

PREMANUFACTURED HOUSING

(or living in 6¹/₂ ounces of pure architecture)

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Thesis submitted to the faculty of Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of Master of Architecture.

December 1996

Urs Peter Flueckiger



To my parents and in memory of Klaus Graf

Modular housing today is like a plastic Coke bottle.

It is a part of our throwaway society.

Not everything can be supersized like the meals at
McDonald's.

There was once a concern for how things were designed,
but the tendency to make things bigger does not
mean that they are also better.

I wonder why the vendors of today try to sell me more
than I will consume, wrapped in a cheap, bubbling
plastic bottle where my hand senses
no care at all.

This project attempts to bring back forgotten values and
not just supersize them.

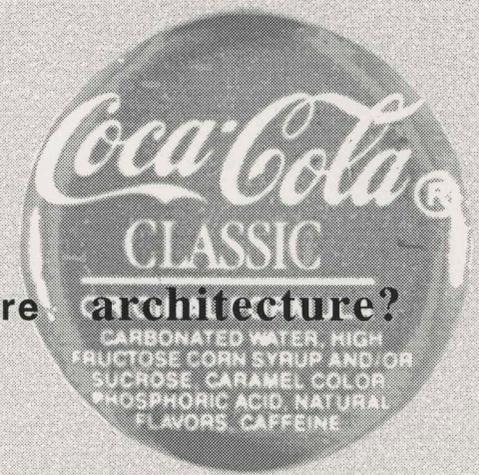
A home,

mobile or otherwise,
is more precious than a

plastic coke bottle.



Wouldn't you rather live in **6^{1/2}** fluid ounces of pure **architecture?**





Jean Prouvé, "The Meudon Houses," Meudon, 1938

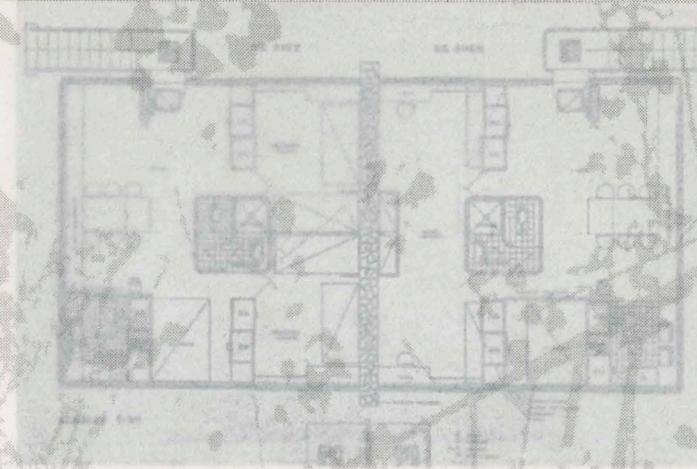
History / Introduction

Many modernist pioneers in architecture overestimated their belief in the power of technology to address social issues. One of the modernist social aims — to bring technological advances to every house — has been met, at least in theory. The use of standardized materials to solve the problem of worker housing — such as Le Corbusier's attempts at the *Pavillon Suisse*, *Maison Clarté*, and especially the project of the *Maison Loucheur* — has failed. All the modernists, especially Le Corbusier, misunderstood the impact of architecture in a social framework.

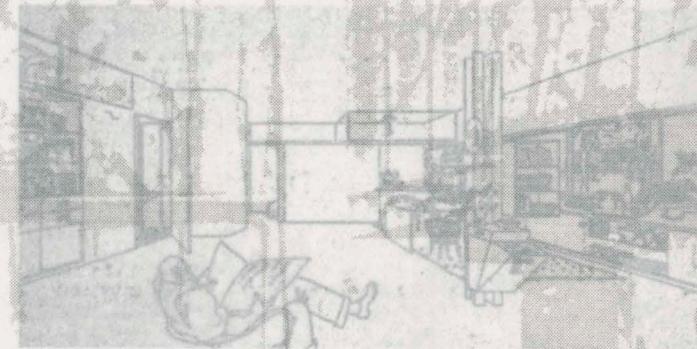
Many of Le Corbusier's works manifest great thoughts. At *Maison Loucheur*, a project for the Minister Loucheur, Le Corbusier proposed that completely prefabricated housing units be produced in the factory and delivered by trucks to the site. The project was never built. The *Unité d'habitation* in Marseille stands as a Mecca for architectural tourists, but remains unsuccessful in terms of providing for its original intentions. Le Corbusier was concerned with the many problems of mass housing in the twentieth century. Many leading contemporary architects make direct reference to the work of the modernist pioneers, relating their own work to a part that these pioneers addressed.

Le Corbusier's use of standardized materials became a focus of my thesis research. In his design for *Maison Loucheur*, Le Corbusier resolved the technological concerns associated with premanufactured housing through a systematic means involving factory production and distribution.

Why didn't it succeed? Along with Le Corbusier, other leading architects such as Walter Gropius and Ludwig Mies van der Rohe were concerned with a rational approach to pragmatic issues, a strong theme in early modernist architecture. The semantic aspects of architecture weren't considered and were even condemned as irrelevant because of their "supposed" bourgeois origins. The *Weissenhofsiedlung*, under the direction of Mies van der Rohe, was a built manifesto showing the modernist idea in its brightest light. Le Corbusier with his courageous client Henri Frugès built the *Quartier Moderne Frugès*, Pessac, 1926, offering an idealized form for worker housing, while simultaneously disregarding the workers' actual needs. The tenants, not considered in the planning stage, added iconographic elements such as pitched roofs, shutters, and smaller windows. Those changes were made gradually because of technical insufficiency (leaking roofs, loss of heat, etc.), and partly because the occupants couldn't recognize how to live in a *cubist environment*. The widespread belief that the machine age would resolve the problem of low cost housing with only a new formal vocabulary could not be accomplished. The worker didn't want to live in a *machine a habiter*.



Plan Maison Loucheur, 1929, Le Corbusier



Interior perspective Maison Loucheur, 1929, Le Corbusier



Jean Prouvé, "The Meudon Houses," Meudon, 1938

Exterior perspective Maison Loucheur, 1929, Le Corbusier

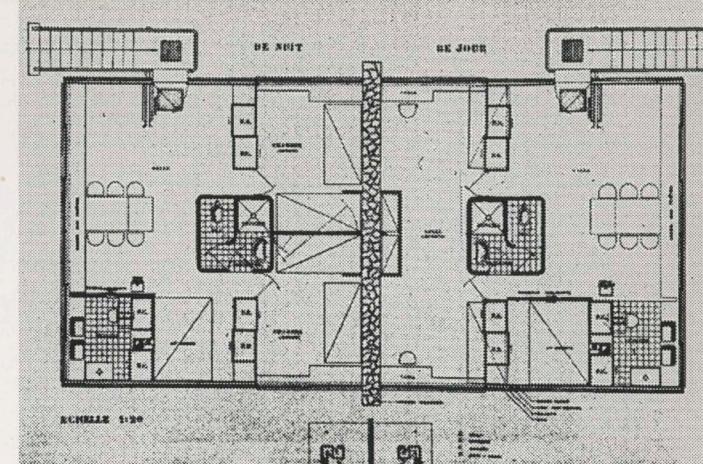
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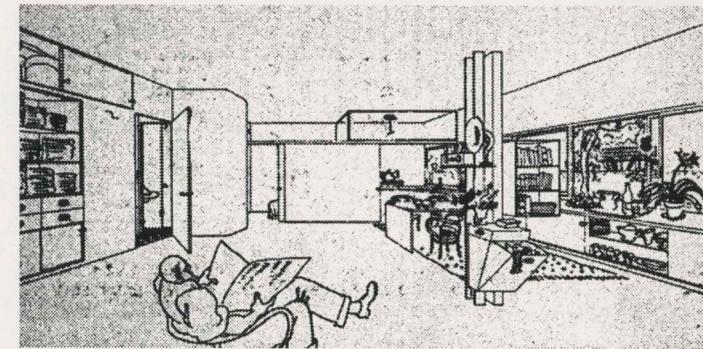
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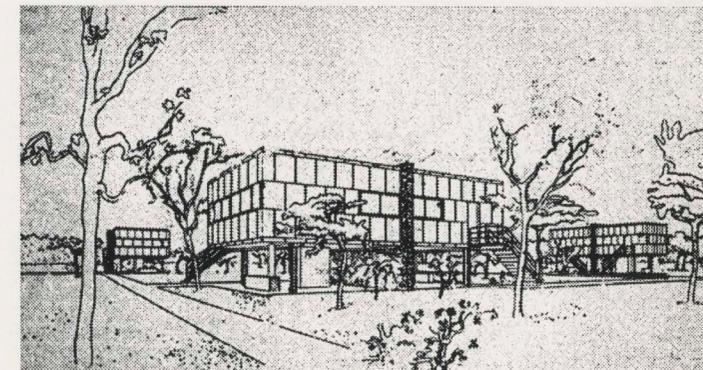
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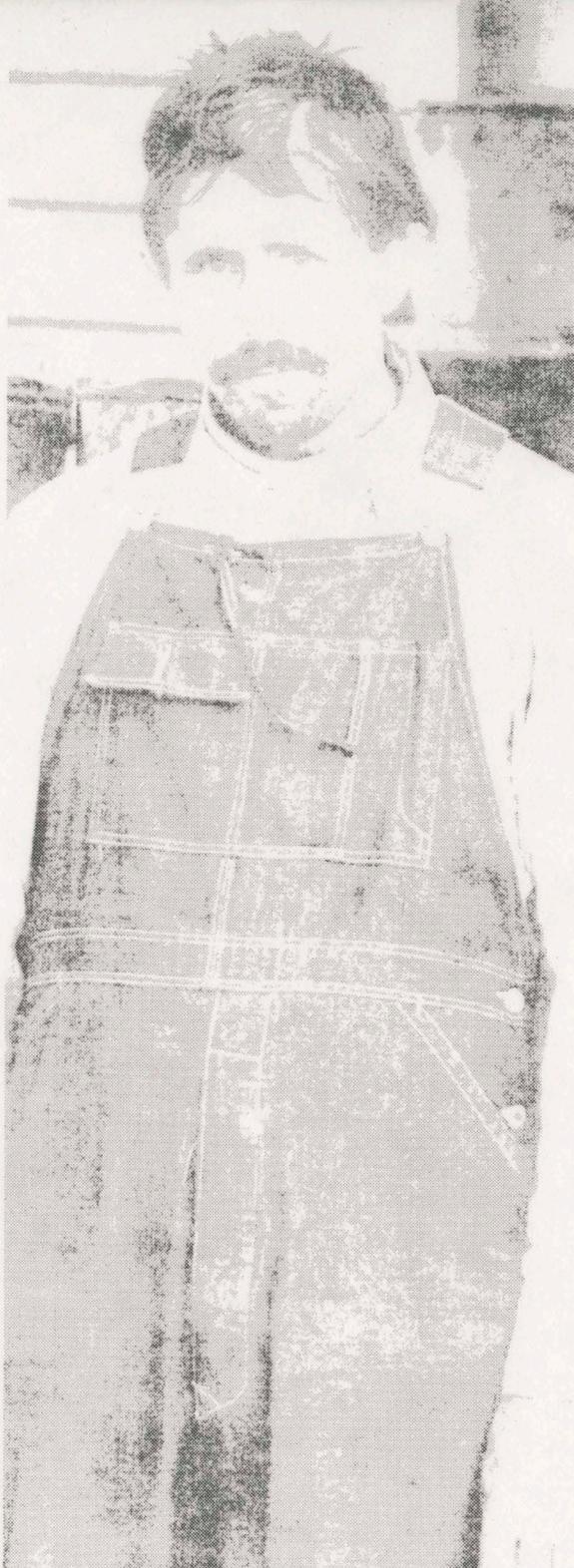
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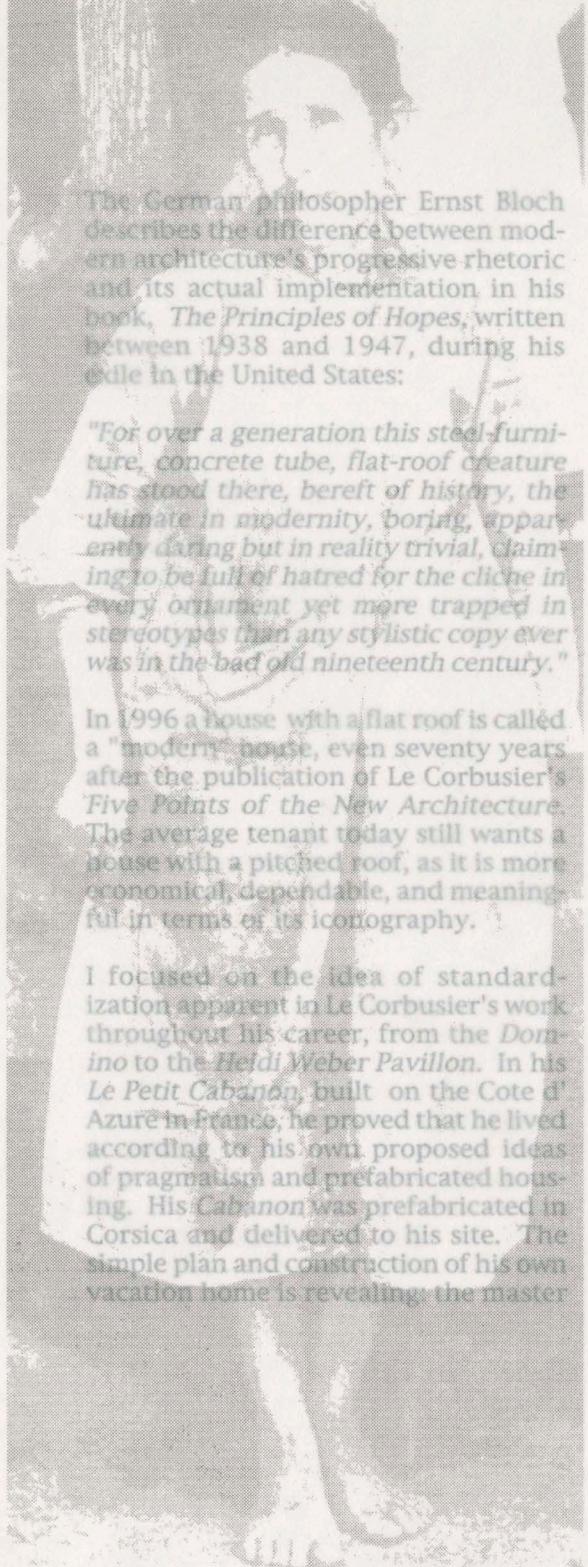
Exterior perspective Maison Loucheur, 1929, Le Corbusier



From *"Let us now praise famous men,"* J. Agee, W. Evans



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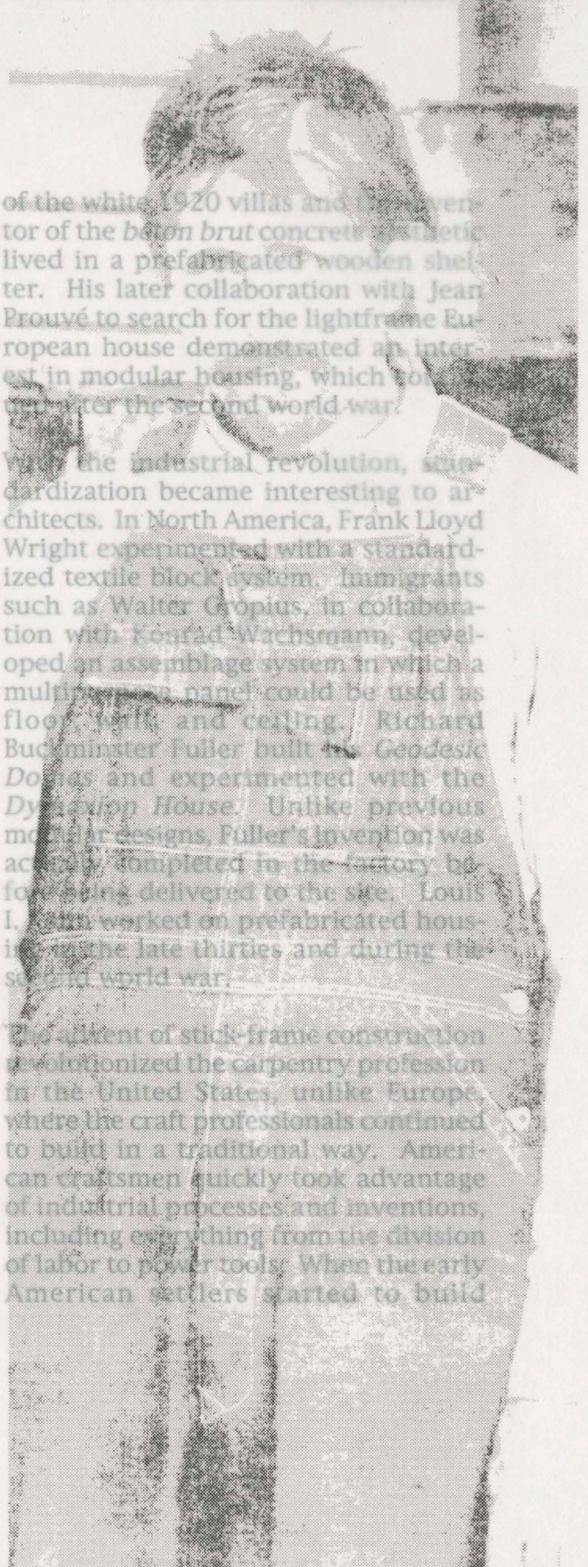


The German philosopher Ernst Bloch describes the difference between modern architecture's progressive rhetoric and its actual implementation in his book, *The Principles of Hopes*, written between 1938 and 1947, during his exile in the United States:

"For over a generation this steel furniture, concrete tube, flat-roof creature has stood there, bereft of history, the ultimate in modernity, boring, apparently daring but in reality trivial, claiming to be full of hatred for the cliché in every ornament yet more trapped in stereotypes than any stylistic copy ever was in the bad old nineteenth century."

In 1996 a house with a flat roof is called a "modern" house, even seventy years after the publication of Le Corbusier's *Five Points of the New Architecture*. The average tenant today still wants a house with a pitched roof, as it is more economical, dependable, and meaningful in terms of its iconography.

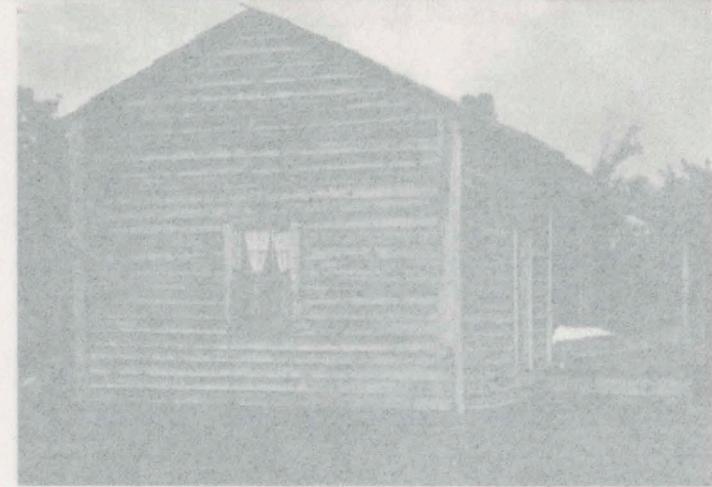
I focused on the idea of standardization apparent in Le Corbusier's work throughout his career, from the *Domino* to the *Heidi Weber Pavillon*. In his *Le Petit Cabanon*, built on the Cote d'Azur in France, he proved that he lived according to his own proposed ideas of pragmatism and prefabricated housing. His *Cabanon* was prefabricated in Corsica and delivered to his site. The simple plan and construction of his own vacation home is revealing: the master



of the white 1920 villas and the inventor of the *beton brut* concrete aesthetic lived in a prefabricated wooden shelter. His later collaboration with Jean Prouvé to search for the lightframe European house demonstrated an interest in modular housing, which took shape after the second world war.

With the industrial revolution, standardization became interesting to architects. In North America, Frank Lloyd Wright experimented with a standardized textile block system. Immigrants such as Walter Gropius, in collaboration with Konrad Wachsmann, developed an assemblage system in which a multipurpose panel could be used as floor, wall, and ceiling. Richard Buckminster Fuller built the *Geodesic Dome* and experimented with the *Dymaxion House*. Unlike previous modular designs, Fuller's invention was actually completed in the factory before being delivered to the site. Louis I. Kahn worked on prefabricated housing in the late thirties and during the second world war.

