

Signature of the Author

A. I.

Jonathan Lawrence Teicher
Department of Architecture
May 12, 1989

Certified by Nabeel Hamdi
Lecturer in Architecture
Thesis Supervisor

Accepted by
William Hubbard, Jr.
Chairman, Departmental
Committee on Graduate Students

Enabling Housing

dwelling + home + domesticity
typology + specificity + site
chaos + complexity + control

by Jonathan Lawrence Teicher
A.B., Comparative Literature, Washington University, December 1975
A.M., Comparative Literature, Washington University, December 1977

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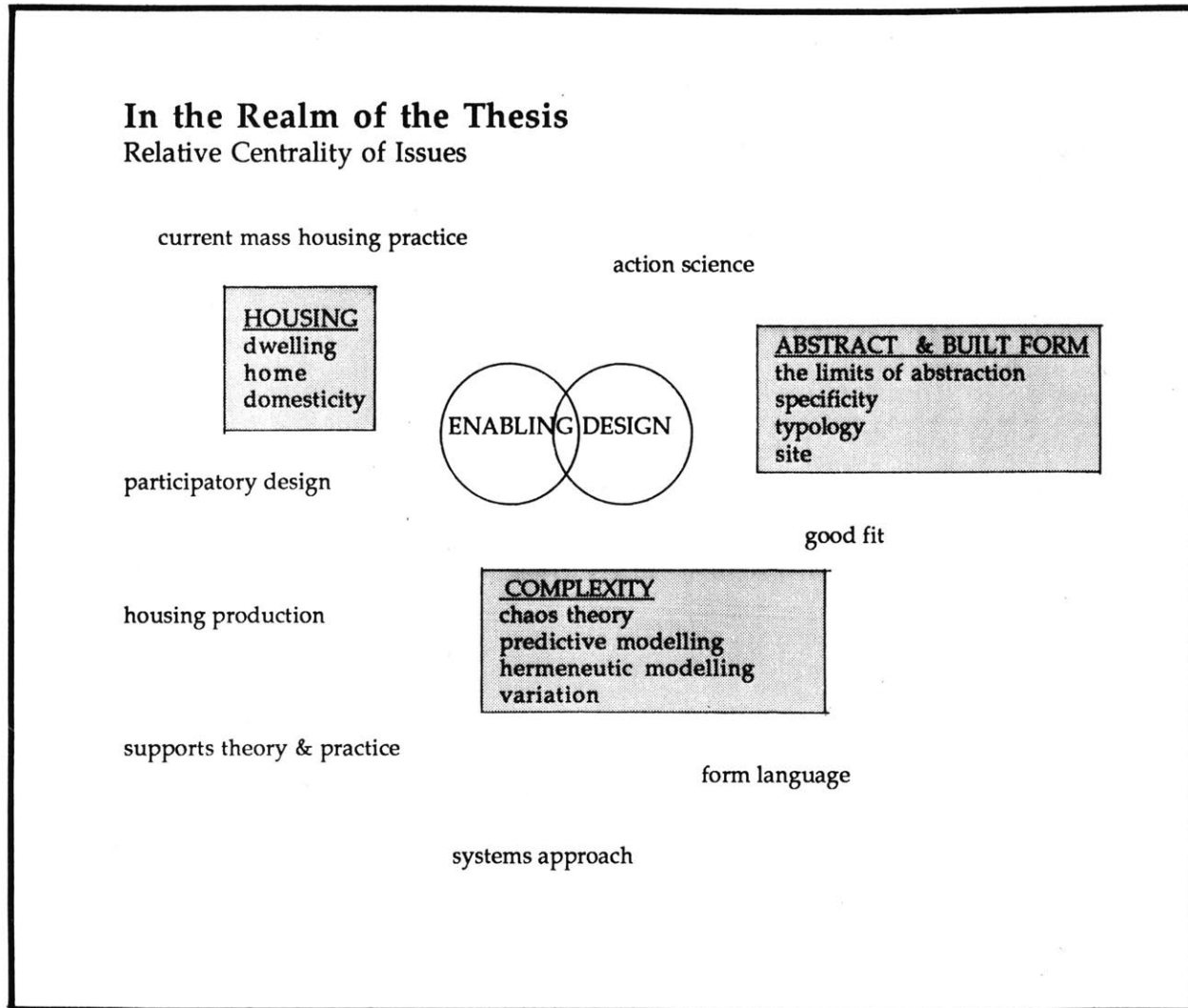
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Relative Centrality of Issues



Enabling Housing

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Thesis supervisor: Nabeel Hamdi
Official Title: Lecturer

Abstract

This thesis explores housing through the filter of *enabling*, an Elizabethan word which has come to be associated with inhabitant empowerment. It proposes the existence of basic cultural, economic and constructional as well as formal categories of enabling. Such characteristics are observable and describable; in so doing, we develop schemata both for rational decision-making and also for judging the performance effectiveness of architectural moves.

We also become better designers through reengaging our chaotic environment. This means understanding those biases which prevent us from recognizing the inherent good fit between inhabitant needs and desires, and environments like the Levittowns.

Enabling Housing is the culmination of a design research, one which engages design as a tool for understanding. Building upon specific common typologies —the rowhouse, the suburban house and the courtyard house—"developed models" were explored to more fully understand type and its role in low-cost housing. In each iteration, enabling character was enhanced or implemented through evident capacity for use change and transformation; strategic material placement; referential clues about potential transformation; and fractal opportunistic response to specific conditions like site.

Formally, the thesis proposes transforming imageable schematic typologies to generate starter dwellings—*housing which grows*. Specifically, it examines implications in the architectural design of extremely low-cost housing with minimal initial square footage and large unfinished volumes — a basic approach of the Levittowns. The design process thus begins with a modelled type, a recombinant configuration of robust dimensions, systems and logics of assemblage and construction. The actual starter home then results from builder and inhabitant and site transformations of the abstracted type. Additional formal, material and referential clues designed into the dwelling's systems support subsequent incremental growth.

On a broader level, two more general areas of inquiry focused the research: *domesticity* as a cultural artifact, and exploration of *chaology*, the nascent science which already has shattered our confidence in LaPlacian models at many levels wherein they had been implicitly assumed to be operative.

Recognition of chaos, sensitive dependence upon initial conditions and the limits of predictive control models like master plans have brought many questions to bear upon architectural practice. In the last section of this thesis, we outline the changing paradigm as it is emerging.

It would be academically dishonest, and probably ineffectual, to fail to acknowledge the teachings implicitly operational in this research. Included to varying extents in addition to the excellent advice of Nabeel Hamdi, John de Monchaux and William Hubbard, Jr. are the form-making theories of N. John Habraken, and of the lineage of Chermayeff: the form language of Maurice Smith; the pattern language of Christopher Alexander; and the grammar of Howard Davis, in whose entry level studio I designed two tiny houses; and two which were quite small.

Acknowledgements

The Boston Public Facilities Division was singularly helpful. Examining low cost housing sites in the Highland Park section of Roxbury was suggested by Rebecca Black . Darryl Jones provided actual sites, together with technical and informal background information.

It also bears mention that the folks at MIT Department headquarters have been supportive in the extreme, throughout the five years since I first showed up at their doorstep.

Above all, I am greatly indebted to the students of MIT for their engagement, encouragement and unquestioned excellence. Special thanks are particularly extended to Peter Lloyd, Leslie Hamanaka, Chin Lin, Mark Three Stars , Julie Chang, Christina Ip and Don Knerr for a great deal, concluding with offers of thesis production help; and to Celeste Kinginger, for beginning, but not ending, with four years of graduate school.

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Setbacks can be positioned to create robust possibility for commerce, residence or minor frontwards expansion.

Façades should be designed with the understanding that strong gables, particularly when bilaterally symmetrical, inhibit forward growth beneath them.

Attic space should be convertible to inhabitable space. This is generally enabled by raising gable "springing" to create sidewalls.

Initial roof height tends to establish permanent roof height. It's extremely hard to build over an original ridge pole.

Pure, simple, small roof forms are hardest to asymmetrically transform.

Usage is greatly enabled by creation of exterior room-sized use territories adjacent to dwelling.

Cladding principles:

At any given size, surface elements transform most easily when hierarchically parallel

Fastening lightly with two kinds of fit may allow for easier transformation, repair than just one kind: it may circumvent hierarchical material deposition

Clearly present subelement sizes are necessary for transformation within any element.

Cladding systems transform optimally when elements have a clear dimensional range in three dimensions, working best in traditional enclosure when they are fixed in two dimensions.

Some General Enabling Principles

Screen doors require a clear floor dimension of 6' beyond the façade, and 3' beyond the circumference of the doorswing.

In practice, transformational capacity depends upon universality of non-proprietary building systems.

The utility of add-on spaces is related to their size. Add-on window seats niches and deepened wall zones occur in the intensified zone of the wall, and thus are extremely useful. In the case of the tiny house, add-on spaces the size of small rooms may provide less flexibility than an equivalent increase in total square footage.

Enabling fine grained craft and transformation is an important capacity in the dwelling.

Passing, tension and dry-stacked connections may offer maximum transformability.

Separation of systems is a key aspect of understanding as well as technically transforming, systems.

Aggregation enables material and economic savings, the development of slack for architectural decision-making, creation of urban scale gestures, and enough material to place decisions within an explicable system, rather than as isolated, disconnected moves.

Traditional good design and enabling good design, having different though overlapping priorities, performance specs and advocacies, may produce housing which does quite different things.

Our training as architects is largely at an institutional size; as such, it's concerns are not always germane to low cost housing at the smallest size.

Given America's inherited rural ideology and values, extremely flexible stick construction systems and deep rooted informal anarchy, traditional supports projects will not work.

Inherent in our world perception based on control models is an incapacity to conceive organized fractal growth.

The smaller the architect's time spent on-site, the more abstract is its conception. Fractal opportunistic response must therefore become the province of builder and inhabitant. At the level of material, detail and site adjustment, the architect's documents must not preclude fine-grained decisionmaking.

Transformation, like modernity, develops a referential language. This language may not indicate what systems do or enable in use. In practice, our indigenous building systems may transform more rationally than do our rationalized ones.

Some background concepts

Like Pygmalion, we tend to fall in love with our creations. Our cultural love affairs with domesticity and the Cartesian universe have profoundly affected architectural theory and practice. When designing to learn about the inherent use capacities of a place, we must avoid seduction by form rather than behavior, or assuming control by "raiding" the decision territory of hierarchical inferiors.

Our design strategies in housing frequently are organized about our bureaucratic system of management first; and inhabitant needs second. In the inevitable conflict between individual freedom and public coherence or welfare, we must be explicit about our advocacies.

The type represents a cultural convention, and thus an enormous efficiency in eliminating diagrammatic and schematic designing. Its transformation and variation in the built artifact respond to specific inhabitant priorities, as well as opportunistic moves in response to site and use.

Much of architect's inability to understand goodness of fit in housing comes from denial of three strongly implicit operative cultural myths: the cult of domesticity, the cottage in the wilderness, and the individual's unbounded possibility to become or go as he/she will.

Sensitive dependence upon initial conditions helps to explain why obscure glitches in the essential design diagram frequently grow to become major built blunders. It may also explain much of the development of the cult of domesticity as domesticity was exploding into being at the time of the New World's settlement.

The 1949 model house at Levittown, New York, reproduced in *Life* magazine, helped William Levitt become the nation's largest home builder. He based the prototype on conventional residential styles, special "built-in" extras, and extremely low costs.



Introduction

This thesis began with research generated by a matrix of paradoxes of the design process as we have understood it at MIT in the late 1980's:

Miniscule problems latent in initial design diagram may develop into disproportionately severe design blunders.

Wonderful abstract diagrams too seldom translate into good built environments.

As housing designers, architects eschew domesticity. It is a fundamental aspect of goodness in housing, a domain of nonformal associativeness, which cannot be understood through our training.

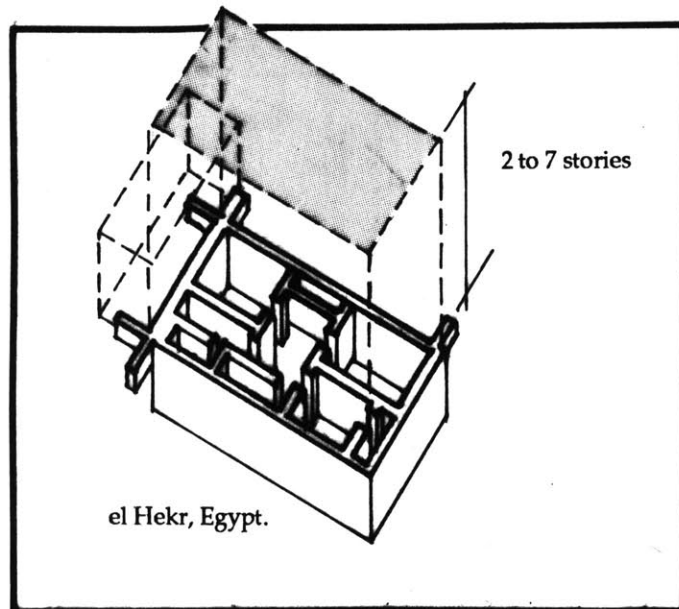
Designers are too highly trained in compositional order and in the language of control systems to produce variation of messy vitality. With respect to variation, architects as a species have inbred one generation too often: we are become mules.

Architects, like ancient armorers, operate within language and value systems largely disjunct from those of users and clients. Built form establishes formal agenda which are often distinct from use: beauty, truth, pluralism, establishment of collective spaces or hierarchies; design with one eye on the future; or with both on the past. In a pedagogical setting, this disassociative scenario has its uses. But current architectural practice also seems to have gone beyond self-consciousness and then beyond narcissism.

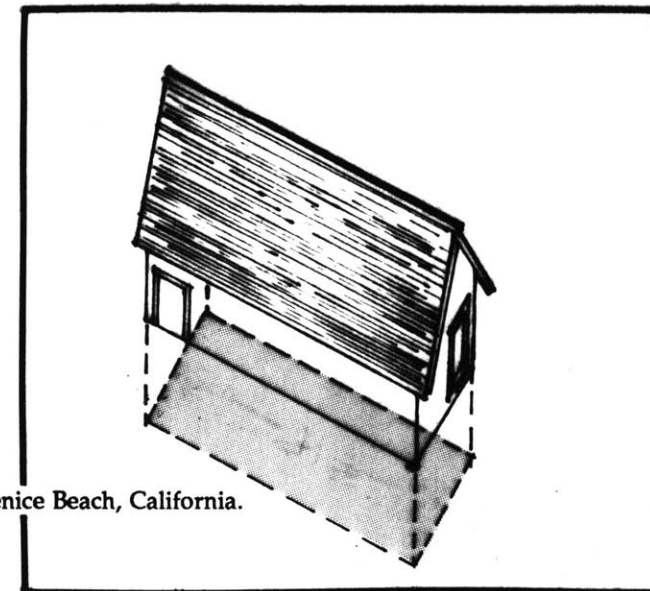
My thesis is that there exist cultural, economic and constructional as well as formal categories of *associativeness*; such *enabling* characteristics are observable and describable; and in so doing we derive principles for decision-making. We become better designers through reengaging our chaotic environment and critically examining the dialectic between our own objectives and those of users and clients. In housing design, this means understanding those biases which prevent us from recognizing good fit between inhabitants and environments like the Levittowns.

Enabling, the conceptual filter through which this thesis approaches design, defines good design through user empowerment performance specifications. Enabling character is engendered or implemented through creating evident capacity for changes in use and transformation; strategic material placement; referential clues about potential transformation; and fractal opportunistic response to specific conditions.

Enabling Housing proposes transforming imageable schematic typologies to generate starter dwellings, *housing which grows*. (see examples below). Specifically, I have been examining the design of extremely low-cost housing with minimal square footage and large unfinished volumes, a basic Levitt housing principal. The design/build process thus begins with a *modelled type*, a recombinant configuration of robust dimensions, systems and logics of assemblage and construction. The starter home results from a combination of builder and participant transformation of that developed typology,



Incremental expansion above a single-story masonry dwelling.

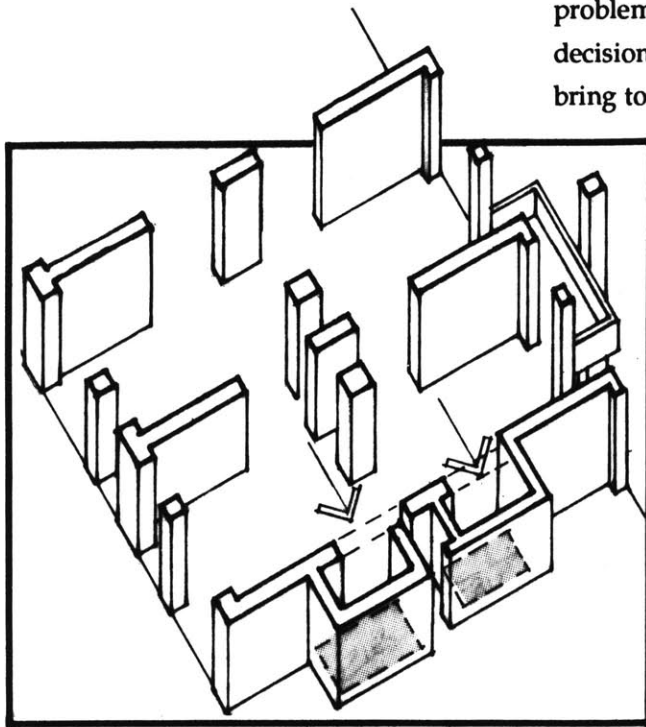


Infill expansion beneath jacked up woodframe dwelling.

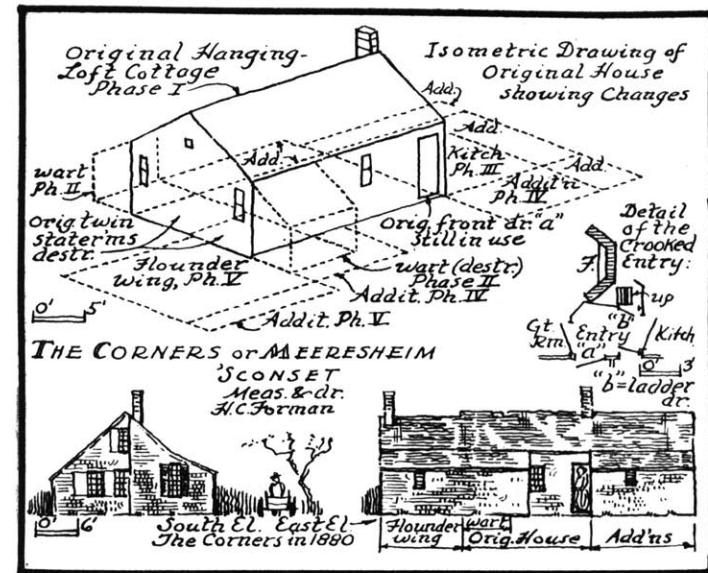
together with opportunistic response to site. Additional formal, material and referential clues designed into the dwelling support subsequent incremental growth.

Low cost housing represents a pathological condition: minimalist, pared down to the bone. Every connection, plane, material and condition is pressed into greater service, scrutinized according to mechanical, referential, cultural, financial and opportunistic usefulness or common sense: : there is no place for gratuitous *beau geste*. As such, it becomes a laboratory for testing convictions, to understand what good design constitutes.

Within a political economy and intellectual tradition founded upon empirically observed natural hierarchy, rational organicists defined the design of complex artifacts as a problem of control: making hierarchy efficient, so that one decision hierarchically orders decisions on lower levels. This anticipated that, given sufficient knowledge, we would bring to urban megasystems the poetic variation of the Greek hilltown, of the conch.

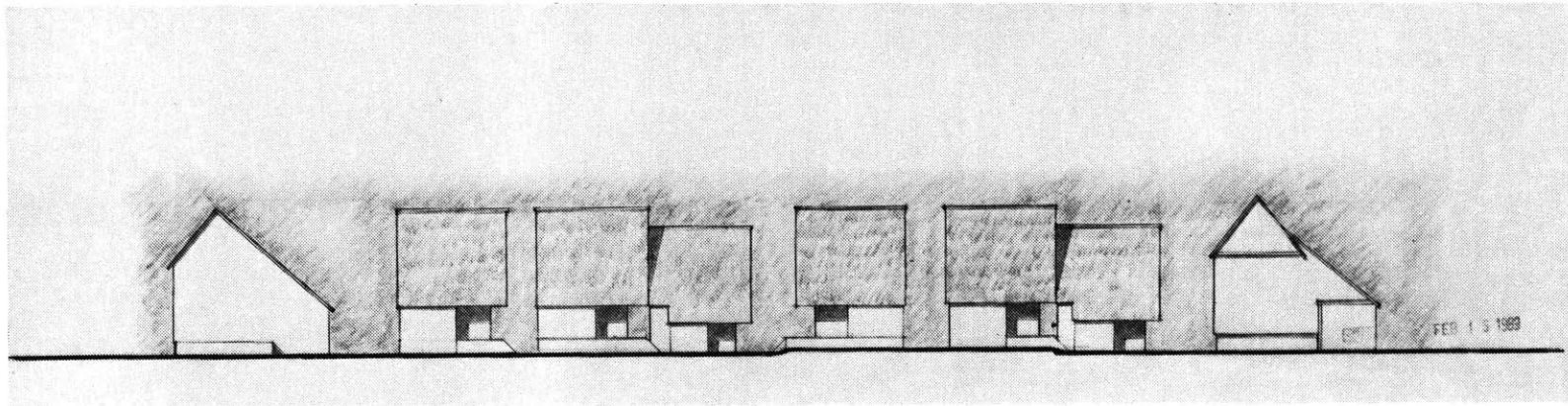
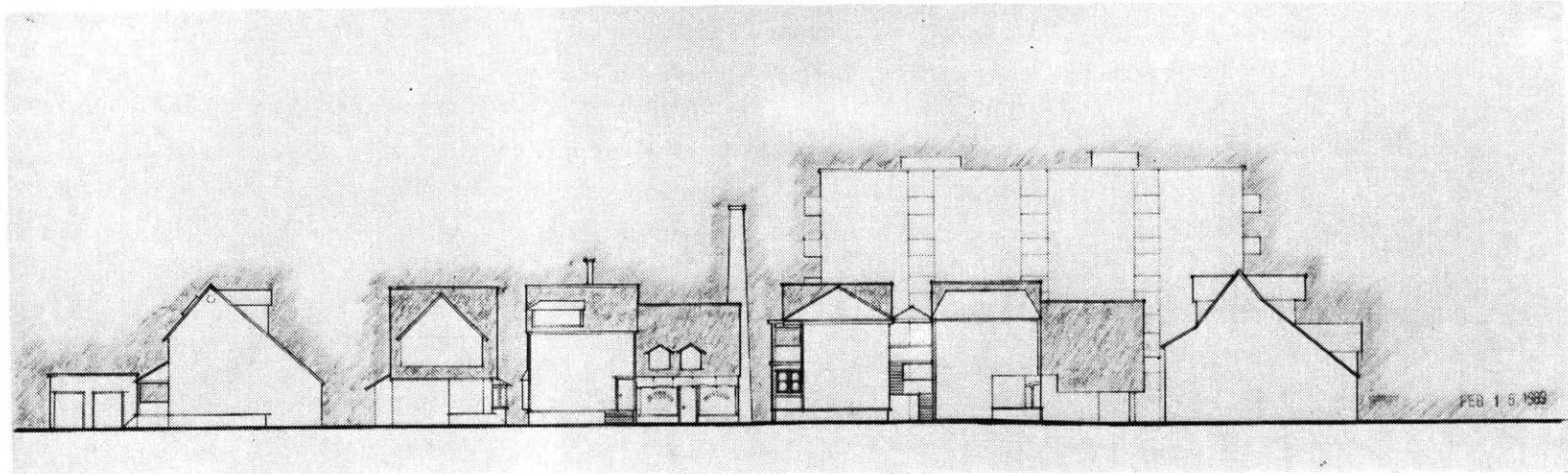


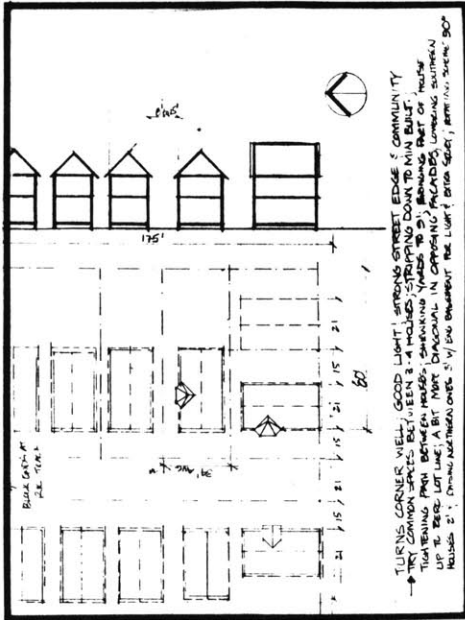
Keyenburg, Netherlands · Shifting partition walls to annex additional adjacent territory from adjacent dwelling.



Sconset, Mass. Pushing out the dwelling's exterior envelope.

**Opportunistic
Growth of
Starter Homes**





Observational notebook sketch

Yet as quite recent dynamical systems research indicates, ecologies and organisms are not exclusively hierarchical: complex natural systems interact *fractally* — at every size, at once — in an opportunistic fashion with simultaneously transformed environments. The structure of institutional architectural practice precludes fractal "organic" design and opportunistic response to fine specificities of site and material: such finegrained *chaos* can be understood through highly structured hermeneutic models. Yet while it occurs frequently in the vernacular, it cannot be generated in strictly hierarchical control systems of design.

In measuring the rightness of design according to rationalized schemata, we essentially check for what Christopher Alexander referred to as *good fit* — an absence of rough edges between stated or implicit design objectives and artifact. Or else, we may after implicit scanning approve the design by affective congruence between desired fit and design, declaring that it "feels right", or "seems reasonable" or "is convincing".

In both cases, theory remains analytical rather than normative: Good architecture is not the record of a set of decisions generated through application of rule systems to form. Rather, it results from a complex layering of culturally-specific good moves, an absence of jarring bad moves, and a vast number of contributory moves which individually exhibit neutral fit. However, as Bernard Deffet's observational thesis (*Built Open Field: Observations and Projections*, MIT '89) demonstrates, the generative abstract diagram, increasingly tends to *become* the form. Fine-grained contributory moves disappear, particularly as size approaches the institutional range.

