 14, and 15) show examples of final design work.

Studio Scenes (far left and previous pages)
These photos show students at work in the studio. The scenes convey the class' 'hybrid' productive environment and the wide range of design actitivies associated with media iterations.

Slide Images (near left)
The studio begins with a warm-up problem that sets up the theoretical and productive context within which the class will operate. This beginning phase is short (2 weeks) and involves reading assignments with or without the presence of a media design exercise. The cultural and media sites where contemporary architecture practice takes place are 'visited' and examined. Individual and group analysis and discussion create the conceptual space that will ground the studio's media and architectural experimentations.

Plate 1: Multiple Function Building (Process I) - Winter 1996

Project:

Eight-week long design of a building with seeming contradictory programs (a bath house and an office building), that address the dichotomies of the information age: a call for disembodiment and an obsession for the body.

Students: Robert Hansen, Troy McOmber & Chris Webb

Description:

1. Video images from from preliminary site analysis are selected (close up shots of fracturing details and connections of dissimilar materials.
2. Digital model exploration leading to idea of “void”.
3. Physical model trying to stabilize concept.
4. Zoning study and functional testing in freehand sketches
5. Digital development from analog model (several views).

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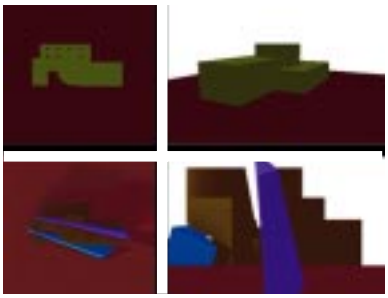

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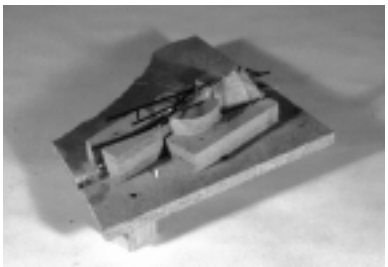

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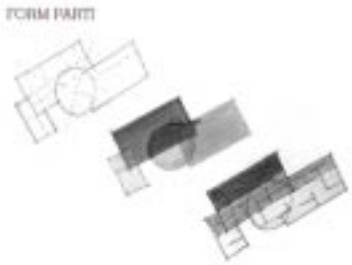

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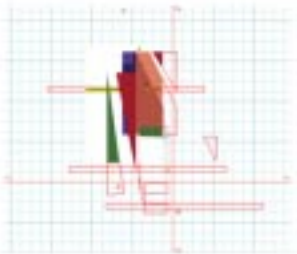

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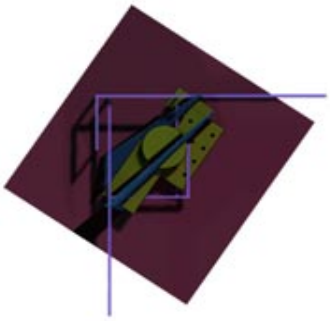

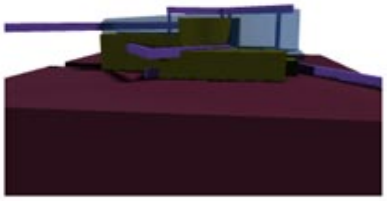

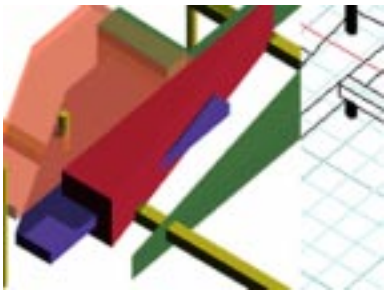

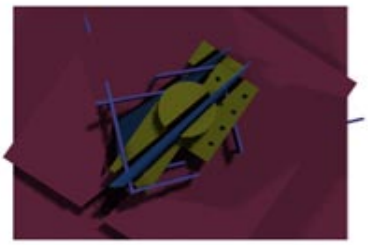

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6. Electronic animation of first schematic design

7. Analog studies of interior spaces

8. Freehand sketches studying experiences

9. Hand drawn floor plan development of design, scanned and digitally enhanced

10. Final physical section model with strong detail and tectonic quality

11. Images of final digital model

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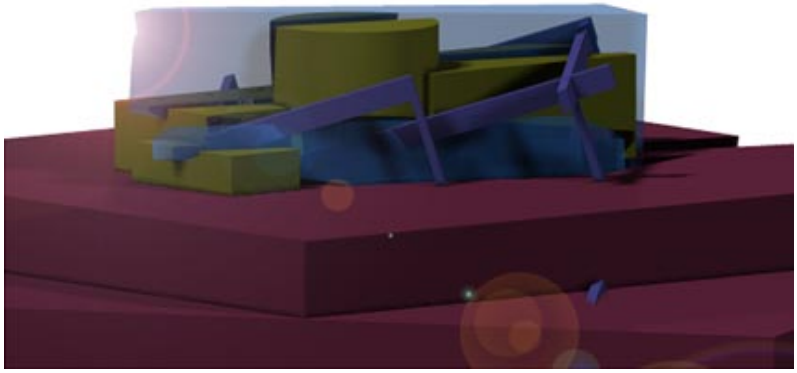

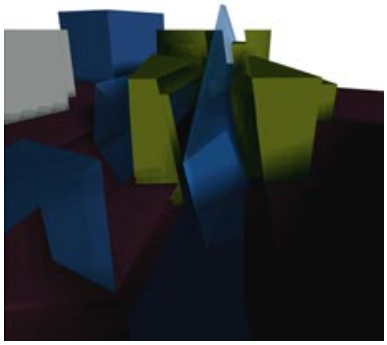

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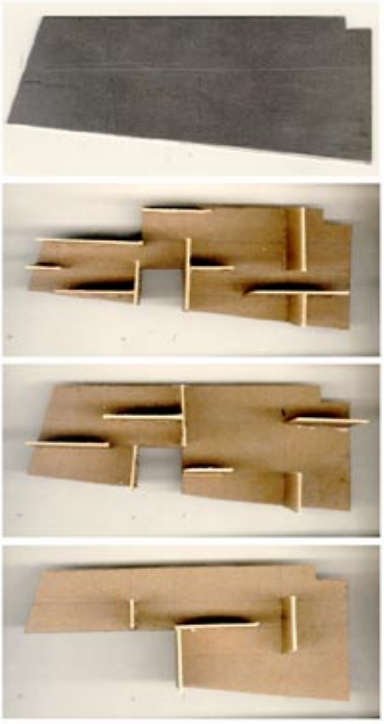

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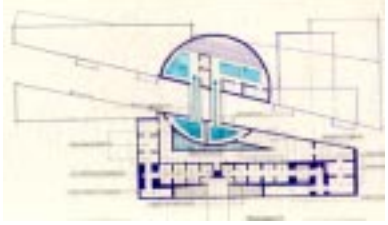

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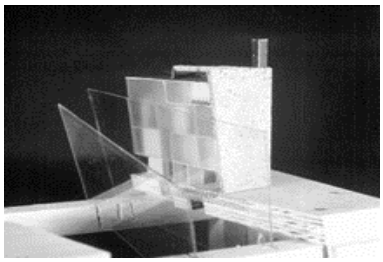

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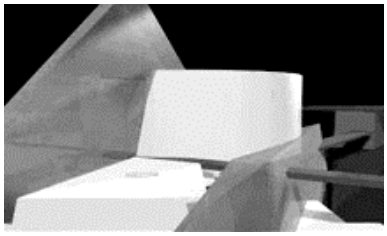

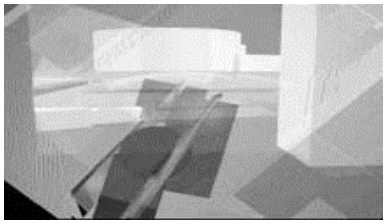

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Plate 3 : University International Center (Process) - Winter 1997

Project:
Eight-week long design of the University International Center on Campus. The building was to serve and represent the international community (1) on campus (i.e., ***physically*** present), and (2) off Campus (i.e., ***virtually*** present). This architectural program builds on the analog-digital conversation theme of the studio. One part of the program seemed to request design responses associated with materiality, embodiment, sensuality, space and form, or the ***analog***. In contrast, the other part of the program suggested the need to deal with an architecture of/for information, disembodiment, detachment, interface/surface, or the ***digital***. The design challenge was to investigate this betweenness, focusing in theoretical as well as procedural, design and media issues. Design process and final results had to acknowledge this dialectic interplay.