The advent of stick-frame construction revolutionized the carpentry profession in the United States, unlike Europe, where the craft professionals continued to build in a traditional way. American craftsmen quickly took advantage of industrial processes and inventions, including everything from the division of labor to power tools. When the early American settlers started to build



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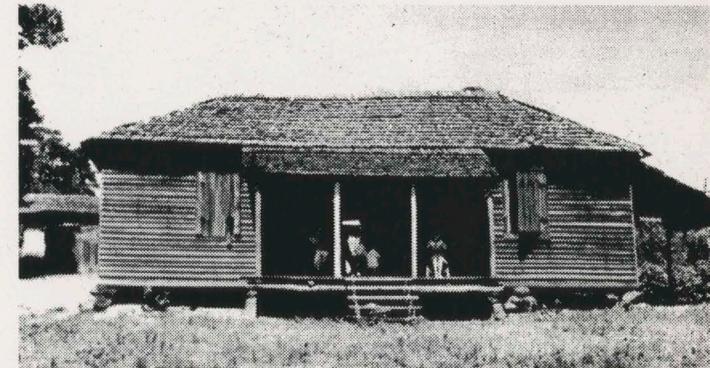
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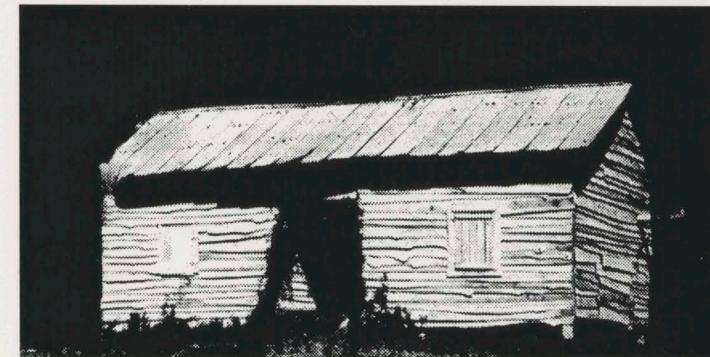
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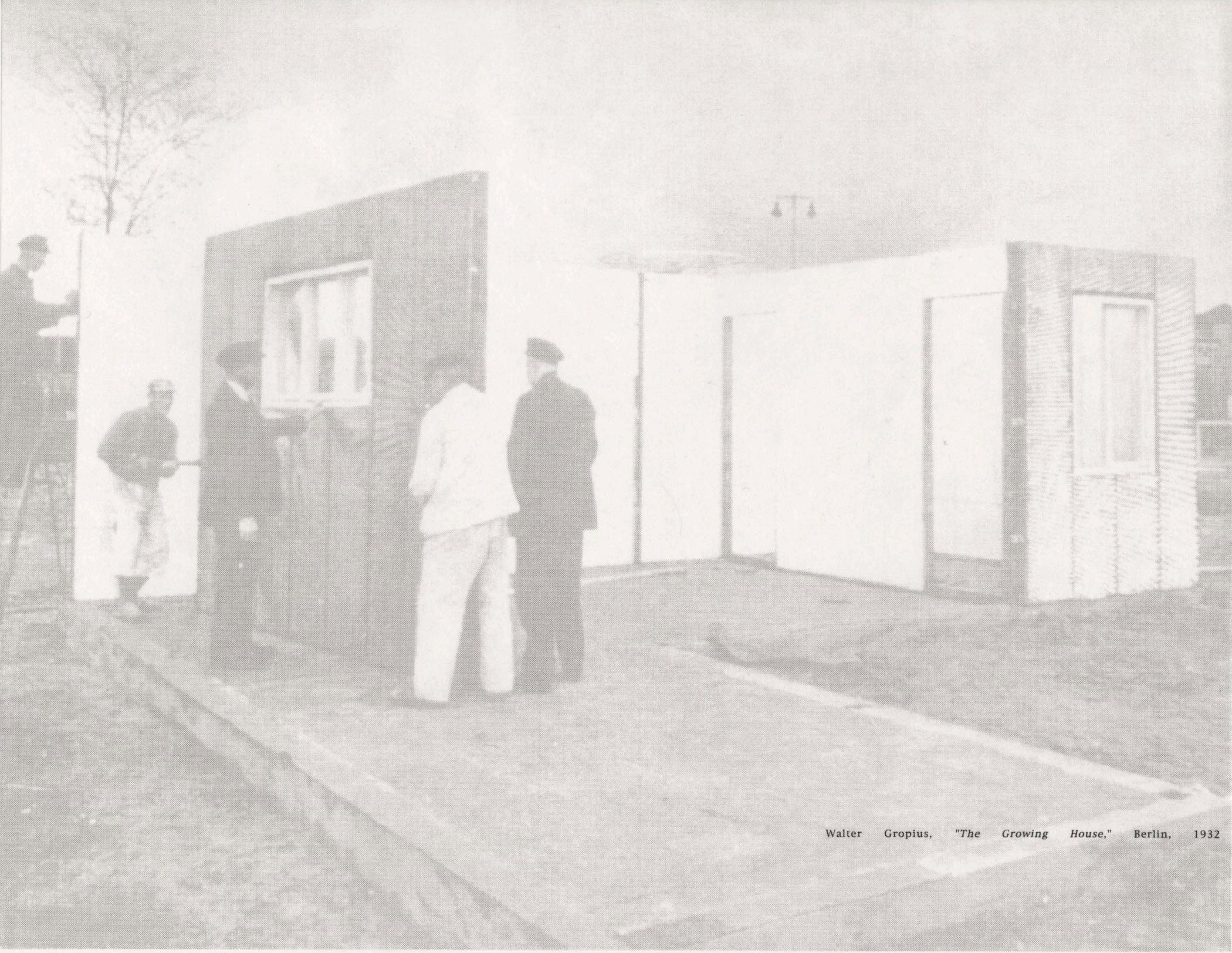
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Walter Gropius, "The Growing House," Berlin, 1932

urban dwellings, they could always count on natural resources, such as abundant land, forests and rivers. Wood could be cut and transported by the flow of the rivers; saw mills were powered by the same water. To work very efficiently, Americans began to develop rational systems. The "Jefferson Plan", a rational concept to subdivide the country without any reference to natural landmarks, was based on efficiency. The American craftsmen, because of the new horizons, were forced to think innovatively, shaping the new world with the "go ahead" spirit.

In Le Corbusier's early buildings such as the "Pavillon Suisse," the material was far more expensive than the labor-hours to build the formwork. Skilled craftsmen shaped the formwork efficiently in order to save costs on the then expensive concrete.

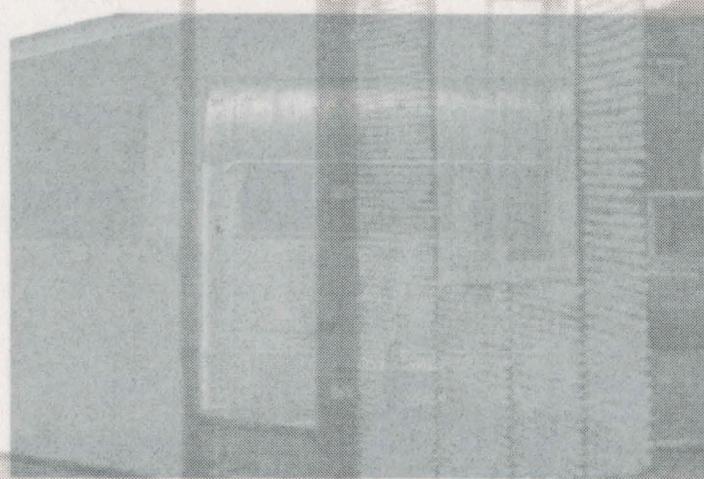
In the United States the situation was quite different. Americans sought to economize labor costs. The stick frame was far more efficient than traditional wood joining. The introduction of assembly line techniques for the mass-production of automobiles, developed by Henry Ford, offered perhaps the most innovative means to save labor time. Walter Gropius was fascinated by Henry Ford's inventive use of mass production. He visited the Ford factory during his travels in the United States. Europeans have been impressed by the phenomenal growth and wealth of the United States, with its rational approach to standardization and increasing efficiency. In the *Quartier Modern Fruges*,

Le Corbusier found a client sympathetic to his social ideas. Frederick Winslow Taylor's studies in maximizing productivity through increasing efficiency in production influenced Le Corbusier, who tried to *taylorize* building practices in the *Frugès* housing project. But did Le Corbusier understand the differences in culture between the United States and Europe? Regardless of his pursuit of a global understanding, he didn't comprehend how Taylor's ideas would work in Europe. Perhaps Le Corbusier's love/hate relationship with the United States prohibited him from understanding it better. Or perhaps he thought that the only way to realize a socialistic ideal was through a capitalistic process. Conversely, the social framework of the United States has been misinterpreted by the European immigrants such as Konrad Wachsmann and Walter Gropius, while their panel system was well crafted and highly adaptable, its costs were unreasonable when compared to conventional building techniques. Furthermore, an assembly system such as this would always need craftsmen to join the different parts on the site. Richard Buckminster Fuller understood that the building had to be finished when it was transported to the site.

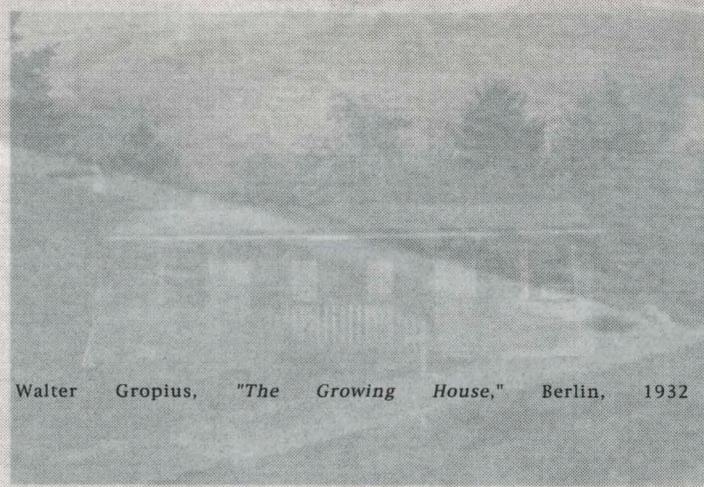
Siegfried Gideon, in his book *Space, Time, and Architecture*, mentions that without the invention of the machine-produced nail and light-frame construction, the development of the United States from the East to the West coast would have been impossible. Before the oil crisis in the early seventies, natural resources such as wood, oil, and



Airstream trailer in permanent use, Southwest Virginia



Trailer within a house, Christiansburg, Virginia



Walter Gropius, "The Growing House," Berlin, 1932

Trailer within a house, Christiansburg, Virginia

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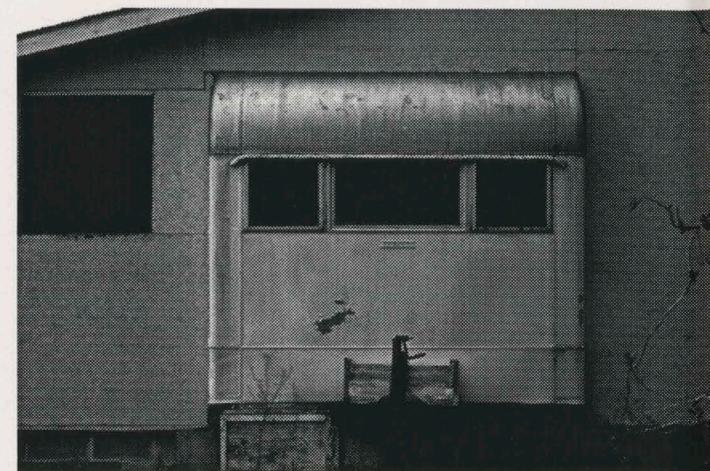
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Airstream trailer in permanent use, Southwest Virginia



Trailer within a house, Christiansburg, Virginia



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REAL ESTATE & MOBILE HOMES



1969 Coronet mobile home. EC. 2BR, all appliances including washer & dryer. \$4500. Located in Radford. 674-8464

12'X35' cinder block building. Has metal roof. Mines road, Pulaski. 980-7040

3 BR home in Monroe Co. WV. 1 1/2 baths. Electric in kitchen w/ appliances. Full size basement partially finished room & woodstove. Large landscaped yard. Large storage building. Fruit trees & grape arbor. Public water & sewer. I

REAL ESTATE

MOBILE HOMES

iron were inexpensive. As opposed to Europe, the United States' relatively short history has had a different impact on the prevalence of craftsmanship. In most parts of the United States, there were few sites where a craftsman could find historical reference points. Europe's density of historical buildings in pre-existing urban contexts had to be preserved and maintained through traditional craft and craftsmanship techniques. The mass immigration from Europe brought farmers and experienced craftsmen who altered their skills to adjust to the different needs of the new world.

In Europe craftsmanship is decreasing; in the United States mobile housing systems are dominating the market of low cost housing. In the Southwestern Virginia towns where I researched, the most recent and numerous structures were modular houses, most frequently mobile homes. Additionally, I found abandoned buildings that weren't repaired. Obviously costs play a major role, but the unavailability of craftsmanship in these towns was influential as well. Often trailer settings have been installed in neighborhoods next to abandoned buildings. Space is still affordable for a reasonable price, but the costs of traditional housing aren't. The cost of traditional house building techniques vary, complete with the comparatively inexpensive production of mobile homes. Unfortunately, many prefabricated housing systems are lacking in quality and technical innovation.

Very few contemporary architects have

shown interest in searching for a modular housing system that would provide an architectural quality bringing pragmatic and semantic aspects together in a syntax.

The Airstream aluminum trailer, developed by Wally Byam in 1933, was invented for wealthier Americans to travel and easily carry their most important personal items with them. The Airstream trailers had been designed for use on temporary sites such as campgrounds. Occasionally these trailers, after their use by a wealthy family, became a permanent home for people with reduced financial means. The "Tenwise," the first mobile home in 1954, designed by Elmer Fry from Marshfield Homes, had to be transported by the railway. Within a short period, the truck delivery method was recognized as quicker and more flexible than the train. Since the fifties, the mobile home as we know it today has changed little in its design. Highway regulations have become less restrictive, and the width for the mobile home has increased accordingly. Doublewide and mobile homes are carried on wheels to their final destination, but the former mobile home has become less and less mobile. Usually the wheels are only necessary to bring the structure to its final destination. After a few years, homes still resting on wheels can only be removed from the site with great expense because the wheel axles are rusted through. The mobile home industry has attempted to offer the client the iconographic elements which were desired, providing the perception of a traditional house.

Entry to a trailer home (with trailer wheels hidden) and interior decoration

1996 mobile home recently installed

Advertisement in the "Trading Post" Montgomery County, Virginia

Craftsman at work in Pleasant Hill, Kentucky, a former Shaker settlement

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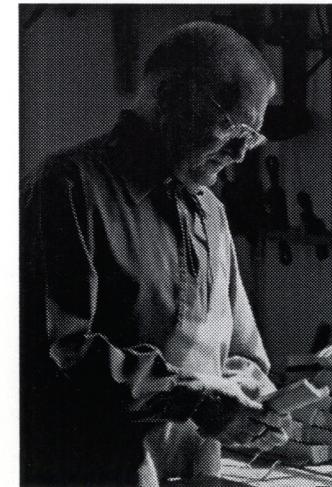
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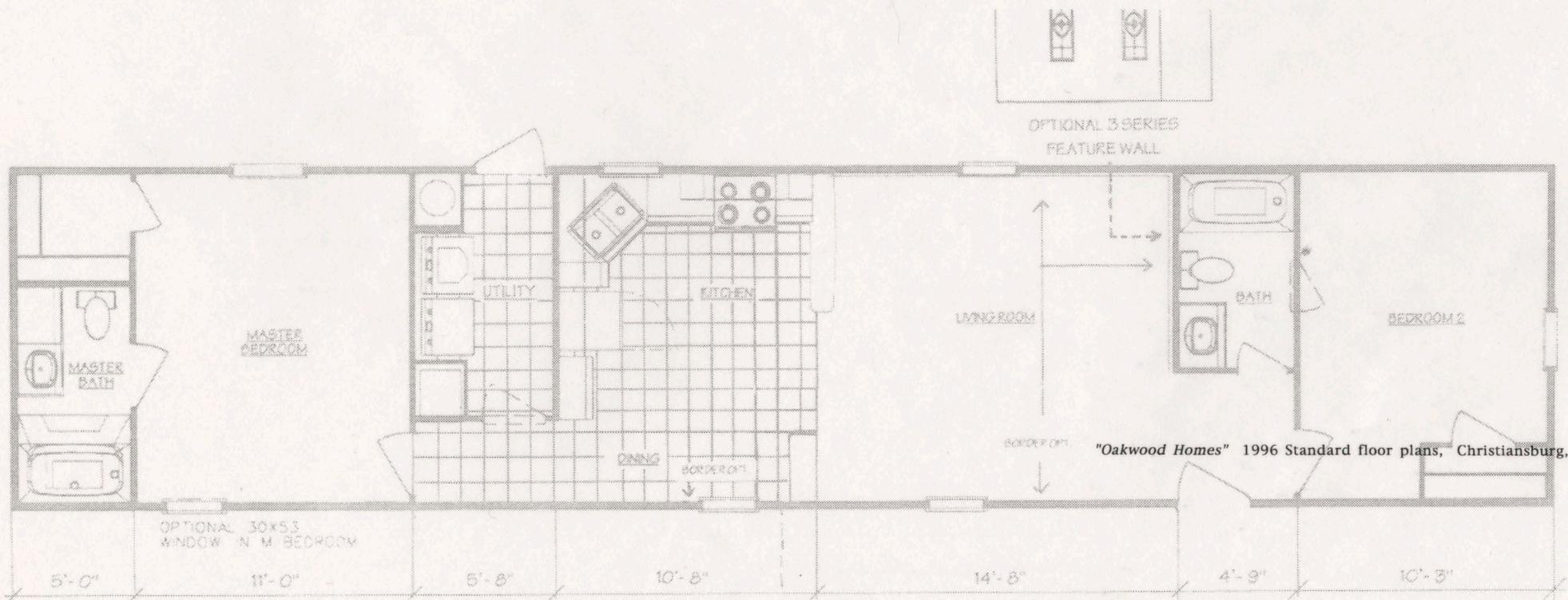
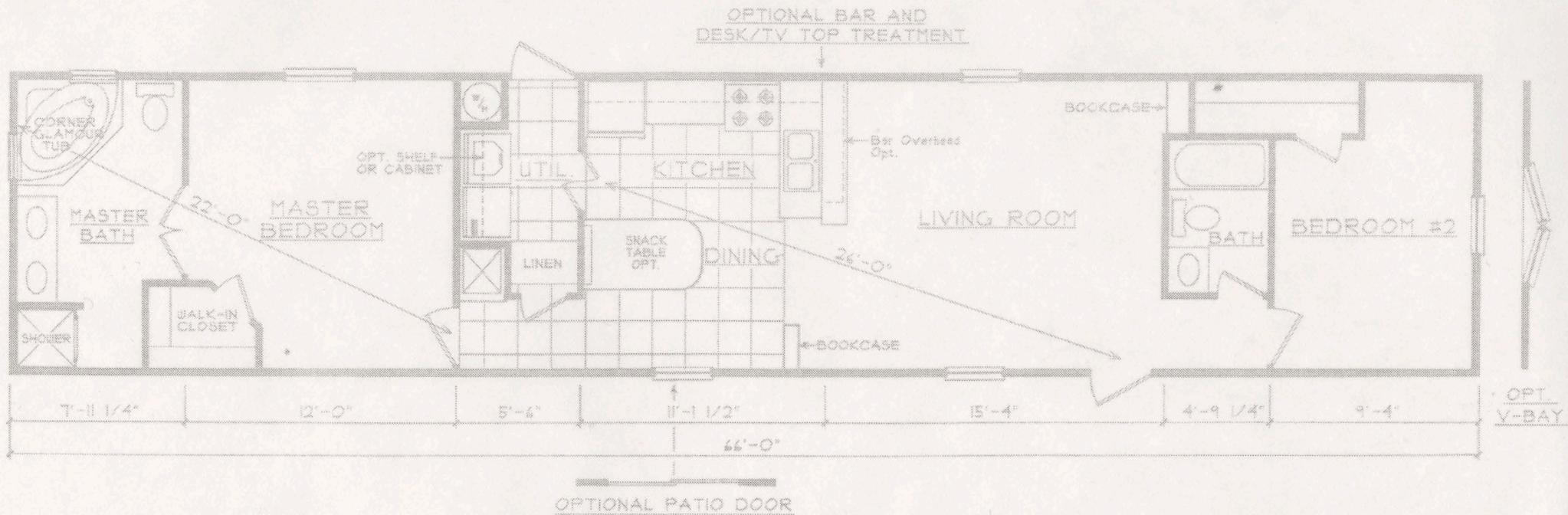
Entry to a trailer home (with trailer wheels hidden); an old wheel as decoration