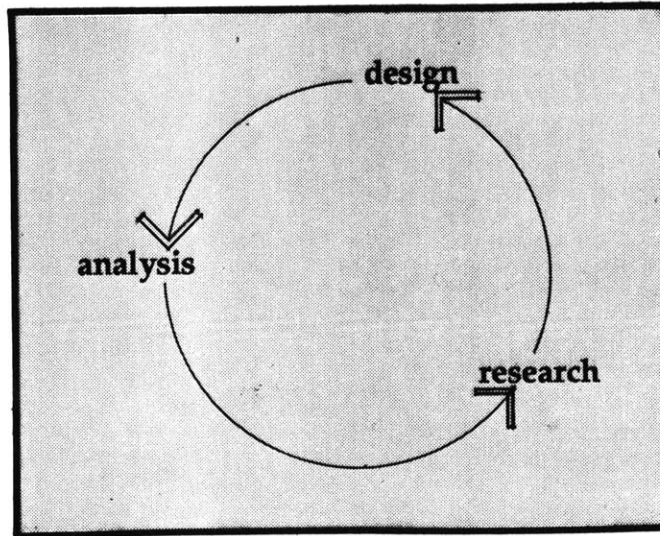
I have observed, with growing abhorrence in recent years, an apparent flattening and homogenization of our environment, language and culture, an ebbing away of nuance, of neologism, of peculiarity. Of richness. In architecture, the finished building looks like an eighth inch scale model, or an unrendered hardline sketch. Research into the limitations of abstract control models, and how those perceptual models become substitutes for chaotic reality, begins to inform such observation.

One shudders at the sheer magnitude of cultural upheaval which would be necessary to regenerate the sort of "organic" fine-grained accretion of individual acts of transformational *dwelling* which characterized the pre-industrial world. In our contemporary cities, such environmental control has been preempted hierarchically. At the scale of tough little starter homes, the enabling architect fosters such individual creation through form, transforming abstract typology to fit initial specificities of site and use. Dwellers, builders and materials through time do the rest.

SECTION ONE

About the research

Anatomy of enabling



Design as a tool for inquiry

About the research

This design research grew directly out of observation of and reading about the postwar merchant builder suburbs, structured by a perception of their goodness. Though they may have been "formally illiterate," builders like Levitt had no problem creating environments of lasting desirability, versatility and capacity for variation through time.

The complexity of conditions which gave rise to the great merchant builders was useful in focusing the thesis investigation. Levittown as phenomenon serves as a reminder that the crucial housing design factors are frequently non-formal. Equally thought-provoking was the contempt with which such extremely robust environments are dismissed by otherwise thoughtful architects. Their goodness of fit was not perceived as "architectural" in nature.

Bolstered by the pioneering work of Lois Craig, Gwendolyn Wright and Herbert Gans, I began to reexamine Levitt housing not as architectural artifact, but as *enabling tool*. In John Turner's idiom, I examined what housing *does*, rather than what it *is*. Not surprisingly, much of what the "ticky-tacky box" does is precisely what architect designed housing will not do: It broadcasts domesticity, invites knickknacks and curtains and lawn decorations, encourages transformation within a non-expert, non-proprietary vernacular technology. The Levitt home broadcast image, guaranteed one tree, one fence, one usefully dimensioned and three ceremonial yards: it was a virtual colonial cottage in the wilderness.

Which is not to argue that "everything is almost alright" in Levittown. The antiurban social, political, formal, and ecological aspects of suburban tract development have been exhaustively documented. The larger the scale of reference, the worse the archetypal Levitt development performs. But as low cost housing with enormous use and transformational capacity, individual control opportunity and decision-making, the inhabitant *enabling* of the Levittowns has not been surpassed.

The first step of the thesis then was to observe critically how and what the suburban typology enables. This led to generating a specific catalogue of strongly enabling moves to design into housing; a series of theoretical explorations into realms like typology, complexity and domesticity; and concurrent examination of the training, role and practice of the architect.

From its inception, this thesis research has emphasized design as a tool for understanding, rather than as an end unto itself. In explorations of housing which grows, of developed types, of site and use response, of domesticity and complexity, it progressed through loops of design, then analysis, then research. Each subsequent loop eliminated some design directions - such as modelled court house types and supports schemes - while opening up new fields of theoretical inquiry. The intent has been neither to design a definitive project *per se*, nor to use design as a vehicle for representing a short list of concepts. Form—even that of a 600 ft² low cost dwelling — has its own irreducible language and logic. Here, it talks fundamentally about an enabling sensibility.

As is developed further in the section on complexity, I am increasingly convinced that explicit rationalization of all design decisions is crucial to multiple client management, control and representative governance. It quickly becomes reductive out of that setting. But more importantly, even in speculative research design, as the form/concept relationship approaches isomorphism, with every line and word bounded by the same concepts, the form loses richness and becomes diagram. Put differently, this thesis presents design in which enabling was explicit and generative, but by no means the whole intent.

In the thesis presentation, text and image are intimately connected, mutually illustrative, yet *self-stable*; each appearing according to its own internal logic, capable of standing alone. Such organization reinforces a model which talks about hermeneutics, rather than control: It lets the ideas develop on their own terms. The thesis as sourcebook

is intended to optionally present a brief catalogue of enabling moves; a survey of the concept; a short list of germane abstract concepts; a bibliography; sample enabling analysis and/or a design research exploration.

I would be hard-pressed to rationalize the vision I first had of combining dense urban infill for badly damaged areas with a sense of wartime, pioneering, systems design, prefabrication, supports theory and suburban typology. Perhaps it came largely from juxtaposing rationalized mass housing, the maddening schism between apocalyptic world war and the too-normal Levitt houses initially built for its returning soldiers, and our myth of wilderness homesteading. Certainly, I was trying to understand Supports theory in an uncompromisingly American context.

The toughness of that initial vision was somewhat mitigated by the unanticipated beauty of the Highland Park section of Roxbury. Notions of the limits of prefabrication in housing, together with an insistence upon opportunistic response to site and the presence of housing vestiges throughout Highland Park, began to transform that image of tough little houses into something more like hermit crabs, creating place by dwelling in the ruins.

enable:... to give power to (a person); to strengthen, make adequate or proficient ... to make competent or capable ... to supply with the requisite means or opportunities to an end or for an object ...

- Oxford English Dictionary

Anatomy of enabling definition and proposals at urban, collective, residential and system sizes

Enabling in the sense quoted was a concept already well established by the Elizabethan era. As an explicit architectural concept, it emerged within the rubric of community and participatory design in the United Kingdom in the 1970s, largely through the influence of the UIA (*Union Internationale des Architectes*), but above all through articles appearing regularly for a decade in *Architect's Journal*. Although media coverage of enabling (and of community architecture in general) has declined during the past decade, the term has become ubiquitous.

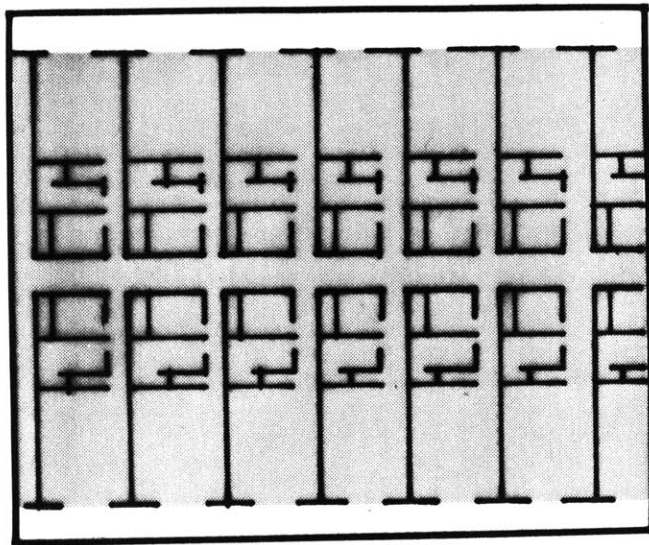
Enabling defines inhabitant empowerment as the primary measure of good design, as *parti* and performance specification. The concept thus models intention performance in design, compelling recognition of the behavior of the artifact at all sizes in user life. In so doing, it brings to the fore inevitable conflicts between individual and collective interest.

In advocating individual choice and freedom, enabling goes beyond *supports* urban tissue design, wherein the architect balances the needs and interests of individual clients against presumed civic needs over a three hundred year period; and beyond community architecture, wherein the architect assumes fiduciary responsibility for the interests of the community-at-large. Enabling design thus highlights, in Turner's idiom, precisely *who provides and who decides*.

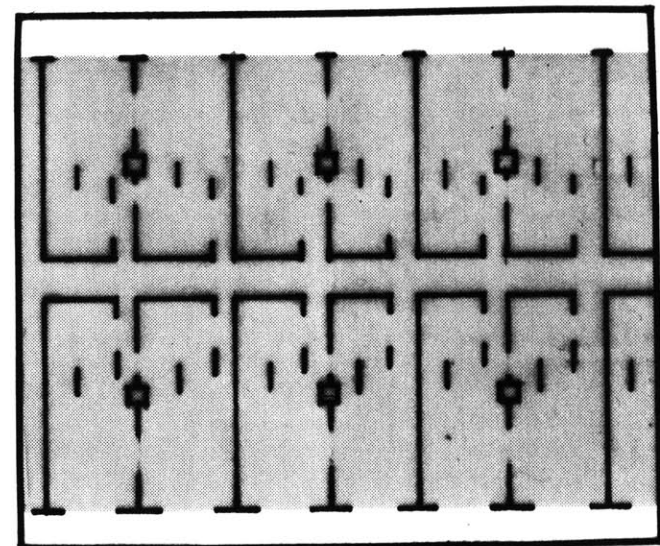
As this research points out, our training as architects is also geared toward the institutional client, and is ambiguous in its fiduciary intent in conflicts between individual and society. There are also troubling conflicts between client perception of needs and architect assumptions. Witold Rybczynski observes in the forward to *Home: A Short History of an Idea*, "The architectural ideals that I had been taught in school frequently disregarded --- if they did not altogether contradict --- my clients' conventional notions of comfort."¹

It seems reasonable that architects should advocate craft, clarity and beauty. Yet in small-scale low cost housing, design represents *triage*. Its altered priorities must find expression in different performance specifications. Compositional concerns take a back seat to transformational capacity, or opportunistic use and site response which implement enabling moves. Again, enabling performance specifications are not intended to excise beauty, but to provide a measure of the relative tug of aesthetics and explicit client need.

In American post-war mass housing, the habitation was viewed as a halfway house between poverty and comfort, a compact analog of the turn-of-the-century sociological *zone of emergence*. Such "temporary" housing discouraged inhabitant intervention, both in terms of rules which explicitly forbade acting upon—and thereby territorially claiming—the walls or interior surfaces of the dwelling; and also through the use of concrete, brick and proprietary industrial systems and materials. There could be no true *dwelling* there: the existential act of inhabitation was prevented.



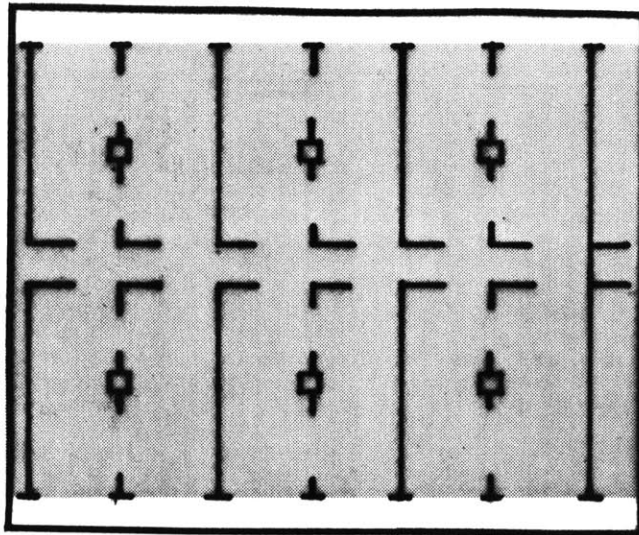
Mass housing



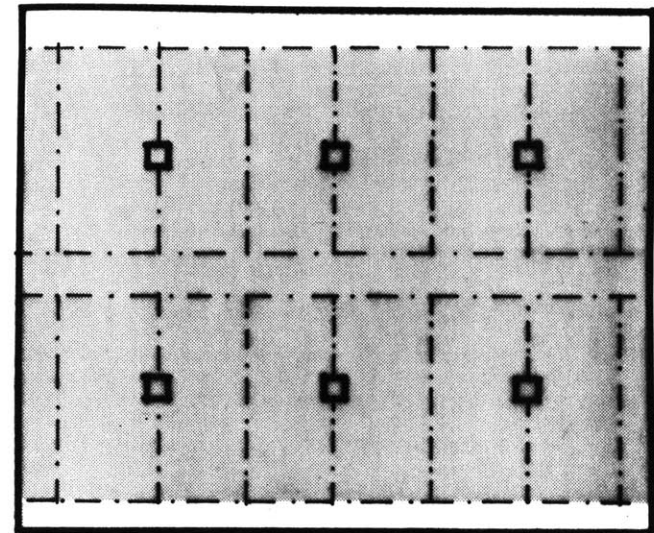
Supports project

In a minimalist perversion of the traditional American Federalist urban aesthetic of practical egalitarianism, every facade was industrialized and identical.² Such construction was institutional rather than homelike, and frequently quite expensive. Material from the lintels to the sheathing to the stoop was brick and concrete and metal. As a result, there was no true dwelling there; the transformational act of inhabitation was prevented. As Kevin Lynch notes, it was frequently a place "where a public agency believes that subsidized units should be a little less than ideal, so that families [would] not loiter there."³

The efficiency of laying in a minimal pipe infrastructure to fixed density and size requirements (which Kroll describes as *architecture cloaque*); the combination of expensive construction and industrial finish; the poor fit of material to use — all of these marked mass housing. There was nothing in it of dwelling; no image of home; no connection to site or to worklife; no opportunity for legitimate commerce; no exterior use territory. The housing project was at once extensive and uninhabitable.



Flexible Housing



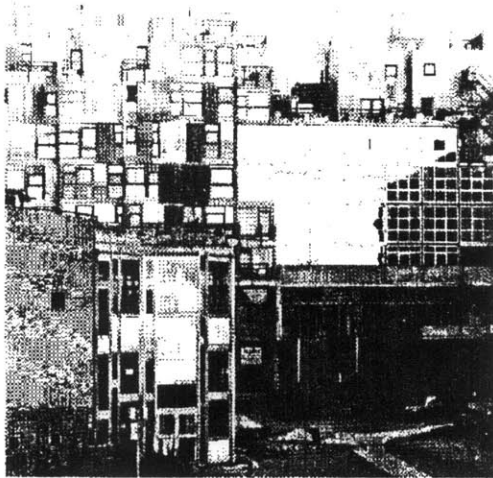
Sites and Services linkage

This sharply contrasted with the prior industrialized but fine grained production of American housing. For two centuries, urban dwellings for all classes had been developed a few at a time, copied from patternbooks or generated within a typology. As Gwendolyn Wright explains, "a speculator often sold several lots to a housewright or an independent building tradesman ...who put up one or two new houses within a year..."⁴

Even in the suburbs of the 1920's, "developers or subdividers ...platted future lots, installed streets and sewers, and then usually sold most or all of the land to small builders...or to individual clients...In the 1950s, generous government-financing programs made it much more profitable for the developer to build the houses as well."⁵ Postwar housing crises, fundamental reorganization of capital, labor, and industrial production, Taylorization and theory of standardized production and "economies of scale" all contributed to the create projects of hundreds of "units", institutionalized housing management and massive public investment.

Government underwrote massive acquisition and construction, then employed property managers and rent collectors in an uphill battle to recover costs. Public intervention was tautologically at a maximum, justified by the sheer extent of public intervention. As analyses in the UK have shown, it is frequently most economical to simply give such mass housing to tenants.

As federal intervention in housing projects has tapered off, theorists for several decades have explored how to reorganize low cost housing production at a much smaller scale. Slowly, global emphasis shifted from government provision of support and infrastructure of a diminishingly physical character. In the 60's, this was conceived as provision of built frameworks for mass housing — e.g., Yona Friedman's linear housing proposals in France, the plug-in cores proposed by the Japanese Metabolists, and Habraken's watershed Supports: An Alternative to Mass Housing.



Médé: domesticated virtual chaos

By the 70's, industrial flexible systems design sometimes reduced architecture to endless possibility, at the expense of explicit material indication of intended use and capacity through form. As Nabeel Hamdi points out, sites and services self-help projects left inhabitants with little more than quite rationalized municipal services hookups, while public housing tenants got dwellings. The costs, at least to tenants, were the same⁶

Despite such *reductio ad absurdum*, existential, formal, social and economic benefits clearly result from decentralizing, deinstitutionalizing, and breaking down the mass of mass housing. Code restrictions become less imposing, systems and materials can be lighter and non-proprietary, more transformable. With small builder decision-making comes freedom to respond to fine-grained stimuli. Low cost housing can return to the American republican egalitarian ideal, looking like any other housing, allowing pride of dwelling.

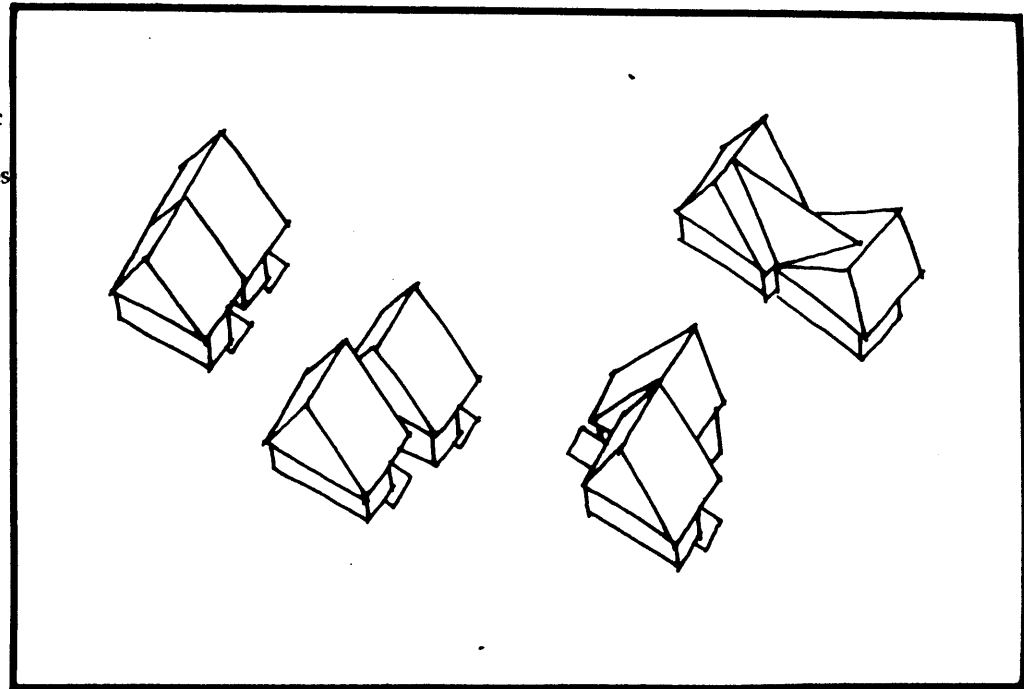
As Habraken has argued, the efficiency of variation is furthered by participatory design. This is in contradistinction to projects such as Erskine's or Kroll's Médé, wherein variation becomes input, mediated and compositionally expressed by the architect, using high tech systems to create a variety of domesticated virtual chaos.

This thesis argues for a new approach to low cost urban infill housing which grows through time, based upon changing perception. Redefined performance specifications of housing include sheltering, anchoring individuals to the community. This is accomplished by enabling them to territorially transform and inhabit a dwelling and its site, encouraging them to invest in it and help secure and return to productivity torched and redlined neighborhoods, inviting them to profit from legitimate commercial opportunities and the informal work sector. Sweat equity, whether in the form of house improvements or policing the neighborhood is recognized as value-adding investment.

Such enabling housing requires redefinition of Habrakian *supports*, and of public intervention in housing. SAR supports practice establishes sectional form and builds to

maximum target density, employing proprietary partition systems for horizontal flexibility. To date, there has been minimal provision for growth through time as such, no fine-grained, opportunistic individual site or use transformation, only movable transverse boundaries. Understanding of the opportunistic fractal nature of organic design reinforces environmental perception that there exists no substitute for transformation over time.

Collective form helps build urban density and characteristic sizes, enabling shared structure, linkages and resources. For the low cost housing designer, it enables variation and moves which the enormous constraints of the individual dwelling could not otherwise permit.



collective enabling

Clear benefits emerge from aggregating housing below institutional size, where fine site response is still practical. For extremely low cost construction, it begins to offer options and trade offs to the architect, decisions which by their nature are individual design judgments — e.g., sharing foundations, party walls and/or access in return for landscape or finish or detail amenities, upgraded fenestration, or optional structure or screening. Clearly, a wooden stair or brick path or entryway for one dwelling may easily have the inherent capacity for use by several. The enabling limit occurs when residential character becomes institutional, when practical engineering concerns resulting from specific collectivization decisions dictate individual dwelling design or unreasonably restrict choice.

Vertically stacking unrelated dwellings in response to density requirements poses specific problems, such as alienating inhabitants from landscape and landscape use; and limiting outdoor play for children who require supervision. Each additional floor requires progressively increasing infrastructure: shear walls, elevators, internalized access systems, enclosed masonry fire stairs, parking lots, massive foundations, institutional floodlighting. All of the above exist within the public realm, and require public management and maintenance.

Acoustically, the vertical stacking of unrelated dwellings also precludes wood or other low-density, resilient and transformable systems. Plumbing locations and basic activity zones within the apartment must all be fixed to avoid irremediable acoustic conflicts. Everything must be acoustically insulated, then isolated with mass. Even so, there is no economically feasible solution to impact sounds, which account for fifty percent of all neighbor complaints.⁷

For these reasons, enabling housing has been envisioned as grounded, freestanding semi-attached or row housing. The potentially independent rooms or studio apartments are assumed to be under the control of the inhabitants of the first floor, who would otherwise have impact noise complaints, or require excessive noise control.

The urban infill housing model promotes fine-grained permeation of redlined or badly disintegrated neighborhood sites as infill. There, existing intermediary structures will help to stabilize the community, and encourage community investment to match civic improvements. Thematically developed typologies, dimensions, materials, connections and use-based decisions about architectural space design become a branched network throughout the city --- a conceptual "support" structure. Knowing what they will do, their approximate scale and range of uses, maximum capacities and FARs for regions of the city can be zoned. Specific disposition of material at block size or smaller is determined by topological, market, human, social, historical, cultural and chance factors.

While the longterm form of any specific dwelling site is unknown, predictable patterns of decision- and city-making inevitably emerge. Control models of this chaotic process traditionally led to hierarchical decision making in which form at the smallest sizes was limited by a need for predictability at the top. With the capacity to model that *sensitive dependence upon initial conditions* (highly-structured mathematical chaos) characteristic of human decision-making , more responsive hermeneutic models may be studied.

The premise of **Enabling Housing**, as stated in the introduction, is transforming imageable schematic typologies to generate starter dwellings, *housing which grows*. Its materials and design are efficient, but non-institutional. Dwellings have an initially minimal perimeter, within an expansion envelope of up to 1500 ft², and an urban scale roof. Incremental investment can develop several hundred square feet of unfinished interior, before requiring exterior envelope changes. Basic developed housing transformations vary in response to site and use over time.

systems

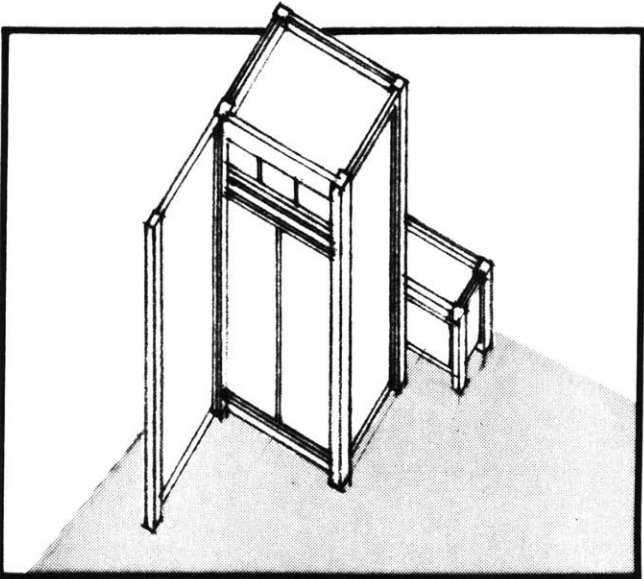
Implicit in the use of rationalized dimensional systems in enabling is a pedagogical intent as well as rationalized efficiency. It is assumed that human beings respond kinesthetically to dimensions and their capacity for use — e.g., a low wall designed at sitting height, or a low ceiling which discourages use change from private to collective where inappropriate. In the same way, the visible structural system becomes a way of introducing some understanding of generative abstraction, as well as how structures transform.

With the possible exception of sheathing and flooring systems, freestanding wardrobes, prefab baths and kitchens, optional modular bays and occasionally modular "rooms within rooms", the projected housing is based upon generic and universally understood 16" oc stud wall construction. Projected maximum window and door rough openings are framed with posts and lintels, into which elements are framed (16" oc) as infill. Framing in lintels at a standard height reinforces dimensional continuity and perception of habitation. While organizing facade dimensions, it builds in a capacity for indoor/outdoor extension of functional zones. Rationalized construction and spatial ordering framework favor a four foot material dimension where possible.

Structural tongue and groove flooring, where economically feasible, obviates the acoustic, visual and structural requirement for labor intensive floor and ceiling systems, supporting them when desired. Changes in wall thickness thus do not impact ceilings. Together with post and beam framing where change is anticipated, structural flooring provides easy transformable planes.

Within subsystems, easy transformation is favored by independent floors and partitions, and connections which accept material variation in three dimensions.

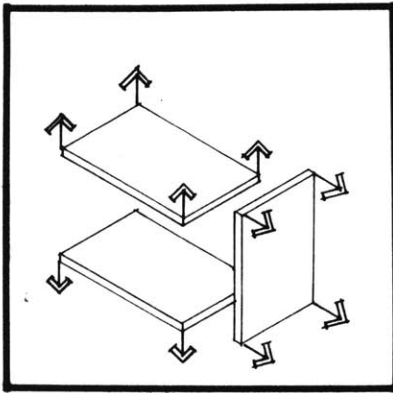
How things come together matters greatly. Enabling methods of joining include press fits and other "dry" assemblage, freestanding tension connections rather than hierarchical stacking, and building in dimensional slack. A zone in which the floor and wall planes can pass, butt, or miss permits dwellers to sectionally connect rooms.