Students: Tami Cleveland, Olga Filippova & Liza Hart

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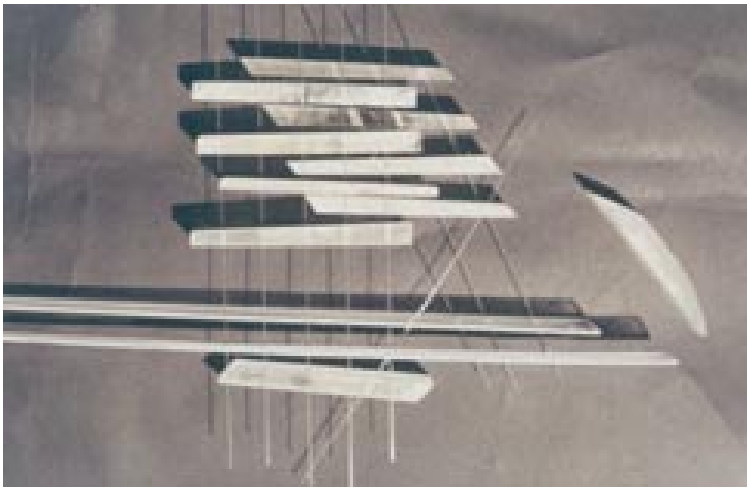

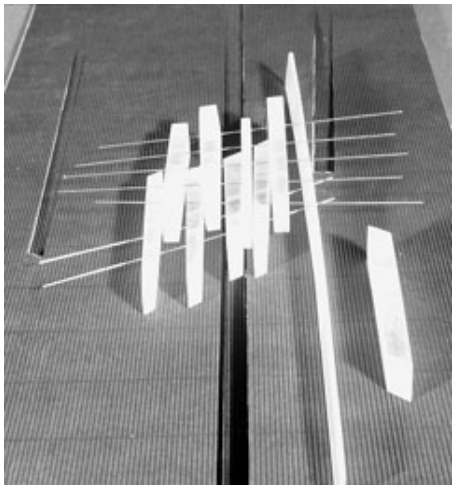

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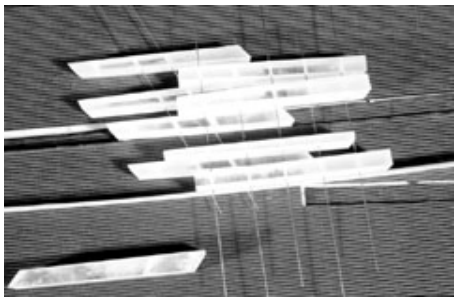

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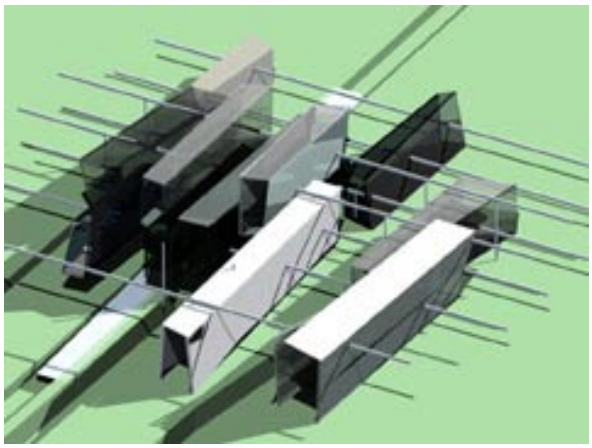

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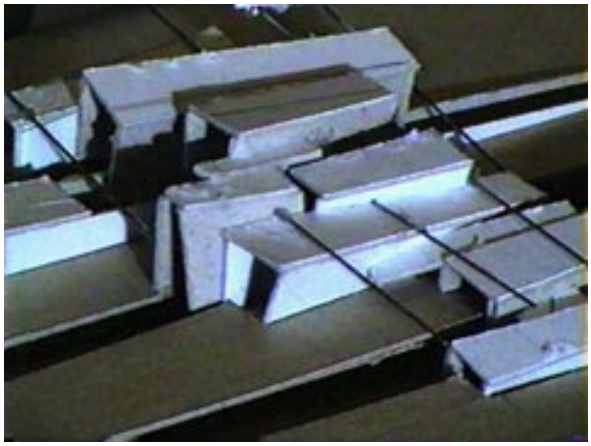

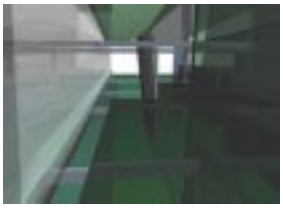

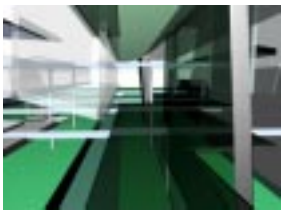

Description:

1. Scanned first analog model studying the idea of 'shearing'.
2. Quick studies of scale and experiential potentials of the idea using low resolution electronic camera (fast feedback).
3. Second analog model simplifying and clarifying 'shearing' concept. Photo-captured images from analog model starts digital studies (not shown)
4. Second digital model (first not shown) and interior images (done in parallel with third analog model —image 5)
5. Third material study model and video-captured images.
6. Final presentation: ***(A)*** Cross section developed from digital model; ***(B)*** Back view of analog section model; ***(C)*** Plan view (digital development from an original manual drawing done out of tracing a print-out of a scan of the 3rd.material model); ***(D)*** Side view of analog section model; ***(E)*** & ***(F)*** digital interior renderings from electronic model

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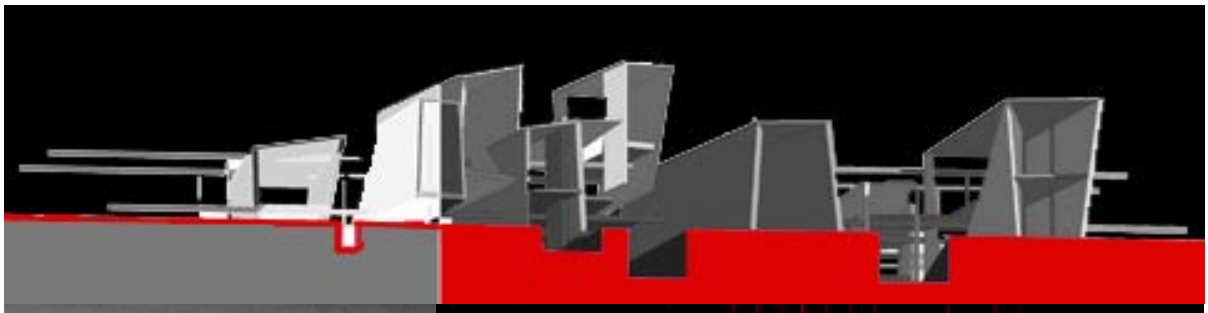

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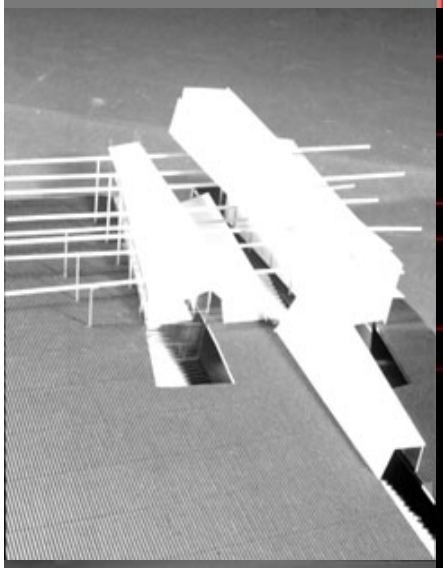

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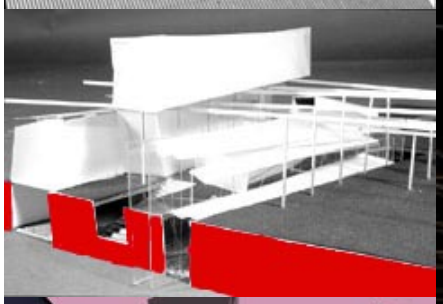