1996 mobile home recently installed



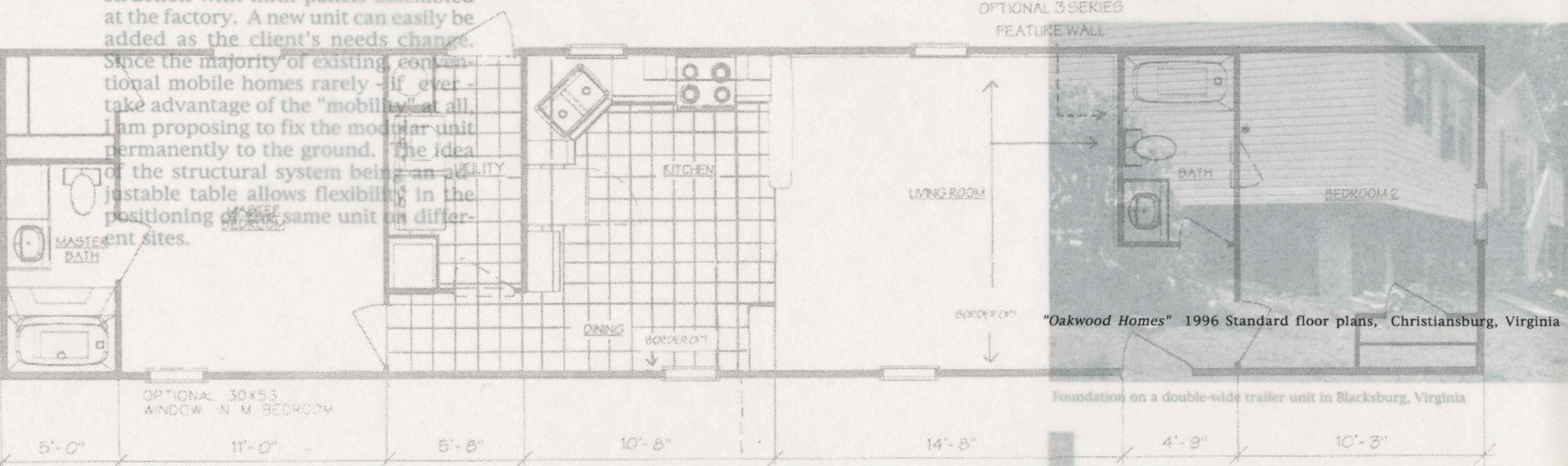
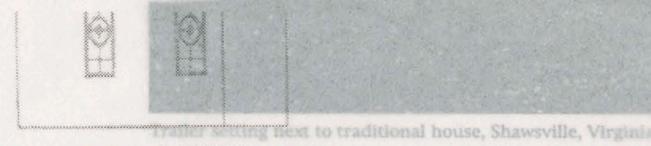
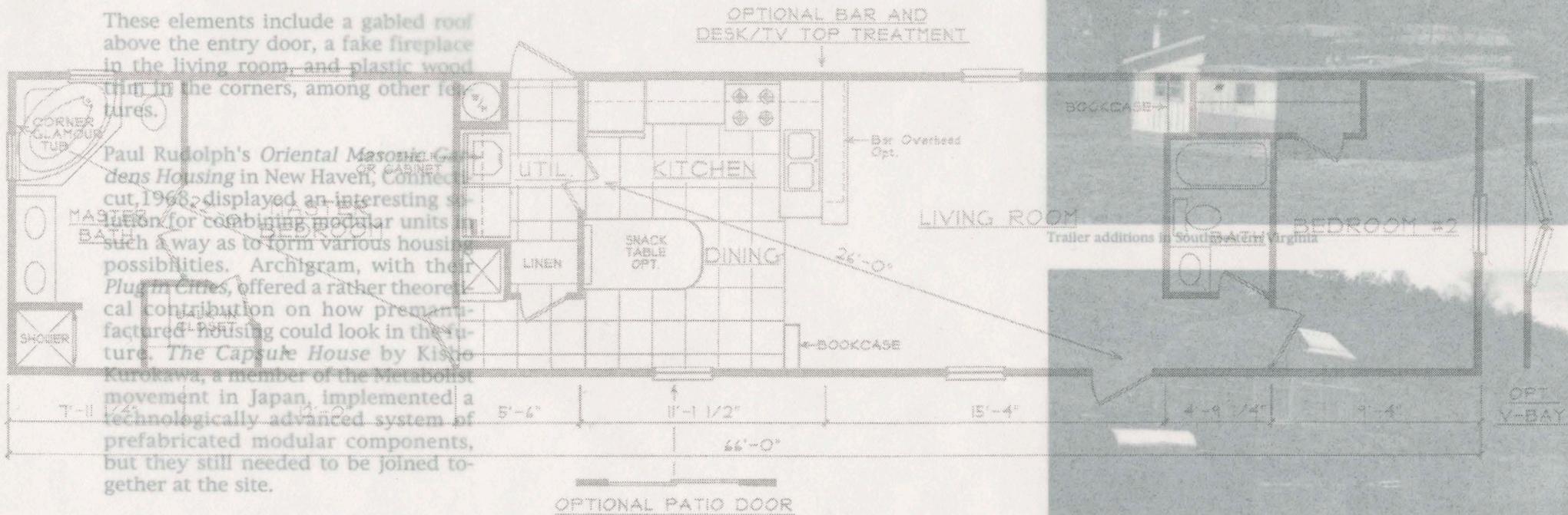
Craftsman at work in Pleasant Hill, Kentucky, a former Shaker settlement



These elements include a gabled roof above the entry door, a fake fireplace in the living room, and plastic wood trim in the corners, among other features.

Paul Rudolph's *Oriental Masonic Gardens Housing* in New Haven, Connecticut, cut 1968, displayed an interesting solution for combining modular units in such a way as to form various housing possibilities. Archigram, with their *Plug-in Cities*, offered a rather theoretical contribution on how prefabricated housing could look in the future. The *Capsule House* by Kisho Kurokawa, a member of the Metabolist movement in Japan, implemented a technologically advanced system of prefabricated modular components, but they still needed to be joined together at the site.

My thesis project, a modular system that can grow and change over time, considers the actual economic and cultural needs of an existing clientele base. The module utilizes steel frame construction with infill panels assembled at the factory. A new unit can easily be added as the client's needs change. Since the majority of existing, conventional mobile homes rarely - if ever - take advantage of the "mobility" at all, I am proposing to fix the modular unit permanently to the ground. The idea of the structural system being an adjustable table allows flexibility in the positioning of the same unit on different sites.

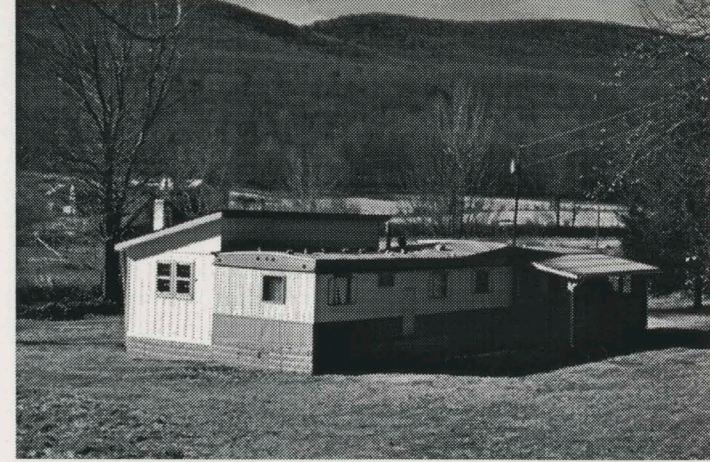


"Oakwood Homes" 1996 Standard floor plans, Christiansburg, Virginia

These elements include a gabled roof above the entry door, a fake fireplace in the living room, and plastic wood trim in the corners, among other features.

Paul Rudolph's *Oriental Masonic Gardens Housing* in New Haven, Connecticut, 1968, displayed an interesting solution for combining modular units in such a way as to form various housing possibilities. Archigram, with their *Plug in Cities*, offered a rather theoretical contribution on how premanufactured housing could look in the future. *The Capsule House* by Kisho Kurokawa, a member of the Metabolist movement in Japan, implemented a technologically advanced system of prefabricated modular components, but they still needed to be joined together at the site.

My thesis project, a modular system that can grow and change over time, considers the actual economic and cultural needs of an existing clientele base. The module utilizes steel frame construction with infill panels assembled at the factory. A new unit can easily be added as the client's needs change. Since the majority of existing, conventional mobile homes rarely - if ever - take advantage of the "mobility" at all, I am proposing to fix the modular unit permanently to the ground. The idea of the structural system being an adjustable table allows flexibility in the positioning of the same unit on different sites.



Trailer additions in Southwestern Virginia



Trailer setting next to traditional house, Shawsville, Virginia



Foundation on a double-wide trailer unit in Blacksburg, Virginia



Acron site at Great Yarmouth, England: 39,000 prefabricated housing units

The Project

During my coast to coast, cross-country trip, I lived, ate, slept, and traveled in a 1976 Volkswagen van. For three months this vehicle was my home. Much of my daily life at this time involved living in a very compact space, a space which I could adjust and rearrange to accommodate the various functions of living and travelling. I found out quickly about the quality or the misuse of space in the van's design. The high quality of materials, the design of the kitchen sink and stove were tested every day. In the various National Forests and campgrounds I could have a look at much larger camp vehicles. The larger they were, the more inefficiently their design utilized available space. On the highways, at least once a week, a mobile home being transported would come into view, either a single-wide or double-wide, barely protected and en route to its final destination, where it would be set up in one day and most likely never move again. In observing premanufactured housing during my first stay in the United States, I desired to learn more and subsequently found the inspiration for pursuing this as a thesis project.

1. The Site / Typology

Current premanufactured housing systems offer little opportunities or typological indications as to how they are adjusted to a specific site. The connec-

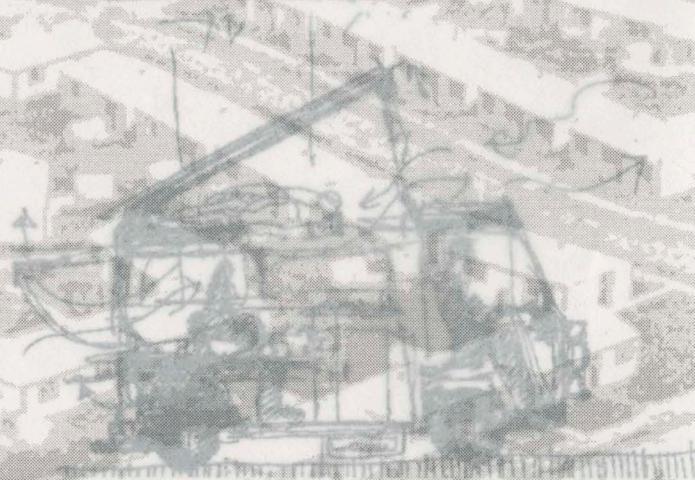
tion to the ground in many cases involves very fragile and rather difficult positioning on hill slopes. This led me to search for a more solid connection to the ground and to a plan scheme that allows a more sensitive way to position the unit to the four cardinal points. A corrugated steel tube set in the ground, filled with poured concrete on the site is the foundation for the whole structure. The floor is the rigid structural "table" held together by several standard steel girders. On the long side of the girders, the outside is connected to a steel tube which is part of a tubular system that allows leveling of the floor.

2. The Module

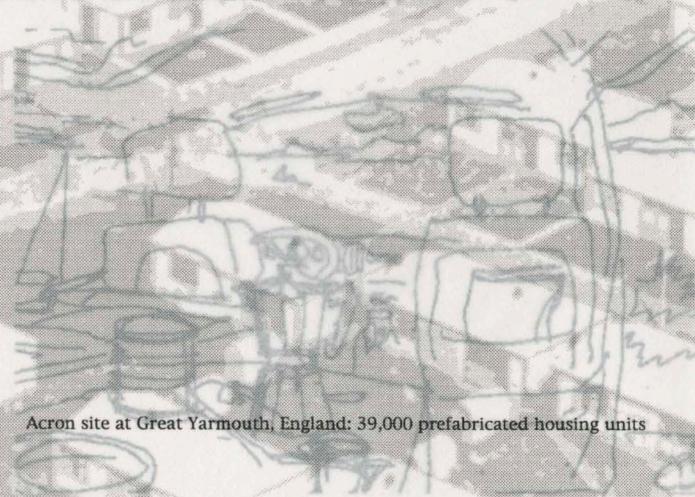
There are two basic premanufactured types based on a 13'X13' square grid, four squares added linearly. The first floor module accommodates all the daytime functions. The other module is for the bedrooms or workrooms and can be added as a first or second story. The two units allow various combinations according to their site location and orientation. An L-shape or a cross-shape orientation breaks the given tubular space in two directions, creating outside spaces which can be used during the warmer seasons. The modules are delivered like trailers by truck, with the difference being that the wheels no longer belong to the mobile home,



1976 VW van cross section: kitchen, engine



1976 VW van cross section: drive, most of components



1976 VW van interior view

Acron site at Great Yarmouth, England: 39,000 prefabricated housing units

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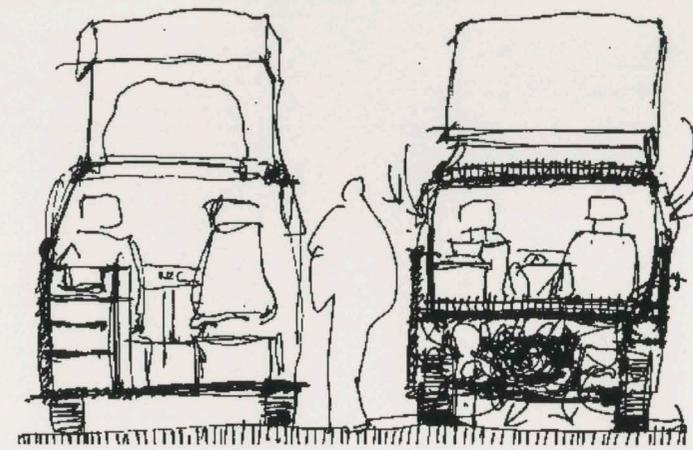
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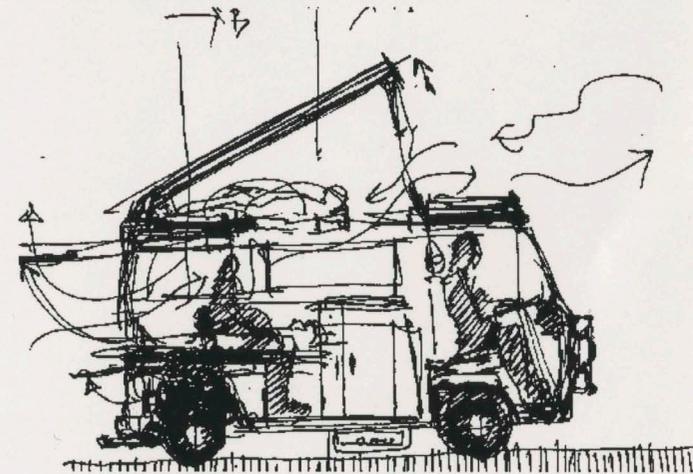
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1976 VW van cross sections: kitchen, engine



1976 VW van cross section: drive, rest, sleep positions



1976 VW van: interior view

but instead to the truck. This allows for a method of shipping similar to standardized transport systems, where containers are transported with the least amount of modification to the truck.

3. The Mechanical Systems

Water, electricity, gas and telephone are installed in the entrance platform. Like a deck, the platform will slightly rise one step above the ground; the rest will be set under ground. The prefabricated concrete entrance platform acts as an anchor where the housing unit is "hooked on". For maintenance and repair work it will be easily accessible from the outside.

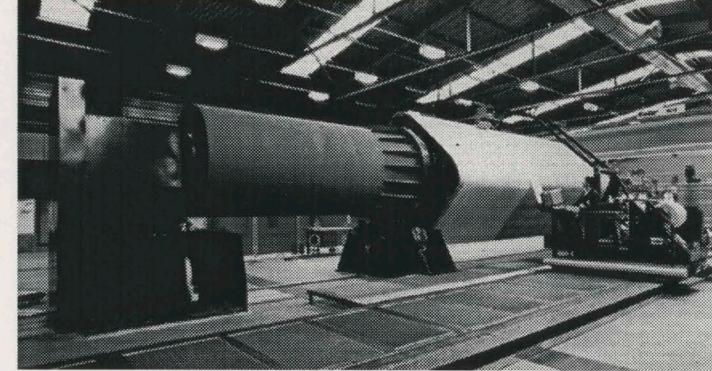
4. The Materials

All structural elements are standard or stock-steel profiles or welded steel girders (floor). Every two 13'X13' L-shaped steel profiles are holding the "sandwich wall", a combination of various layers of plywood and thermal insulation. The panel can be solid or combined with various standard-stock window types. The L-shaped, vertical steel profiles hold up the bent T-steel profile which holds the insulated corrugated steel roof.

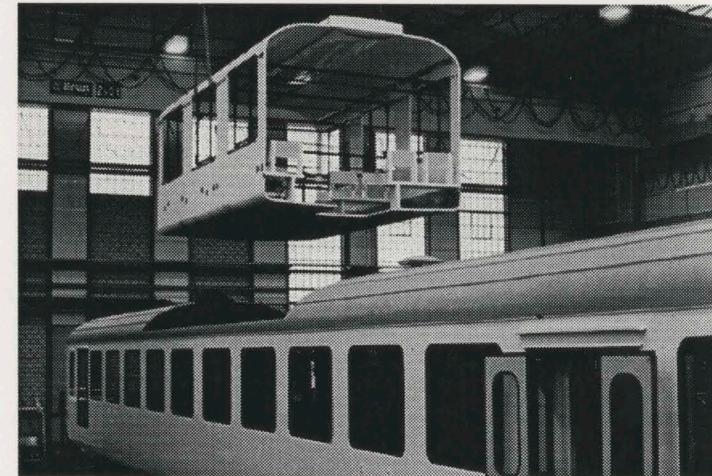
The material research brought me to the field of train manufacturing, where the firm of Schindler in Switzerland developed a new system to produce tramcars from glass fiber reinforced plastic. The idea to produce the train by rolling bands of fiber glass with stiffening ribs is revolutionary. This new work process offered me new direction in my thesis. The decision not to pursue the train manufacturing technique in my project was made in favor of a search for a solution which addressed both semantic and pragmatic issues.

5. The Production

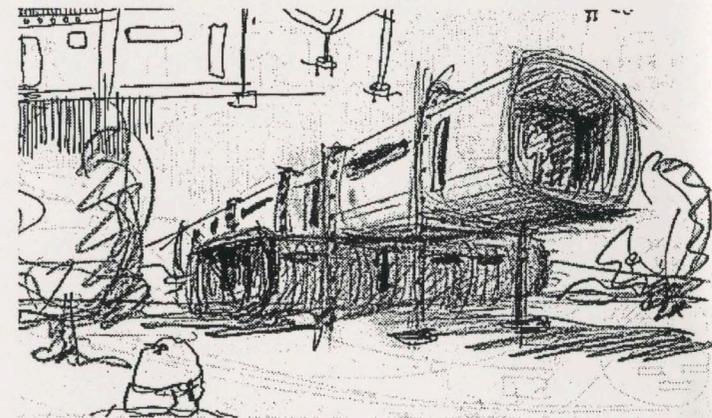
The modular housing unit will be fully constructed, with the exception of the foundation, in the factory. The stable conditions in a sheltered production hall are of obvious value. Weather conditions have only to be considered at the moment of the setting of the unit. The unit will be not produced in a traditional "craftsmanship-way". It will have a more mechanical craft precision such as used by the automobile industry. The lifetime of a unit is estimated to be two generations. The foundation would have to be made by a local contractor or a specialized crew of the unit producer.