Freestanding wardrobes

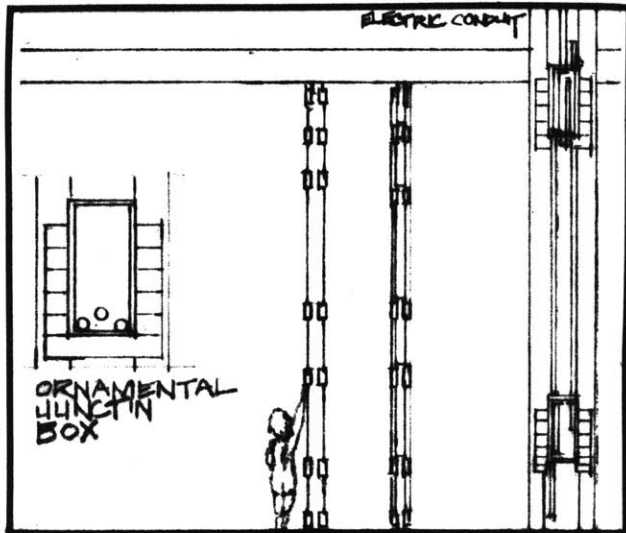


Optional bays

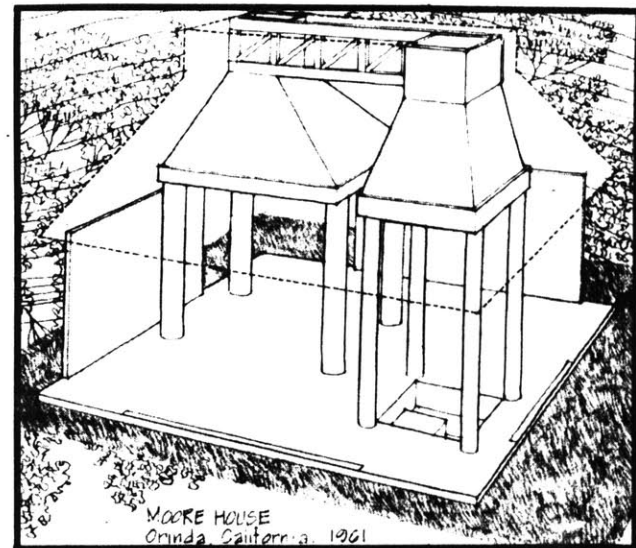


Wall, ceiling and floor systems can be constructed to transform independently

In general, clear separation of subsystems allows them to be understood and transformed independently. Thus windows and modular bays should be removable without tearing into side walls, piping should be easily and continuously accessible through chases, not cast into basement floor slabs. Base molding reveals can be dimensioned to accommodate conduit. Structural wooden posts which are constructed as flanged beams can accommodate wiring conduit and electric boxes within web connectors.



Light posts which incorporate electrical conduit



Rooms within rooms within...

SECTION TWO

Summary

The concepts of home, dwelling and domesticity provide a way of understanding what American housing *does* for inhabitants. Prevailing historical conditions contemporary with the settling of America, and the subsequent blossoming of the cult of domesticity help to explain our predilections for freestanding and isolated houses, for domestic imagery, for looking to the dwelling as a source of self-expression and educational artifact.

The deepest meaning of any place is its sense of connections to human life and indeed to the whole web of living things
- Kevin Lynch.

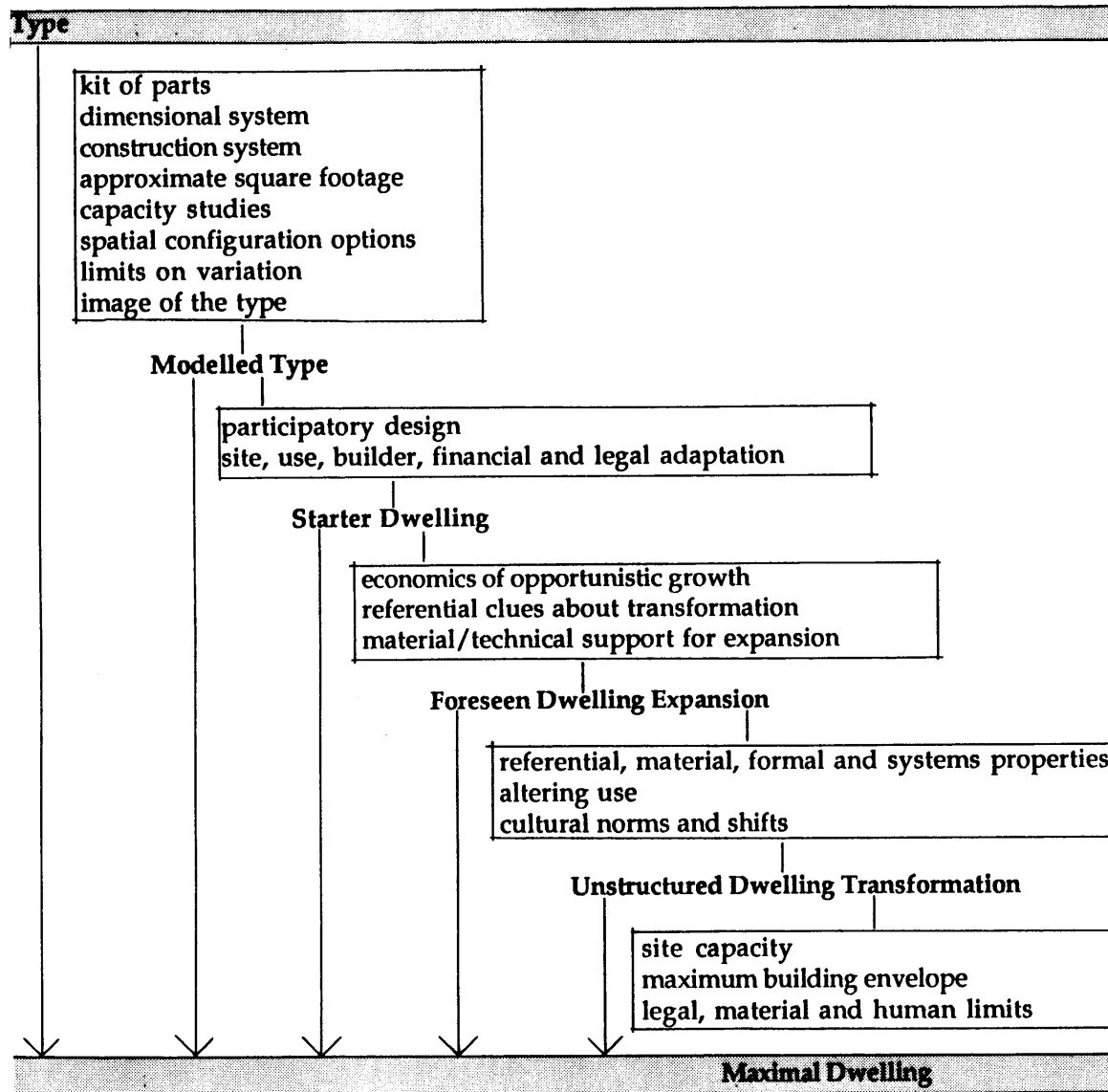
The house is only finished once the owner is dead
- Spanish proverb

In today's housing...do the houses themselves hold any guarantee that *dwelling* occurs within them?
- Heidegger

SECTION TWO

dwelling + home + domesticity

Emergence and Transformation of Dwelling Form Through Time



A Portrait of the dwelling as toaster

The New England dwelling evolved out of unpartitioned wooden cottages with undifferentiated use. These easily transformed post-and-beam colonial prototypes perched tentatively on fieldstone foundations, held in place by gravity. As late as the beginning of the twentieth century, one of the part-time jobs in any small village was that of housemover. As Myron Meserve, a centegenarian New Hampshireman recalled: "they used to move them around constantly, like so many checkers on a board..." Given the relative lightness and tensile strength of their construction system and its minimal connection to foundation, it represented a practical and efficient system for adaptive reuse, at a time when spatial types were less use-specific.

Within a continuum of permanence from carved stone cave temples to tents, such wooden structure is "camping out" on its foundation. The combined attributes of lightness, movability and generic design identifies the New England dwelling much more as a progenitor of the trailer or Sears mail order house --- a movable plug-in appliance --- than its idyllic image of sensitive aggregate site response would suggest.

As Amos Rapoport says, "People live not in buildings but in cultural landscapes." The freestanding wooden cottage on the landscape still portrays the predominant myth and image of the American dwelling, although the image has become entirely alienated from any means of production. At the same time, it is layered within an idea of *home* aggregated over eons, whose epistemological profile still evinces the Heideggerian dwelling's primal characteristics of *intensification* and *enclosure*.¹ To understand the development of our own symbolic and cultural performance specifications, we must focus upon the historical moment at which the New World dwelling was emerging; and who its builders were.



Emanuel de Witte, *Interior with a Woman Playing the Virginals*
(c. 1660)

The Invention of *Home*

Throughout Europe in the middle ages, dwelling occurred in halls of undifferentiated use, wherein organization of production required that all classes be present. Buildings and furniture (in French, *meubles* and *immeubles*) were sparse and multi-purpose. Spatial intimacy was an unknown concept. According to Lukacs, "as the self-consciousness of medieval people was spare, the interiors of their houses were bare ... The interior furniture of houses appeared together with the interior furniture of minds."²

And Witold Rybcynski observes, "Before the idea of the home as the seat of family life could enter the human consciousness, it required the experience of both privacy and intimacy, neither of which had been possible in the medieval hall."³ As he further notes, speaking of the time of Dürer, "It was more than a hundred years later that rooms to which the individual could retreat from public view came into being — they were called "privacies".⁴

The changes in built environment which corresponded to and reinforced progressive individuation of the human psyche, as analyzed in Bachelard's *The Poetics of Space*, are beyond the scope of the present thesis. Related and germane is the notion of domesticity, of which Lukacs observes, "Domesticity, privacy, comfort, the concept of the home and of the family: these are, literally, principal achievements of the Bourgeois Age."⁵ The locus of the emergence of and first experiments with domesticity was the Netherlands in its Golden Age, the sixteenth and early seventeenth centuries.

The development of private townhomes in the Netherlands was a matter of geology, politics, religion and wealth. Neither foundation pilings in reclaimed polder land nor population density could support the *palazzi* or *hôtels* of neighboring nations. Nor, because Holland was a mercantile nation, was there wide need for home production space.

Politics and pragmatism of the Dutch thus dictated small houses; and egalitarianism frowned upon live-in servants (for whom the tiny Dutch dwellings had no place, at any rate.) At the same time, the unequalled mercantile opulence of the nation was such that young servants and apprentices could afford to continue living in parental homes.

The dwelling ceased to be a multi-purpose public production hall as it had been in the Middle Ages; instead, it became smaller, a place of intimacy and leisure.⁶ Children were no longer shunted off to become apprentices or pages at age seven, and parents and children began spending extended periods of time isolated together in dwellings. This was the framework for the emergence of a startling phenomenon: people fell in love with their children, with their homes, themselves, and with the newly-discovered intimacy of family life, with *domesticity*: "It was the opinion of more than one contemporary visitor that the Dutch prized three things above all else: first their children, second their homes, and third their gardens."⁷

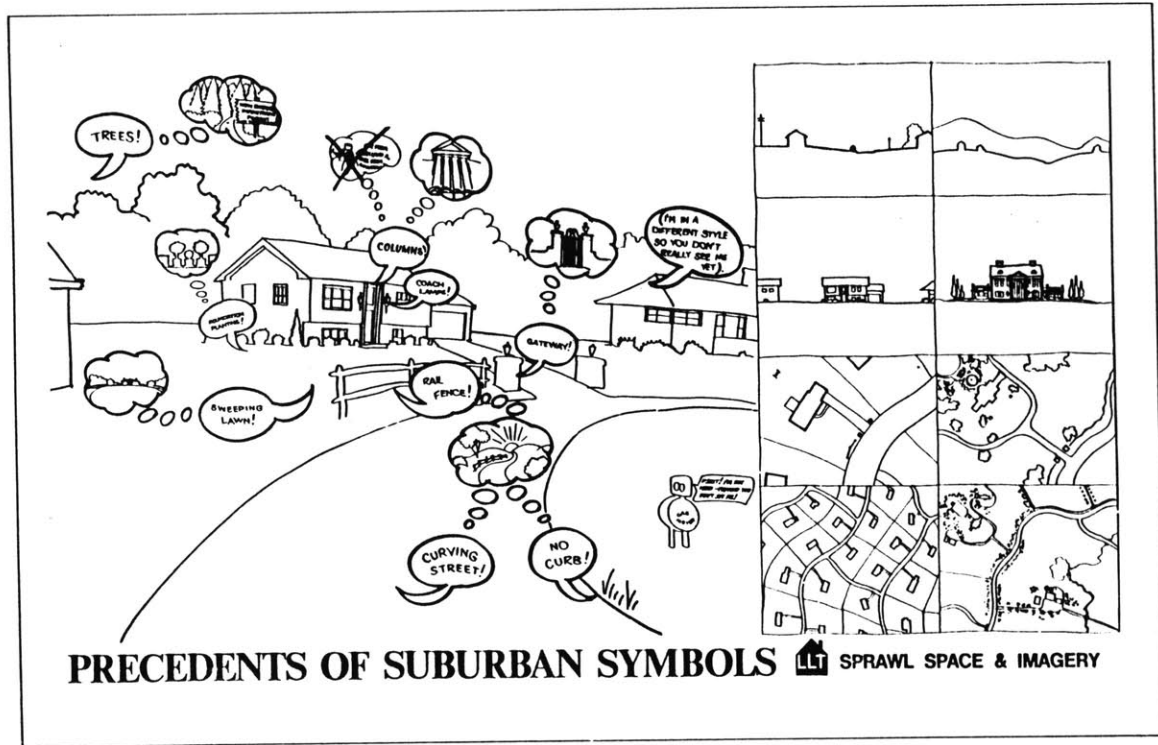
The cottage in the clearing

It was precisely during this historical period, one filled with Flemish domestic paintings and meticulously crafted loving miniatures of homes displayed on mantles throughout the Low Countries, that the Pilgrims sojourned one generation in Holland, then set sail for the New World. It was also arguably a case of *sensitive dependence upon initial conditions*, in which the cultural occurrence of the new concept of domesticity, coinciding with the initial phase of colonial settlement in the New World, grew there to have effects entirely out of proportion to its meaning.

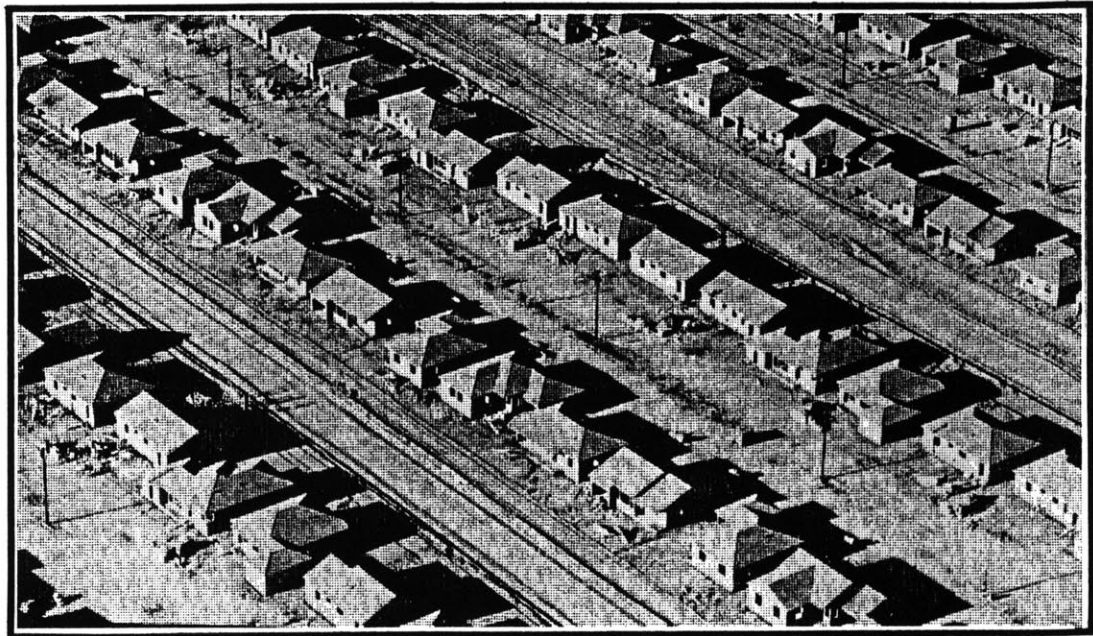
The colonial image of the idyllic cottage in the clearing, and emphasis upon emotional intensity of family life in isolation dominates housing up to the present time. It surely underlies the phenomenology of our freestanding suburban home, surrounded by shrubs to conceal the foundation, its minimal connection to the world.

Domesticity, then, "has to do with family, intimacy and a devotion to the home, as well as with a sense of the house as embodying — not only harboring — these sentiments."⁸ Whereas limited egalitarian thematic variation distinguished Federalist housing, "Middle class Victorians wanted to believe that their houses were impressively unique. At the same time, certain patterns were necessary so that other people could clearly read the symbolism of social status and contented family life in the details...Ignoring the evidence of standardization, people identified themselves with their homes."⁹ Increasingly, Americans would strive for isolation, for privacy, for individuality, and for housing which epitomized both.

Within the home as well, "The desire for a room of one's own was not simply a matter of personal privacy. It demonstrated the growing awareness of individuality — of a growing personal inner life—and the way to express this individuality in physical ways".¹⁰



With the arrival of the Victorian "organic" aesthetic, and identification of naturalism as a "potent nationalist metaphor"¹¹, geometry no longer constrained the plan. "As a result, the room, which up until the Rococo period had been considered as an artifact, if not as a work of art, began to be seen as a locus for human activity; it was becoming a *place*."¹² Rooms thus began to be dimensionally designed for specific uses, and distinct zones of privacy were clearly delineated. "Privacy for the Victorian family was still associated with short periods of time alone, in...a window seat, a cubbyhole under the stairs, a man's library or 'growlery'. Within the home, there was always somewhere to retreat from the intensity of family life."¹³ There is a longstanding American tradition of perceiving domestic architecture as a way of encouraging certain kinds of family life.¹⁴ Thus it was that the Victorian "... mother sought to teach her children values in and through the home."¹⁵ To a great extent, the cult of domesticity's "legacy of domestic bliss, so closely associated with detached houses,"¹⁶ and its predilection for the "familiar signs of domestic prestige and comfort", was inherited by America's tract housing suburbs.¹⁷



Levittown revisited

As Gwendolyn Wright documents, the post WWII phenomenon of vast suburban tracts built by a single developer was largely the result of national FHA policies, supported by wartime introduction of mass production in housing, the desperate housing shortage, and enormous political pressure to provide returning veterans and their brides with homes. It was also the product of the McCarthy era's almost incomprehensible will to conformity: Abe Levitt's vision of building ranch and cape models interspersed resulted in several bank financing rejections: bankers felt certain that the public would never go for such diversity.

FHA incentives and directives of that era established much of our problematic tract housing heritage: institutionalized merchant building which centralized design control and decision-making at a scale which precluded site or use adjustment; automobile-dependant density; "Adjustment for Conformity" ratings which lowered the chances for innovative design approval; and zoning or covenants which prevented multi-family or clustered dwellings, mixed use or mixed races.

Rybczynski argues that "...the advent of domestic technology and home management had put the whole question of architectural style in a subordinate position;"¹⁸ and that the thus subordinated architecture has further become alienated as "interest in industrial-looking materials and objects has led it away from domesticity."¹⁹ It is not, however, the architect in search of a modern machine for living which has caused changes in style: rather, changes in culture and technology have separated the vestigial image of the artifact from its production.

The first step in alienation of dwelling from dweller came when industrially-produced environment was supposed to reflect the innermost being of inhabitants; the second when selected objective correlatives for that being-within-the-house became consumer products rather than handicrafts; and subsequently, with institutionalized relegation of decision-

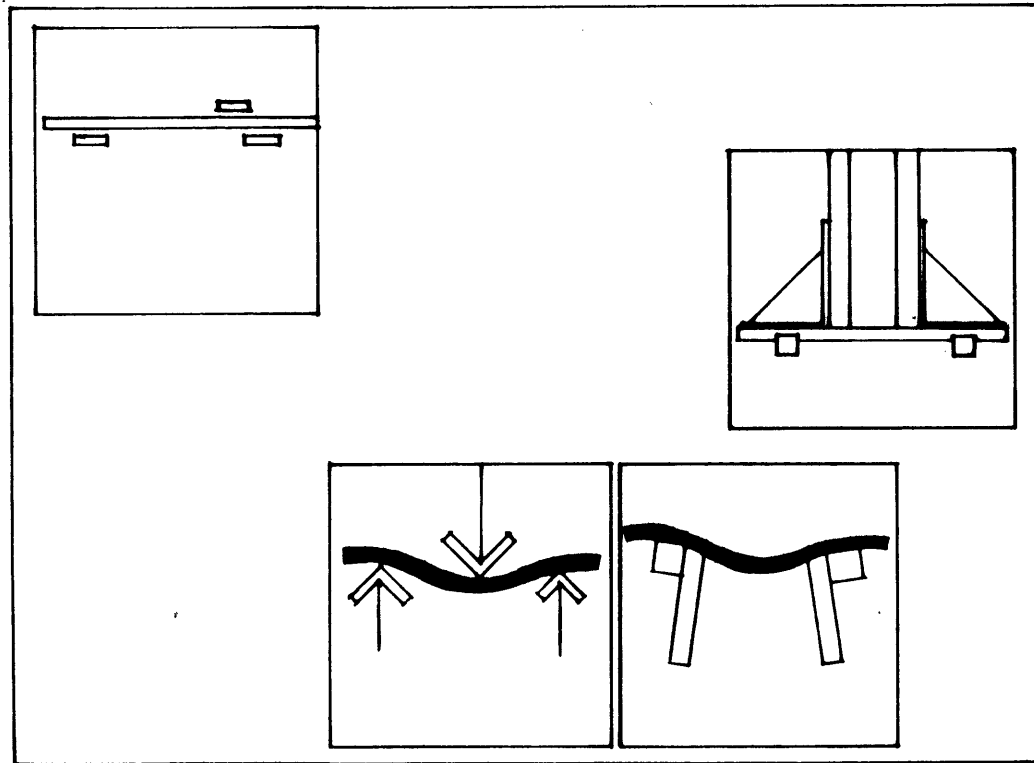
making about art to decorators and designers rather than to inhabitants. With no connection to the decision-making process, whose artifacts do not reflect their production at any rate, there is nothing left for the inhabitant to do.

Dwelling

**However hard and bitter,
however hampering and
threatening the lack of
houses remains, the real
plight of dwelling does not
lie merely in a lack of
houses. - Heidegger**

What has disappeared from architectural discussion of dwelling and housing is largely John Turner's recognition that the two phenomena are dynamic processes, not artifacts. Beyond providing shelter and capacity for use, housing does many things for inhabitants. As Herbert Gans noted in *The Levittowners*, it "provides a symbol of achievement, 'something to show for all your years of living.'"²⁰ Echoing Gwendolyn Wright's observations of the Victorians, Clare Cooper observed that the dwelling represents to inhabitants not only self-image, but an actual symbol of self.

Chris Argyris posited in *action science* that learning comes not from passively receiving knowledge, but from actively engaging, from *doing*. Dwelling, according to Heidegger, is existentially and etymologically linked to the acts of building and of cultivation. On a more practical level, such housing transformation is likely to be the great investment of a lifetime, and valuing the physical inhabitation of the starter dwelling is a clear way to enable it. Housing thereby becomes a generating source of income through neighborhood appreciation, added value, rental, production, or fulfilling basic needs which would otherwise require additional investment. The latter is not to suggest that the home become a substitute for the world beyond it, or a self-sufficient island, "to absorb activities and interests that were once played out in a variety of settings."²¹ Nor do we endorse that simplified vision of intensified isolationist dwellings wherein it is believed that "There is nothing 'really important'...that cannot be experienced within the boundaries of the home,"²² For thus, the Victorian *cult of domesticity*, unrestricted by counterbalances within suburban developments, has grown pathological. It provides the basic backdrop against which, "The family settles down to a life of 'quiet desperation'"²³



CARTOUCHES: ornamental graphic abstraction of structure to reinforce inhabitant understanding of how it works and what clues it gives about subsequently transforming the dwelling.

A Formal Conclusion

Above, we have touched upon the two heritages of the New England dwelling: a history of great physical and transformational flexibility, and one of great emphasis upon domesticity. Included in the latter is an understanding of some of the power, significance, and self-identification associated with image.

Just as a human being is broadly assumed to have two feet on the ground, the archetypal American dwelling has attached land, and prides itself on being self-standing. The image and the typology are both pervasive, longstanding, and resistant to change. Given the enormity of dwelling investment in the lives of inhabitants, low income housing needs to respect these factors.

On many levels, there is a strong connection between self-actualization and active dwelling. At the same time, there is a tradition of looking to the dwelling for education; and of unreasonable expectation that the architecture of the home can somehow miraculously change lives, or even psychological makeup.

Clearly, it is practical and desirable to reintegrate enormous transformational capacity, use flexibility, and expansion into the dwelling. While the designed starter home is complete, it is, due to expenses of design and construction, minimal. In low cost housing, fine-grained inhabitation is entirely left to dwellers. At the same time, we must separate transformational capacity from an institutional-scale industrial systems language, whose proprietary, non-indigenous vocabulary does not serve the needs of modest, and culturally conservative, minimal dwellings. In that light, architects need to understand the act of looking like a house as an active, responsive thing which the dwelling does. We respect image not for its own sake, but rather for its symbolic role in the lives of inhabitants.

We also need to understand the enormous influence of domesticity in our culture, and the expectations, unrealistic and otherwise, which it places upon the architecture of the dwelling. We may indeed use the pedagogical tradition to stress understanding of complex

environments, both through clear systems with analytical cartouches, and with apprehensible and effective use dimensioning. Abstraction as a tool might be one particular aspect explored in the visible construction and layout. Obviously, the significance of how things come together is another.

Realizing the reductive proscription inherent in using domestic architecture to mold family life from a wide range of behaviors to a slender normative range, we must work with typologies with inherent formal capacity for non-traditional living arrangements, and allow participatory design to adjust fit. The goal is to achieve ²⁴ "a vision of cultural pluralism, different kinds of family life, and more diverse communities," rather than an isolated "lifestyle community", whose simplification further extends the pathology of the intensified home. Socialization, as required, is better forged in the ongoing confrontation of being-in-the-world, rather than in the spatial mold of a simplified domestic retreat.

While preserving yards, we may design footprint dimensioning and placement for optimal use, and to build or reinforce urban formal and spatial character at a larger scale. For the small dwelling, this is aided by clustering and overscaling roofs, as well as minimizing setbacks.