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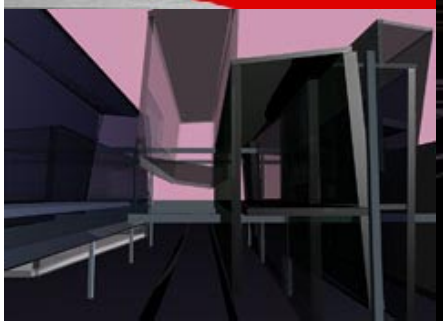

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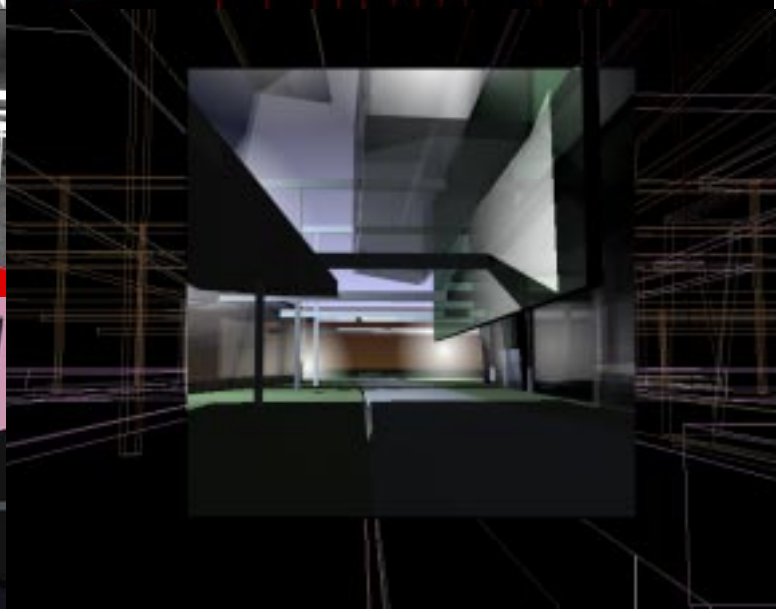

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Plate 5 : Meditation Center (Process I) - Winter 1998

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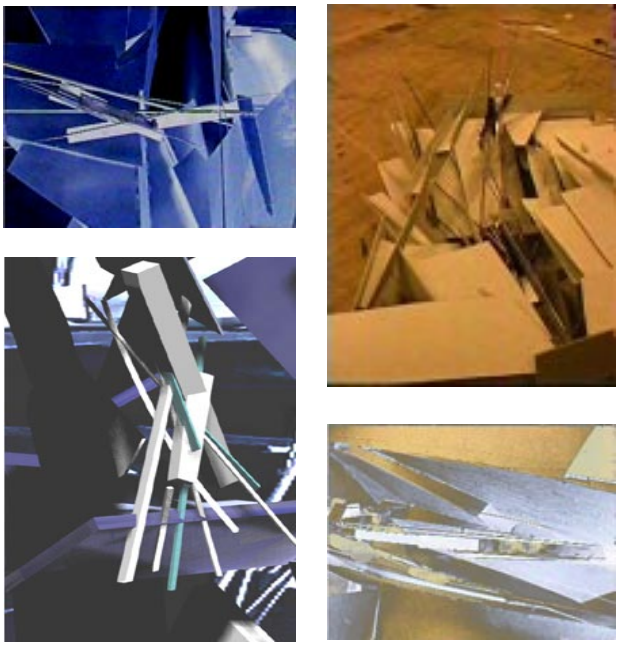

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Project:

Six-week long design of a 20,000 sq.ft. meditation center in a crowded and busy downtown context. The objective wasto induce an empty state of mind in the midst of urban chaos through an experiential and architectural approach addressing the nature of betweenness.

Students: Jim Agutter, Jeff Hulse & Cecilia Parera

Description:

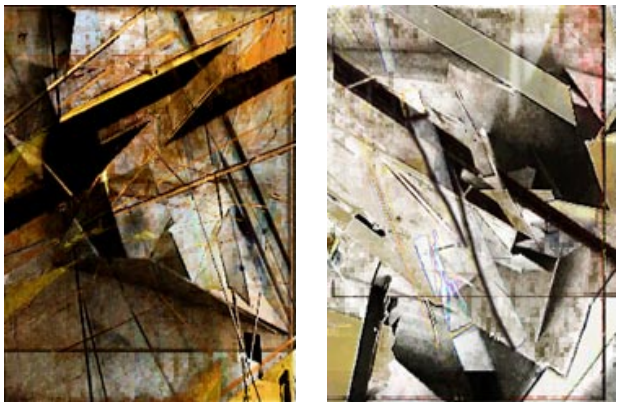
1. Initial series of material study models

2. Video study and digitally captured and manipulated images exploring the idea and experience of ‘interval’.

3. Electronic model (based on analog experiments) depicting the conflictive nature of in-between states.

4 Digitally enhanced close-up images from video-captured scenes that investigates concepts of ‘gap’.

5. Scanned and digitally augmented images trying to bring together ideas of ‘gap’, ‘interval’, ‘trajectory’ and ‘betweenness’.



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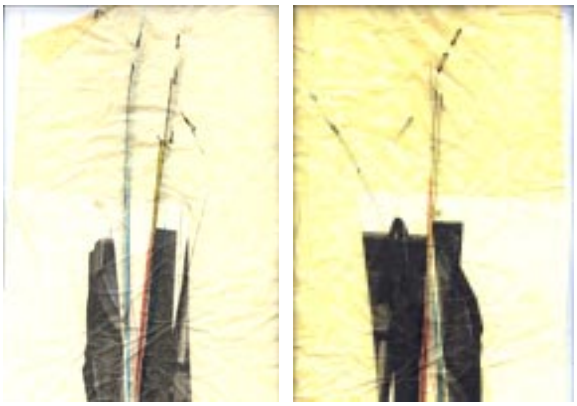

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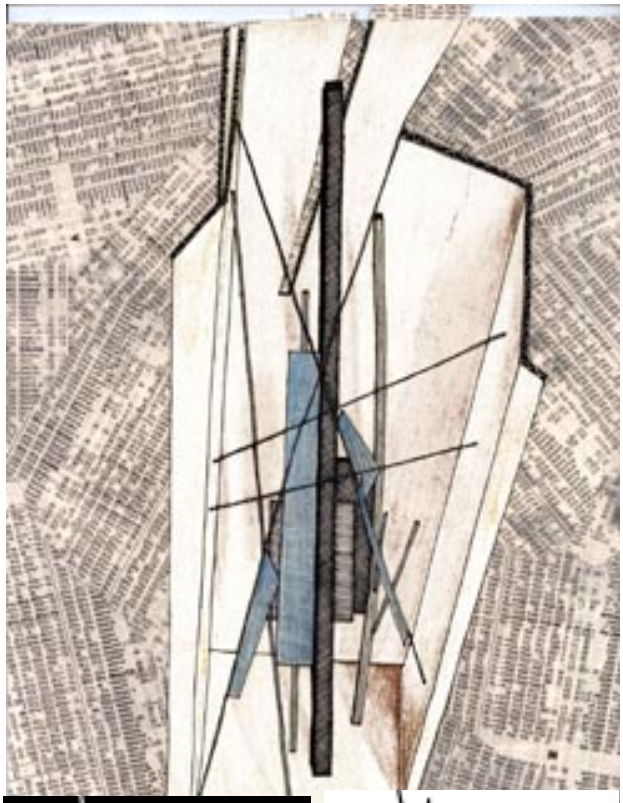
6. Close-up freehand studies of ‘colonizing’ (architecturally) the gap