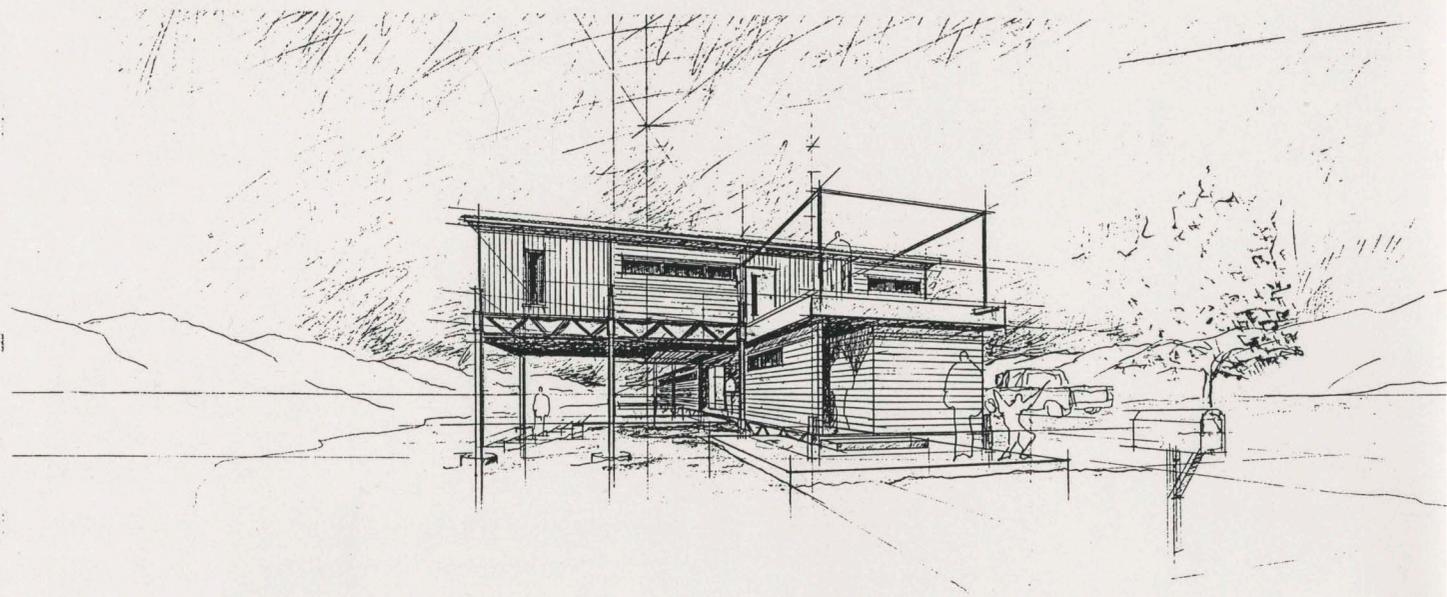
Rolling process in the train production. Schindler, Switzerland

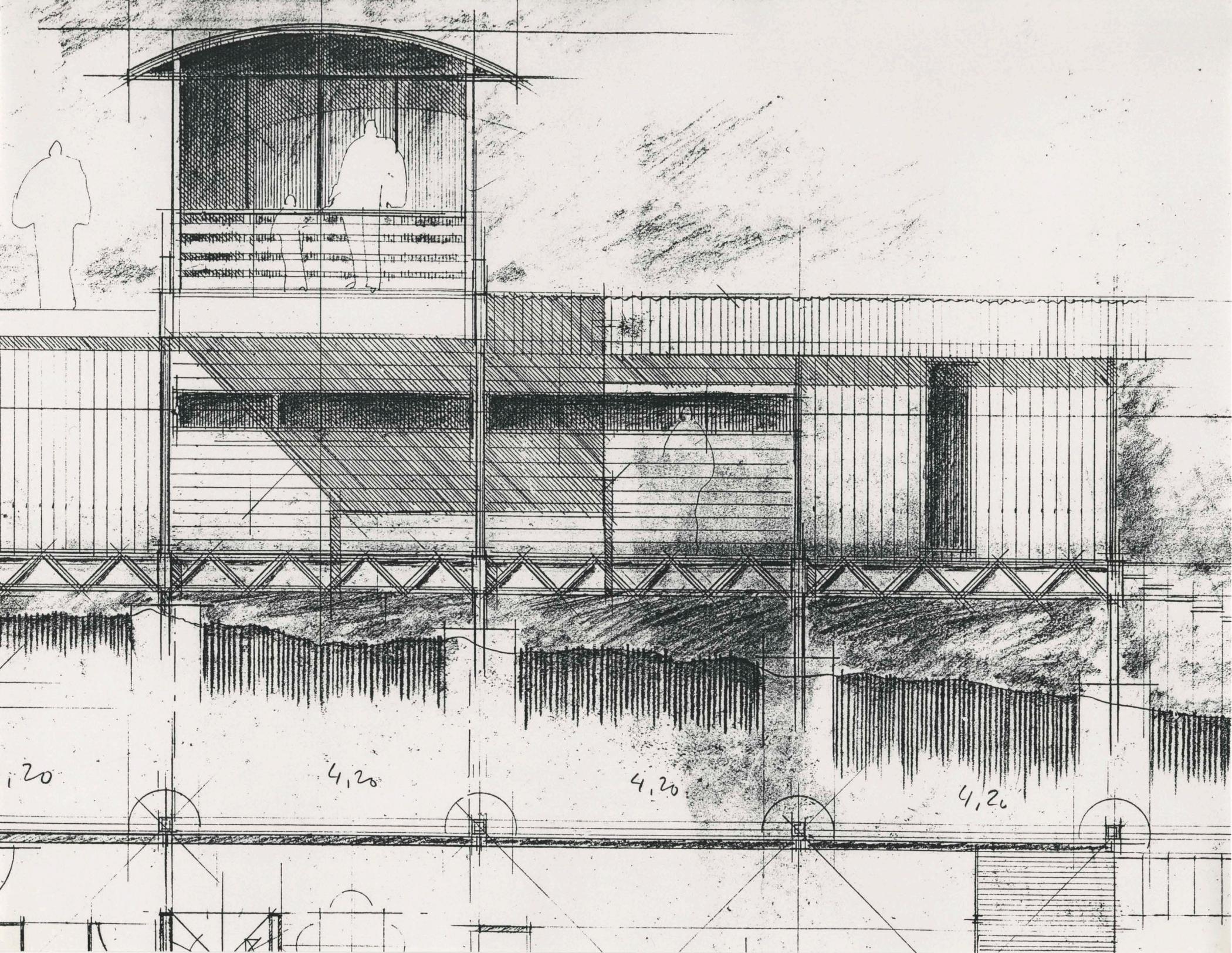


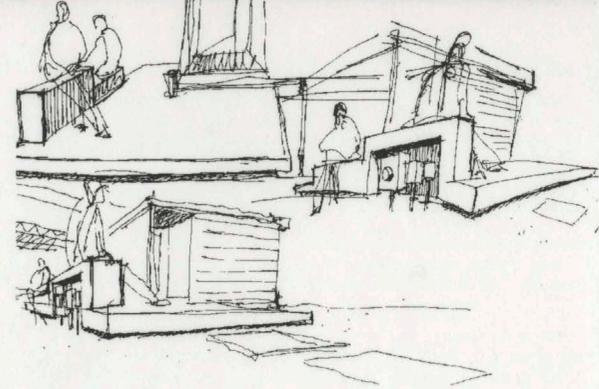
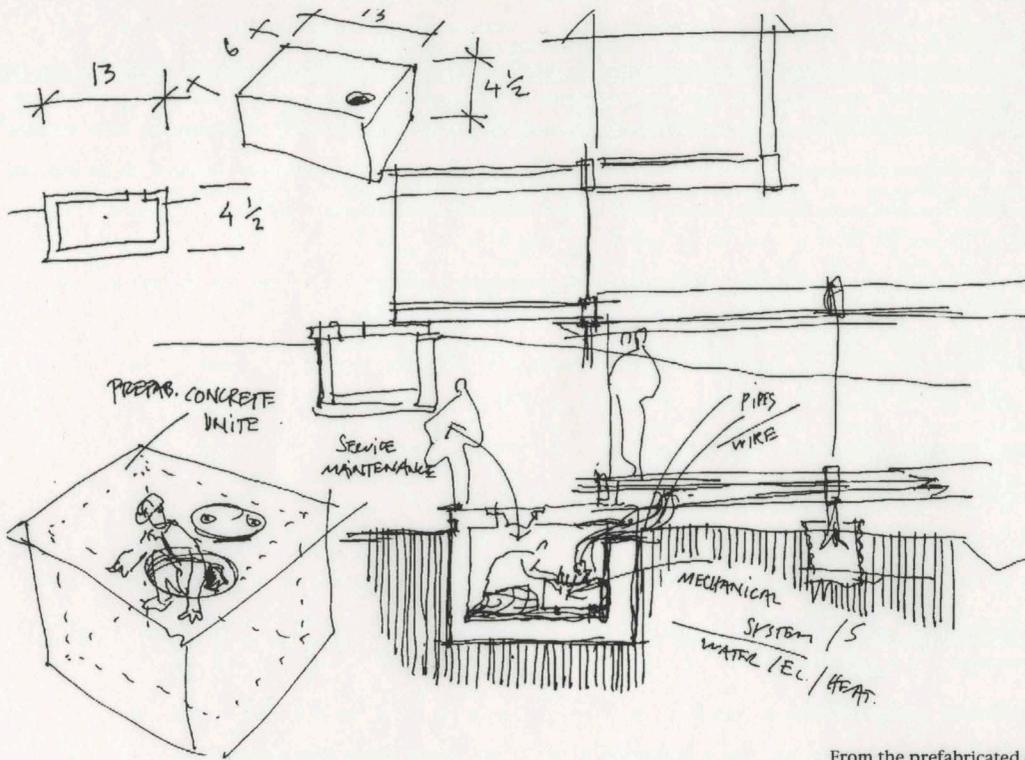
Schindler train production, Switzerland



Stacked train as a modular housing unit

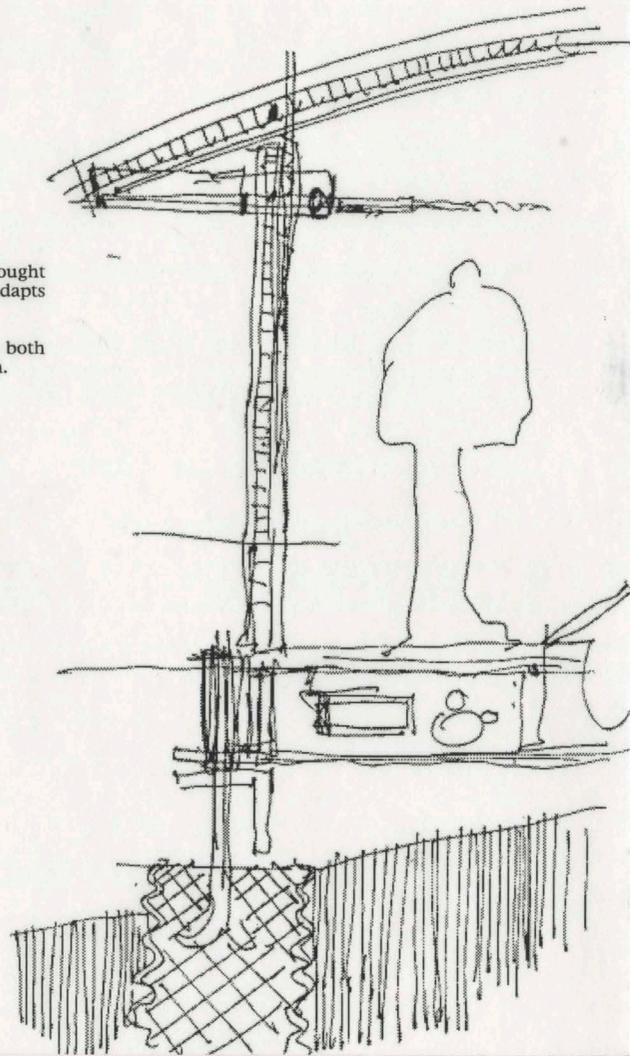
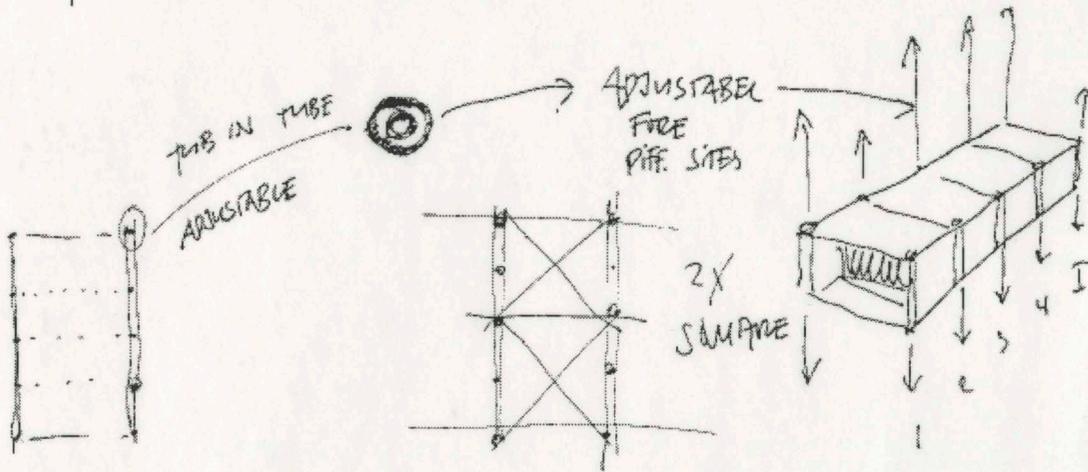


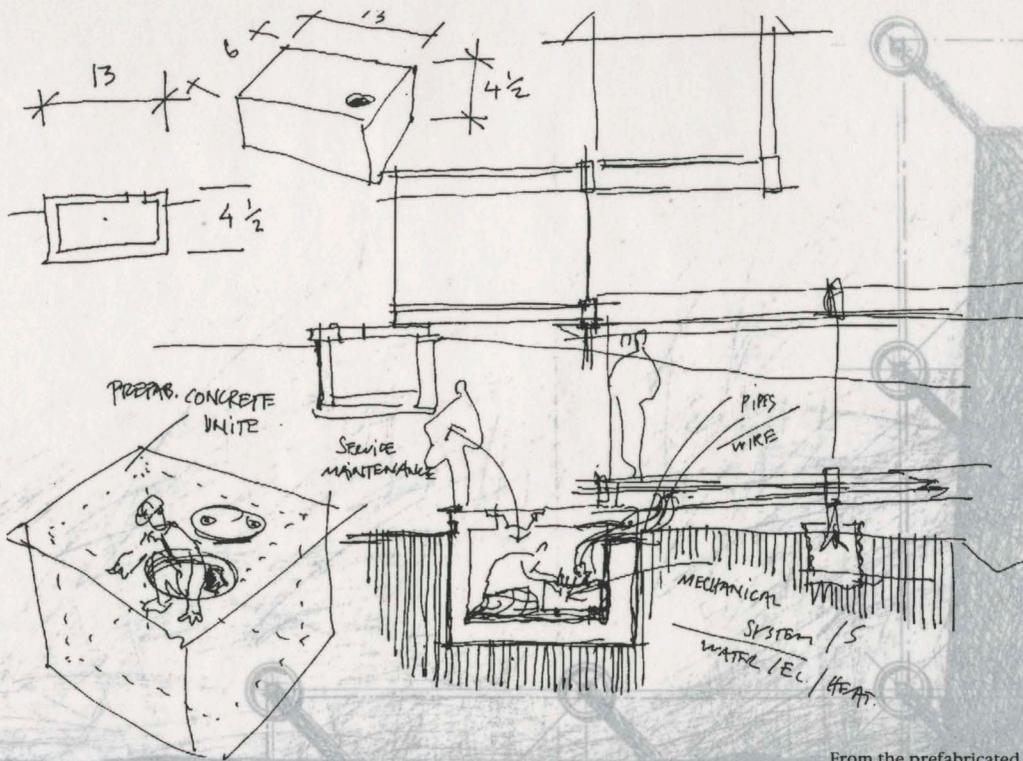




From the prefabricated concrete slab, the unit can be brought into a leveled position where the single point foundation adapts to the topography of different sites.

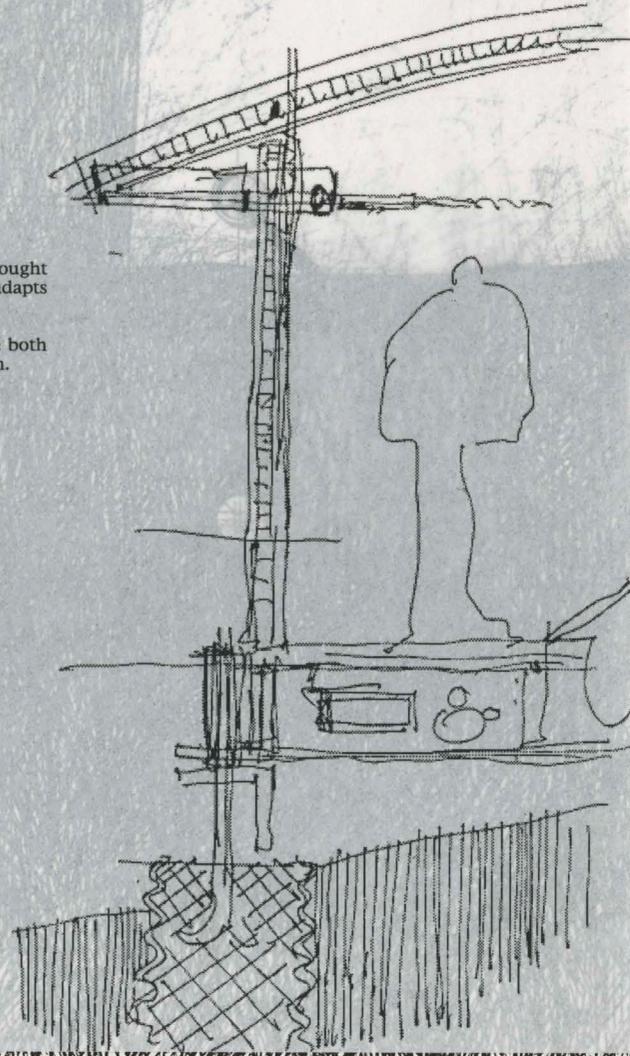
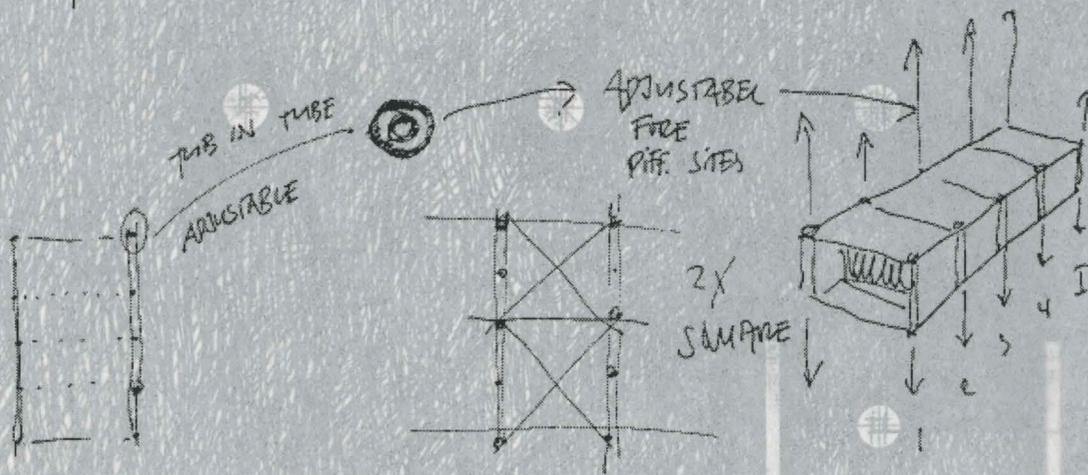
The modular unit has a foundation that allows it to be both secured to the ground and moved to a different location.