To quote Gwendolyn Wright, such housing is "cast in architectural terms and ... it will have implications far beyond architecture."²⁵

SECTION THREE

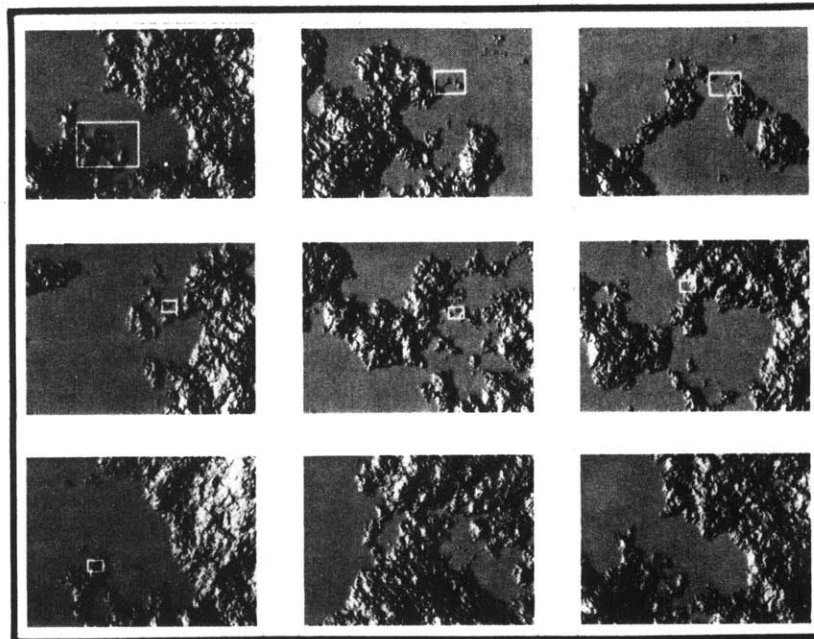
Summary

Chaology is toppling the rationalized LaPlacian model of reality. Recognizing chaos, sensitive dependence upon initial conditions, and the limits of predictive control models of complex phenomena like environments requires new fractal fine-grained decision-making models, and an emphasis on housing as process rather than artifact.

**Passionate advocates of
the new science go so far
as to say that
twentieth-century
science will be
remembered for just
three things:
relativity, quantum
mechanics and chaos.
- James Gleick**

SECTION THREE

**self-consciousness; systems approach;
self-differentiation; rational modelling
and its limits; control hierarchies;
The Place of Chaos**



A FRACTAL SHORE. A computer-generated coastline: the details are random, but the fractal dimension is constant, so the degree of roughness or irregularity looks the same no matter how much the image is magnified.

Modelling organic reality

For millenia, we have been attempting to imitate the fine-grained form-making patterns ubiquitous in nature. In industrial design systems, the closest we have come is arguably randomized Cabbage Patch dolls. This is not, in itself, overly encouraging.

Within the context of a western rationalism founded upon belief that natural hierarchy was being empirically observed, the discovery that ecologies and organisms develop *fractally* --- at every size, at once --- in an opportunistic fashion with their environments is a profound realization. It brings into question both the perceptual origins of control models, and their limiting effect upon our ability to abstractly model --- and thus to create--- environments.

According to Morse Peckham's arguably ethnocentric view, suppressing the experience of disorder and perceiving acts in the world as comprehensible are adaptational necessities in *homo sapiens*. Our perceptual orientation thus leads us to reinforce incomplete models while suppressing conflicting facts. The same incomplete schema is reiterated and then experientially reinforced, encouraging us to further suppress unsupportive counter perception.¹ He contends that chaotic richness and complexity of necessity aesthetically represent the absolute experience of disorder in existence which our perceptual schemata otherwise suppress. To the extent that "organic" environmental design truly seeks to emulate modelled ecologies, how do new perceptions of chaos within natural growth inform previously Cartesian design?

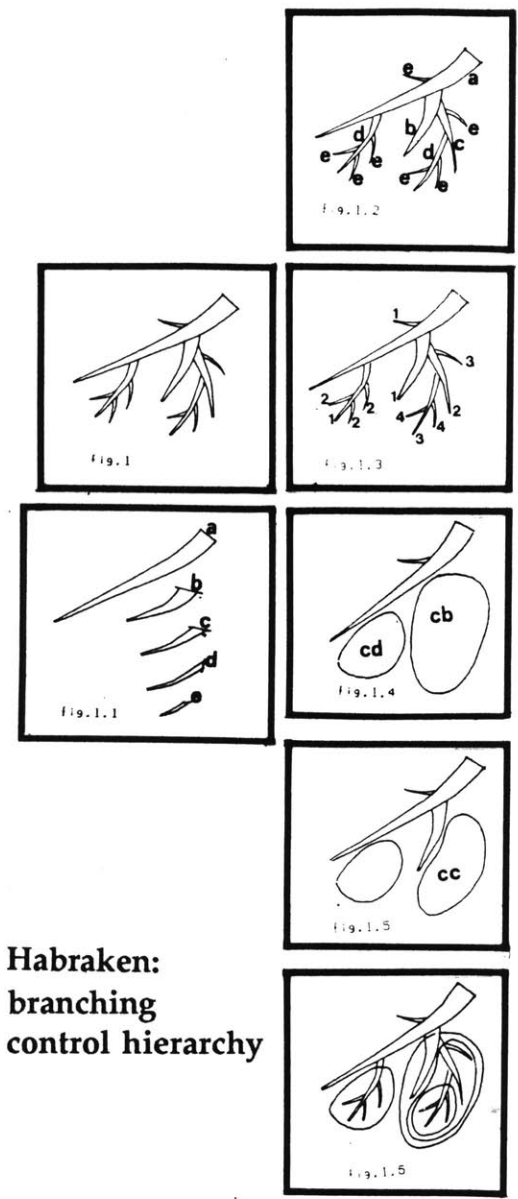
This section begins with an exploration of the connection between historical development of Western rational objectivism and the parallel emergence of the differentiated bicameral mind, as they have framed the "organic" systems approach to design. In anticipation of the final section, we then touch upon the changing paradigm of the designer, in light of advances which the recognition of dynamic, nonlinear order within systems has brought to our abstract modelling capacity.

The evolution of the differentiated bicameral mind did not isomorphically correlate with the parallel physical or cultural evolution of our species. Relatively total emergence of the differentiated self is arguably a recent western cultural phenomenon. Eliel Saarinen envisioned the medieval master builder as "an intuitive genius who simply knew—he felt in his bones—how to put the stones together to create his architecture and, by extension, how to build his cities..."² We understand in the statement a physical identification between designer and material, an implicitly internalized association with stone.

By contrast, whether inevitable or by historical accident, "ours is a world far removed from that of Saarinen's medieval master builder: we now need to be self-conscious about how we proceed to solve the problems of planning and design."³ In *Transformations of the Site*, John Habraken observes, "Observation is only possible when the observer and the observed are separated."⁴ At the core of our cultural development is an implicit agreement about a quantifiable objectified reality, separating observer from phenomenon.

At its limit, this scientific method creates a model for reality, then confounds the virtual and the real. Thus we have Chris Argyris asserting that, "there is a basic structure to the organization of reality which transcends usual depictions of it."⁵ Tacit assumption that there need be structure within reality itself — which is arguably not a human creation — is the epitome of what Alfred North Whitehead calls "the error of misplaced concreteness — confusing the abstraction one makes with the reality one perceives"⁶

"In its simplest sense, a model is a representation of reality. Usually, it is a representation of a system which is an intellectual construct of that reality ... One builds a descriptive model for purposes of communication and heuristics (discovery), and a predictive model for projecting and ultimately controlling the behavior of a system."⁷



Habraken:
branching
control hierarchy

Clearly, design practice has traditionally favored predictive models for control virtually to the exclusion of heuristic models.

Contemporary journals of the era of unidimensional urban renewal intervention abound with assumptions that, by amassing enough high quality information, humanity would soon begin to predict and therefore control behavior within all natural systems.

Christopher Alexander and Ian McHarg produced prodigious numbers of overlays, attempting to prove by tautology that *homo sapiens* was rational and predictable in all settlement decisions and patterns.

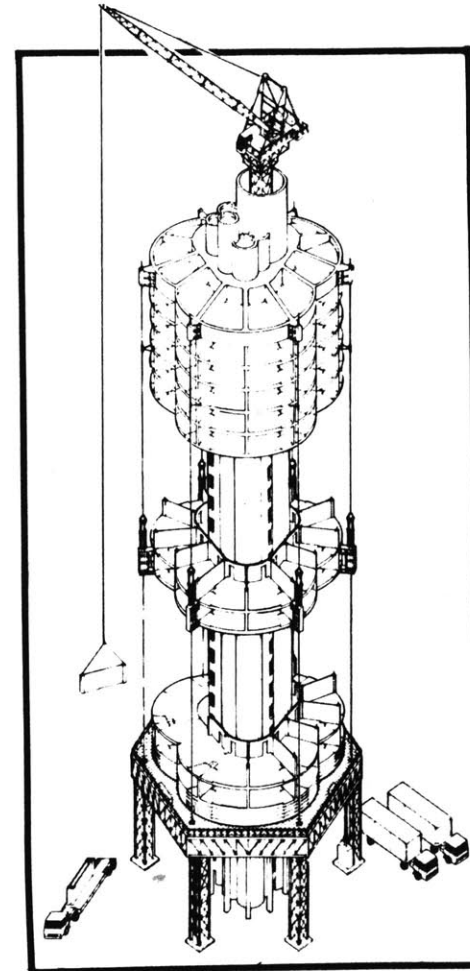
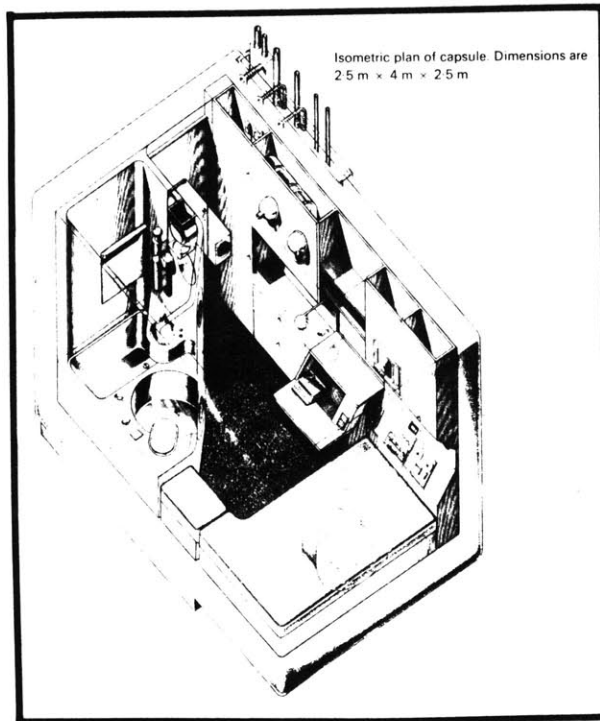
This organic+systems analogy in built environment has a long historical pedigree. Ferguson finds the protosystem analogy to living things already in Vitruvius, stated quite explicitly as a systems idea by the time of Alberti.⁸ Gaining favor particularly among the Romanticists, the idea of organic urban growth in all of its cosmological, natural, systems, ecological and cellular resonance grew by layered accretion and association, always bringing forward previous meanings in its nested conceptual ontogeny. Biological analogy was constantly drawn, from "metabolism in architecture", to discussing the framework megastructures as "skeletons", to Habraken's exploration of "the biological strategy underlying...building strategy."⁹

In their analog systems, theorists such as Habraken have sought to control the design process by creating hierarchical frames of scale which correspond to pyramidal systems of control in complex artifacts. In the most general case of what Richard Sennett referred to as "the peculiar calculus of efficiency guiding much of city planning"¹⁰ this takes the form of an economic --- and therefore quantifiable --- rationalized suboptimization routine

$$f(x) = x$$

wherein we are concerned exclusively with input and output on each given level.

The capsule is cyborg architecture. Man, machine and space build a new organic body. - Kisho Kurokawa



Within such a framework, "Design expertise involves breaking or partitioning the design into workable-sized pieces, or fragments, working the pieces separately then reassembling them. We try to minimize connections between the pieces so that we may work each piece independently....We consider each piece as a separate design problem in which we may optimize a different objective."¹¹ Christopher Alexander bluntly states, "We are trying to replace [real world trial and error] by a symbolic method, because real trial and error is too expensive and too slow."¹² As a trade off for efficiency, internal processes of the "black box" function, and possible internal effects of input and output on the mechanism itself cannot be modelled.

Because such rationalized "criterion functions" do not model linked series of self-transforming processes, systems and events over time --- wherein all factors remain variables rather than constants --- there existed no abstract construct through which such processes could even be recognized. This method, as Ferguson observes, lacking the resources to consider all reasonable options in decision-making, "abstracts selectively and sparingly from the real world with significant possibility for its distortion." ¹³

It is becomes more apparent why, as Mark Gross stated in his recent MIT design thesis, "Many design disciplines are now approaching a 'complexity barrier'...where traditional methods fail to produce acceptable solutions."¹⁴ Complex environments, modelled within the new synergetic and chaotic paradigm, will be chaotic and nonlinear, filled with unpredictable moves at all levels. Attempts to control their development irrevocably will either change their essential character, or fail.

Organicism in design is neither straightforward nor simple: certainly it is not the self-organizing, self-repairing, self-reproducing character discerned by Kant. Yet in none of the organic urban design analogs do we witness any of the opportunistic drive which characterizes life. From heliotropism to nesting to symbiosis to parasitism to species-wide adaptation of unfathomable variety, living things from cells to individuals to entire

classes of life change instantaneously and/or within minutes and/or seasonally and/or over millions of years to exploit possible environmental benefits. It is precisely this richness of predictable and random behavior, variation occurring at all sizes and time scales simultaneously, which distinguishes the inorganic planned city from the from the equally inorganic snowflake or conch shell. The historical importance of the Japanese Metabolist group lies in the abandonment of master planning in favor of systems planning, in conceptual schemes based abstractly upon change, growth, interaction and the simultaneity of functions. ¹⁵ Richard Sennett notes

growth, in massive planning, is... conceived along mechanical lines as the realization of an initial vision. This has been the inner contradiction that has crippled the very act of planning for large cities; there is no provision for the fact of history, for the unintended, for the contradictory, for the unknown. ¹⁶

Ferguson observes: "...a much neglected impetus for systemic thinking has been the requirement to justify decisions once they have been made..." for a client which is now a bureaucracy. ¹⁷ As long as governing powers are working at the urban scale and seeking to control costs and growth at all levels, virtual organic form remains impossible.

Above all, in a universe ruled by entropy, drawing inexorably toward greater and greater disorder, how does order arise?
- James Gleick

Muddling through

In the absence of a robust hermeneutic model, Christopher Alexander ultimately concluded,

*We do not believe that these large patterns, which give so much structure to a town or of a neighborhood, can be created by centralized authority, or by laws, or by master plans. We believe instead that they can occur gradually and organically, almost of their own accord..."*¹⁸

Kevin Lynch concluded that

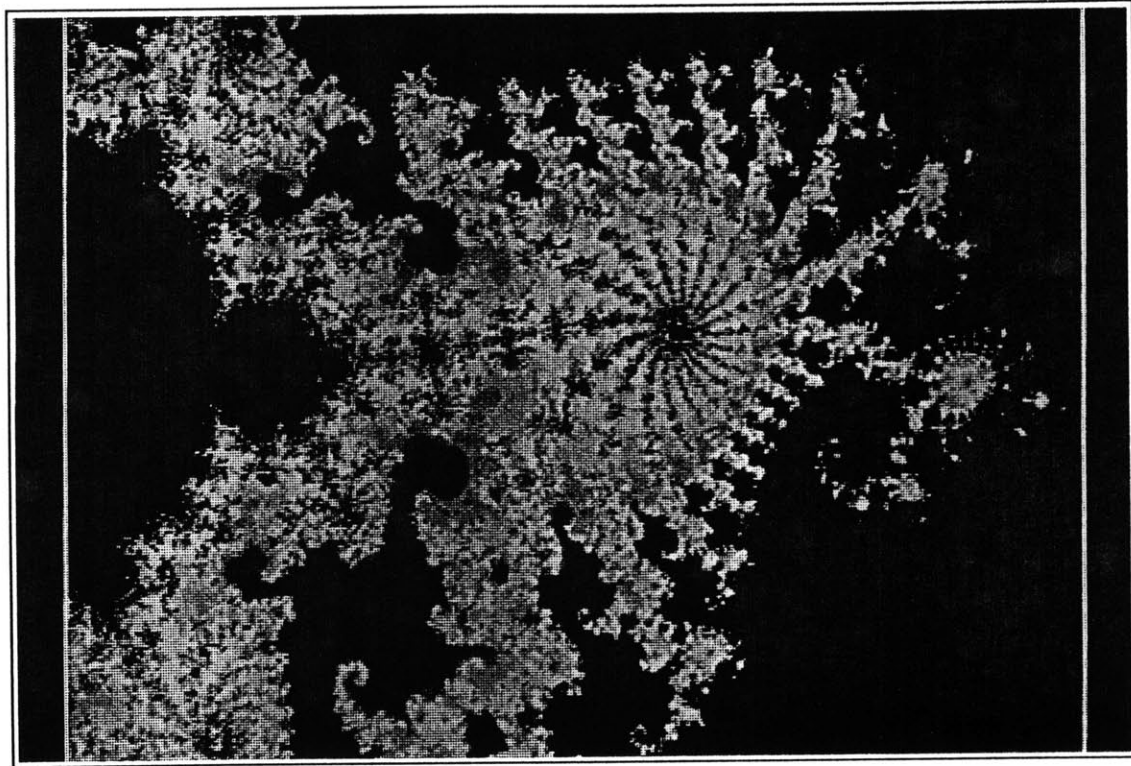
"A settlement is a valued arrangement, consciously changed and stabilized. Its elements are connected through an immense and intricate network, which can be understood only as a series of overlapping local systems,"¹⁹

Or, as that line of reasoning was more strongly articulated in the unpublished draft of "Is a General Normative Theory Possible?,"

*"...cities are so complicated that, while you can design a house, you can never design a city. And should not. Cities are like vast natural phenomena, beyond our ability to change, and beyond our knowing how we ought to change them."*²⁰

As a way of coming to terms with infinite complexity, the Lynch model seemed far more reasonable than Robert Venturi's "almost alrighitism" in *Complexity and Contradiction*; to Charles E. Lindblom's technique of "Muddling Through with Disjointed Incrementalism"; perhaps to the hierarchical control mechanisms explored so systematically by John Habraken. It was, to paraphrase Mies' exasperated reply to Allison Smithson, simply the best we could do.

That was before chaos eliminated the LaPlacian myth of deterministic predictability.²¹



An image from the infinite fractal Mandelbrot set of chaotic systems.

Emerging chaos

Synergetics emerged as a technique for modelling through binary means phenomena where patterns change on macroscopic scale; and chaology to explain some irregular systems behaviors which nonetheless evolved in highly structured ways simultaneously determined in many spatial and temporal "frames".²² Reversing the above control models, chaotic systems frequently are controlled from the smallest level up, building "a reliable system from unreliable elements."²³

Chaos theory evolved out of a recognition that "random" occurrences and unpredictable nonlinear dynamic systems *do* frequently follow a pattern. By assigning to higher order functions phase space Cartesian coordinates, images of the behavioral shapes of unimageable complex systems emerge. At the same time, quite simple matrices of linear functions have been demonstrated to exhibit similar chaotic behavior. With a new conceptual model in hand, scientists in numerous disciplines have rushed to isolate phenomena which were formerly categorized as random, and may now be understood as chaotic systems.

This is one importance of the new *chaology*---the determination of the limits of predictability. To quote Robert Shaw,

Modern science owes its success to its ability to predict natural phenomena, thus allowing man a degree of control over his surroundings. The steady increase in man's predictive power has enabled the building of a variety of machines which have transformed daily life. However, recent work in dynamical systems theory has made clear that the predictability of even classical deterministic systems can be quite limited. The existence of [chaos] raises both practical and conceptual questions...²⁴

One lesson learned has been that *sensitive dependence on initial conditions* in dynamic systems makes longterm prediction impossible. Multidimensional systems behavior of chaotic systems occurs within a modelled chaotic phase space or "cloud" envelope, anywhere within which it is likely to be. Such behavioral models may also indicate when a system will be chaotic and when it becomes predictable.

We now know that the 60's projects to gather so much high quality information to strengthen the prediction of longrange behavior of many complex systems was misdirected. Prediction is doomed to failure because of chaotic systems characteristics like the "butterfly effect":

"Tiny differences in input...quickly become overwhelming differences in output — a phenomenon given the name 'sensitive dependence on initial conditions'. In weather, for example, a butterfly stirring the air today in Peking can transform storm systems next month in New York."²⁵

From the point of view of the observer, "After a time ... the initial and the final states will be *causally disconnected*...and another measurement will need to be made to make any prediction..."²⁶ At each point in time, the behavior is fractal, and jumping to a larger scale allows us to predict behavior only at that scale. So we know that, given continuing high development pressures in Boston, Roxbury's Highland Park will be developed. We cannot reasonably project the use or density or materials of any edifice to be erected on any specific corner forty years hence: the frame of reference at that scale is too sensitively dependent upon unpredictable conditions which are continually transforming the entire system.

In his significantly titled "The Control of Complexity in Complex Artifacts," John Habraken observes that in architecture as well, "We tend to stress the constancy and immutability of the architectural form."²⁷ Again, according to Sennett, "The ideal is that nothing be out of control."²⁸

Contrasting that goal of our perceptive schemata is the architectural desire articulated by Peter Blundell-Jones, "to produce a real measure of variety and complexity and to avoid the unification which institutionalizes." ²⁹ As Lucien Kroll states, "Having no fondness for disorder, we have prudently ignored it, and have been unable to recognize how necessary it is...We have lost ambiguity, complexity, subtlety and contradiction." ³⁰

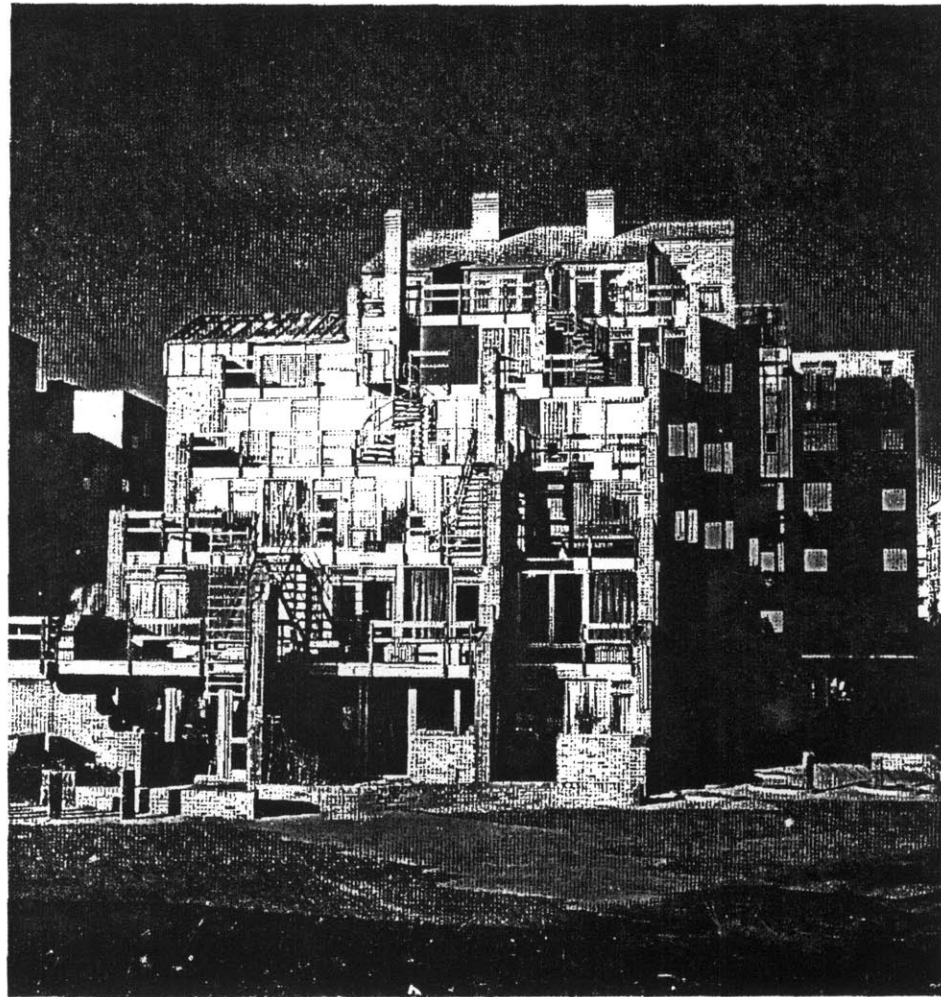
In many respects, the design profession has been slow in evolving with respect to changes in the nature of the client, scale, and exponentially increasing complexity of the artifact created. Ultimately, we must search for "systemic properties from which complex environmental organizations can be built."³¹ And like Habraken,

"By looking at the architectural form as an instance of a continuous process of change, we become interested in the mechanisms of transformation... change is brought about by people designing, making and inhabiting the environment. We have to deal with human constructs, and hence the complexities we observe are of our own making. Therefore the structure we find is a reflection of patterns of control. " ³²

Whereas architecture was traditionally produced "by the interaction of a designer's experience, intellect, aesthetic, sensitivity and common sense,"³³, changes in the nature of the client, the organization of labor and society have all considerably upped the ante. Analysis, formerly equated with artistic intuition, has become recognizable as a problem of optimization and control.

Clearly, much investment through time will be needed before specific dynamic models can be generated, to learn in what environmental projection may, in fact, be possible. For the time being, we understand that longterm master plans don't work as templates for growth: environments are highly unpredictable dynamic systems. And, presented with a fast-tracked centrally-controlled hierarchical urban scale project which makes pretension to the organic qualities of a Grecian or Portuguese hilltown, we can rationally articulate the

Médé: Avenue de L'Assomption façade



intuitive absurdity of the claim.

To the extent that environmental form embodies a social artifact, designers like Kroll and Erskine create analogs of the old growth of villages by using participation to efficiently generate variety. Chaos is largely reduced to a sort of domesticated compositional complexity. While even given a reasonable computer simulation to generate chaotic fractal growth patterns, there can be no mathematical substitute for human transformation of dwelling as artifact. Nor can one designer replicate the vestigial urban objective correlative of fractal human interaction with site, others and existence through time.

As John de Monchaux points out, recognition of the inherent urban "complexity of messiness enables a wider view of problems and a wider inventory of plausible interventions by time, resources and place, as well as by wit and imagination."³⁴

Until we model techniques for fractal participatory design of large-scale environments, urban size projects are likely to yield recognizably institutional character. To some extent, humanizing complexity in intervention by a single architect is likely to continue to be somewhat artificial. Small scale, short-term plans for diffuse open-ended interventions are most likely to produce benign habitable environments without the upheavals which characterized urban renewal. Of all factors upon which to base rational decisions, the range or ergonomic sizes corresponding to human use, from singular privacy to urban-sized plaza seem comparatively stable in the medium term. Internal combustion cars have come and will inevitably go, but basic human activities, like walking, birthing, eating and coupling have occurred, with thematic variation, since the arrival of the species.