7. Freehand summary sketch of design process thus far.

8. Figure-Ground and reverse studies of scanned and electronically cleaned-up summary sketch (fig.6)

9. First digital 3D model translating figure-ground.



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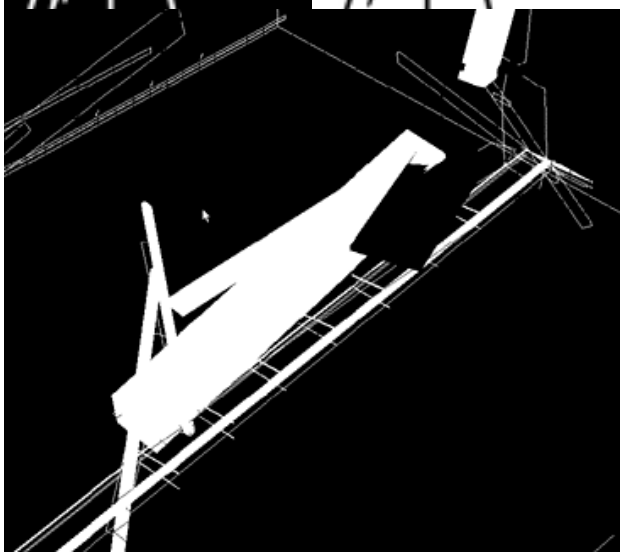

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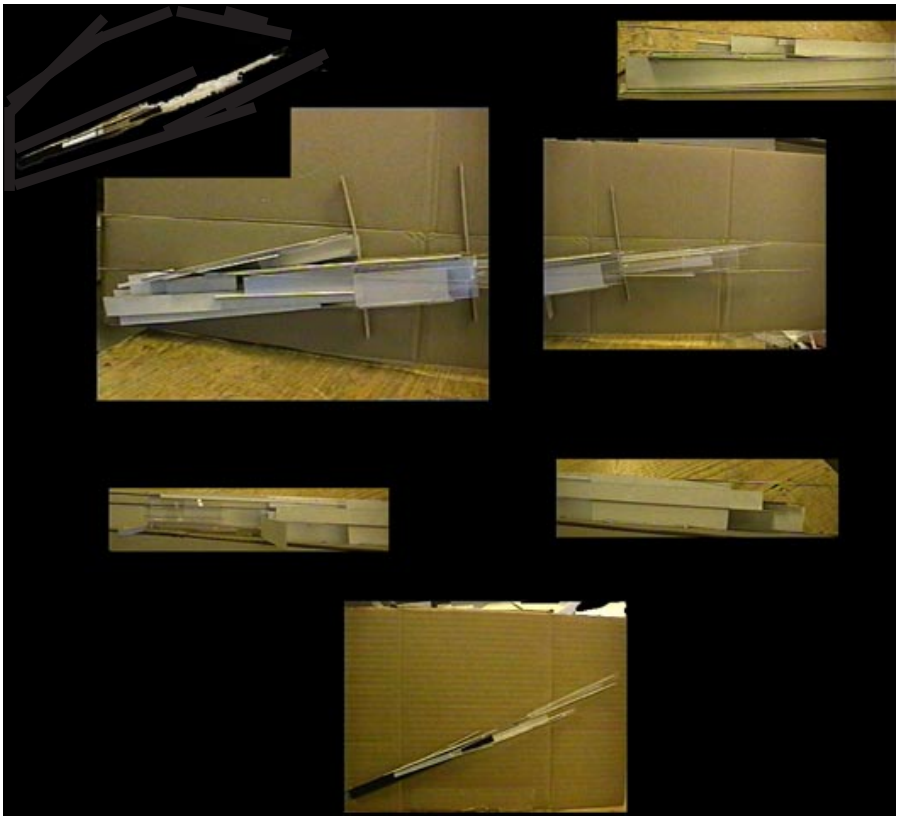
Plate 7 : Meditation Center (Process III) - Winter 1998



10

10 Second series of analog study models developing insights obtained in 3D electronic inquiry.

11 Selected analog model summarizing sought ideas.

12 Digital studies through spatial enhancement and transformation of video-captured images from the following analog model (seen bellow, fig.13C).

13 A. Freehand geometric study (over the print-out of a video-captured top view of the next analog model).

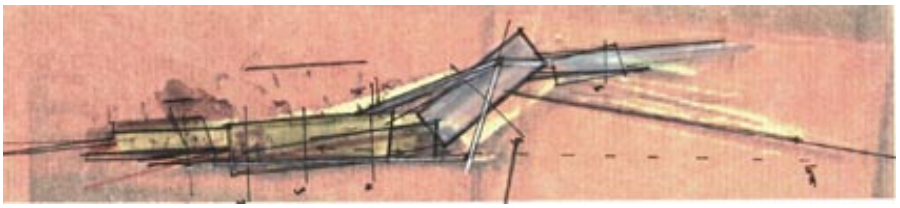
13 B. Freehand trace of 13A clarifying geometric intention and functional potentials.

13 C. CAD tracing of a scanned analog model based on conclusions arrived at 13B.

11

12

13A



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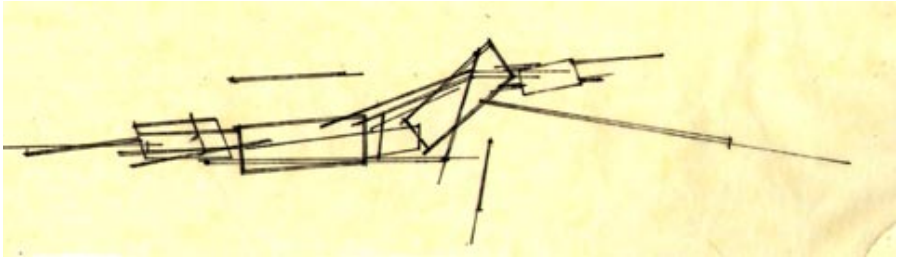
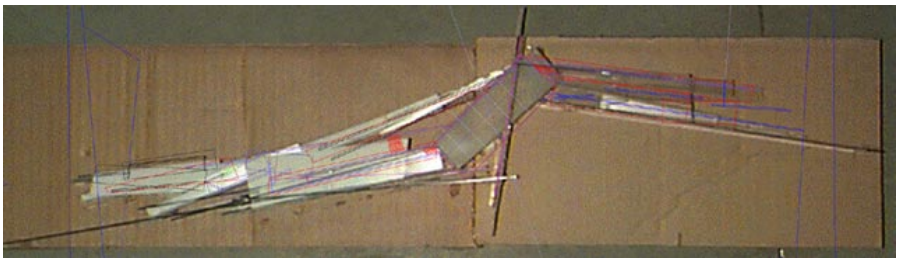


13C



14

14 Freehand analytical sketch depicting formal transformations ending in selected spatial organization

Julio Bermudez

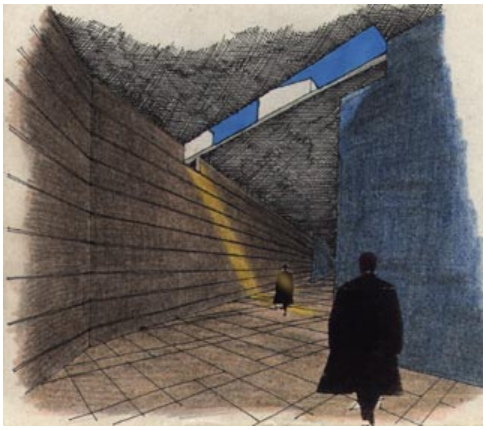
15 Example of freehand studies of interior experiences

16 Sequence of experiences. Digitally enhanced images from video-captured footage of large scale light study models (material) — and based on previous freehand studies

17 Digital Section of 'interval' space (meditation area). This section was animated to convey the slow changes in sunlight.