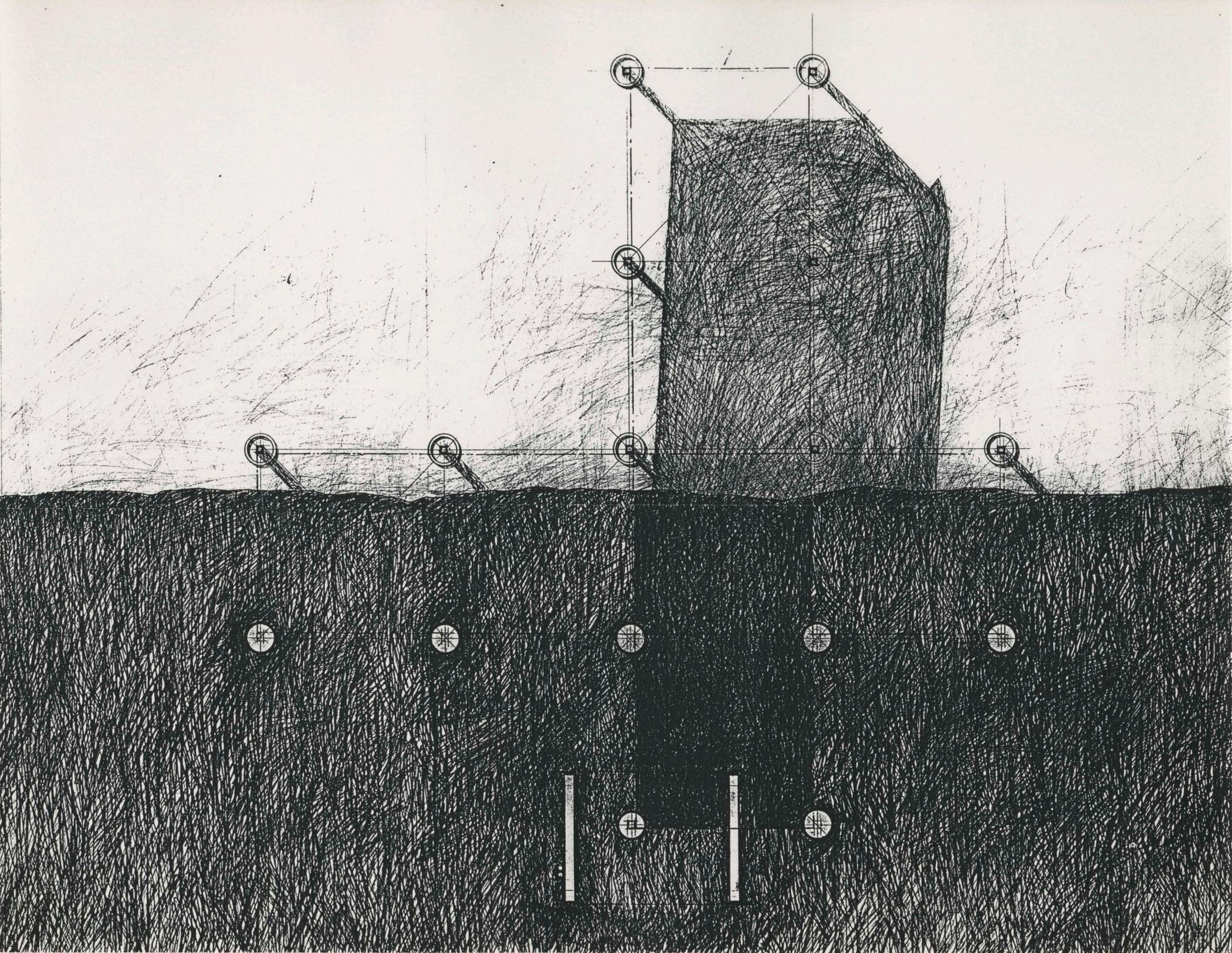


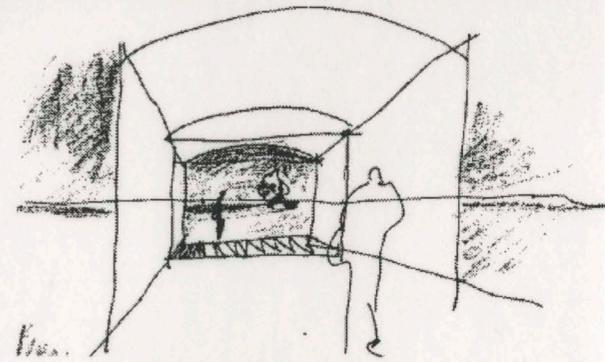
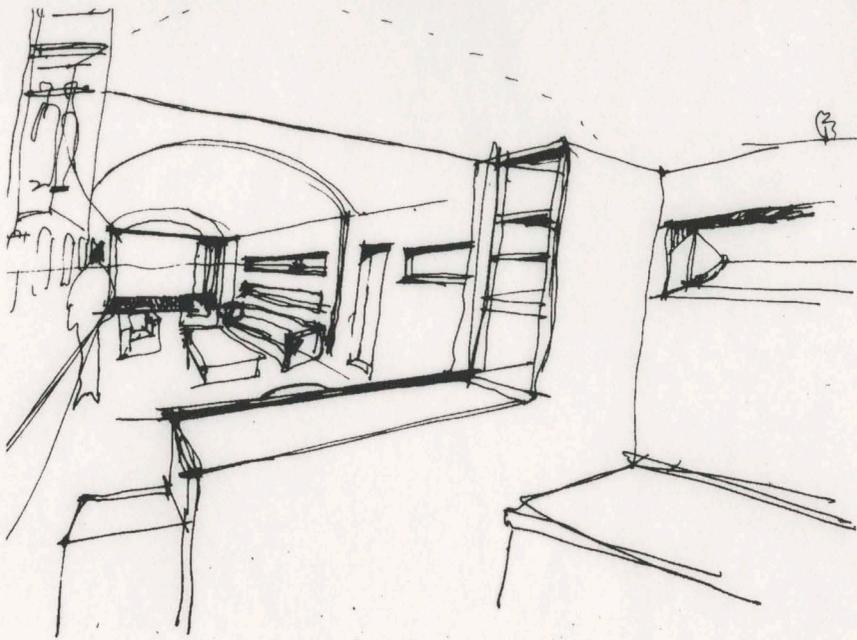


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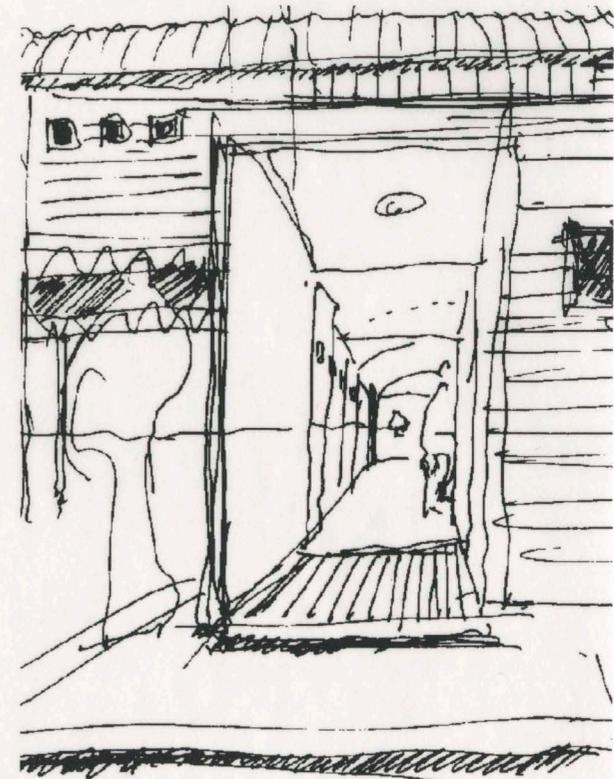
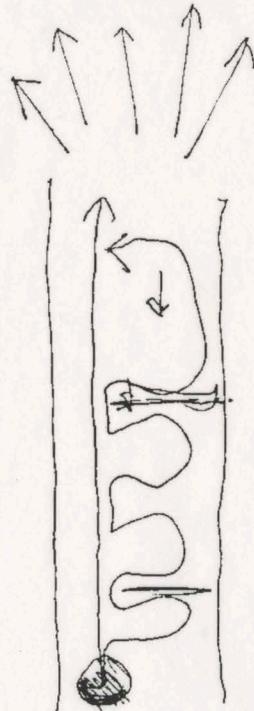
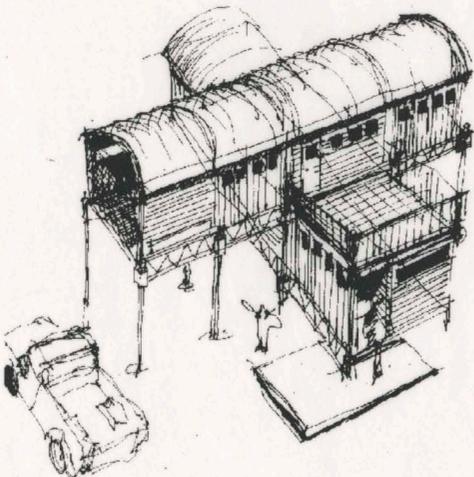


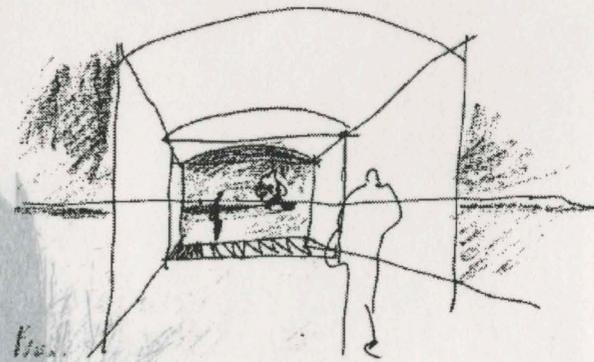
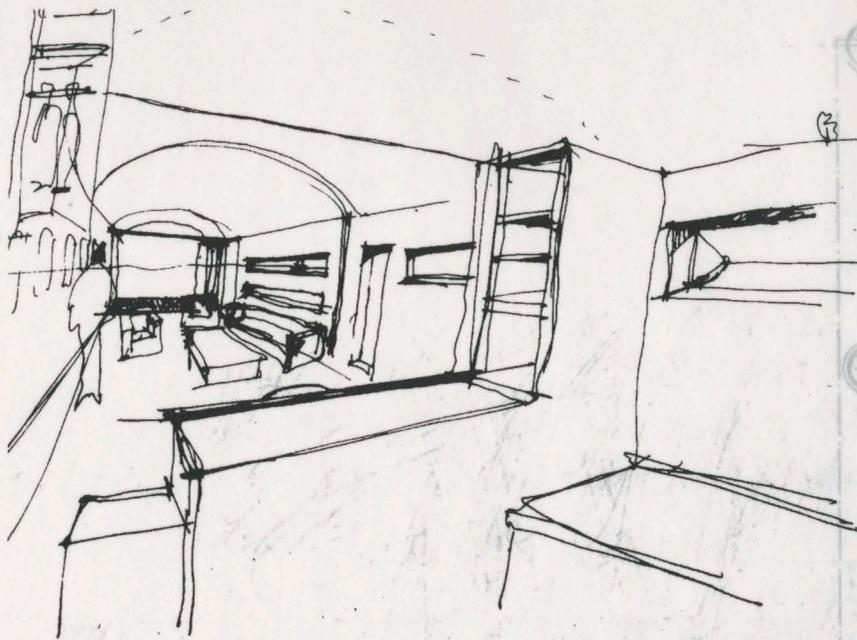




The unit's entry is at the end of the long side. The concrete platform and the covered entry area emphasize the progression upon entering the first floor. In the closet and kitchen, the ceiling is flat until one reaches the living room. There, the space unfolds with a vaulted ceiling and a window that opens to the outside.

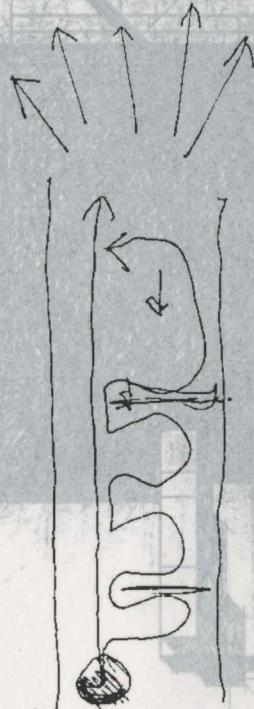
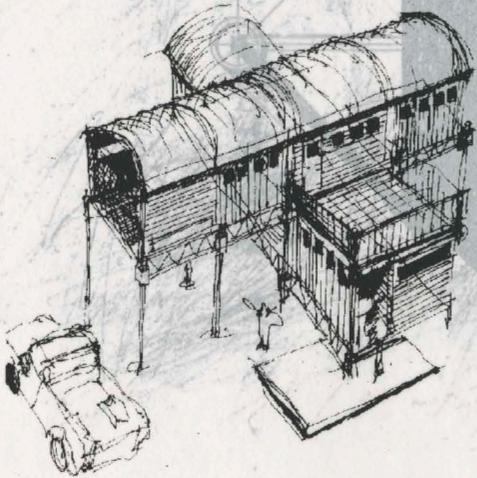
The given width of the unit, limited by highway restrictions, tries to use the long rectangular shape advantageously.

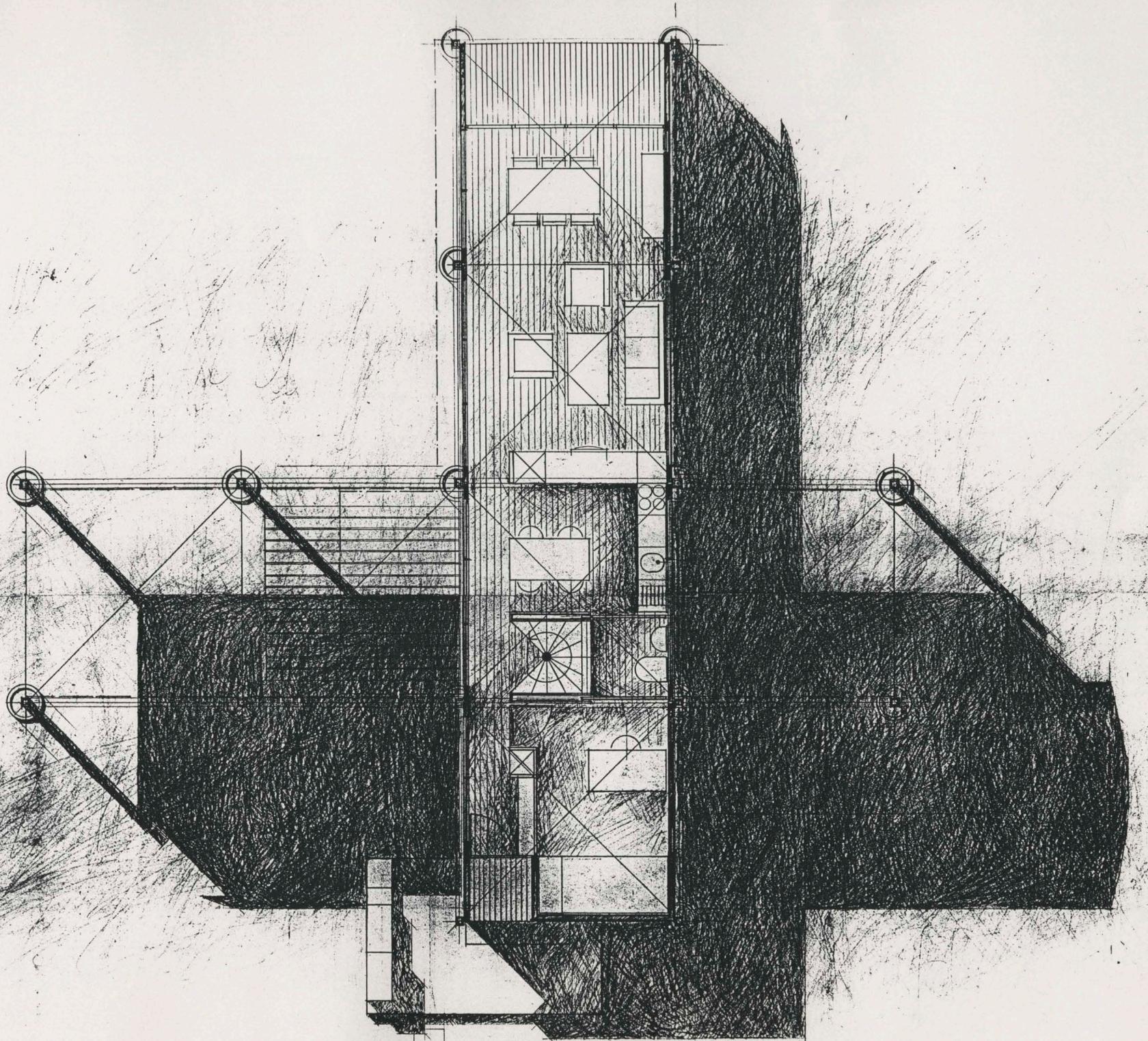


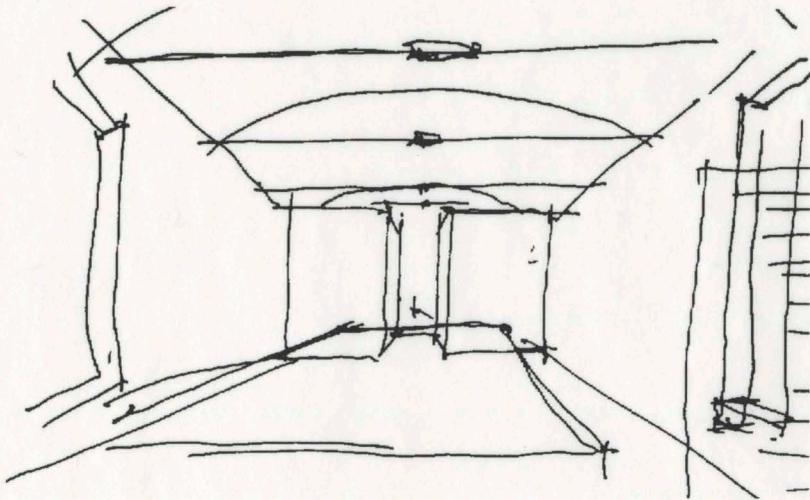
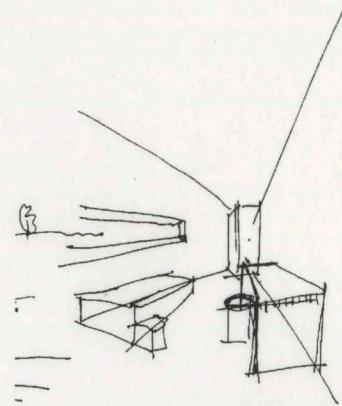
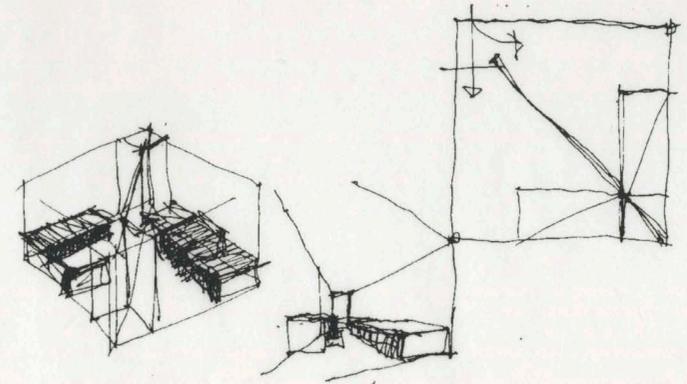
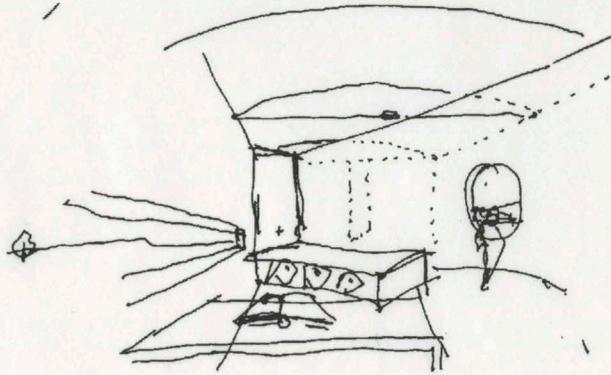


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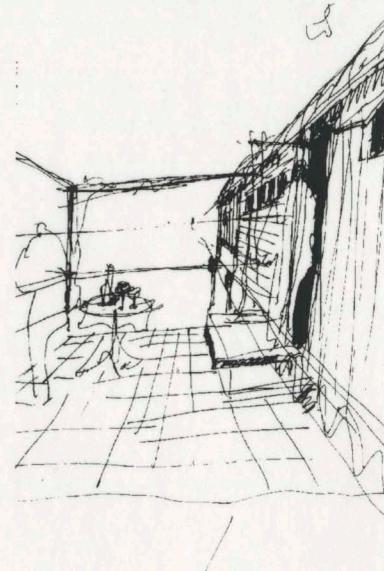