Introduction of urban-scale mediating physical support megastructures would reduce the equation to fitting unique pegs into square holes. Yet continuity of dimensions across the field at an urban scale and separation of subsystems— another important Habraken principle—together with independence of decision-making authority on different levels

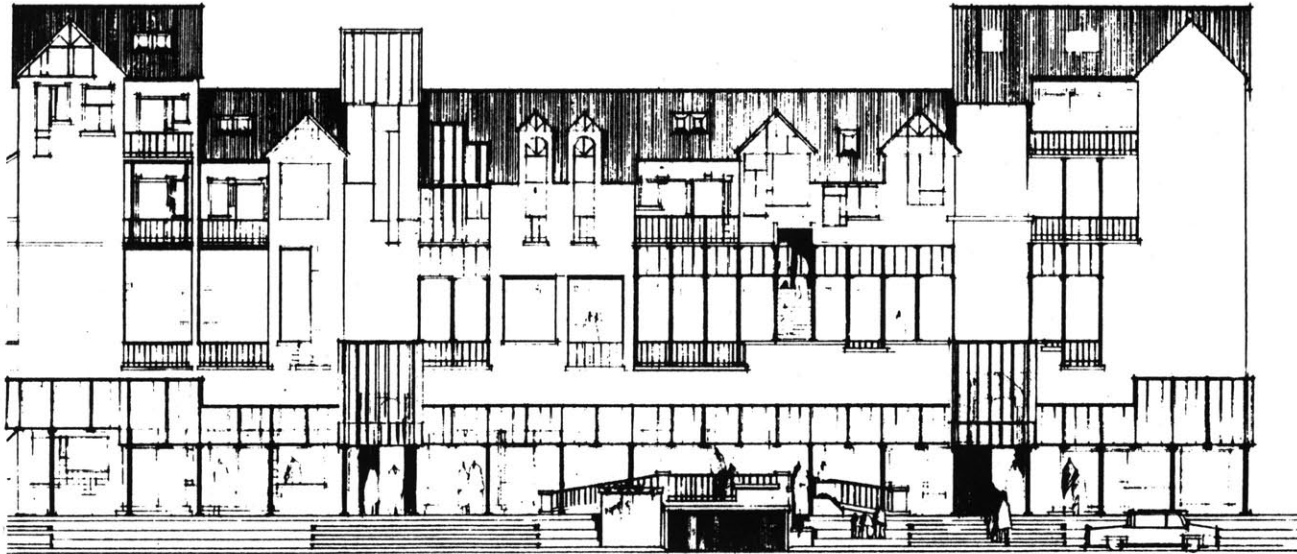
will likely enhance robustness. Rationalized analog models may well demonstrate that those environments which we would emulate can only be built by accretion of non-hierarchical fine-grained fractal decision-making through time. But faced with an implementation decision which our deeply ingrained hierarchical bureaucratic management tradition could not survive, we may ultimately consciously opt for maintaining more centralized control. Christopher Alexander, a trained mathematician, began to identify the extent of the problem in "The Goodness of Fit and its Sources," when he stated,



Habraken et. al.: the Grunsveld variations on a basic urban theme

"No complex adaptive system will succeed in adapting in a reasonable amount of time unless the adaptation can proceed subsystem by subsystem, each subsystem relatively independent of the others." 35

Historically, order arose by ignoring disorder, modelling machines and organisms alike as clockwork mechanisms. Understanding chaos, the possibility that linear systems may become unpredictable, and that there exists a theoretical limit to the predictability of environmental systems has already contributed to considerably more favorable recognition of messiness in design and environment. As new working approaches toward architectural practice continue to develop fractally under dynamic conditions, longterm projection remains consistently unpredictable.



SECTION FOUR

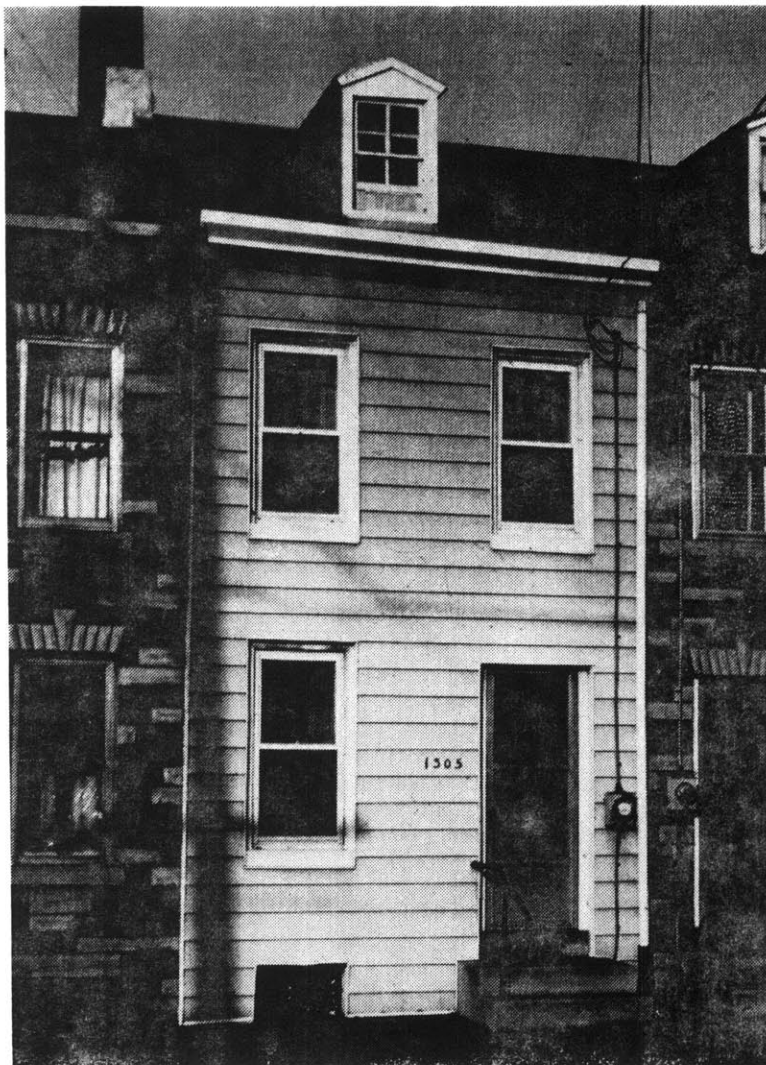
Summary

A "modelled type" derived from existing cultural typologies is posited as a design tool. Informal linkages as well as hard physical data, and abstraction in the service of clear performance goals inform enabling design. Ultimately, specificity of site and use preclude total prefabrication of dwellings, and create opportunities for fine-grained decision-making .

SECTION FOUR

**typology + specificity + site:
predictability and happenstance**

Row House: Reading, Penn.



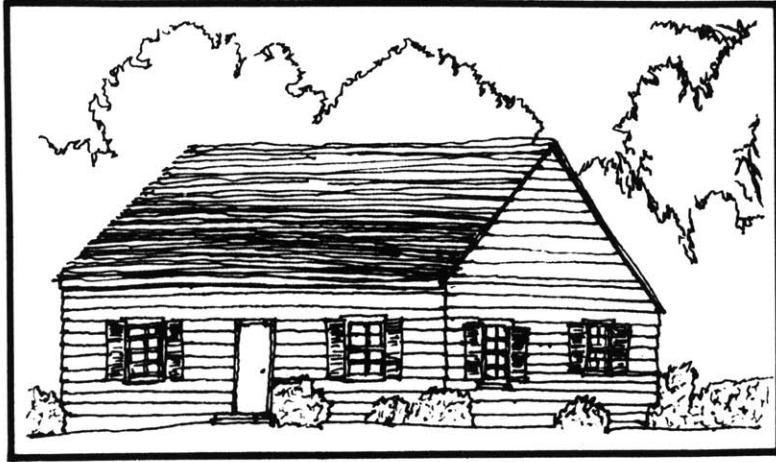
type

According to John Habraken, "The type can be described in many ways, as a spatial system, as a combination of technical systems, as a system of façades and decorations."¹ As Peter Lloyd observes in his 1989 MIT thesis, "A Convention Center: A Typological Approach to the Design of an Institutional Building," distinction must be drawn between type as built form and type as concept: "As a concept describing the configuration of built and spatial elements, type is an intellectual system. If the relationships in the configuration are invariable, then what is being described is not a type but a model."²

Type, as we understand it, is a member of a class of buildings defined by sharing culturally implicit subsystems, values and uses. The *modelled type* as posited earlier represents a design tool. It is, in that sense, an educated best guess for a system of formalized relations of space and material which might be generically successful in enabling comprehensible, acceptable, extremely low-cost and low initial square footage dwelling.

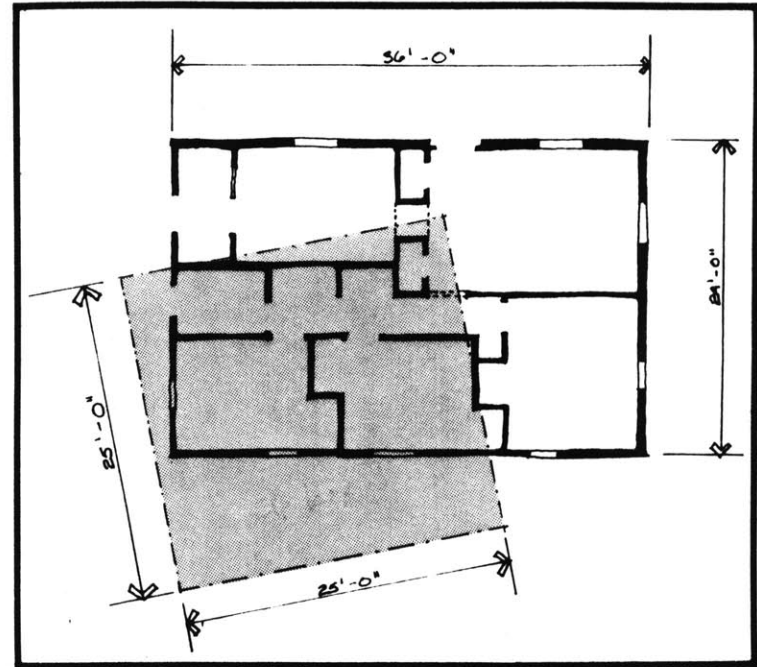
At the same time, repeated use of the type builds a cultural continuity, in a fashion which is increasingly discernible as systematic. In discussing the phenomenon of meaning in architecture, Norberg-Schulz offers the explanation that "Man 'receives' the environment and makes it focus in buildings and things. The things thereby 'explain' the environment and make its meaning manifest. ..."³ In deploying common typology and dimensions, we *repair* the urban system, removing those breakdowns in the systems of orientation decried by both Norberg-Schulz and Lynch.

Widespread and repeated use of the modelled type in essence represents the manifestation of a ubiquitous *support* network within existing fabric, a conceptual support defined now by dimension, construction and type. Models within typologies have been designed, use and transformation capacity studies have been made. But rather than mass produce expensive institutional universalized structures — which are then infilled to achieve variation — participatory design offers additional design time in exchange for better fit, increased variation, more successful user growth and savings on redundancies



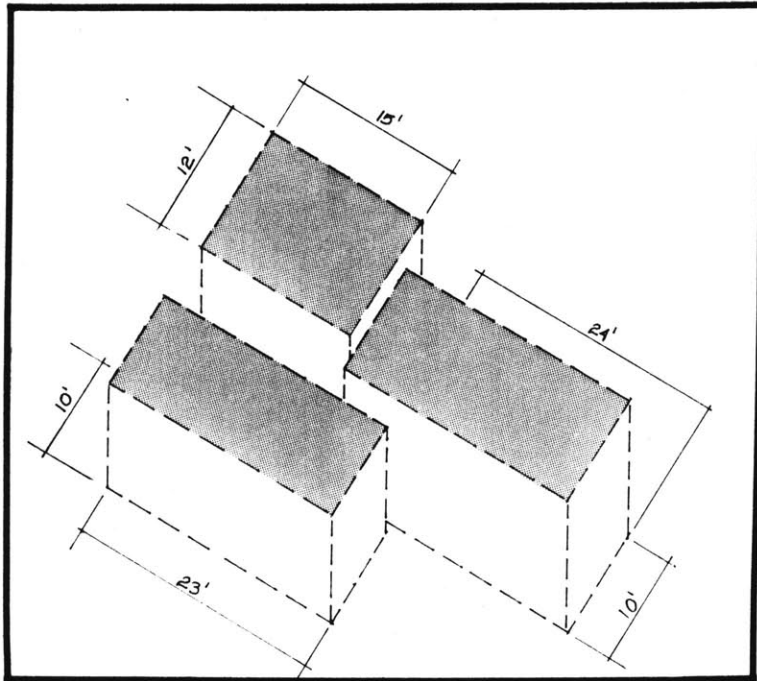
Suburban house type

Minimizing initial square footage

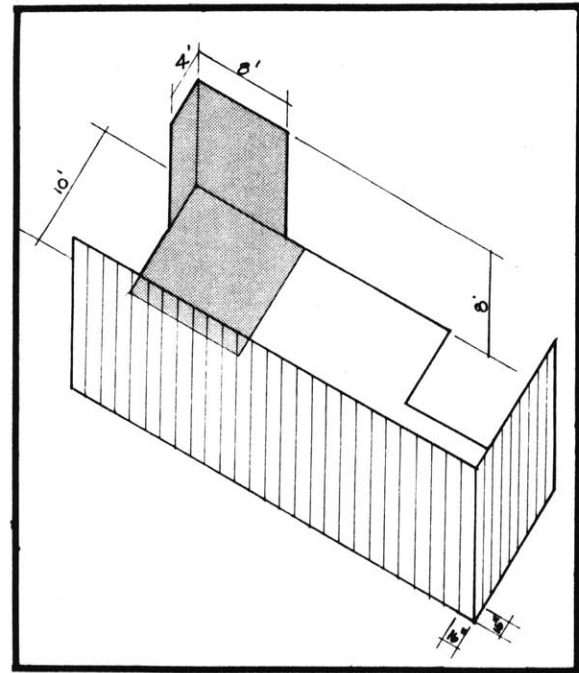


otherwise necessary to generalize design.

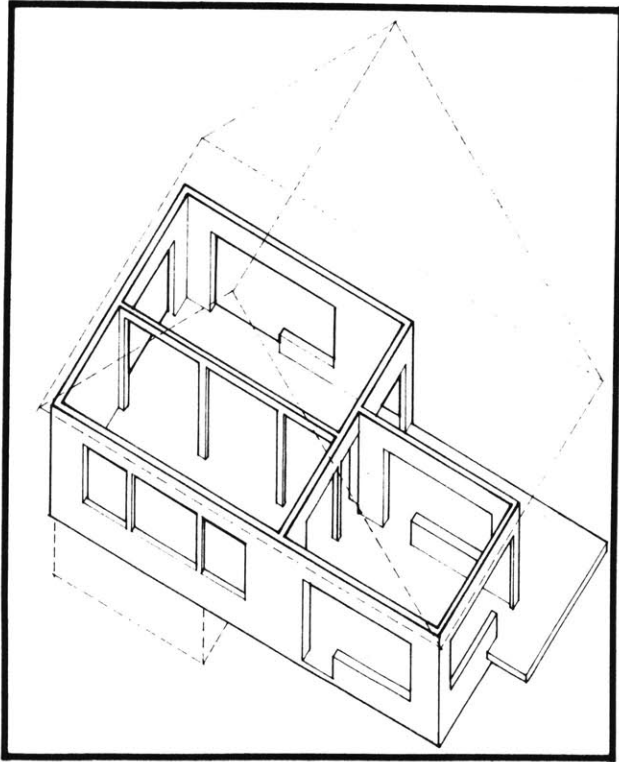
Certainly, the modelled type is precisely what reasonably prolific architects *implicitly* start with. Charged with a unique new commission, they inevitably look first to their own recent work for exportable systems, images, details and organizational and spatial configurations, then to classical precedents or typologies. Following good Victorian principles, the emphasis is then on how to emphasize the *uniqueness* of the resulting architecture.