18 Final Floor Plan and Section

16



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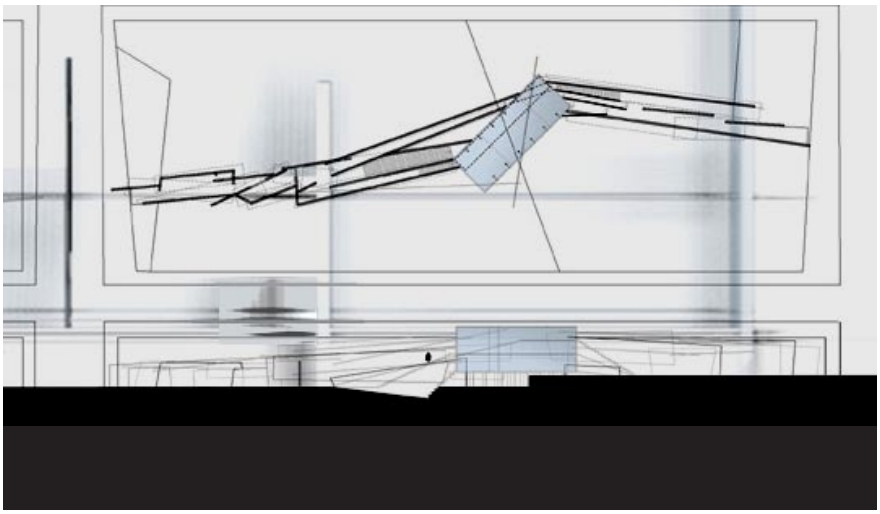

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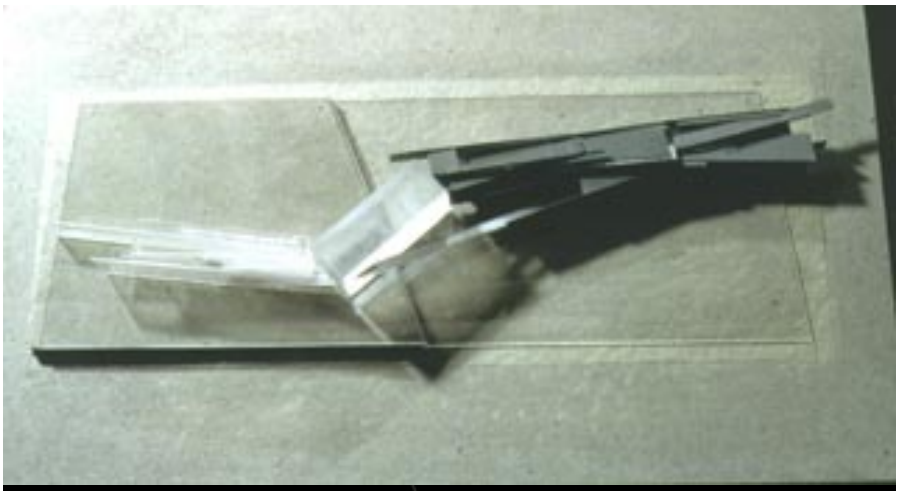
Plate 9 : Meditation Center (Final) - Winter 1998



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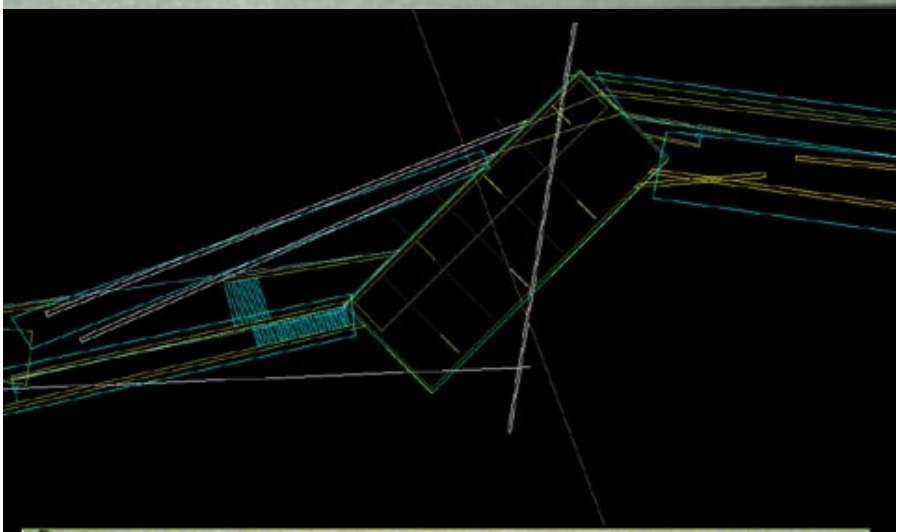

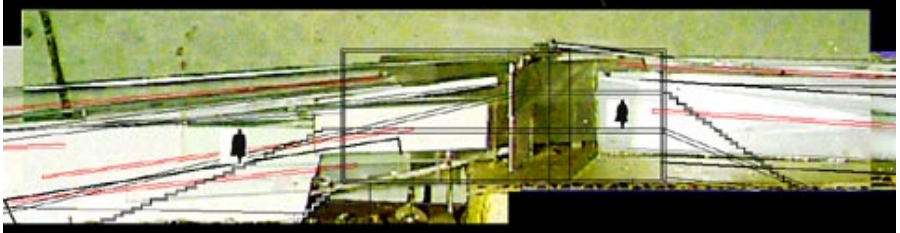

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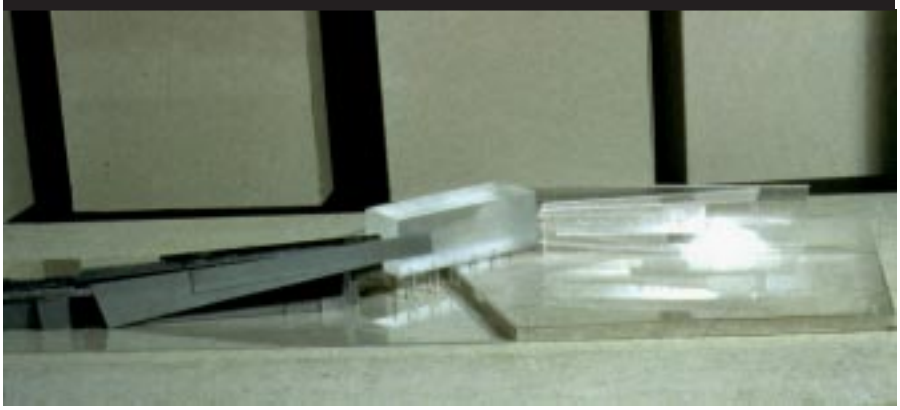


21

19 Final analog model (top view)

20 Large scale digital Floor Plan and hybrid media Section of ‘interval’ space (meditation quarters)

21 Final analog model including context

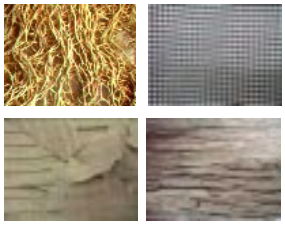
Single Family Dwelling - Fall 1998 (UNMDP, Argentina) (Process) : Plate 10

Project: Five-day long charrette to design a 3,000 sq.ft. dwelling unit addressing the clash between material and media cultures.

Participants: Arqs.Patricia Mabel Muñoz, Dora Castañé, Marino Pangos, & Miguel Angel Toro (Universidad Nacional del Mar del Plata, Mar del Plata, Argentina)

Description:
(1) First analog model articulating 5 pairs of contradictory words developed during brainstorm session; **(2)** Scanned pallette of materials; **(3)** Freehand sketches based on captured video images are used to study architectural possibilities; **(4A)** One sketch is selected and **(4B)** developed toward an 'image of synthesis'(summary of the first 2 days of work); **(5)** Ideas extracted from synthetic image lead to the selection of "tension" as the guiding design metaphor. Next, a series of image transformation take place: **(5A)** Freehand sketch of an analog model (not shown) starts the process; **(5B)** Construction of a 'tectonic' image using the sketch and the materials pallette; **(5C)** Study of the image as Section; and **(6A)** using the image as Top View of the last analog model (video-captured image); **(6B-C)** Different views of the last analog model; **(7A-D)** Digital Model. Final Design