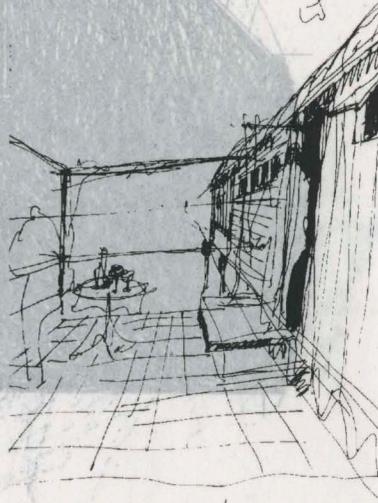
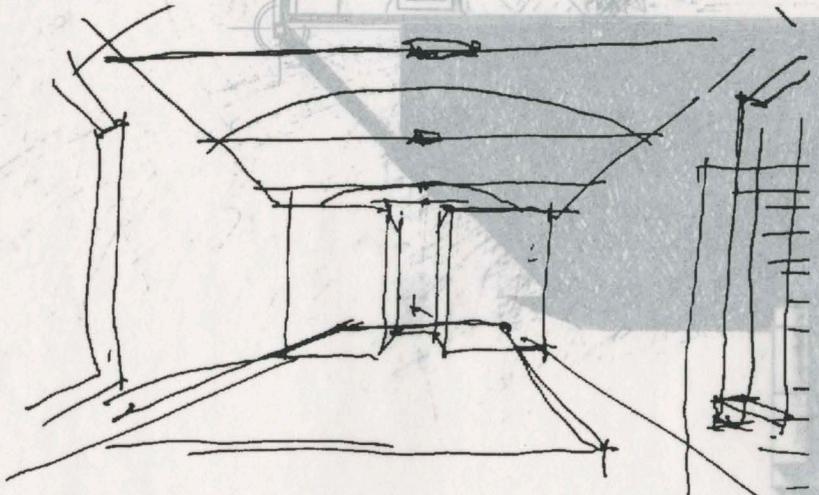
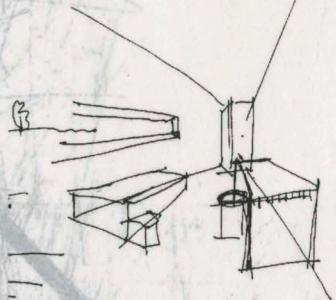
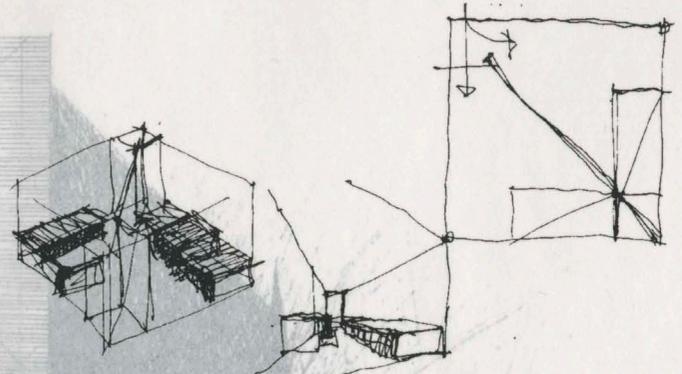
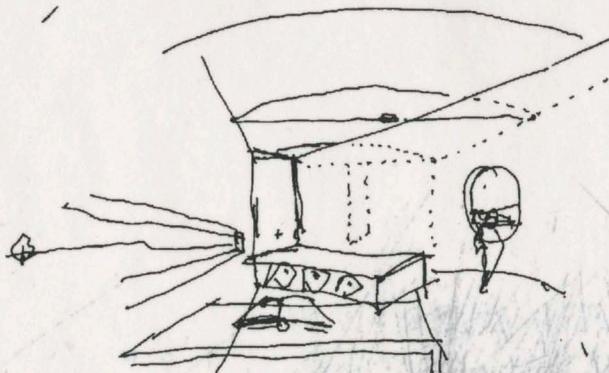


The second story accommodates the private rooms. Each room has the complexity of two or more functions that can be rearranged according to specific needs.

The children's rooms are divided by a seven foot high panel that gives the children their own privacy and access to their rooms.

The diagonal division allows a maximum of space and suggests a larger area. The vaulted ceiling spans over both rooms.

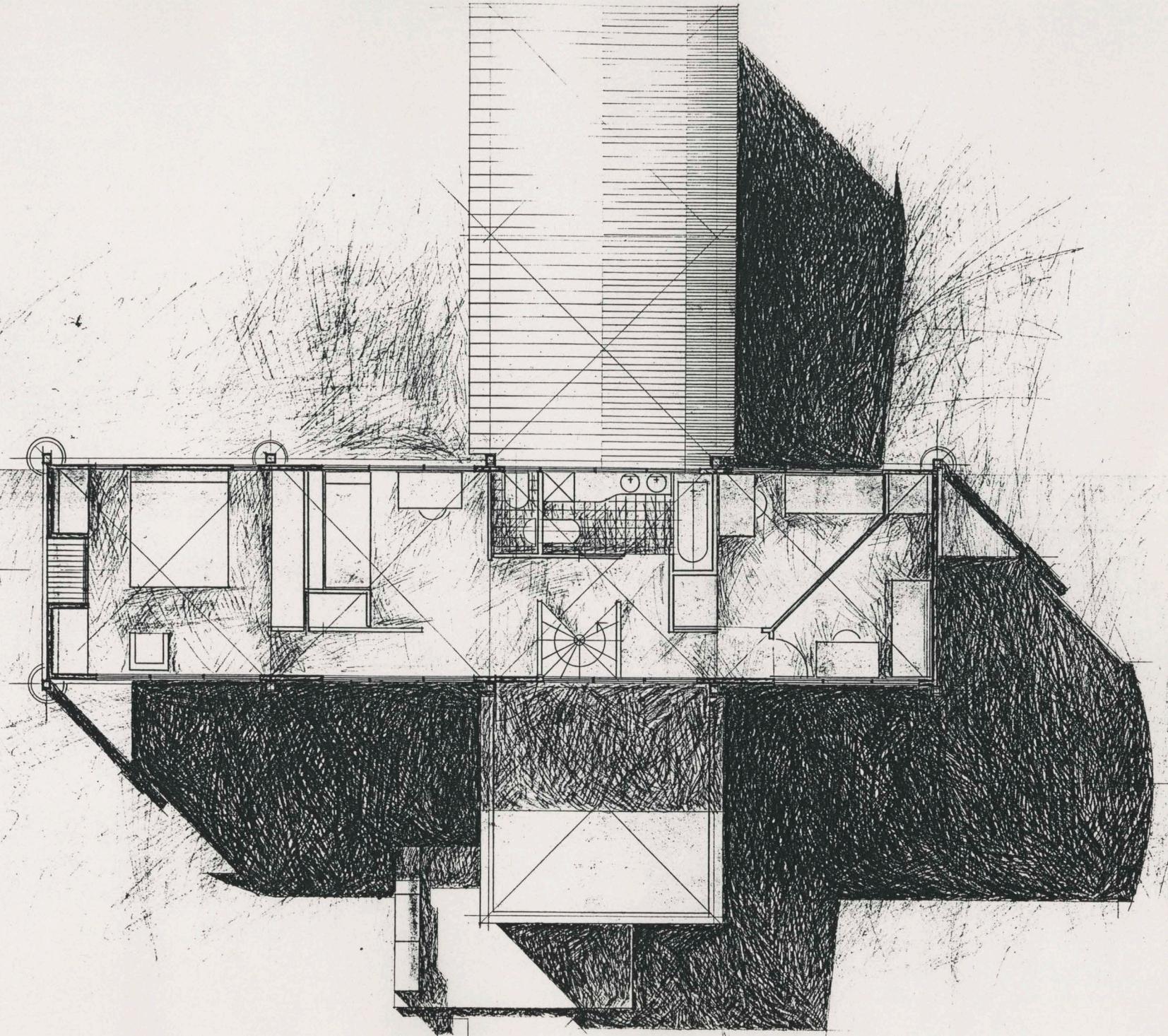


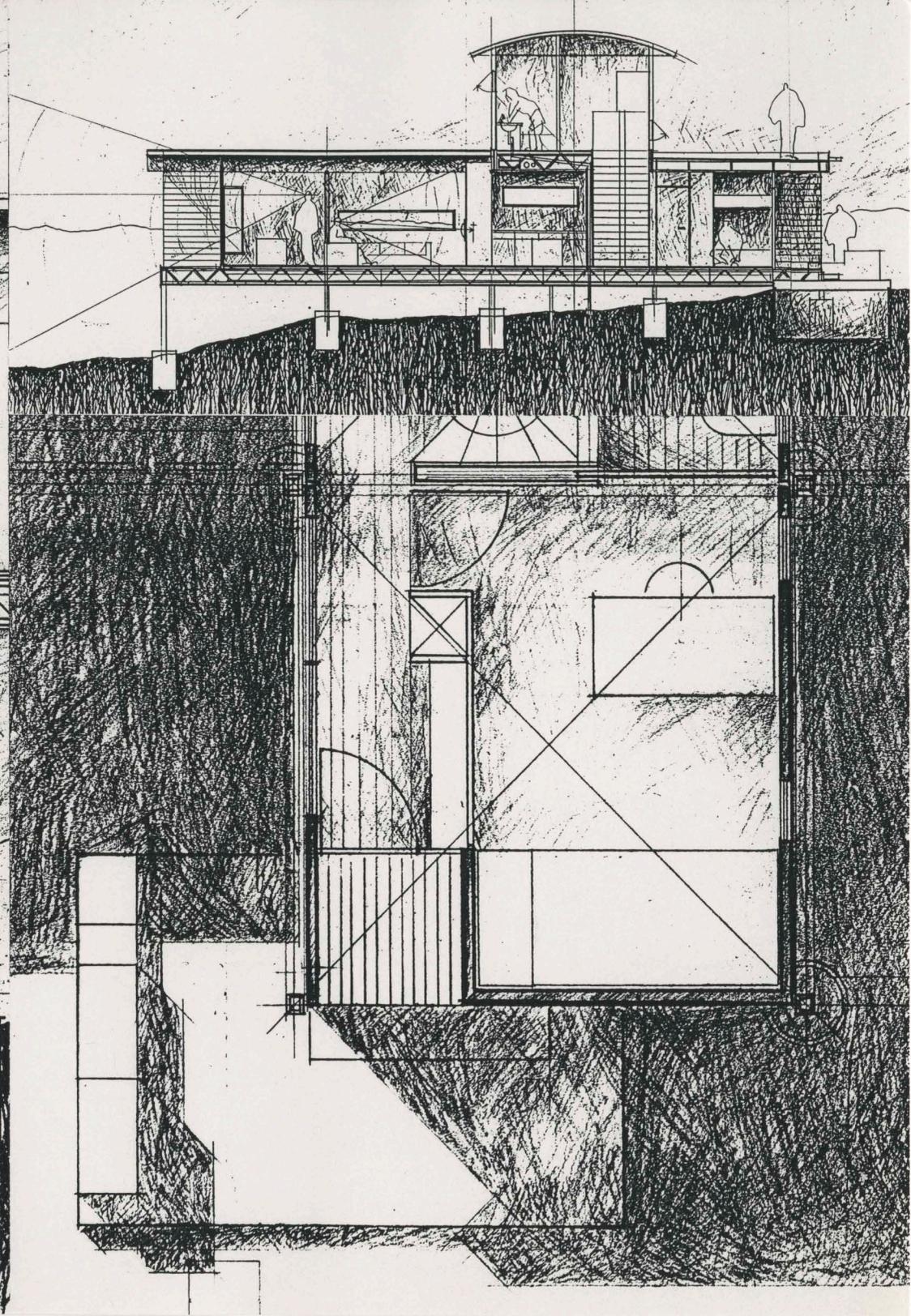
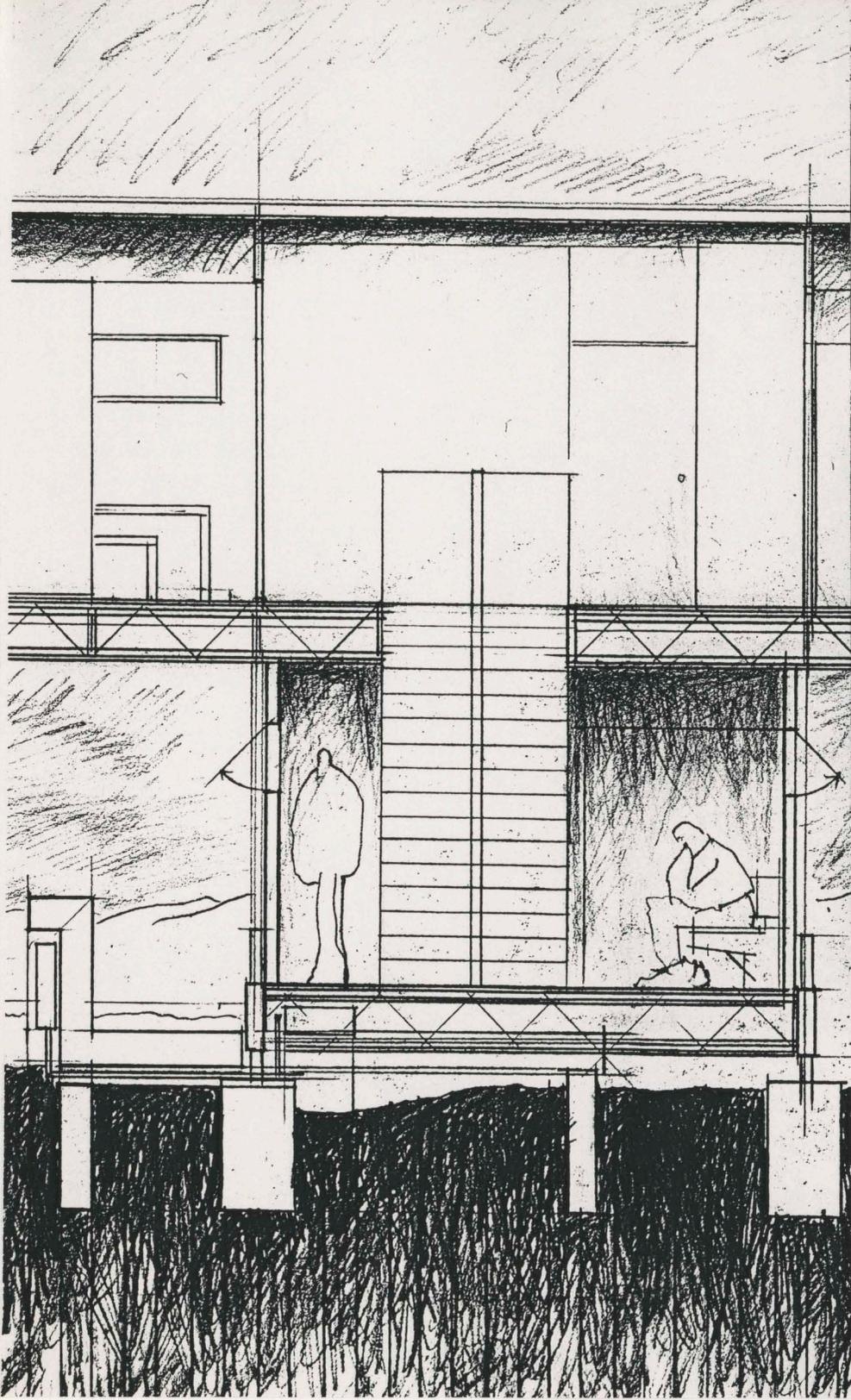


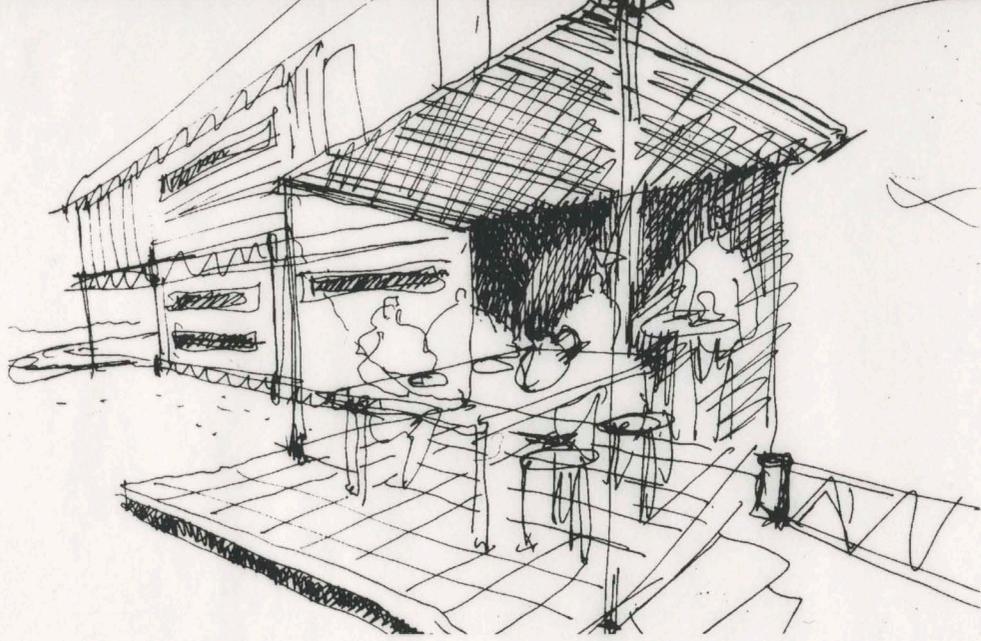
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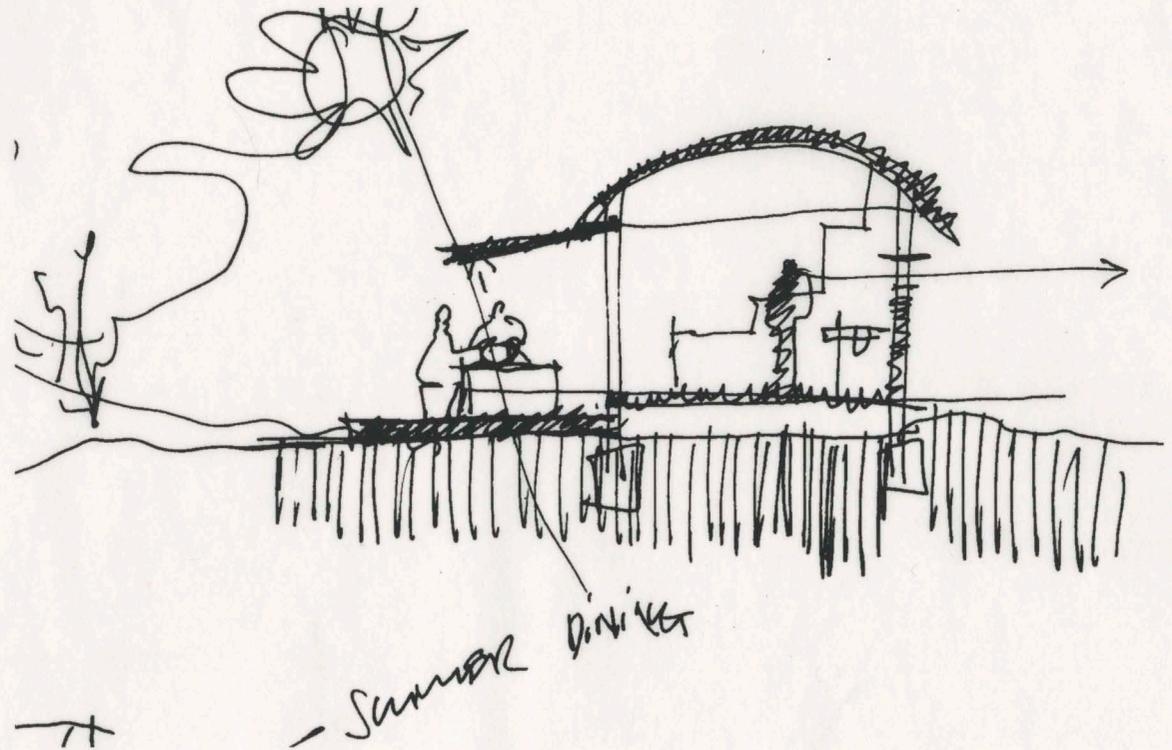
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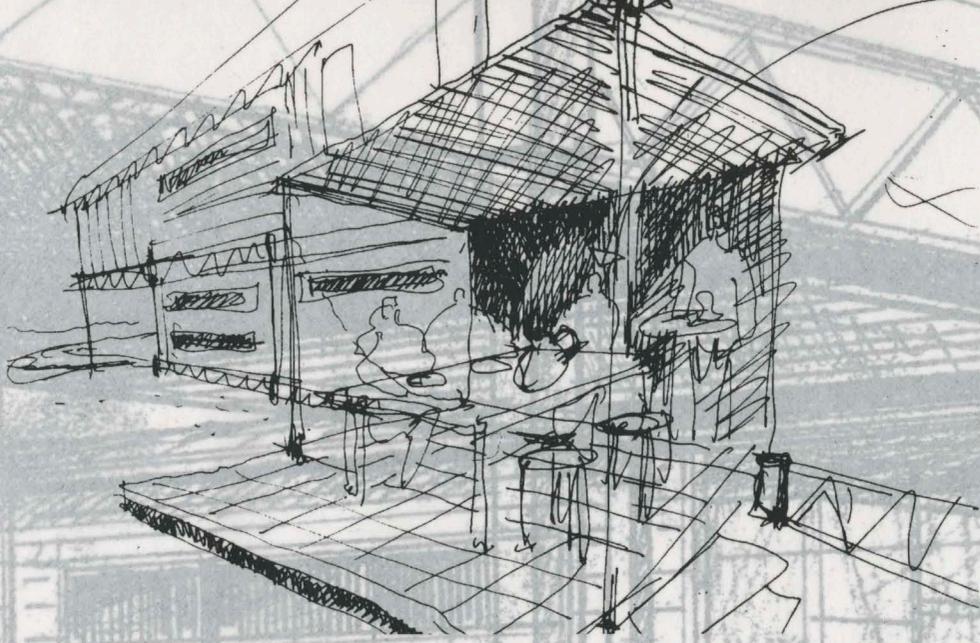