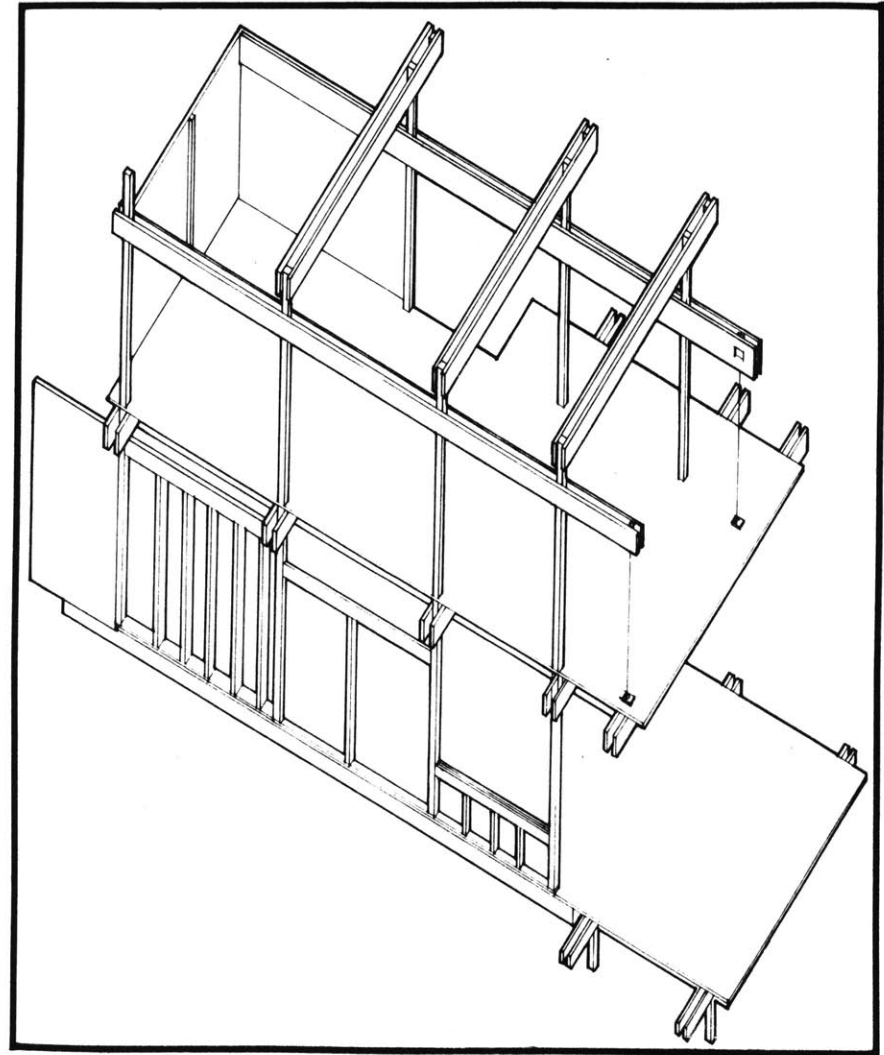
Initial use volumes



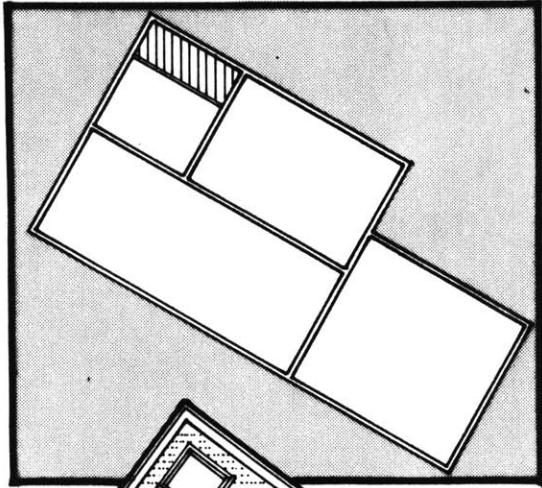
Dimensional system



Initial configuration

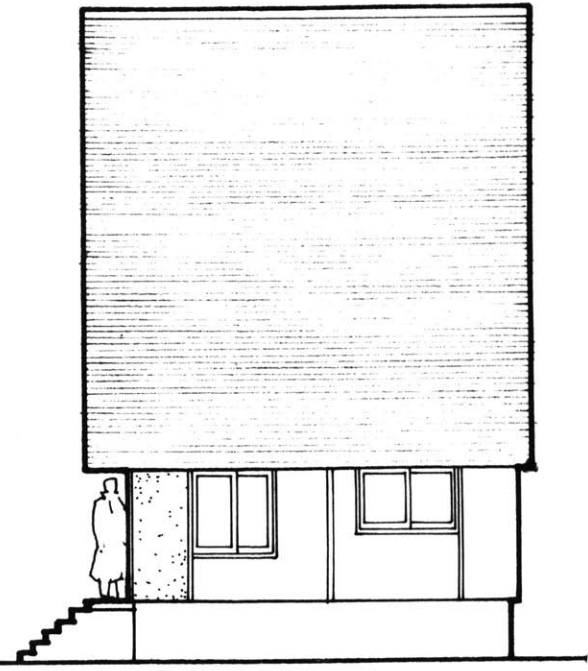


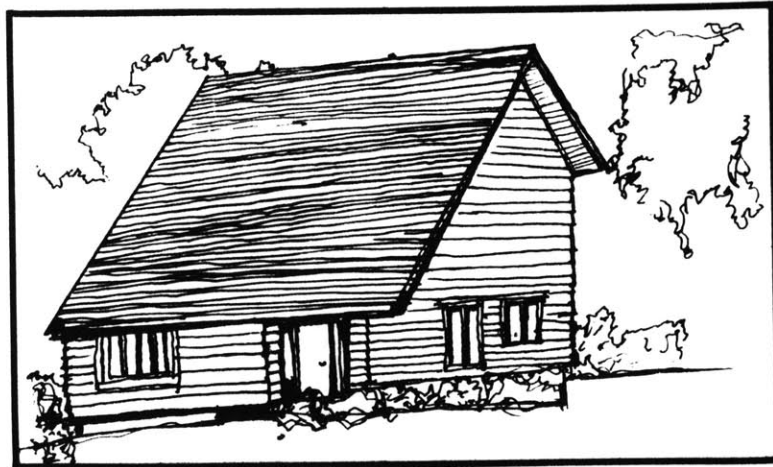
Building system



Row house modelled type

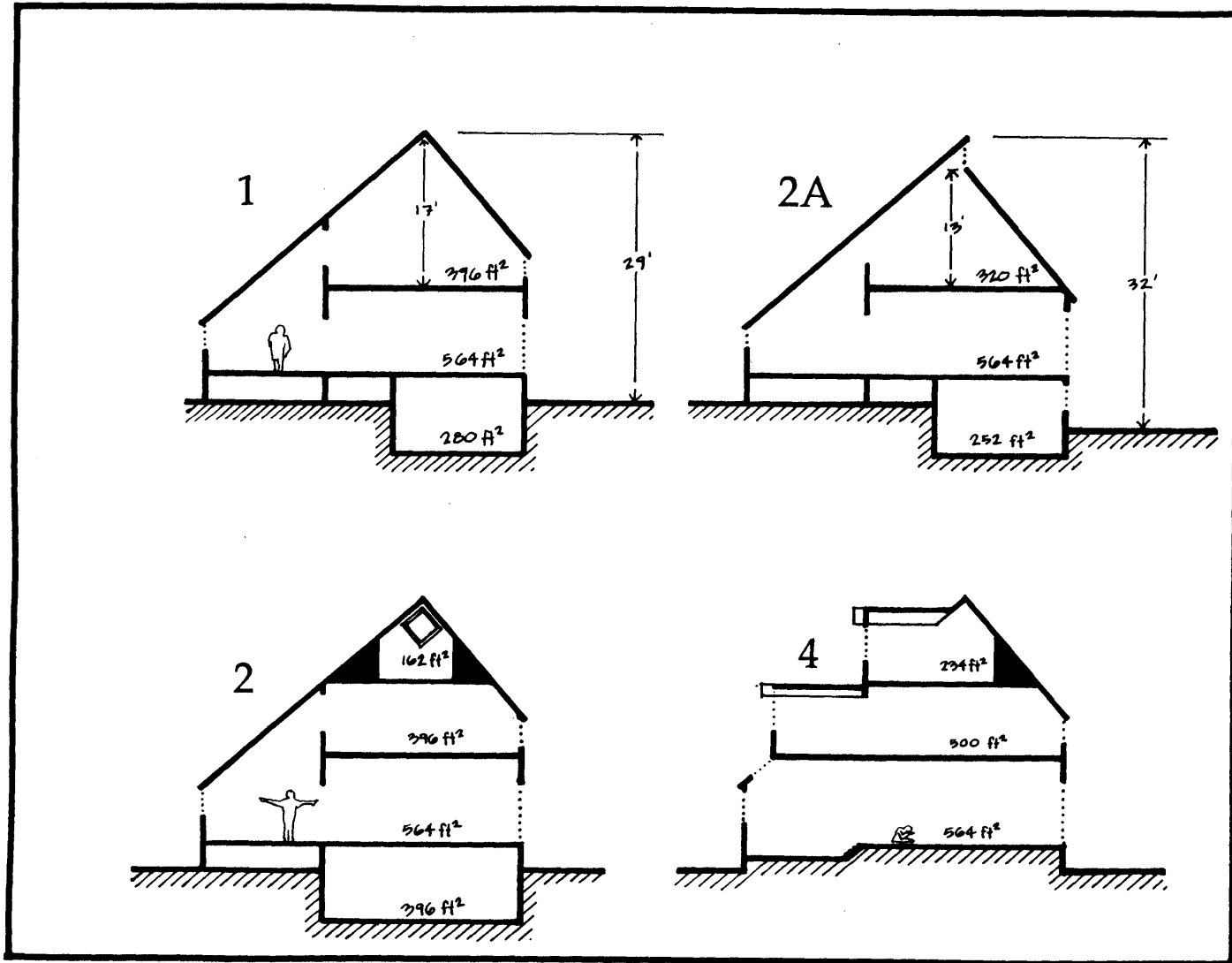
2 bedroom 616 ft²



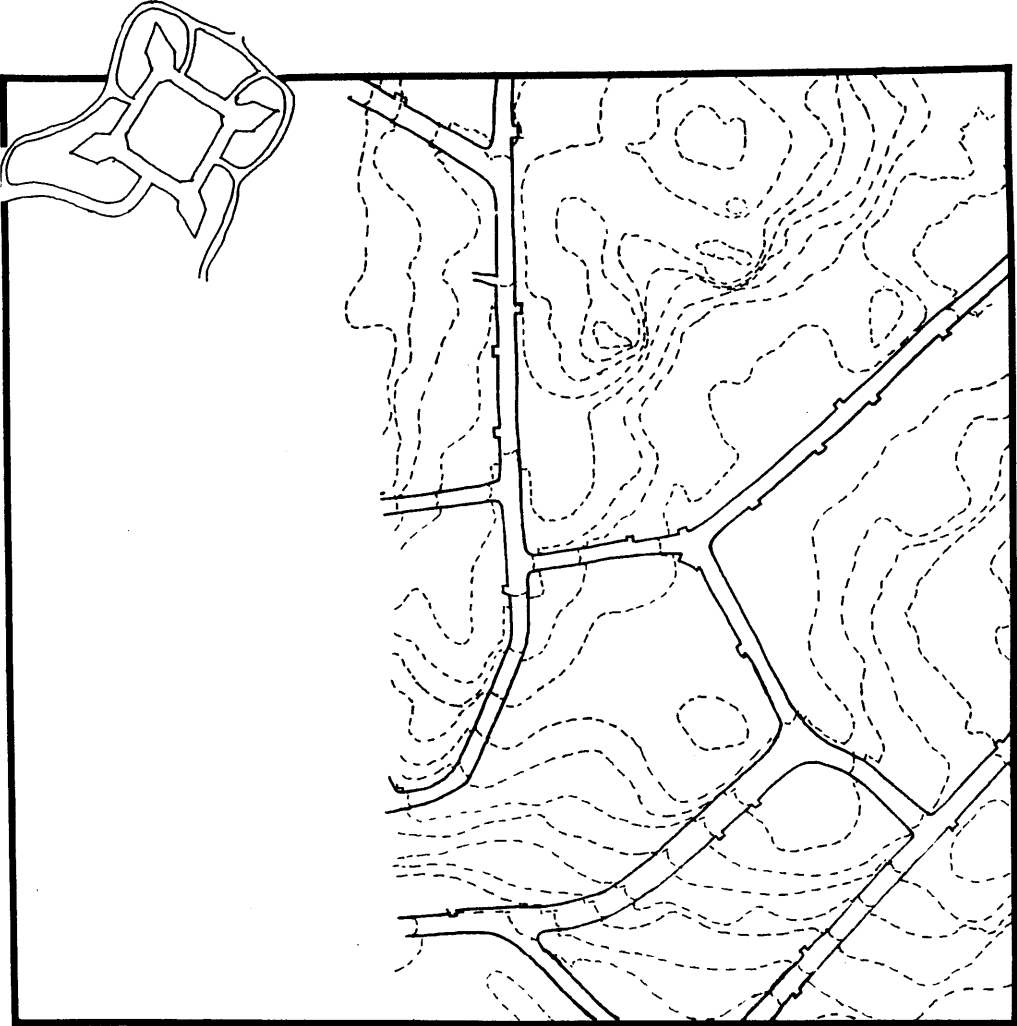


The modelled type is easily imaged

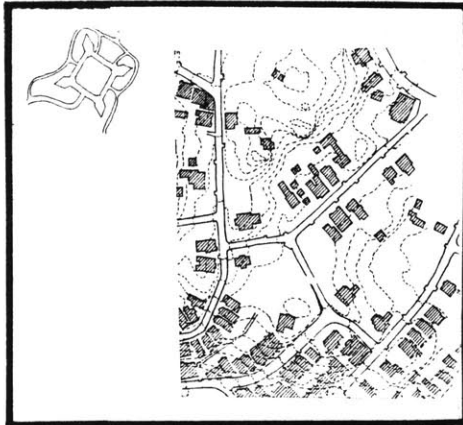
Sectional transformation through time



Highland Park
Roxbury, Massachusetts



site



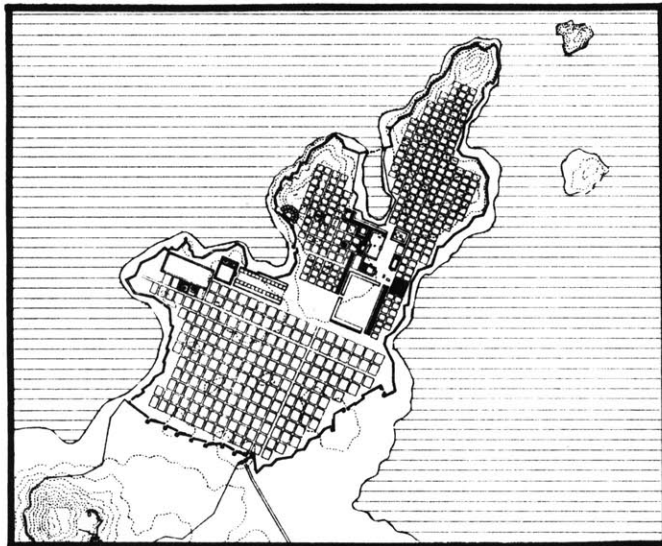
Again according to John Habraken, "the autonomy of the site imposes... certain relations upon us"; it poses its own terms.⁴ Norberg-Schulz also champions *genius loci*, and Lynch observes that the site exhibits "a complexity so complete as to have a distinct character."⁵

In one sense, our curse is the unbearable lightness of our construction: that sinewy tensile strength which reinforces our inherent sense of freedom, the ability to transform or unbolt and move. The lack of a basement in the Levitt houses was perhaps a symptom of such rootlessness. Modelled after the wartime prefab military housing process, Levitt housing came close to achieving industrialized production.

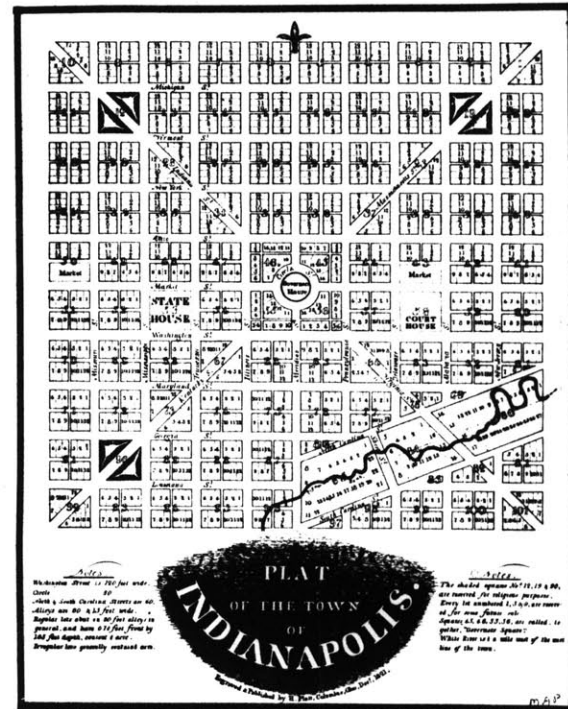
In the siting process vast expanses of land were of necessity bulldozed— removing all specificity of place. After building came domesticated virtual landscape: a bit of bulldozer berming, a choice of solitary fruit tree. It thus became "characterless ground, where limits, potentialities and differentiations must be generated by the designer."⁶

That remains basically as far as the "starter home" has developed. It is a modelled type with no capacity to respond to user or site. In 60' x 100' lots, mechanically placed across agricultural land and jurisdictional boundaries, it has come to epitomize merchant built tracts. Using rationalized construction, economies of scale, mass production techniques and non-union labor, Abe Levitt set the persisting standard for the merchant building process and product. We have come to expect indifferent subdivision of land, identical houses centered within quarter or eighth acre plots. A neutral, geometric rhythm marches past the windshield, with what Lynch early on categorized as "monotonously conventional, careless, shallow and ugly" site design. Frequently, the decision is preempted from even developer choice, having been determined by zoning and restrictions which, in attempting to preserve neighborhood density and character, end up legislating both building type and subdivision footprint.

In urban sites, we now expect equally indifferent subdivision, but without outdoor territory or transformational capacity. Because subsidized renters have no right to *dwell* in rented space, it is frequently the case that "a public agency believes that subsidized units should be a little less than ideal, so that families will not loiter there."⁷ Condominium owners also surrender many rights of built inhabitation whose exercise could not otherwise be controlled. Both conditions admit of little architectural transformation in response to use or site: one may be offered a selection of three tones of carpet, or four species of shrub.

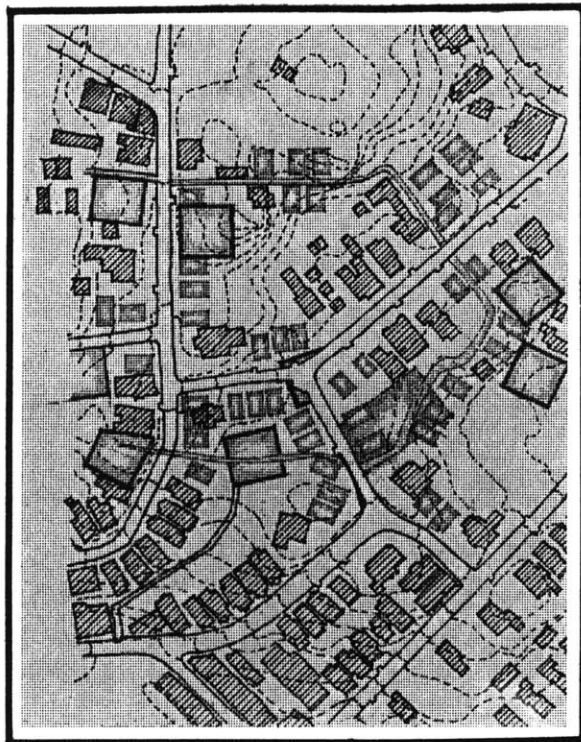


Miletus, Turkey ca. 400 B.C.

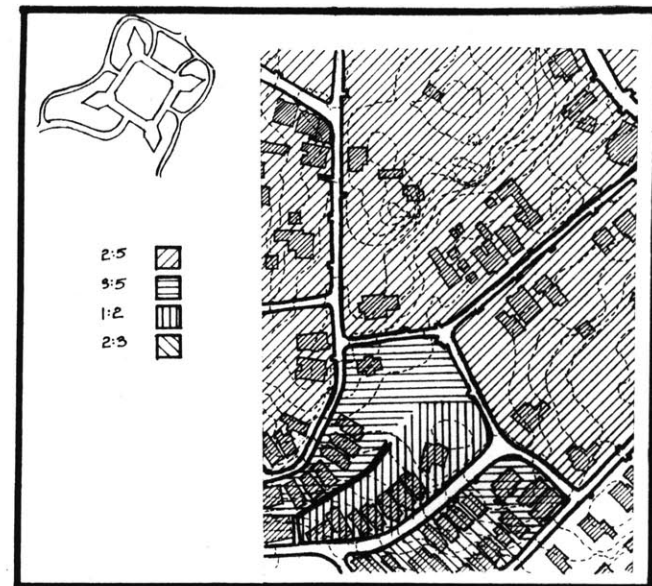


Indianapolis, Indiana

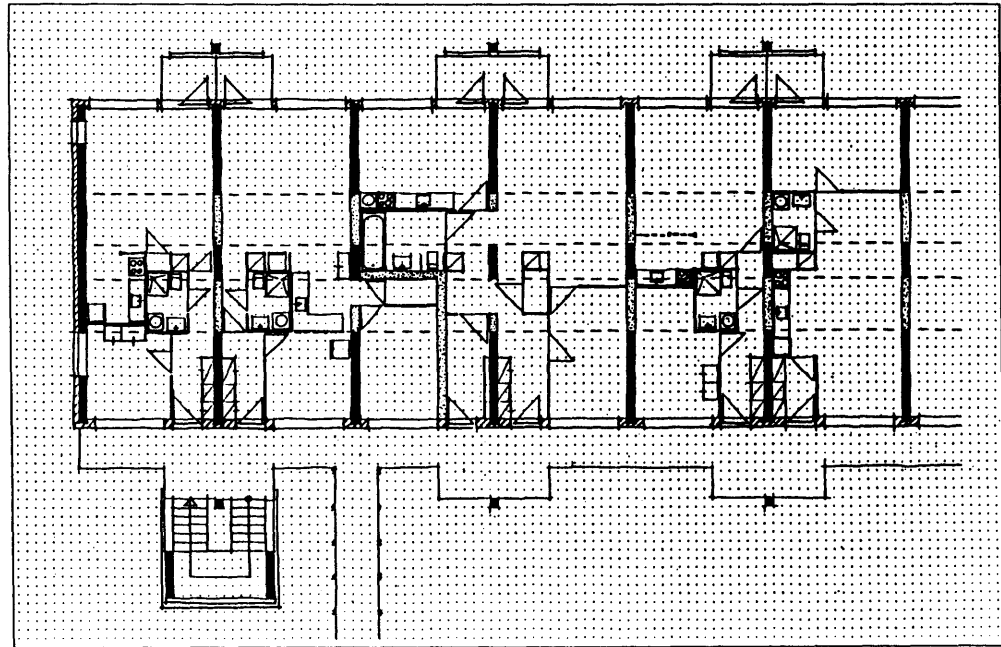
In fact, it is precisely the site, joined with initial use decisions, which demands specificity, and preempts the possibility of true modular construction. Modular or prefab housing, like the Manning's Portable Colonial Cottage produced in London in the 1820's, depends precisely upon a colonial attitude: abstract disjunction with site. The Sears Modern House represented a level of commitment above that, simply because it was not demountable: there was no opportunity to stuff it back into the packing crates and move along. In a colonial or crisis situation, demountable housing has obvious virtues, but capacity for site response and creating place are not among them.



Urban master site plan

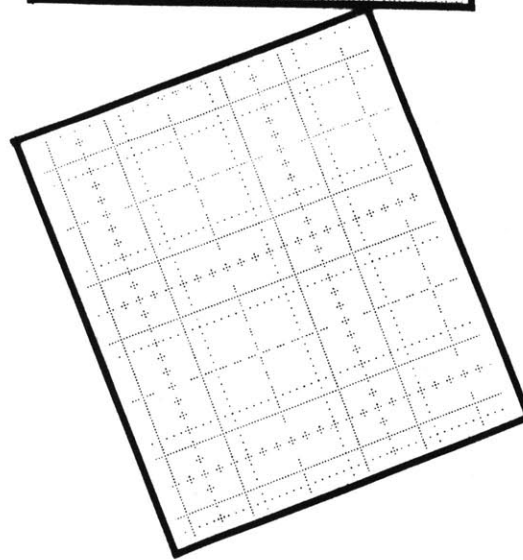
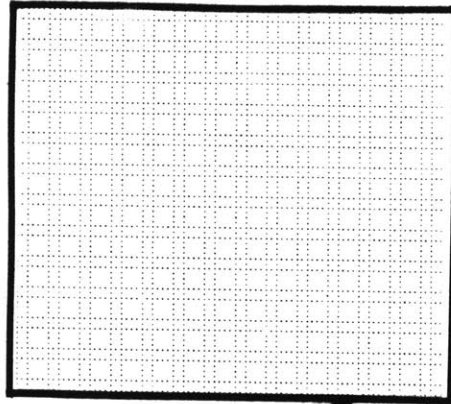


Zoning for residential density



Keyenburg, Netherlands. Supports housing.

SAR "Tartan"
10-20-10 cm band grids
for modular coordination



Together with the Weimar era *existenzminimum* projections in Germany came explorations of prototypical supports structures: masonry mass housing projects with modular coordination and demountable partition walls. Even in the United States, by the 1930's, industrial house proponents had fixed upon SAR's now-familiar 10 cm [4 inch] modular wall thickness. Yet, by 1950, the factory-built house's strongest proponents in America, Walter Gropius and Conrad Wachsmann, had both left high density prefab housing to concentrate on freestanding dwellings.⁸ The rigors of high density modular construction responded to Northern European constructional and density constraints, but found little applicability in the New World.

As Bemis reasons , prefabrication ultimately failed because it performed for inhabitants in no new manner. The term *prefab* was in fact perjorative, yet without massive subsidies it was never truly competitive with the traditional housing market. This is in part due to the expense of universal structural redundancy, but more specifically the result of the closed system's uneconomical response to specificity.

Herbert concludes in THE DREAM OF THE FACTORY-MADE HOUSE "...given a vigorous and highly competitive free-enterprise system...The prefabricator...could never begin to deal with the problems of housing the urban poor. He could try to provide for the less well off...through the provision of a minimum product, sited with little concession to space and amenity, at a very low cost."⁹ Even so, given tooling up and production overhead, proprietary system prefabrication is only feasible in a guaranteed and steady market. By contrast, prefabricated components such as bathrooms, storage wall systems, solaria, dormers and bay windows may complement the usual window and prehung door units in introducing substantially better construction and more efficient installation than onsite fabricated units.

In general, site should be "a source of language"¹⁰, of discourse and of generative specificity. Whereas appropriate typology brings design efficiency in the form of clear spatial, dimensional and constructional ordering of theme and range, site — together with participation — articulates that efficiency: We have neither to theoretically posit and justify form variation based on invented issues, nor do we have to build in the "structural redundancy inherent in a universal system."¹¹ Variation or relative weighting of design priorities is informed by inhabitant desire, use and transformation; or from clues inherent in the site.

Predictability and Happenstance

We look to type to enable the predictable, and to site and use for chance opportunity. Where site contributes nothing beyond sun angles, slope and access, observing it has not informed design beyond the abstract studio diagram. Lynch in his classic *SITE PLANNING* is quite explicit about two kinds of site analyses necessary: one in which technical data are tabulated, and the other in which informal access and use, possible linkages, any vestigial structures or foundations, and opportunities adjacent to the site can be gleaned for subsequent opportunistic response.

Thus Hamdi leads us to look for clues to establishing informal linkages: Are there teens around to safeguard, hinder or help build the project? Has the next door neighbor got a stockpile of available building materials? Would she accept a paint job or a privacy fence or a roof repair in return for driveway or stairway use rights?¹² Lynch adds the possible generative influence of microclimate, outdoor acoustics, views, easements.¹³ Such latent opportunistic intent is inherent in the term *site*, "...which suggests that we look at the environment with the intention to act upon it, or to observe an act in it."¹⁴

Within the disorganized informal sector of exurbia, there currently exist better options than minimal tract housing. Having obtained generic rationalized "model" plans, one can locate a builder, financing and a site and then work out a fit. However, the building and real estate sectors are too disorganized, complex and market-driven to spontaneously

Don't blame us for not building more low income housing. People don't really want it. .. Remember, we're just businessmen, so we have to go where the profit is..

- a Texas developer

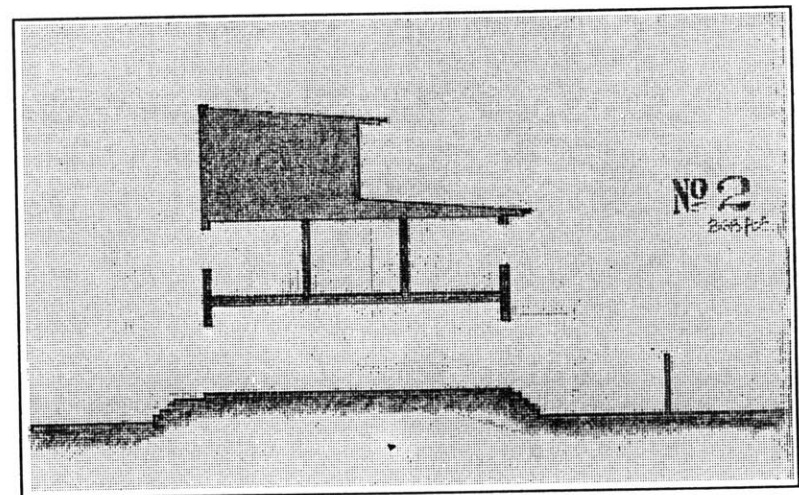
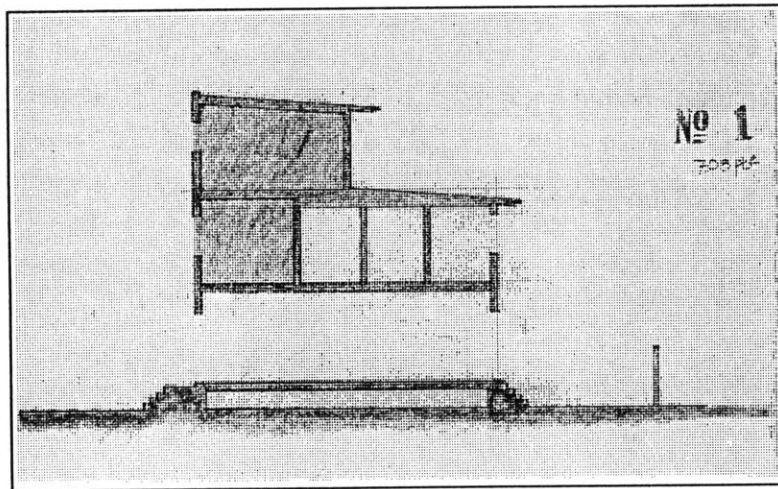
produce low cost housing, although they quickly organize to exclude it. At present, financial incentives for building low cost housing have disappeared. While most cities have an acute housing shortage, there is an increasing tendency for their market to be glutted in upscale residences.

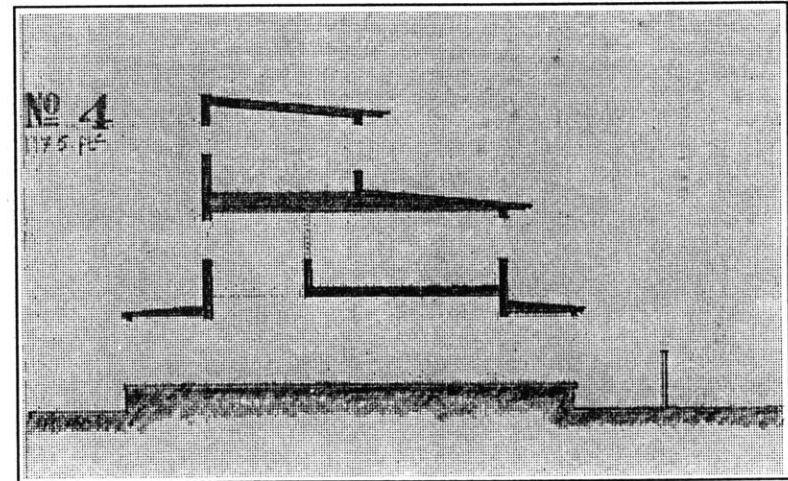
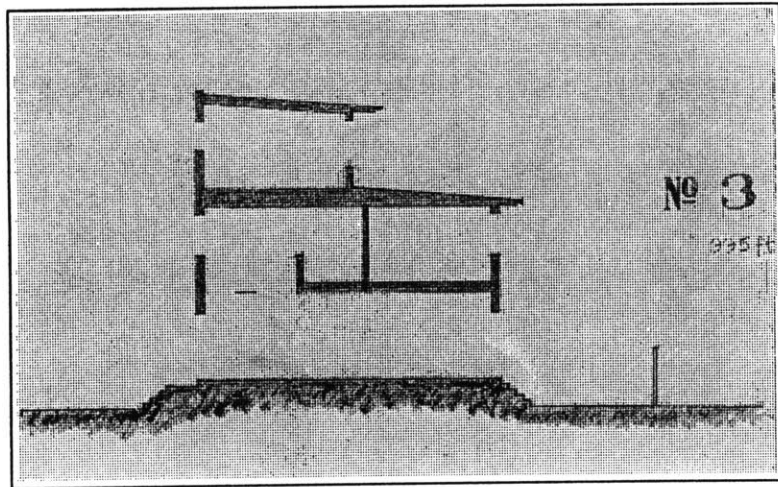
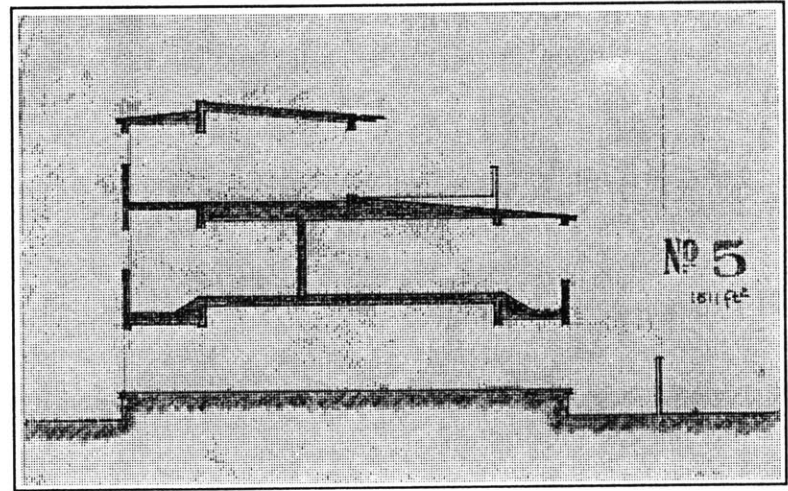
As a rule, a majority of the most capable architects do not go to work designing dwellings for "plan shops", or into low cost housing. In this thesis, I have advocated exploration of realistic redefinition of the role of the enabling architect. As such, fine-tuned long-considered response to opportunities of site and neighborhood — the Chinese garden master's approach — seem prohibitive in low cost housing. But taking a modelled type and working with inhabitants to adjust its systems to particular site, section, use and predicted transformation seems efficient.

Thus the model transforms in response to light, views, topography, economics, construction timing, use and household organization. Single parents may not require a master bedroom; nonbreeding couples may not require small bedroom subdivisions; wheelchair access may change section and plan; aggregation may free up space, structure and capital; desires to eventually run a business in the home, increase household size or develop rental space all benefit from design. Knowing the life cycles of various components and systems, the architect also advises about the relative cost benefits of options — or how to make such decisions — from a perspective having no vested interest in materials or images selected.