1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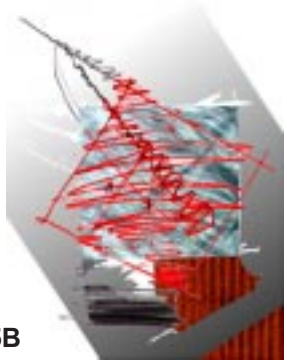
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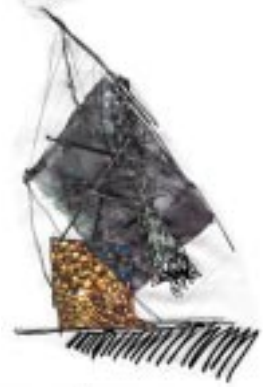
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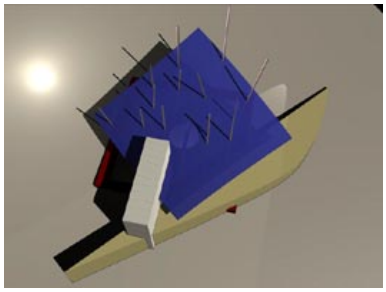
6A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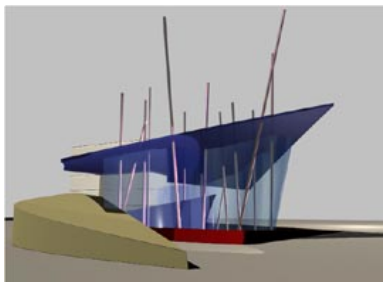
6B


6C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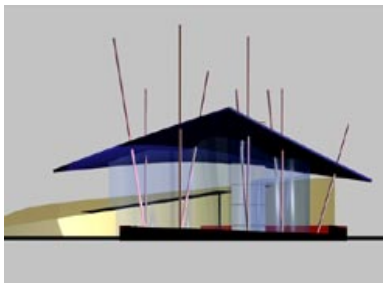

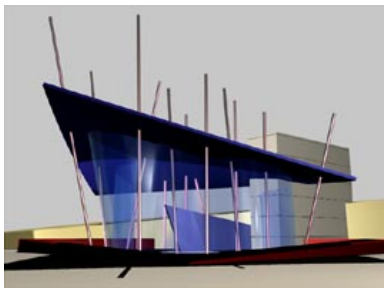

Plate 11 : Single Family Dwelling - Summer 1997 (UNL, Argentina) (Process I)

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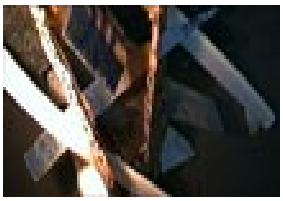

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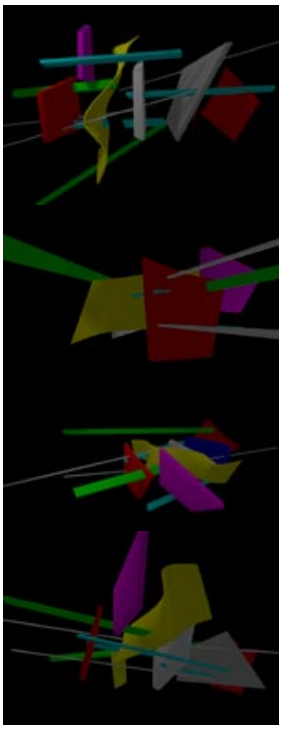

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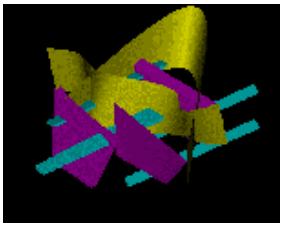

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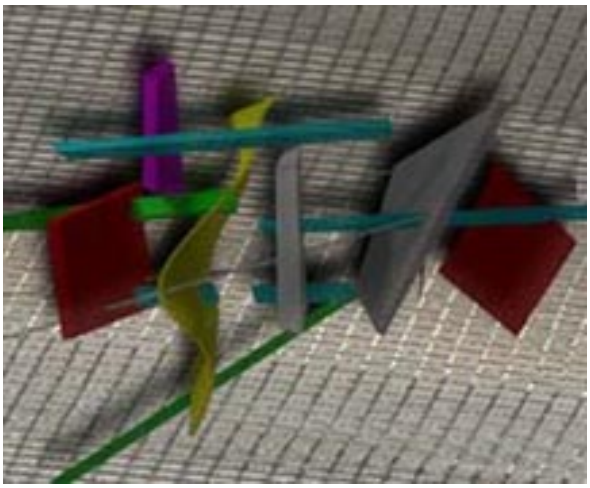


7

Project:

Three-week long simple design problem involving a 3,000 sq.ft. dwelling unit investigating the issues behind the clash between material and media cultures in today's civilization.

Students:

Martin Calabrese, Guillermo Mantaras, Guillermo Weiskal, & Gustavo Weiskal (Universidad Nacional del Litoral Facultad de Arquitectura, Santa Fe, Argentina)

Description:

1. Analog sketch model of several planes articulated by a hinge

2. Manual sketches trying to conceptually summarize the ideas present in the physical model

3. Second analog model assigning meaning to planes and penetrating lines the meaning. The model is video-taped, images are digitized and 'cleaned up' to communicate the conceptual scheme behind the image. The idea of "layer" is chosen as guiding design metaphor.

4. Quick digital model built to explore concepts of line and plane

5. Two models, one analog **(A)** and one digital **(B)** are constructed, both pushing the idea of "layer"

6. Electronic animation to study temporal implications of scheme

7. Image of synthesis: extraction of essential design elements

8. analog model built focusing in the tectonic and spatial nature of planes and lines. This model is video-taped and images are digitally captured. At this point, video takes a phenomenal power in informing the design process as it delivers uncountable images suitable for analysis, selection, change and design development.

9. One video image (top view) is selected as a 'plan' and digitally analyzed **(A)**, printed, and manually traced/re-interpreted in a very lose free hand sketch **(B)**. Concepts and relationships related to lines and planes are manually synthesized first **(C-D)**, second scanned **(E)**, and third imported and developed in CAD **(F)**. As this takes place, *section studies* (not shown) are being developed in parallel following the same procedure.

10. Assignment of activities in floor plan.

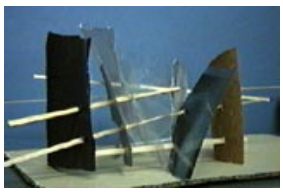
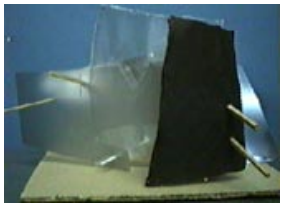
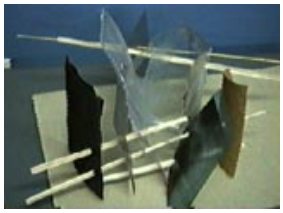
11. The insights obtained are transferred to a new digital model based on extrussions from scanned plans

12. Still images, animations and VRML model are used as final electronic presentation.

Single Family Dwelling - Summer 1997 (UNL, Argentina) (Process II) : Plate 12



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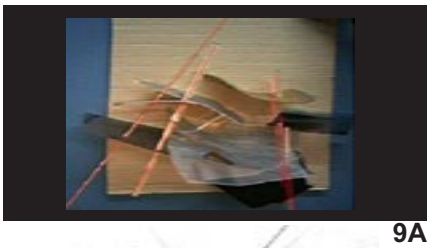

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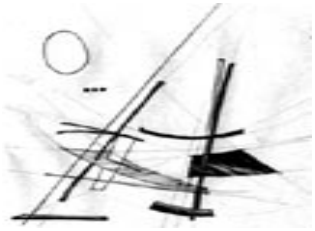

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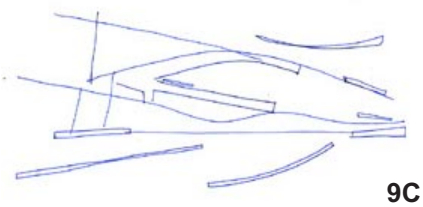

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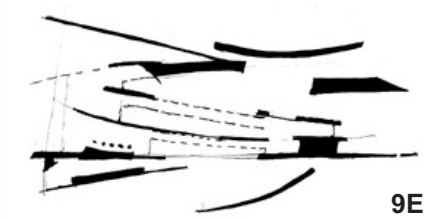

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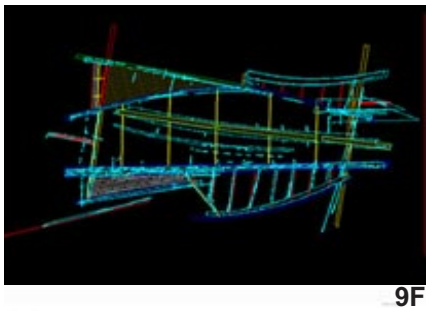