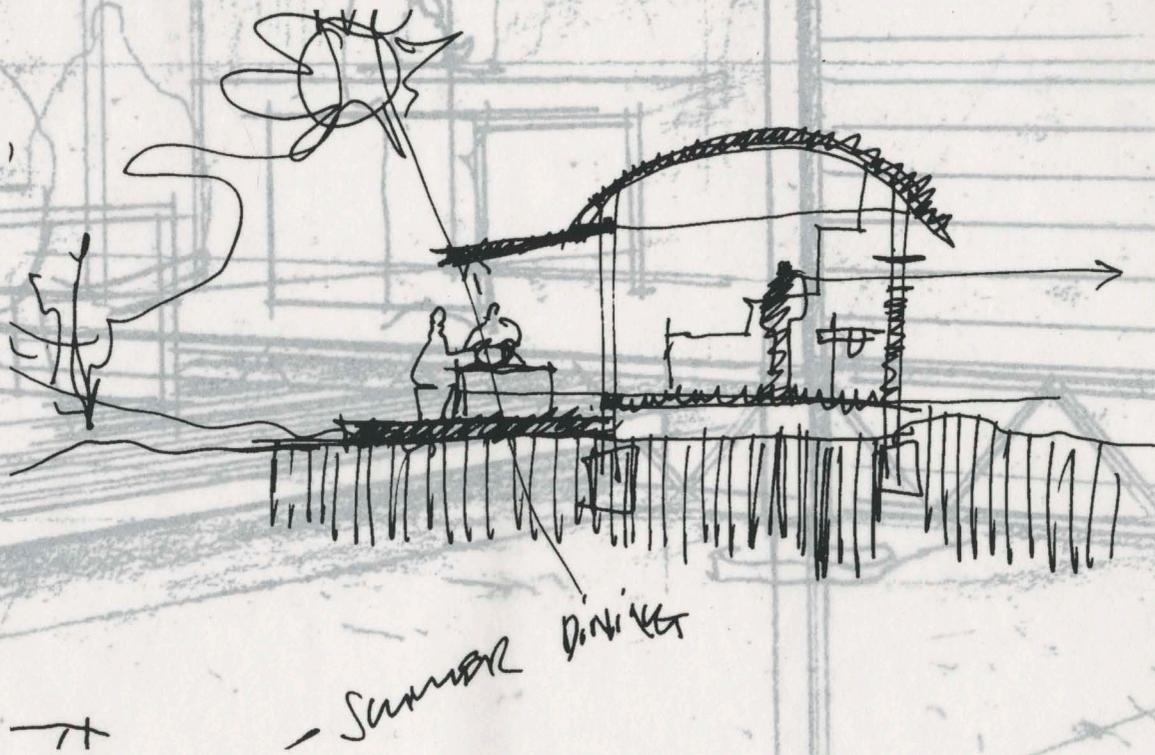


The movable infill panel allows the residents to use the outdoor-space as a dining area in the warmer seasons.

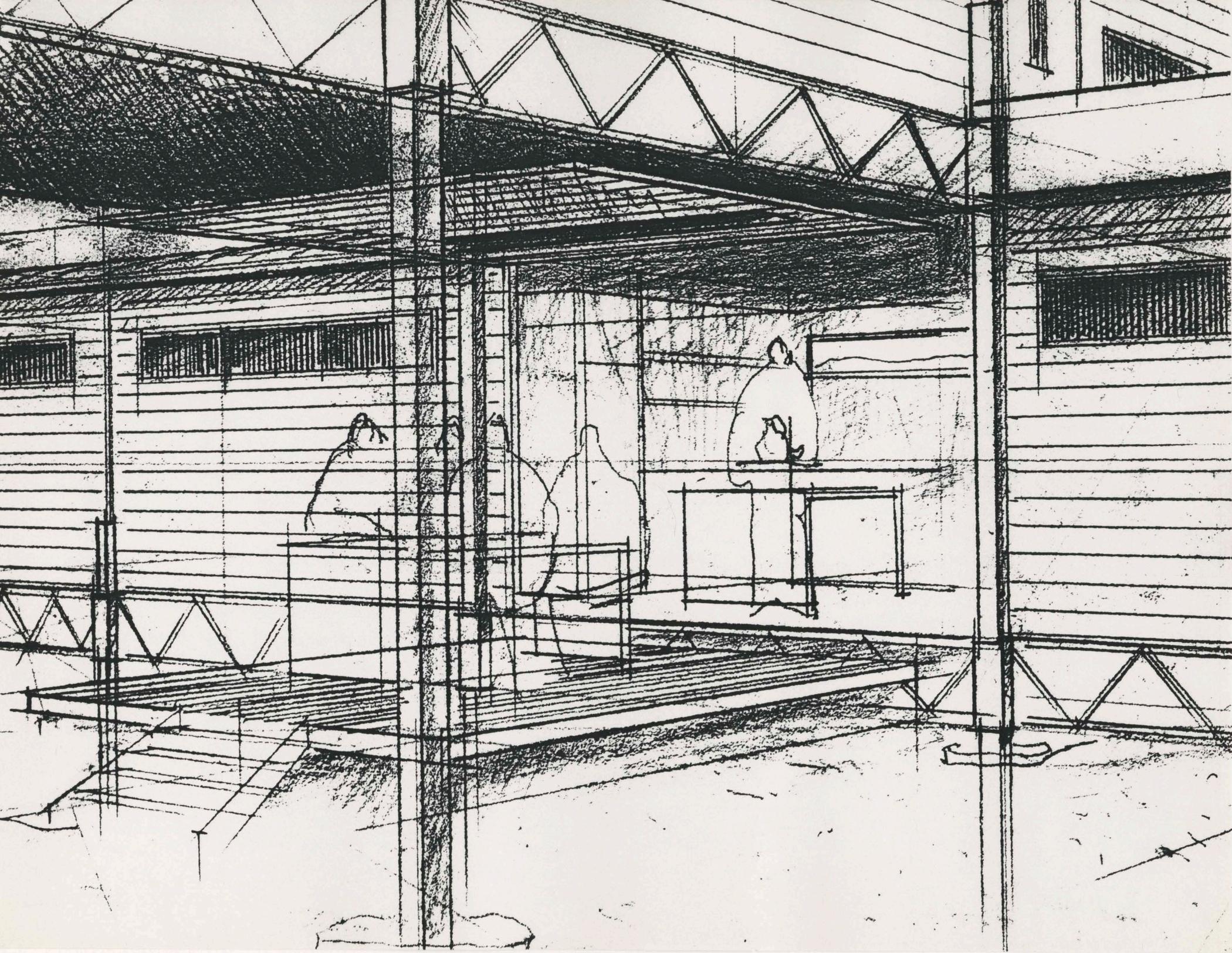


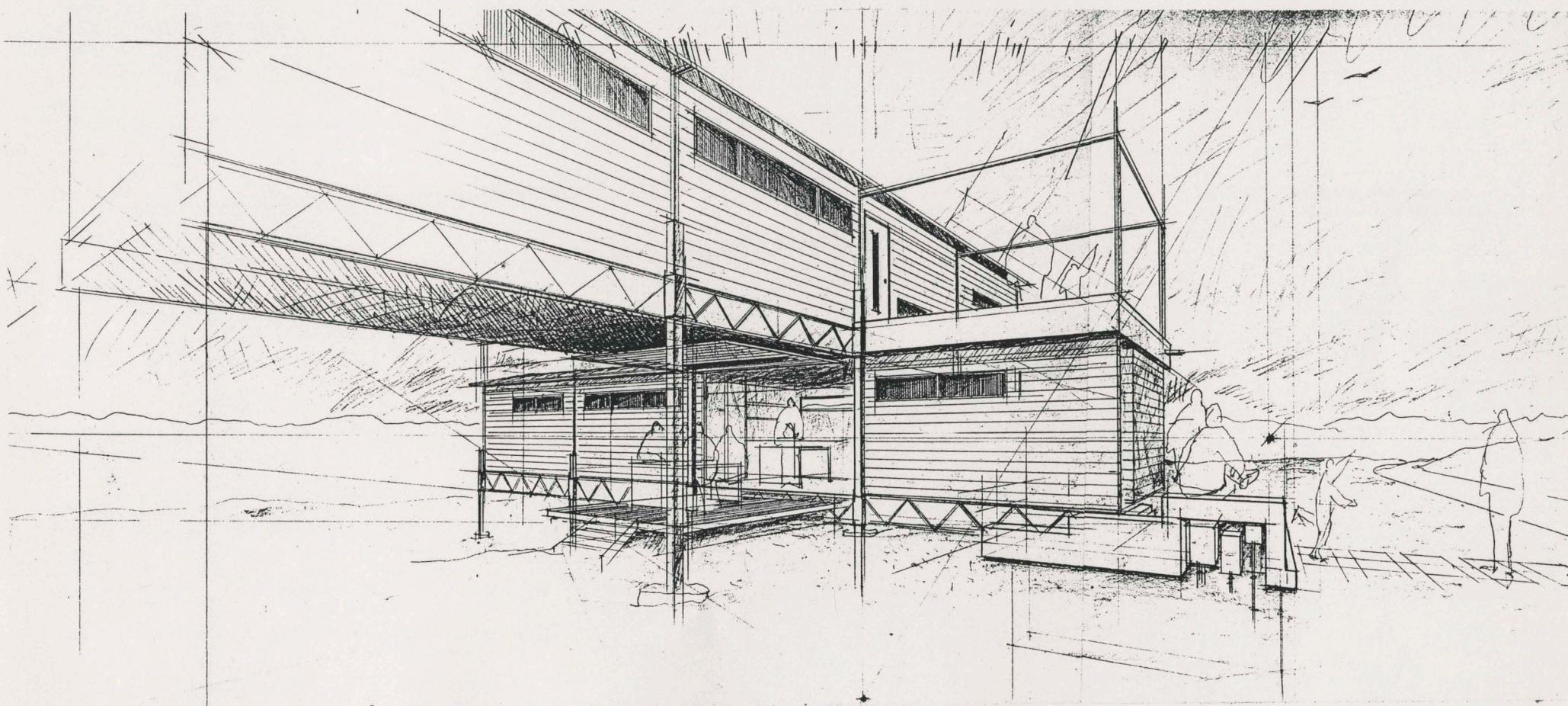


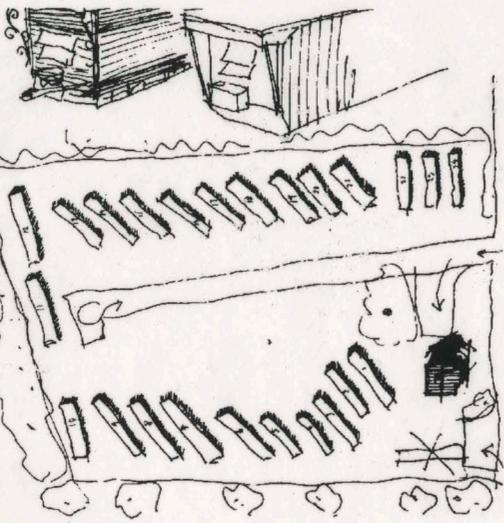
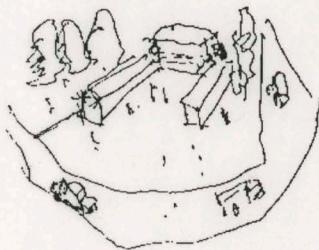
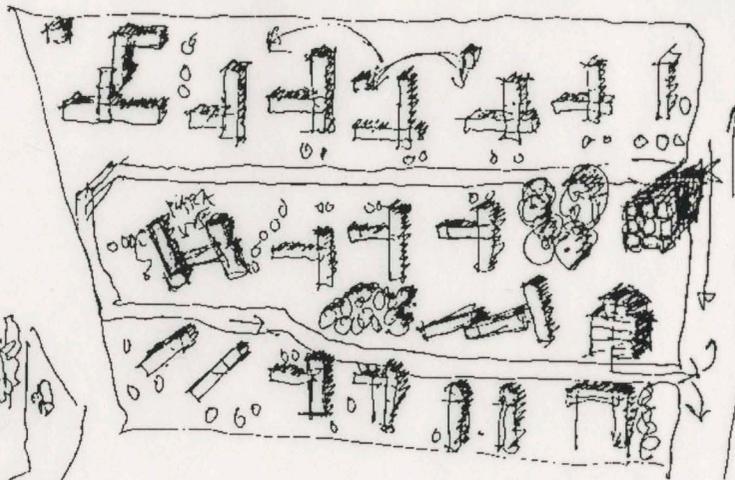
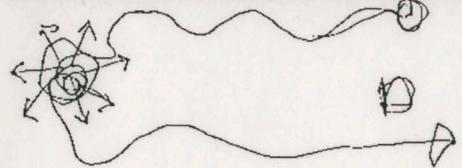
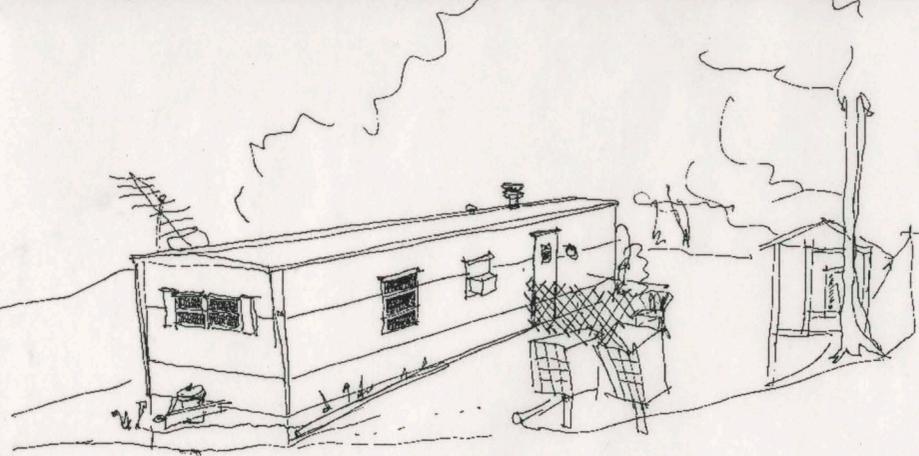
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- Summer Dining

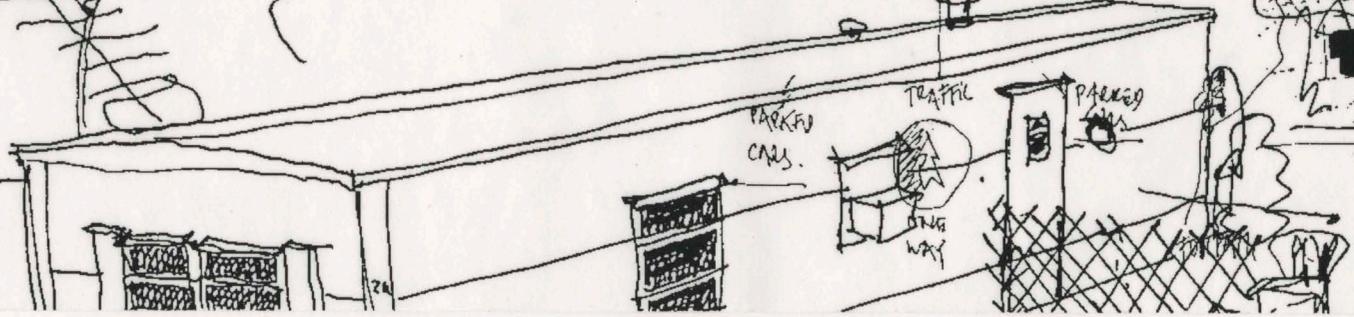
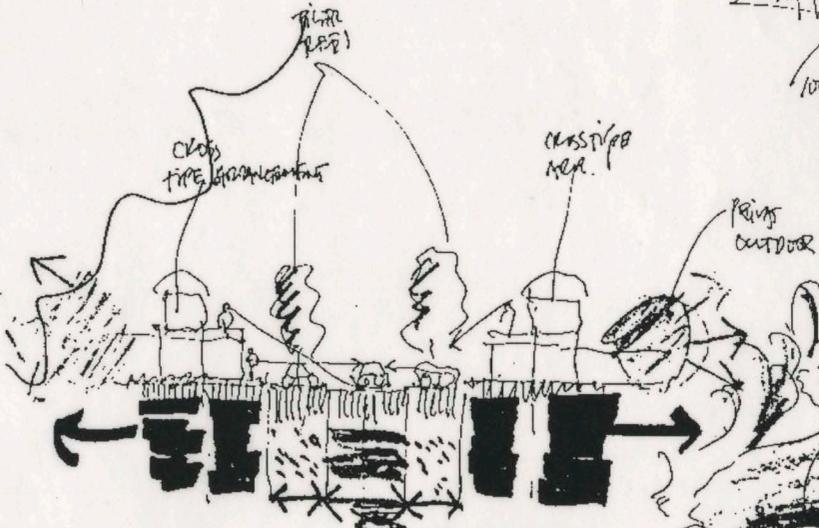


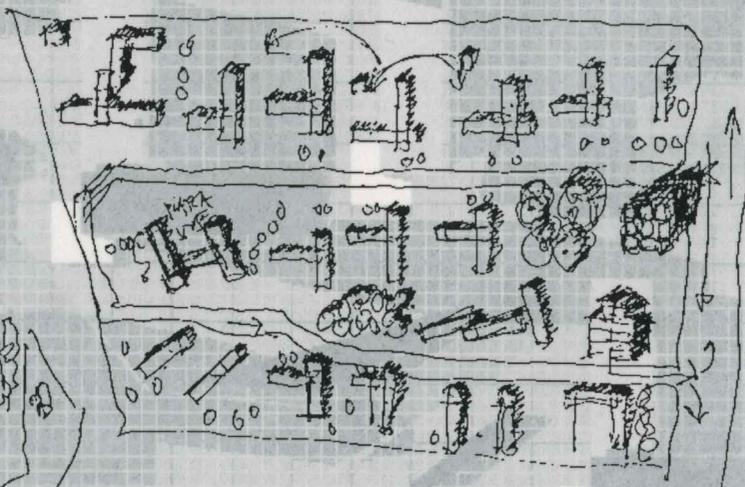
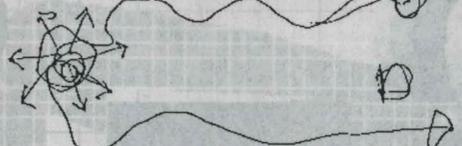
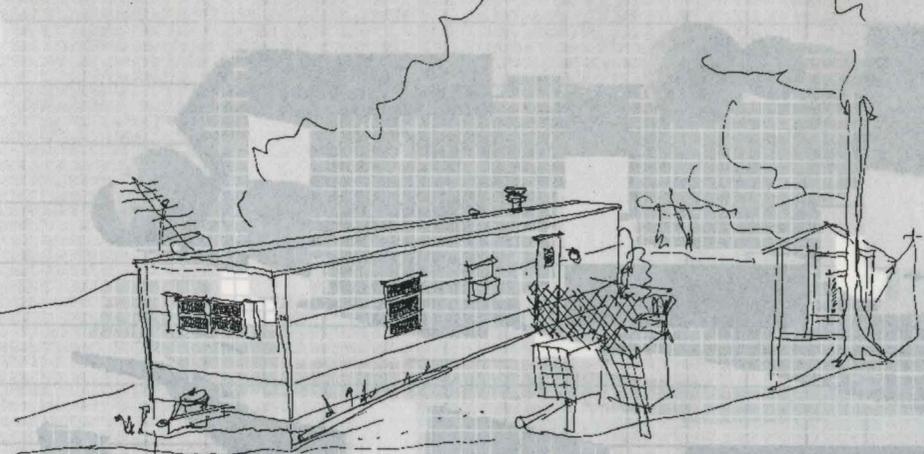




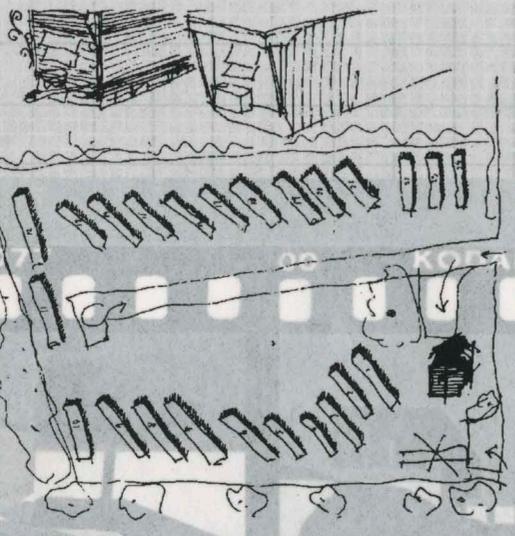
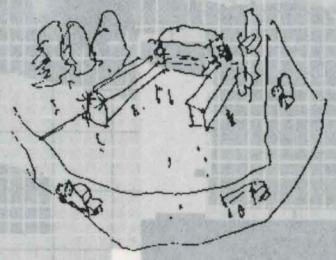
- 25 TRAILERS
- ~ 70-80 PER.
- ONE ACCESSED
 - TREES
 - THE SEMI-USE
 - PARKING
 - PEOPLE USE THE
 - IN THE PARKING
 - AS WORKING
- A COMMUNITY
 - ONE CUTS THE
 - GRASS OF HIS NEIGHBOR
 - LITTLE PRIVACY
 - MISE

An investigation of existing trailer park and potential organizing schemes: the relationship between public, semipublic, and private spaces by natural boundaries and unit positioning.