As capacity and façade studies have clearly demonstrated, architecture is far more domestic in character when the construction system responds to generic possibilities, and the closure system is informed by specific use. E.g., within the enabling house, datum lintels supported by beams allow predictable fenestration transformation through time. Façade design is most successful and least institutional in character, however, when it responds to specific window, door and bay placement. Rather than projecting and

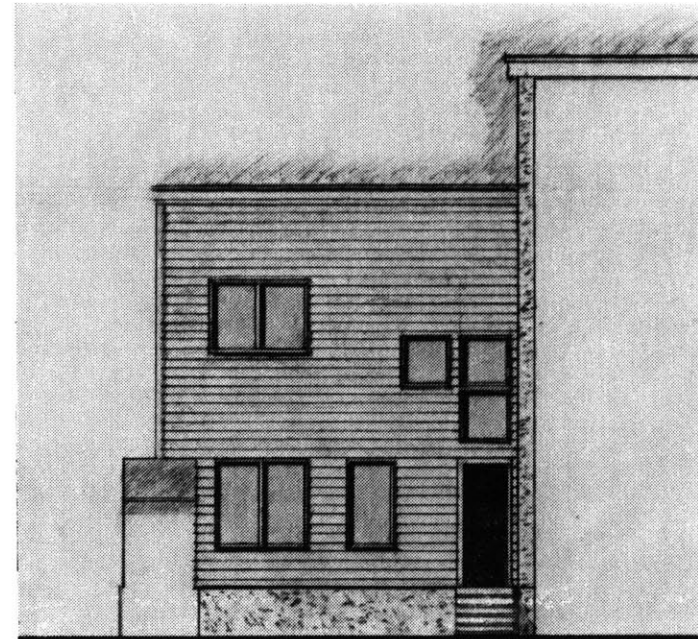
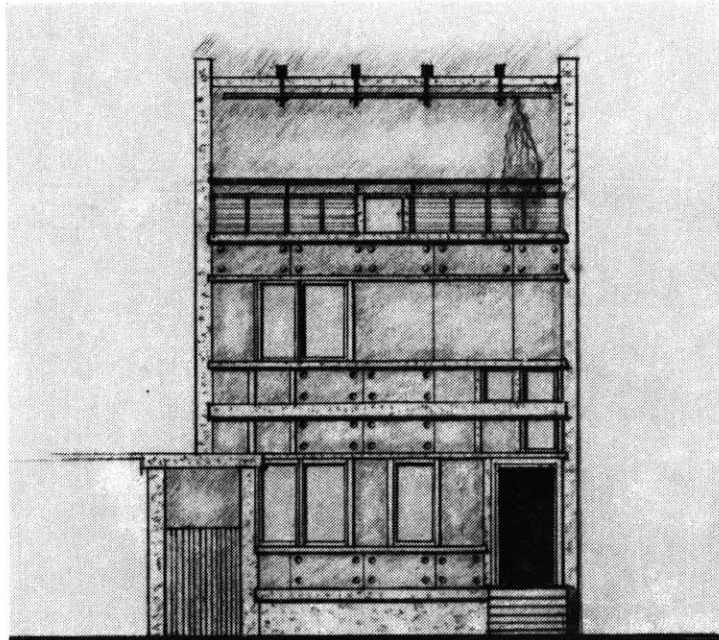
Projected sectional transformation through time





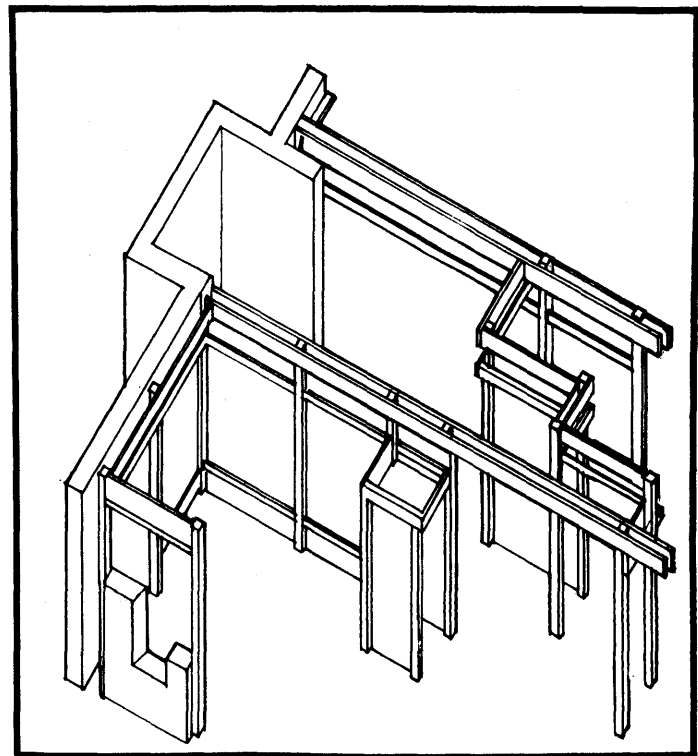
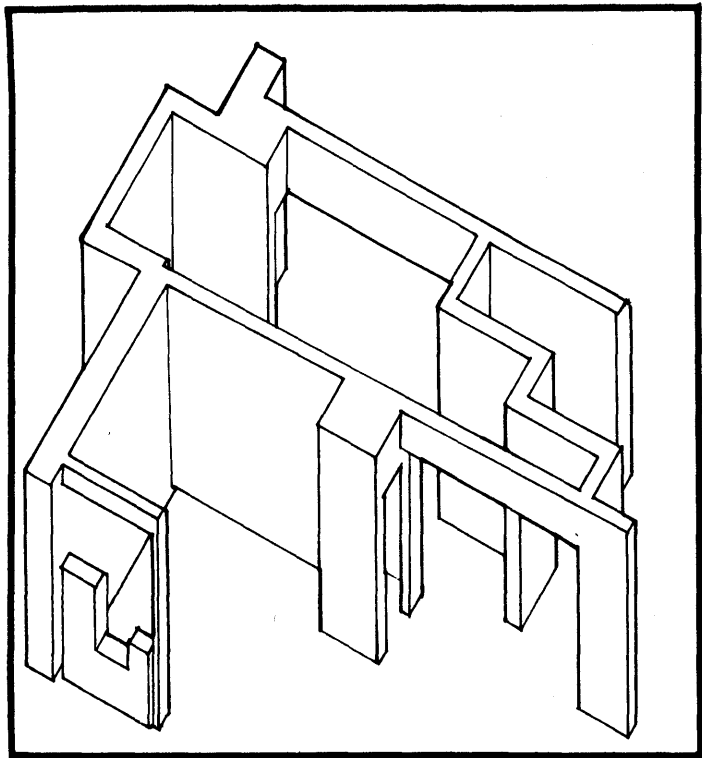
anticipating future transformation with infill panels, it may give more subtle referential clues to evince a capacity for change. The participatory design process which determines housing image and variation has not been directly explored in depth in this thesis.

As architects and social thinkers, we must appreciate, reinforce and predict the growth of rootedness to place. In polar opposition to massively overbuilt postwar housing developments, we have community architecture sites and services schemes. In looking for something in between the monolith and the *tabula rasa*, I am arguing for systems of dimensions and logics of assemblage and construction which are recombinant, and then interlock with —embrace—a foundation, which is entirely responsive to site. This perspective on low cost housing seems feasible, practical, socially reinforcing and eminently architectural.



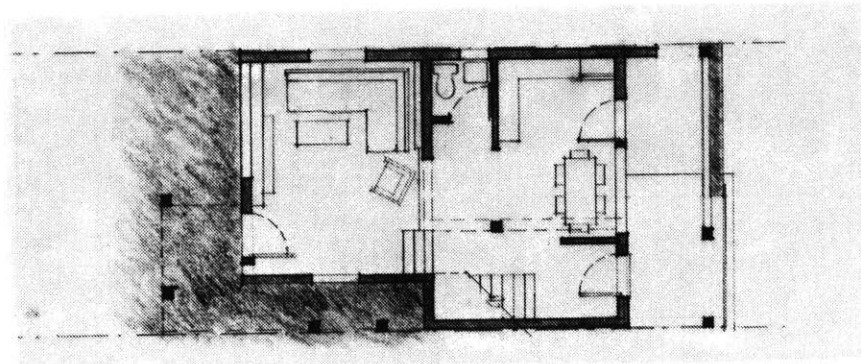
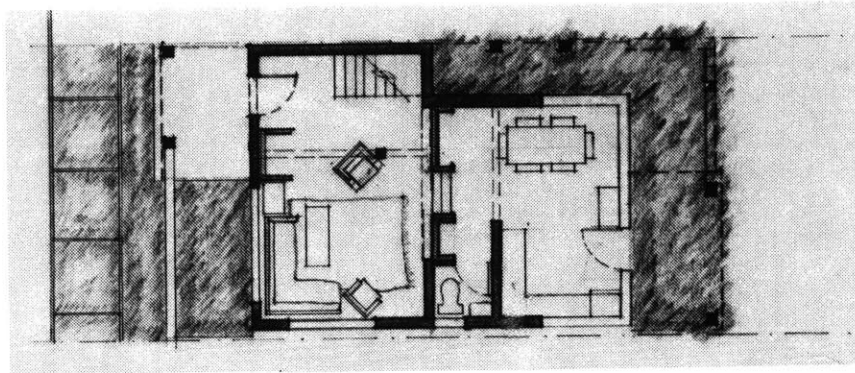
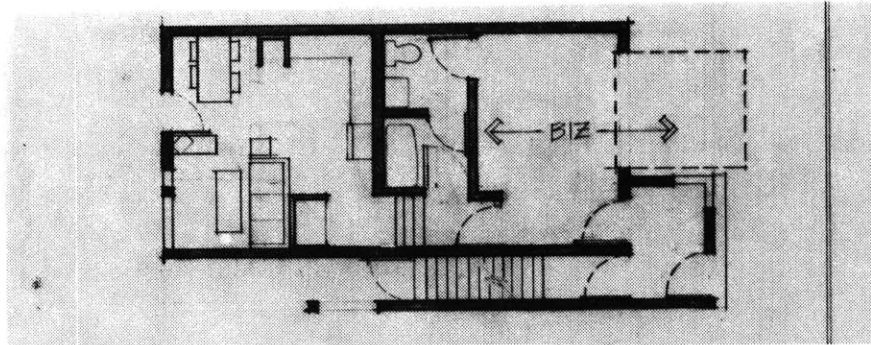
Transformational vocabulary vs. capacity for change

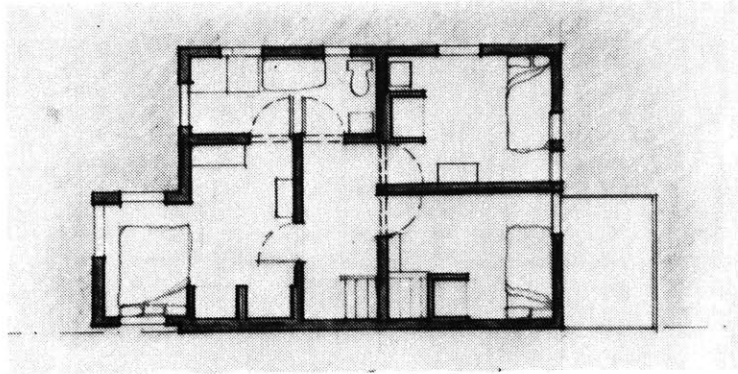
Exploring the gap between architectural expression of flexibility and implicit flexibility of vernacular construction



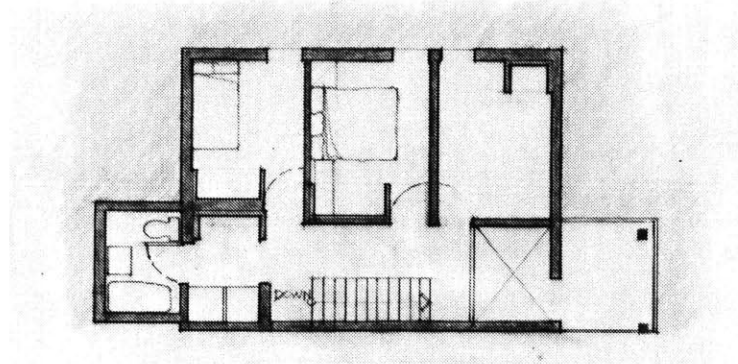
Capacity studies

first floor

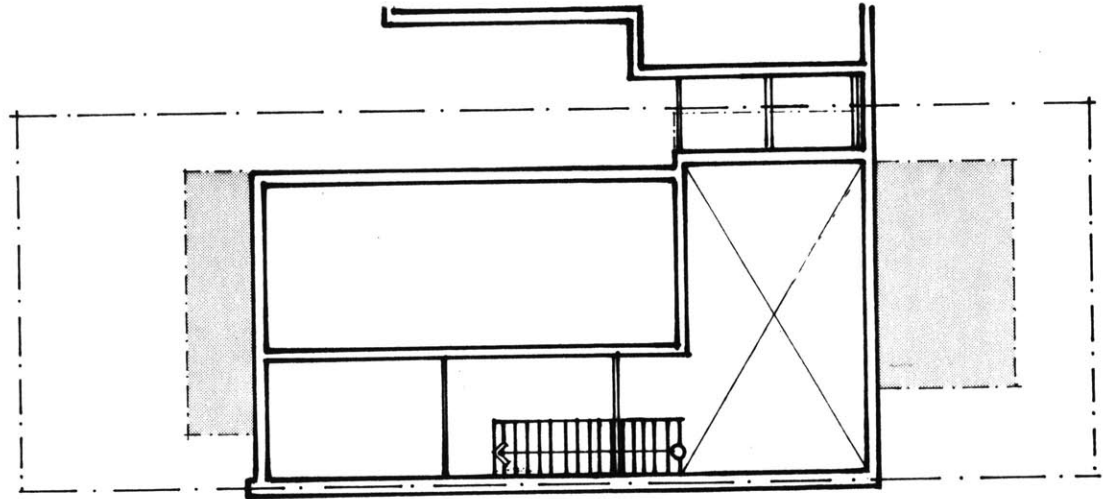




second floor

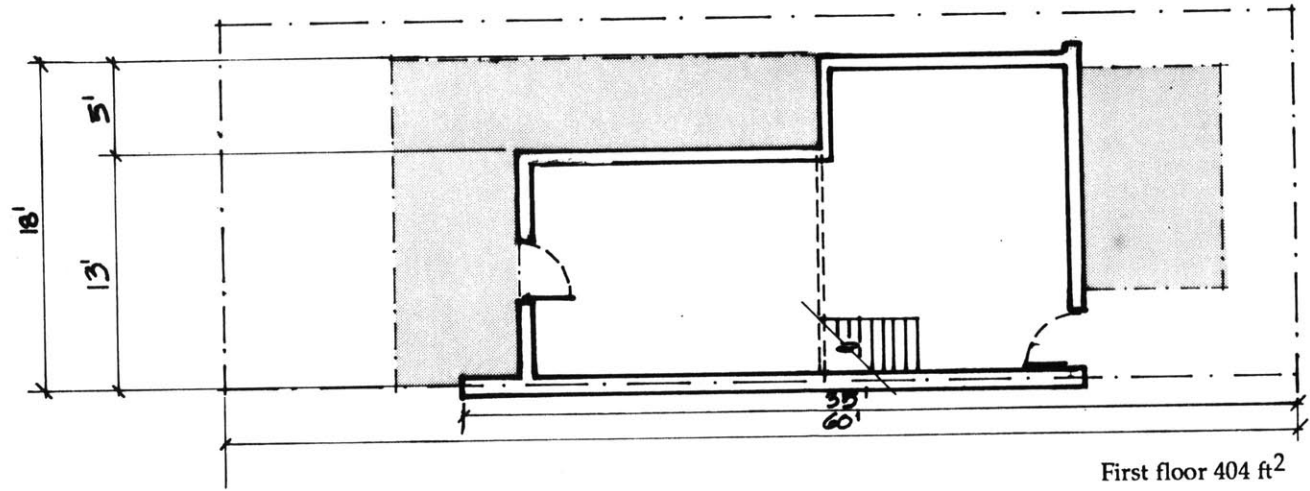


Row house modelled type



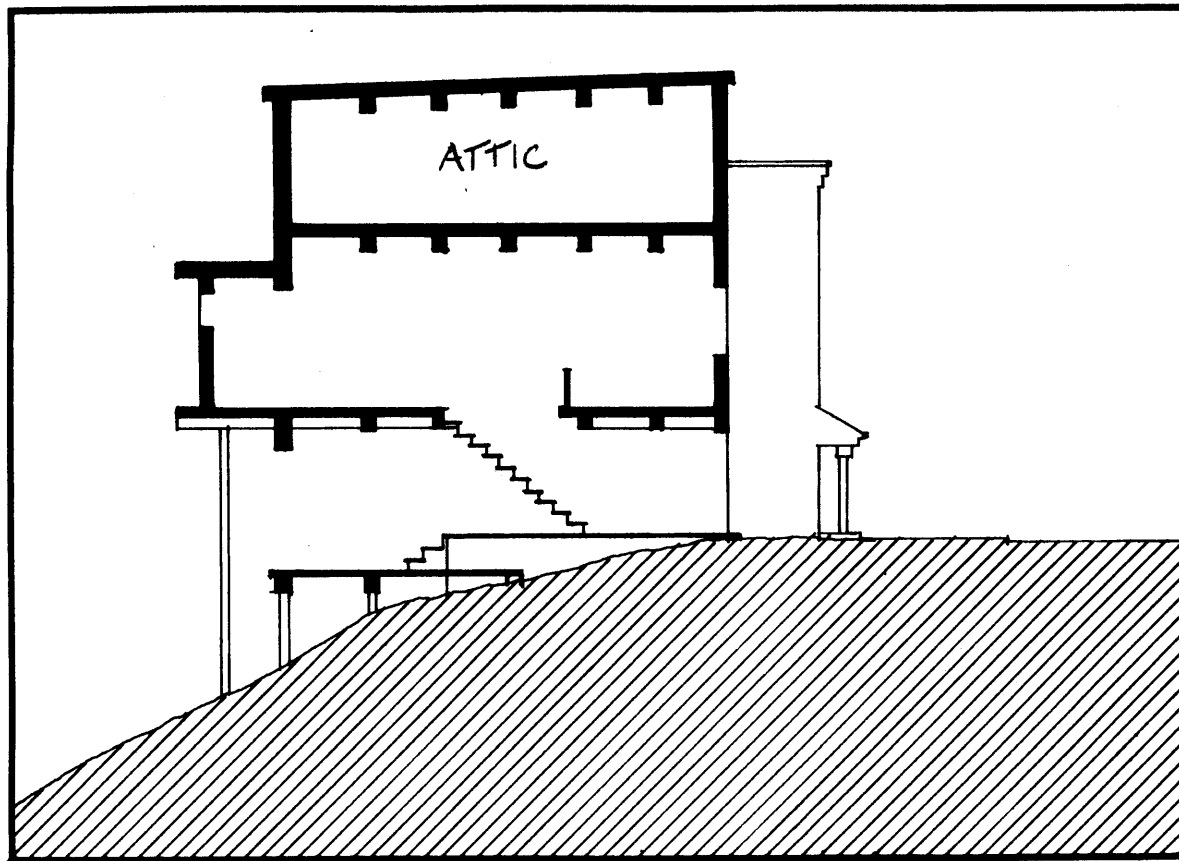
Second floor 304 ft²

expansion zones

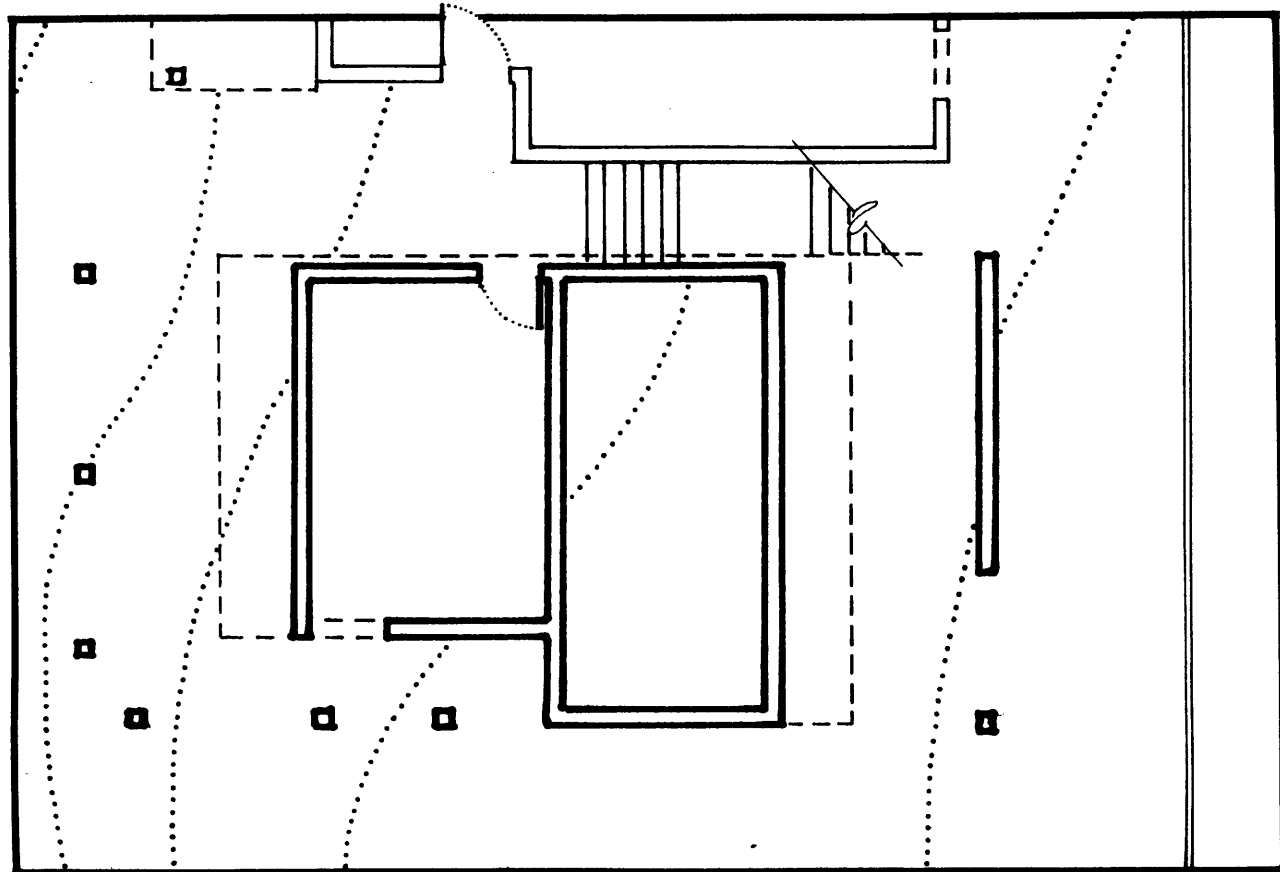


First floor 404 ft²

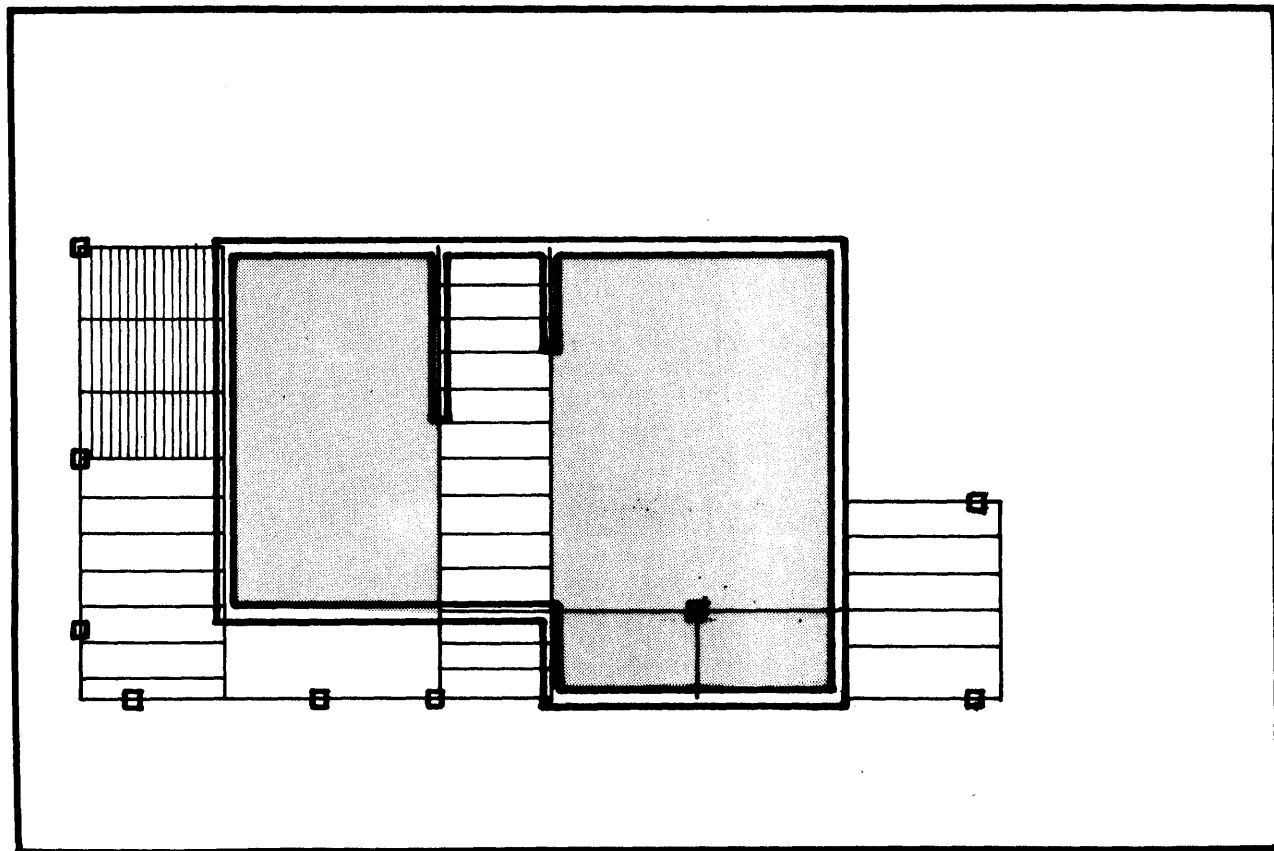
Row house modelled type sectional site response



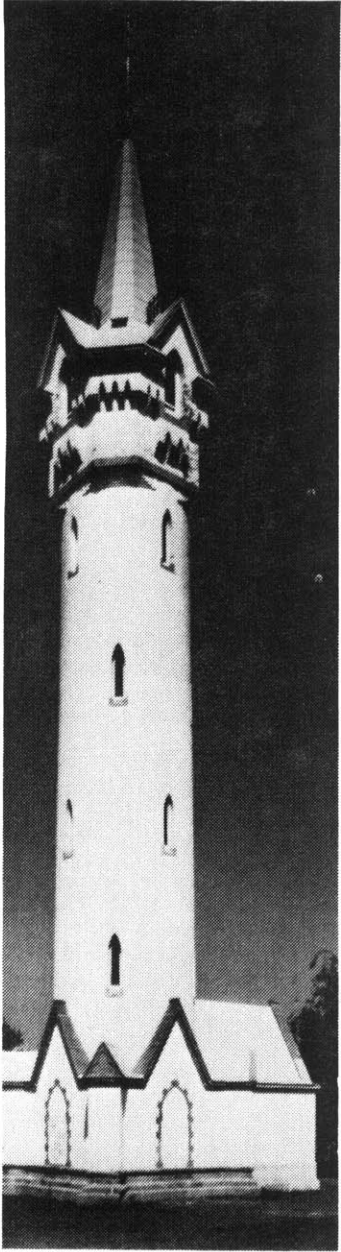
Row house modelled type plan site response



Row house modelled type optional construction



Modelled second floor framing plan for structural tongue-and-groove flooring



SECTION FIVE

**anatomy of enabling
revisited**

ERA OF REDUCED EXPECTATIONS

WELL, IF EVERYTHING GOES O.K., THAT OLD LEFT FOOT SHOULD BE COMING INTO VIEW SOON.