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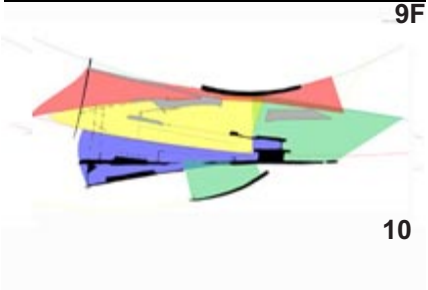

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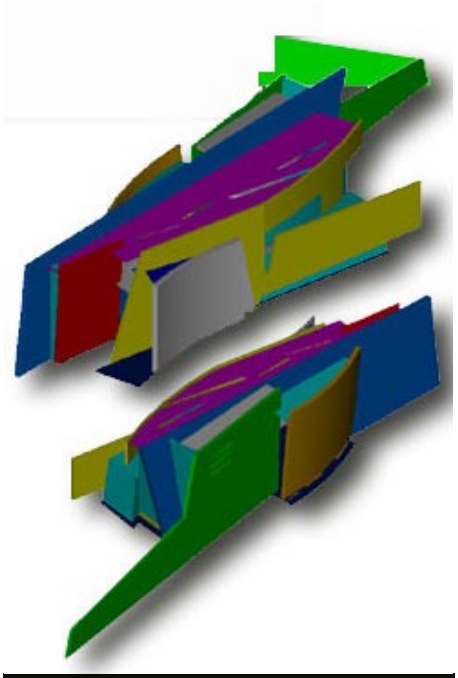

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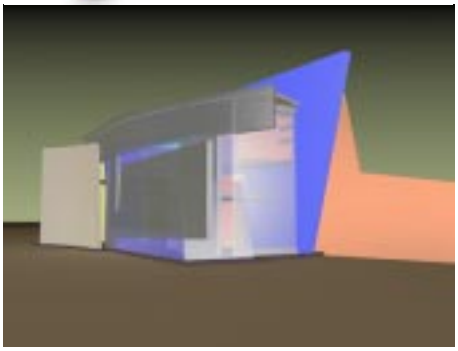
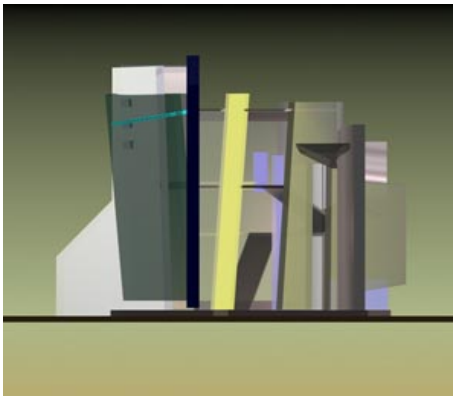
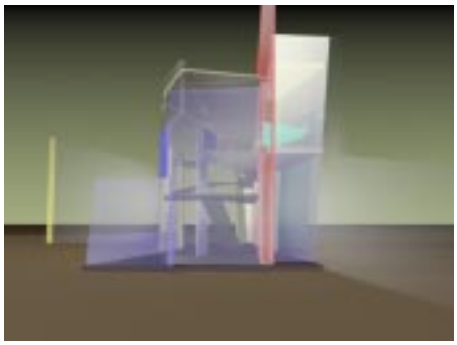




12

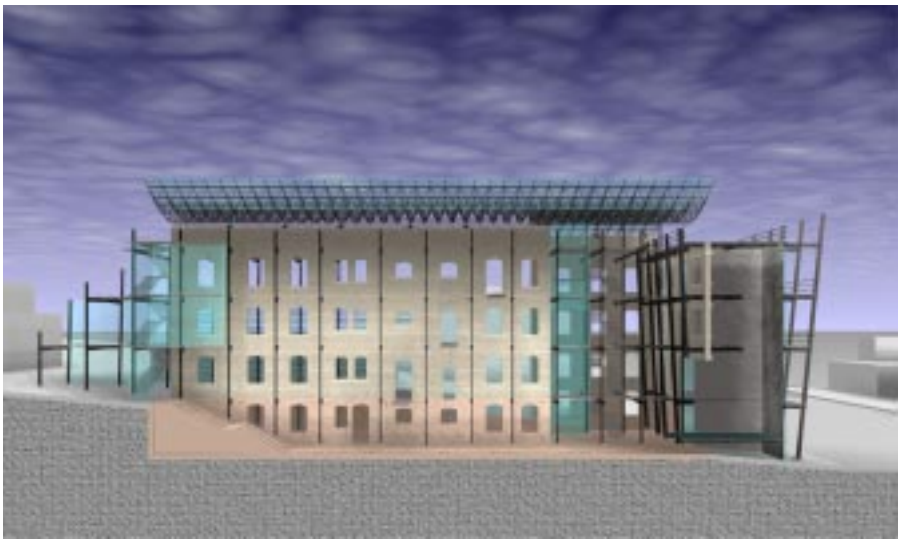
Plate 13 : Student Forum - Winter 1998 (Final)

Project:
Six-week long design of a 20,000 sq.ft. alternative off-campus environment for students to socialize. The project builds upon an existing building on the edge of campus that bridges the city and the university.

Students: Verl Adams & Steven Weenig

Description:
The scheme takes on the form of a city street, which is metaphorically a connection between places, people and ideas. The design strategy is to allow the masonry character of the old building to retain its strength of expression. The renovation does not hide or cover up the old building material but rather looks for ways in which it could be experienced in the presence of the new. The old manifests solidity and rigidity whereas the new represents lightness and movement.

Ideas and basic forms were discovered through freehand sketches and digital modeling and then validated and further designed both electronically and tectonically. By developing a symbiotic relationship between both media, the students were able to remarkably accelerate their design process. The result is a project designed down to the structural detail while giving careful consideration to contextual conditions.



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Julio Bermudez

Final Presentation (all renderings are digital)

1. Longitudinal Section Perspective of main interior space.

2. Renderings of interior space, looking up and main axis.

3. 1/2”=1’ scale analog model depicting one of the building bays in detail

4. Interior Perspective of second floor

5. Cross-section Perspective of the building

6. View of street corner

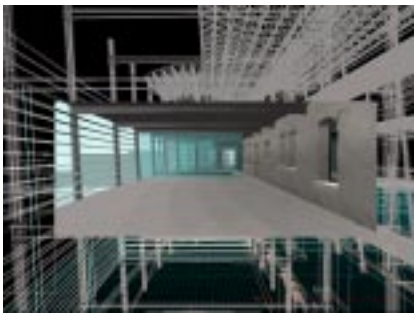
7. Site plan

8. Structural Section of the proposal.

9. Detail of beam-column intersection

10. Close-up perspective of space frame roof.

4



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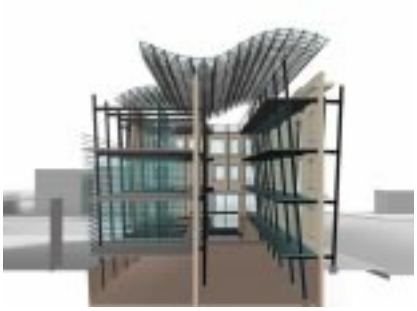

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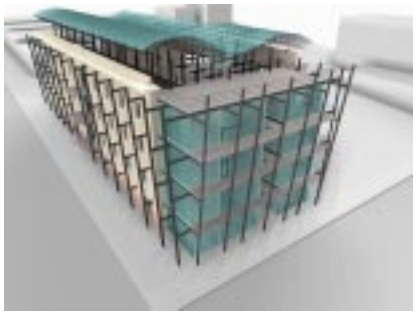

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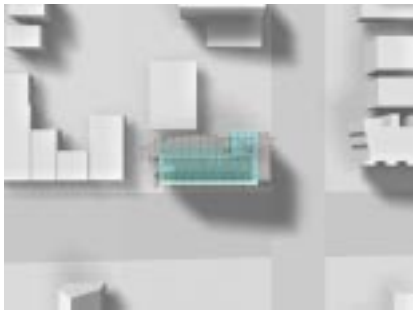