Paved
or space

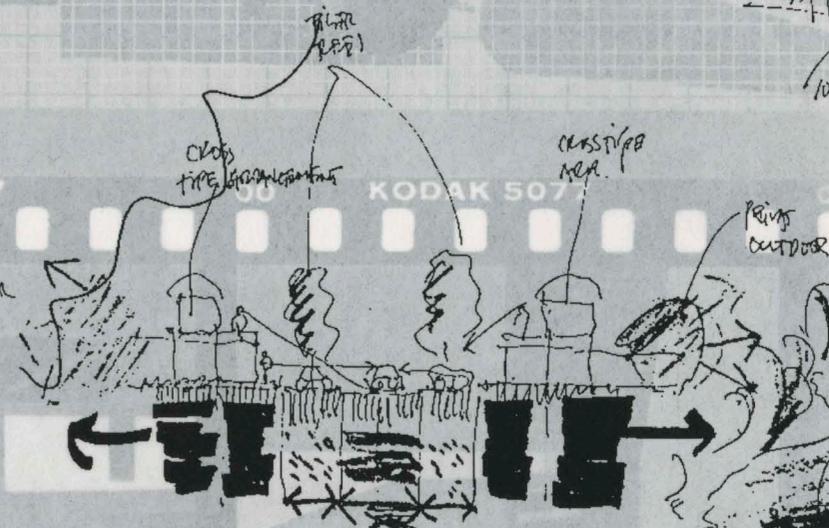


DRIVE
WALKWAY

- 25 trailers
- N 70-80 ft.
- ONE ACROSSWAYS
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- MISE

An investigation of existing trailer park and potential organizing schemes: the relationship between public, semipublic, and private spaces by natural boundaries and unit positioning.

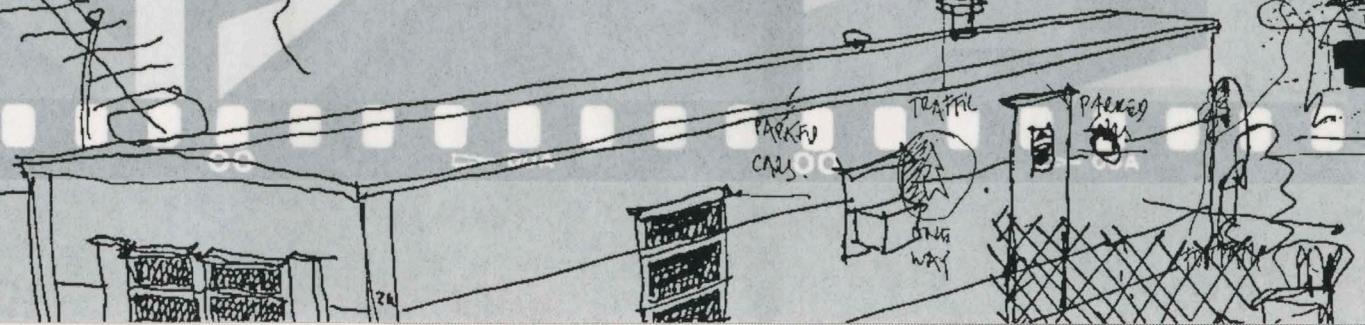
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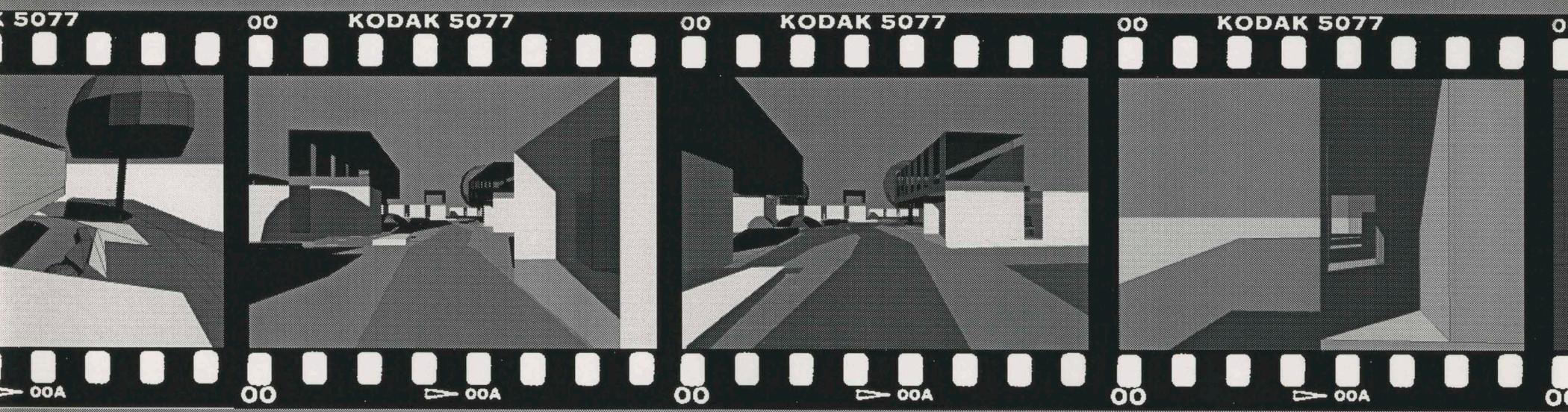
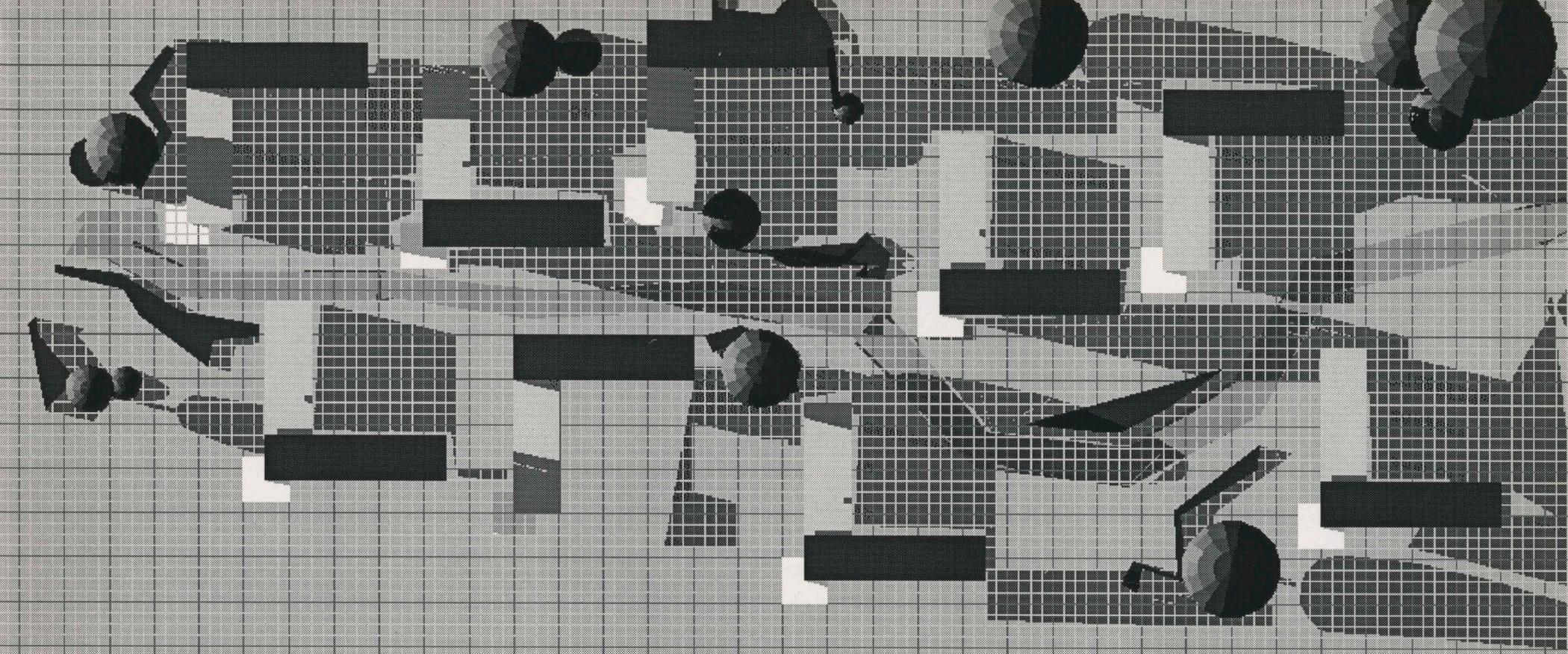


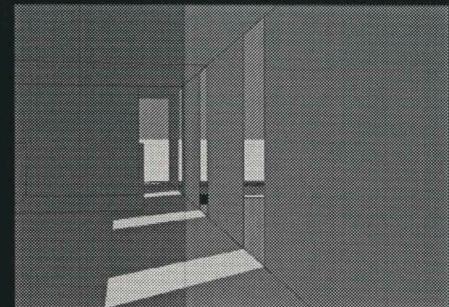
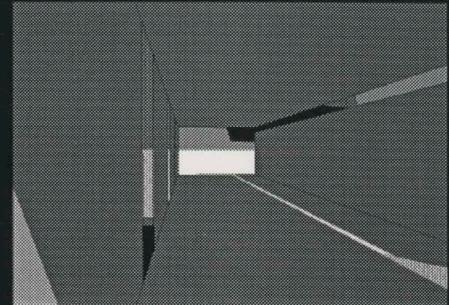
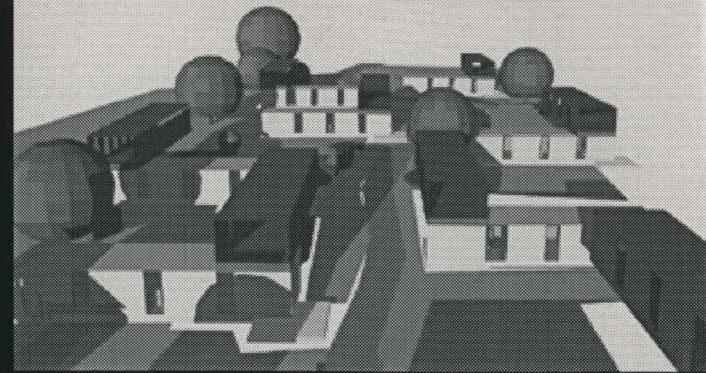
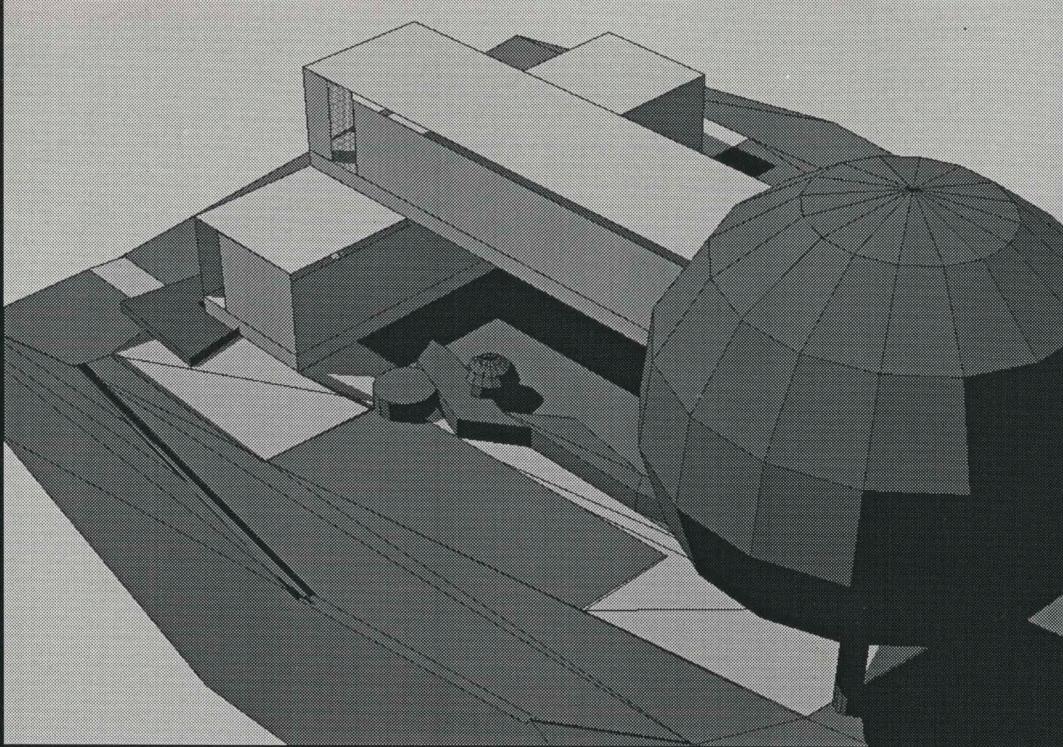
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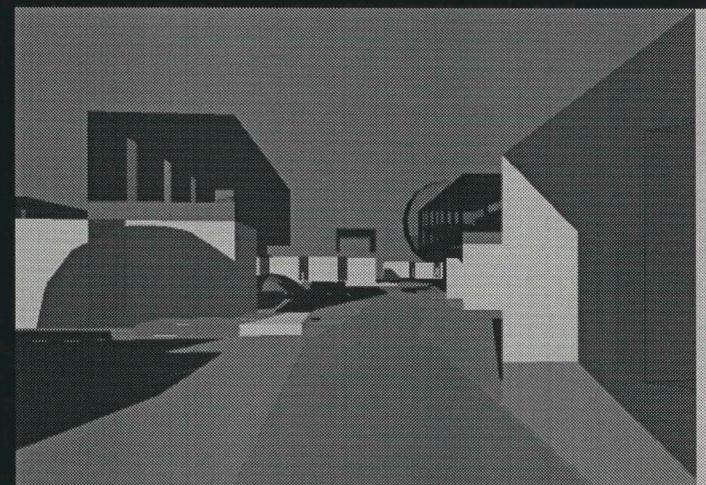
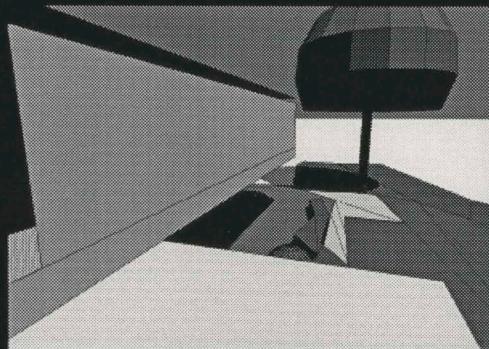
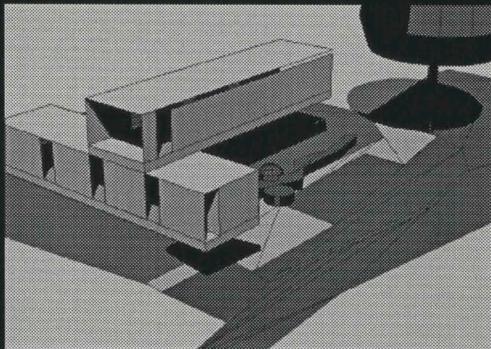
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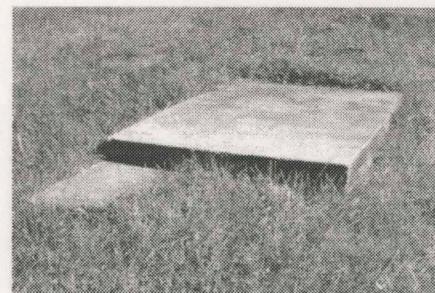




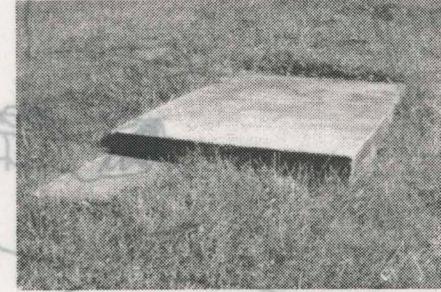


Through the media of computer modeling and animation, the assembly system could be tested in a grouping of several units, giving an accurate sense of dimension, proportion and relationship to the neighborhood. The technology could also give a clear reading of the boundaries such as the public road, parking areas, and the concrete entrance patio.





These are the remnants of a trailer park seen in 1996. The trailer settlement disappeared in the mid-eighties because of diverse interests of the owner. Roughly ten years later, one can see what use has been made of the lot since the tenants had to leave. The concrete patios are a quiet reminder of the human settlement that once existed. No developer has built there yet. It's beyond my knowledge to determine if the trailer setting was right for the short time it was there. This thesis showed me that my proposal intention is not about permanence, but about caring for that which is happening at the present. The quickly changing times make it almost impossible to react to building environments with any certainty at the end of this millennium. It is necessary to ask ourselves what will now happen. The following page can be seen as what may happen to my trailer setting design 69 years after its proposal. I see it not as an ending, but as a beginning.



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Selected Bibliography:

Agee, James and Evans, Walker

Let us now praise famous men
The Riverside Press, Cambridge, MA, fifth printing 1960

Bloch, Ernst

*Das Prinzip der Hoffnung,
Bauten die eine bessere Welt abbilden Architektonische
Utopien, 1938-1947*
Suhrkamp Werkausgabe, 1977

Boesiger Willy

Le Corbusier & P. Jeanneret
Oeuvre complete
Edition Girsberger, 1964

Cook, Peter

Archigram
New York, Praeger Publisher, 1973

Gideon, Siegfried

Raum, Zeit, Architektur
Studiopaperback Verlag fuer Architektur, Artemis. 1976

Koolhaas, Rem and Mau, Bruce

Small, medium, large, extra-large
Monacelli Press, New York, 1995

Kruff, Hanno Walter

Geschichte der Architekturtheorie
Verlag C.H. Beck, Muenchen, 1985, dritte Auflage, 1991

Kurokawa, Kisho

Metabolism in Architecture
Studio Vista, London, 1977

Huber, Benedikt and Steinegger, Jean Claude

Jean Prouvé
Prefabrication: Structures & Elements
Praeger Publisher N.Y./ Washington / London

Mallory, Keith and Ottar, Arvid

Architecture of Aggression
Architectural Press, 1973

Mc Halen, John

R. Buckminster Fuller
Georg Brazille, New York, 1962

Mertins, Detlef

The Presence of Mies
Princeton Architectural Press, 1994

Nerdinger, Winfried

Walter Gropius
Bauhaus - Archiv, Busch - Reisner, Museum Gebr. Mann
Verlag / Berlin, 1985

Oakwood Homes, Christiansburg VA
Floorplans, 1996 mobile home

Rudolph, Paul

Paul Rudolph
London. Thames and Hudson

Schindler Tramcar factory public relation service,
Photographs of the tramcar production
Altenrhein, Switzerland, 1996

Taylor, Frederick Winslow

The principles of scientific management
New York; London: Harper & Brothers

Wachsmann, Konrad

The turning point of building; structure and design.
New York, Rheinhold Pub. Corp., 1961

Wolfe, Tom

From Bauhaus to our House
Farrar Straus Giroux, N.Y., 1981

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December, 1996

Urs Peter Flueckiger