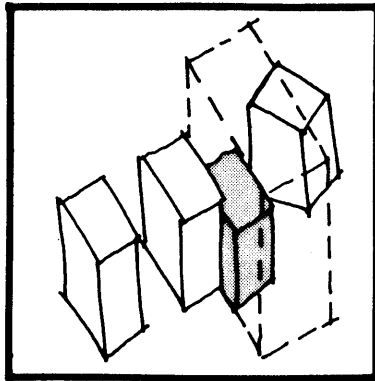
Model enabling evaluation matrix: categories & elements

ARTIFACT	TYPES OF ENABLING	ACCOMPLISHED THROUGH
	<i>dwelling</i>	extra material capacity
	display	referential clues
	craft	technical engineering
	display of self-in-the-world	opportunistic placement or response
	transformation	good/loose fit
	<i>upgrade</i>	
	<i>use change</i>	
	<i>expansion</i>	
	<i>earning</i>	
	shops	
	offices	
	cottage industries	
	boarders; apartments and rental offices	
	investment return	
	affordability	
	physical enabling of child supervision from adjacent territory	
	incrementality	
	<i>existential</i>	
	self-expression	
	<i>display</i>	
	<i>opportunity for craft</i>	
	learning	
	<i>observing</i>	
	<i>doing</i>	
	decision-making and adjustment	
	responsibility	

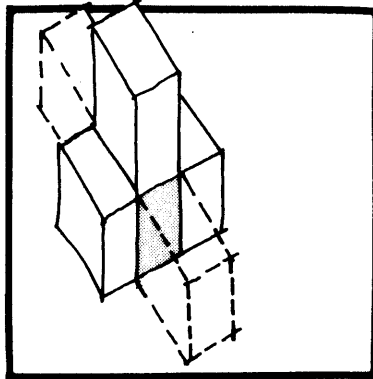
Spatial Enabling Principle

enveloping grounded dwellings within light and air on 3+ sides and above; and establishing adjacent exterior use territories

Enabling Siting



"Packed" boxes



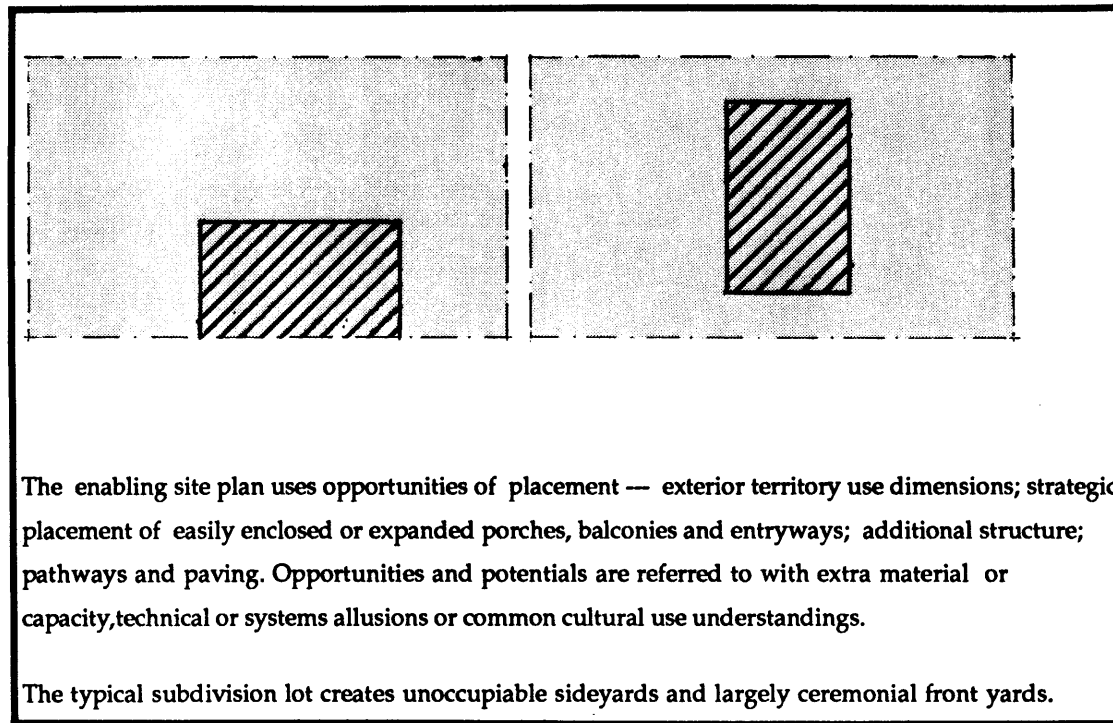
optimal natural lighting
optimal natural ventilation
acoustic isolation from impact sound
light construction
minimal intermediary infrastructure
formal imageability of dwelling

Traditional good design characteristics...

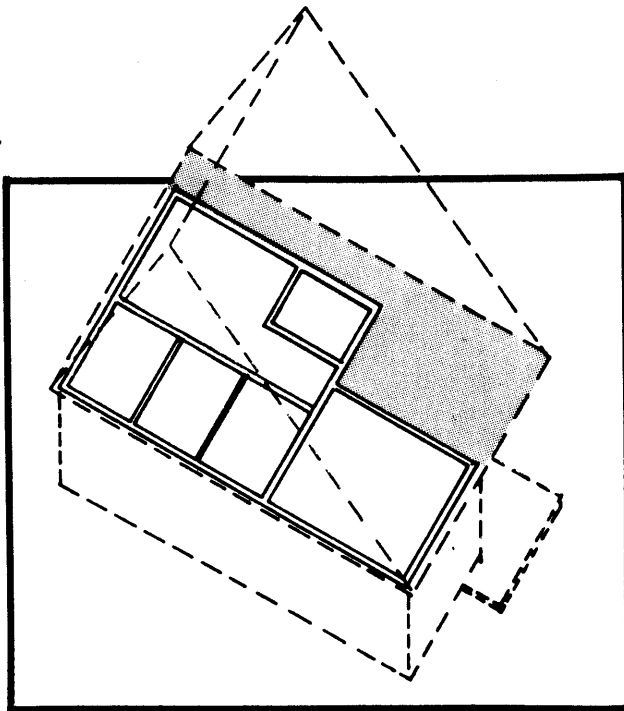
...Additional enabling performance

finer-grained decision-making
fewer mediating management structures
microscale opportunistic site response
ownership of tangible dwelling
more options for commercial use
lower subsequent construction costs

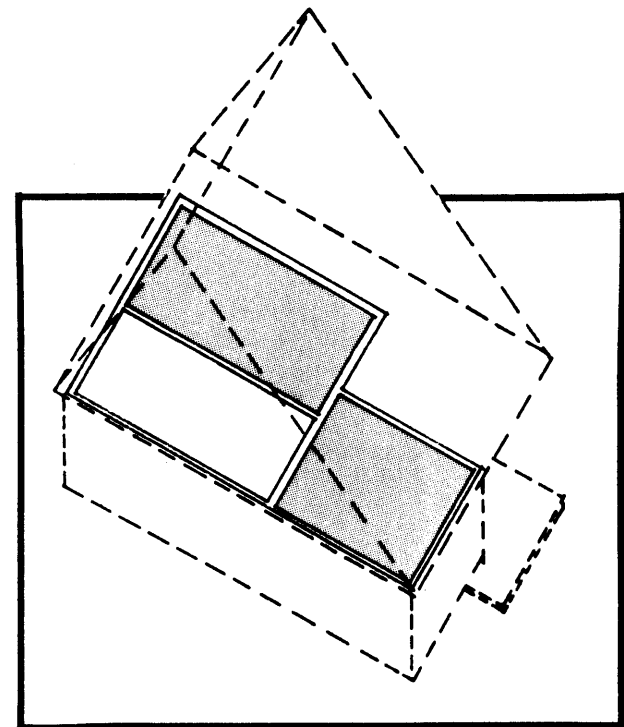
Enabling Siting



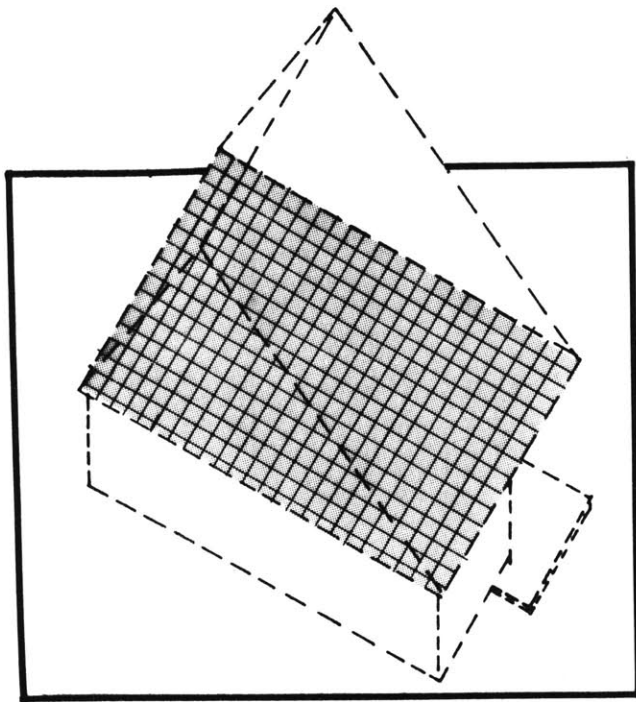
Illustrated anatomy of enabling



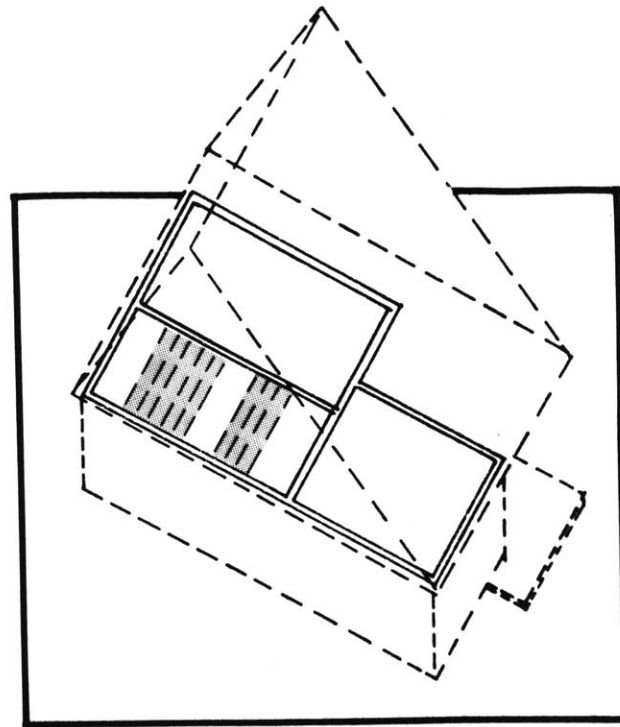
urban roofs with deep overhangs



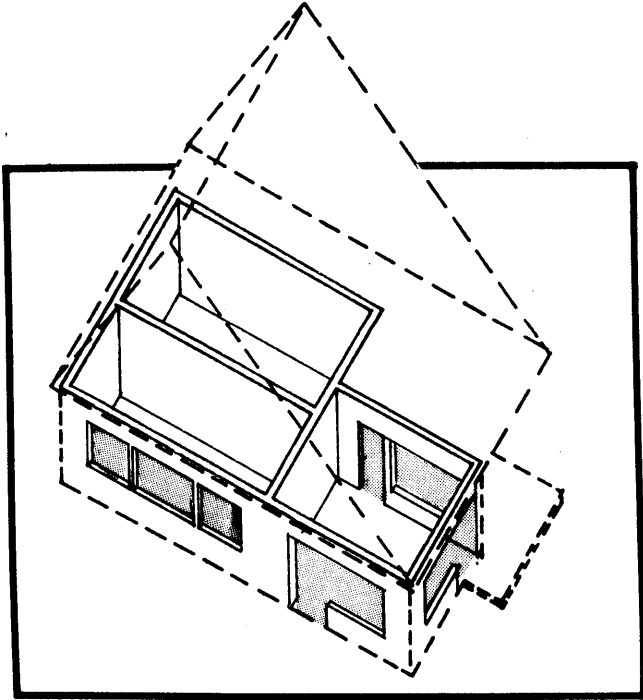
large collective spaces



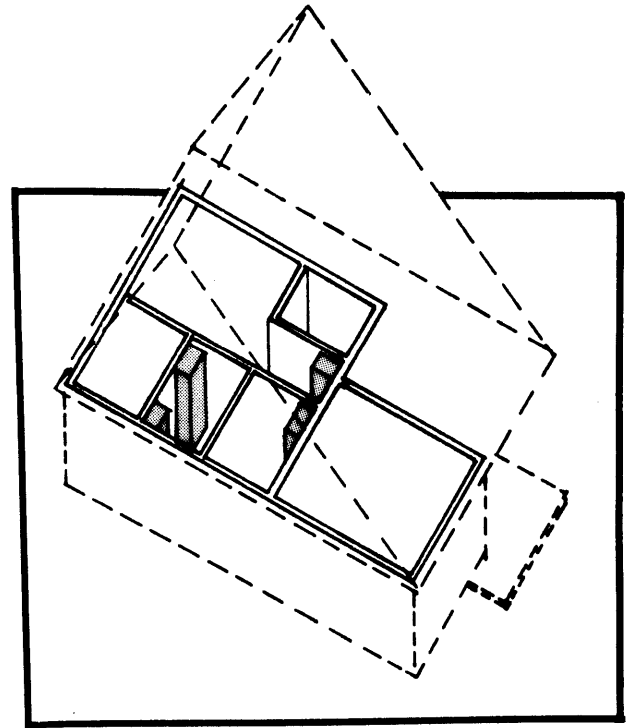
rationalized construction dimensions



flexible bedroom wall positioning

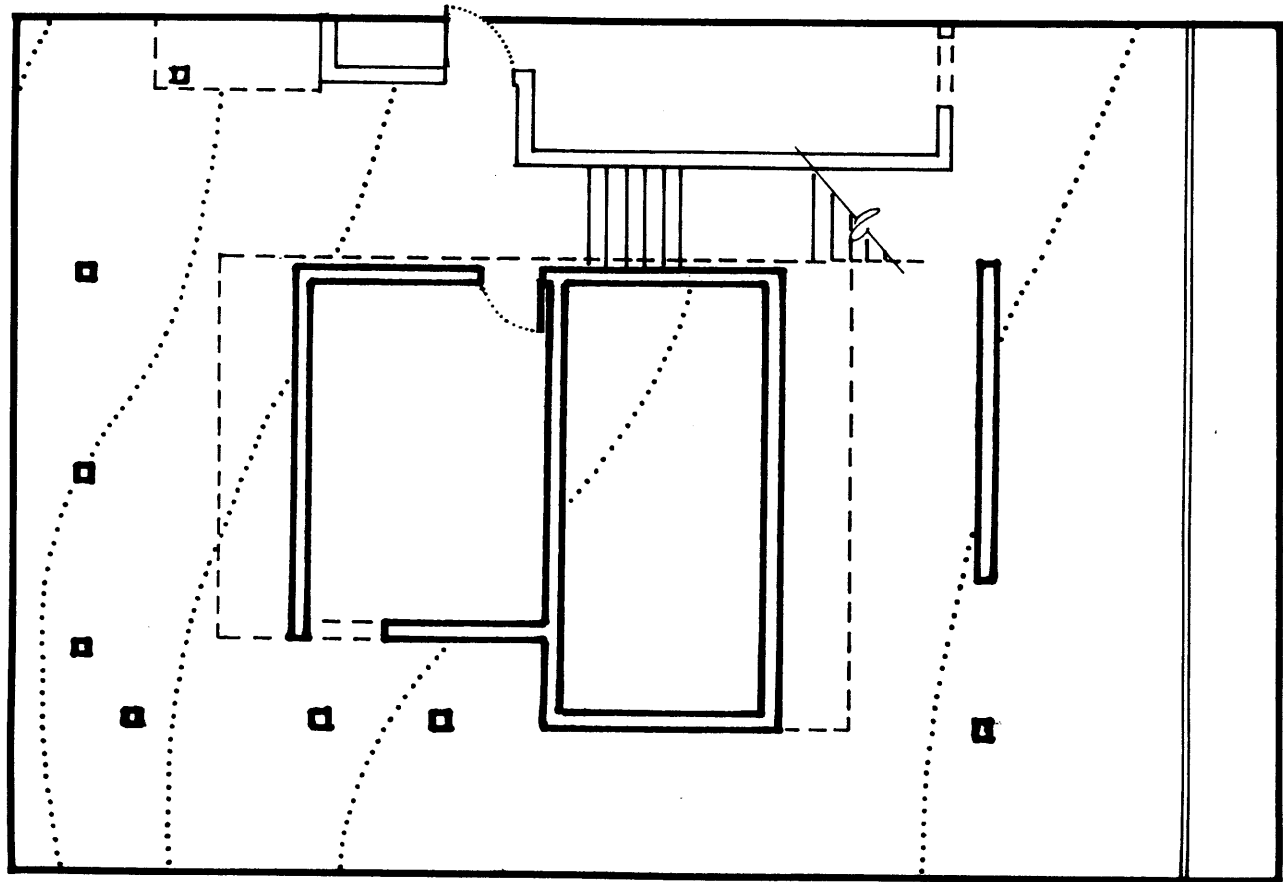


post and beam fenestration and door infill zones



freestanding wardrobes

Row house modelled type plan site response



SECTION SIX

Conclusions:

The changing role of the architect

It is clear that much of our training occurs at an institutional size, and involves decision-making in the presence of sufficient capital to enable many decisions which cannot be described as solely pragmatic. At the same time, we are now accustomed to the practice of rationalizing for the benefit of a multiple client, one whose fiduciary decisions on behalf of a collective good may be subject to rational scrutiny and require justification beyond the affective congruence of the artist announcing that "it feels right."

In the extreme case of very low cost housing, the situation is quite different. It is frequently difficult to distinguish precisely who the client really is. Basic background statistics, when available to give profiles, will frequently prove dead wrong in the field. Funding is always uncertain, tied into dynamic public political perception. The public good, which has traditionally been the virtual client in post World War II mass housing, is at best an uncertain beast.

But most striking of all is the fact that the problem of housing is not an architectural problem, nor, as many First World theorists have exhaustively argued, is it a technical or production problem. There is a problem, and an urgent need for dwelling, but one which seems fairly distinct from the mere production of houses.

Ultimately, then, what is the role of the enabling architect, given our present political economy and organization of labor?

It seems reasonable to conclude that given our present organization of society, architects are not likely to be paid for extensive hours spent customizing individual low cost housing designs. And while we remain grateful for the fine-grained variation and complexity in the façades of supports/infill projects or of *built form* screen and framework system compositions, there is indeed in both a degree of humane preciosity. Humane because, to paraphrase T.S. Eliot, humankind cannot take too much oppressive reality.

Precious because it is domesticated complexity, limited, controlled and frequently responding to formal or compositional rather than use or natural landscape adjustment. To build great endless rows of institutional buildings we have culturally found abhorrent. To mitigate them with scale changes, formalist axial shifts and systems collisions makes them bearable, to some extent by denying their organization and production. It makes for beauty and a more tolerable urban environment, but it does not in actuality reflect the kinds of integrity of rational systems design to which the inheritors of the modern movement lay claim.

It is thus not mass housing it self which was horrible. It was merely *logos*, the state of social organization made flesh; and there is little indication that recent decades have made the cultivation of housing easier, or the social landscape more fecund.

Ultimately, I would argue that while the problem is not architectural, our contribution to the production of houses need be. As the most highly-trained urban and small-building sized form makers around, architects know far more about capacities within dimensions and forms, and about the behavior and language of form than any other professionals.

At the same time, the enabling housing architect is likely to know a great deal as well about the inherent capacity of certain forms and building systems and material connections to transform through time. E.g., while the el Hekr accretional highrise in Egypt may be built by stacking brick upon brick through the years, we know that freestanding brick cottages do not easily move out beyond their façades to claim additional landscape. And while the Venice beach solution of jacking up houses to make the first floor plan into a second floor is quite seductive to the architect, it cannot be done incrementally at all.

Similarly, we know that circular geometries, whether columns or temples, do not easily transform or grow in our culture, just as we understand that in our context, a four foot space is by physical definition a privacy for one. Given the training of a true master builder, the Italian *geometra* is a far better model for the training of a housing architect than the

average graduate of our most theoretical schools of architecture, when it comes to small scale production of housing. But perhaps in no other training is one forced to understand communication, team coordination, and problem-solving in which there can be no truly rationalized solution or optimization, just intelligent, articulate generalist intervention.

Ultimately the use of developed or modelled culturally implicit typologies does represent a great efficiency for the housing architect, as does inhabitant participation in the generation of variation. But it would be misleading to suggest that reorganization into a series of community shopfronts could work without some sort of outside funding, or that our culture's disposition of capital is such that it would pay for the hours necessary to architecturally empower its poorest inhabitants.

Which is ultimately to conclude that, while the problem is not architectural, the partial solution which we offer as architects is. For some, as in sites and services practice or highly flexible schemes, the problem leads to abandonment of formmaking, in favor of mastering an understanding of building community linkages. For others, it becomes a question of policy, of economics, of community organizing and politics. Or a dream of the prefabricated house.

Like Pangloss, we may view the cosmos mouth agape, expend our existence pursuing the nature of organic form, the shape of chaos, implications of the cult of domesticity. But ultimately, like Candide, we have spent the better part of a lifetime cultivating an abstract philosophical understanding within which to dwell in the world.

Knowing that architecture is generally the solution to a far more modest problem than that of housing, it does nonetheless behoove us to tend our garden.

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2 Gwendolyn Wright, **Building the Dream,** (Cambridge, Mass.: MIT Press, 1983)pp. 23-27.

3 Kevin Lynch, **Site Planning.** (Cambridge, Mass.: MIT Press, 1962). p. 135.

4 Wright, *op. cit.*, p. 31.

5 *Ibid.* p. 248.

6 Nabeel Hamdi, **Housing Without Houses.** unpublished draft, p. 73.

7 Fergus Fricke, **Requirements in Multi-Occupancy Residential Buildings.** (Sydney, Australia: University of Sydney Department of Architectural Science, 1977). p.13.

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SECTION THREE
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p. 11.

2 *ibid.* p. 16.

3 *ibid.* p. 48

4 *ibid.* p. 18.

5 *ibid.*

6 *ibid.* p. 107.

7 *ibid.* p. 60.

8 *ibid.* p. 75.

9 GwendolynWright, **Building the Dream: A Social History of Housing in America.**
(Cambridge, Mass.: MIT Press, 1981). p. 113.

10 Rybczynski, *op..it.*, p. 110.

11 Wright, *op. cit.*, p. 106.

12 Rybczynski, *op. cit.*, p.119.

13 Wright, *op. cit.*, p.112.

14 *ibid.* p. xvi.

15 *ibid.* p.110.

16 *ibid.* p.113.

- 17 Herbert Gans, *The Levittowners*. (New York: Columbia University Press, 1967). p. 265.
- 18 Rybczynski, *op. cit.*, p. 193.
- 19 *ibid.* p. 214.
- 20 Gans, *op. cit.*, p. 278.
- 21 Richard Sennett, *The Uses of Disorder*. (New York: Alfred Knopf, 1970). p. 82.
- 22 *ibid.* p. 61.
- 23 Gans, *op. cit.*, p. 151.
- 24 Wright, *op. cit.*, p.281.
- 25 *Ibid.*

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2 *ibid.*

3 Frances Ferguson, **Architecture: Cities and the Systems Approach.** (New York: George Braziller, 1975). p. 2.

4 N. John Habraken, **Transformations of the Site.** (Cambridge, Mass.: Atwater Press, 1988). p. 76.

5 Ferguson, *op. cit.*, p. 5

6 Peckham, *op. cit.*, p. 27.

7 *ibid.* p.18.

8 Ferguson, *op. cit.*, p. 28

9 Habraken, N. John, **Supports: An Alternative to Mass Housing.** (New York: Praeger Publishers, 1972). p. 6.

10 Richard Sennett, **The Uses of Disorder.** (New York: Alfred A. Knopf, 1970). p. 86.

11 Mark D. Gross, "Design as Exploring Constraints." MIT M.Arch. Thesis, 1986, p. 19.

12 Christopher Alexander, **Notes on the Synthesis of Form.** (Cambridge, Mass.: Harvard University Press, 1964.). p. 45.

13 Ferguson, *op. cit.*, p. 79.

14 Gross, *op. cit.*, p. 1.

15 Ferguson, *op. cit.*, p. 42.

16 Sennett, *op. cit.*, p. 99.

17 Ferguson, *op. cit.*, p. 2.

18 Christopher Alexander, **A Pattern Language: Towns, Buildings, Construction**. (New York: Oxford University Press, 1977). p. 3

19 Kevin Lynch, **A Theory of Good City Form**. (Cambridge, Mass.: MIT Press, 1981). p. 116.

20 Kevin Lynch, "Is a General Normative Theory Possible?", Unpublished ms. p. 7.

21 Gleick, *op. cit.*, p. 6.

22 H. Haken, ed., **Chaos and Order in Nature**. (New York: Springer-Verlag, 1984). p. 2.

23 *ibid.* p. 6.

24 Robert Shaw, "Modelling Chaotic Structures," In H. Haken (Ed.) **Chaos and Order in Nature**, *op. cit.*, p. 220.

25. Gleick, *op. cit.*, p. 8.

26. *Ibid.*

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29 Peter Blundell-Jones, in L. Kroll (Ed.), *The Architecture of Complexity*, *op. cit.*, p. 12.

30 *Ibid.*

31 Habraken, *op. cit.*, p.3.

32 *Ibid.* p. 15.

33 *Ibid.* p.1.

34 John de Monchaux, "Getting Things Done in Messy Cities," *Places*, Vol. V, No. 4, p. 39.

35 Alexander, *op. cit.*, p. 54.

1 Habraken, N. John, "The Control of Complexity," *Places* Vol IV, No. 2, 1987, p. 6.

2 Peter Lloyd, "A Convention Center: A Typological Approach to the Design of an Institutional Building." MIT M.Arch. thesis, 1989, p. 6.

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4 N. John Habraken, *Transformations of the Site*. (Cambridge, Mass.: Awater Press, 1988). pp. 64 - 69.

5 Kevin Lynch, *Site Planning*. (Cambridge, Mass.: MIT Press, 1962). p.9.

6 *ibid.* p. 33.

7 *ibid.* p. 135.

8 Herbert, G. *The Dream of the Factory-Made House: Walter Gropius and Conrad Wachsmann*.(Cambridge, Mass.: MIT Press, 1984). p. 319.

9 *ibid.* p. 308.

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