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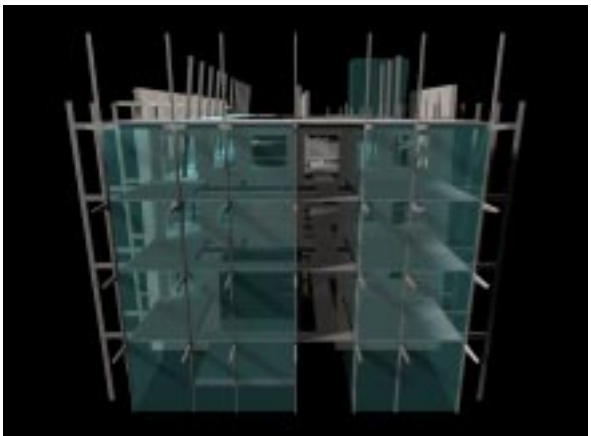

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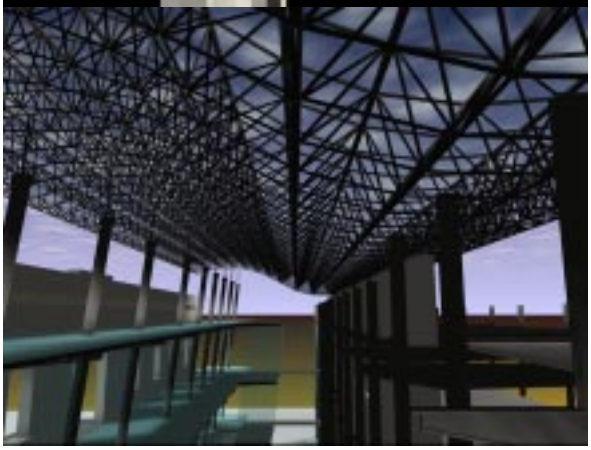
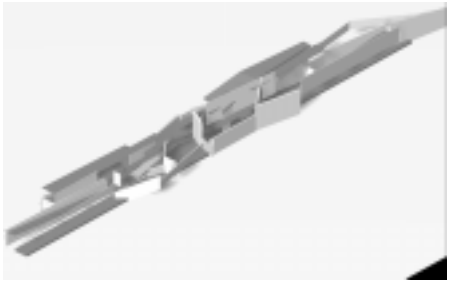


Plate 15 : University International Center (Final) - Winter 1997

Project: refer to Plates 3 & 4

Students: Jeff Farnum, Tom Thorum & Steve Wunderlich

Description: **(1)** Digital Model; **(2)** Analog Model; **(3)** Interior Perspective; **(4)** Section Perspectives; **(5)** Plan.



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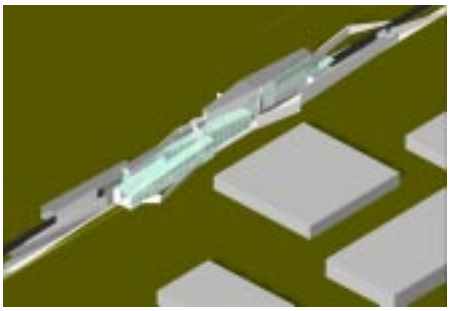

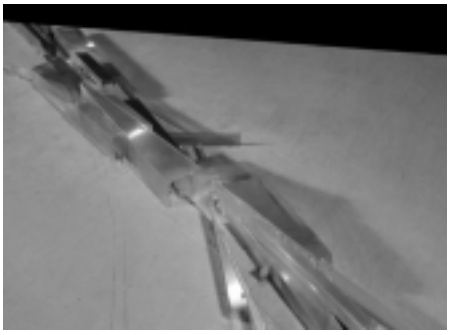

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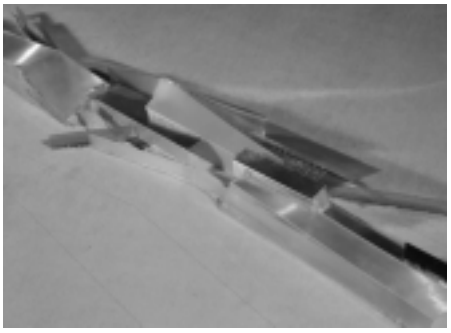

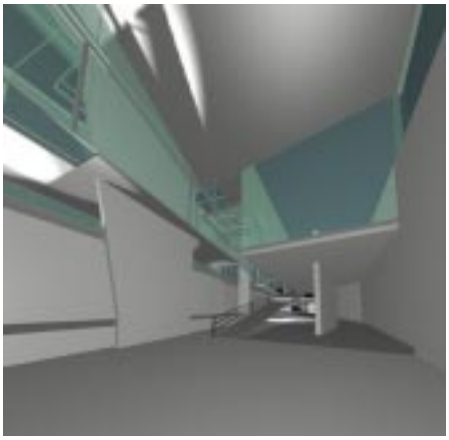

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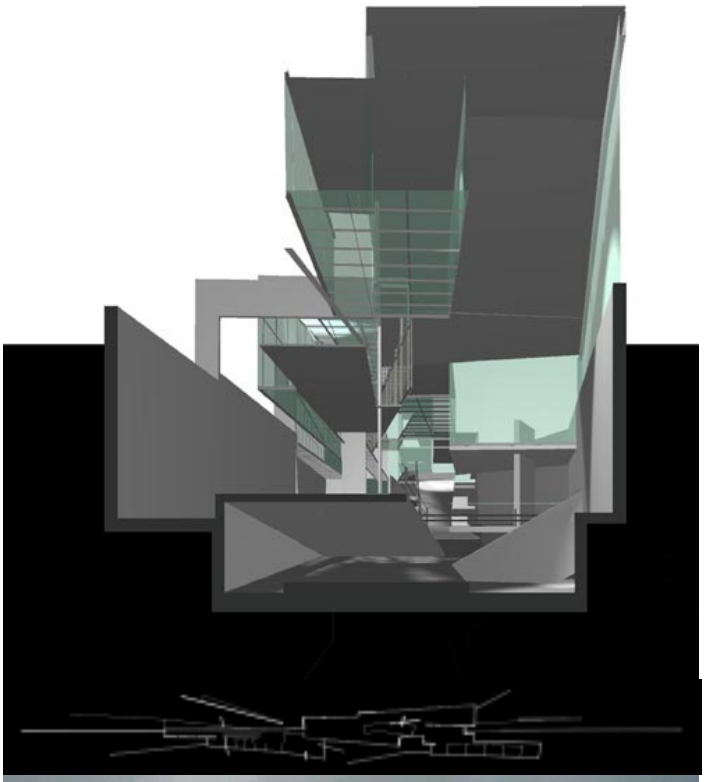

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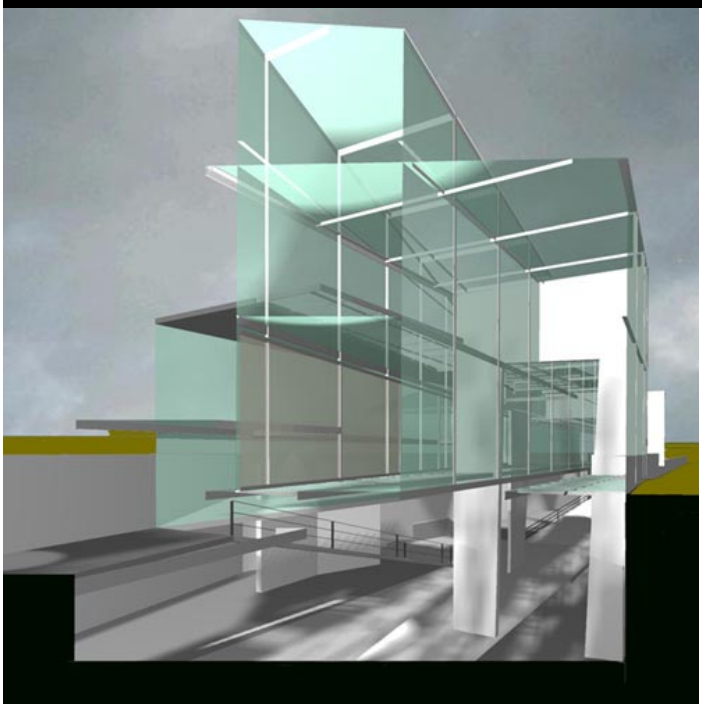

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