A MORPHOLOGY OF CONSOLIDATION:
Spatial Form and Physical Change in an American Suburb

by
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Submitted to the Department of Architecture in partial fulfillment of the requirements of the Degree of Master of Science in Architecture Studies at the Massachusetts Institute of Technology

September, 1983

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This thesis is an exploration and analysis of the spatial form and structure of physical change within an American suburb. Typified as middle class, residential, and single family, one finds in such settings detached one or two story houses on 1/8 to 1/4 acre lots.

One central argument is that physical change, or change of spatial form and structure, is a requisite concern within all built environments, including suburbia. The second argument is that physical change (ought to be) is guided by the existing spatial form and structure of the built environment (suburbia) such that the resulting environment manifests similar patterns of spatial form.

The purpose of the thesis is to bring to rational, objective consideration a particular type of physical change which is occurring in suburbia yet is to a certain extent denied and not accepted. If such change is to be properly managed and to be used to the advantage of the greatest number of suburban residents, it must become a legitimate topic for public discussion. This thesis attempts to enable and facilitate the discussion through the presentation of a rational and systematic understanding of how physical change does/would/could come about and through an understanding of the environmental consequences of such change.

The particular mode of physical change considered here and occurring in many lower density, middle class, residential suburbs is being referred to as "consolidation".[1] The term, consolidation, is defined as the extension of and the building from current residential investments in housing and infrastructure in order to provide additional housing units without disrupting the existing built environment.

The objective confronted in this thesis, in relation to consolidation, is to enable more and a greater variety of households to live in suburbia while guaranteeing these households and existing residents the maintenance of a certain degree of environmental qualities. In addition, such housing must be affordable to purchase and maintain, and tailored to a variety of household sizes and configurations.

Thesis Supervisor: Edward Robbins
Title: Assistant Professor of Anthropology in Architecture

Acknowledgements:

I wish to extend my gratitude to the many individuals whose enthusiasm, thoughtful comments, and intellectual and moral support have helped to carry this thesis through to completion:

Professor Chester Sprague, upon whose ideas, insight, and prior groundwork this thesis has been built; Professor Ed Robbins who winnowed the chaff, uncovering what I really was trying to accomplish; Professor Tunney Lee for providing initial guidance; Professor Phil Herr for initial suggestions of the various directions one can take with a topic like this; Hattie Hartman for her previous extensive research activity; to fellow S.M.Arch S. students, particularly those in Environmental Design, for their evaluations of work in progress and the sharing of their own work; to Patricia for her critical analysis of my rationales and method and her much appreciated assistance in production.

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CHAPTER ONE: SOME ARGUMENTS OF CONSOLIDATION: WHAT IS PROMPTING THE CONSIDERATION OF CONSOLIDATION?

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setting and scope

Setting and Scope:

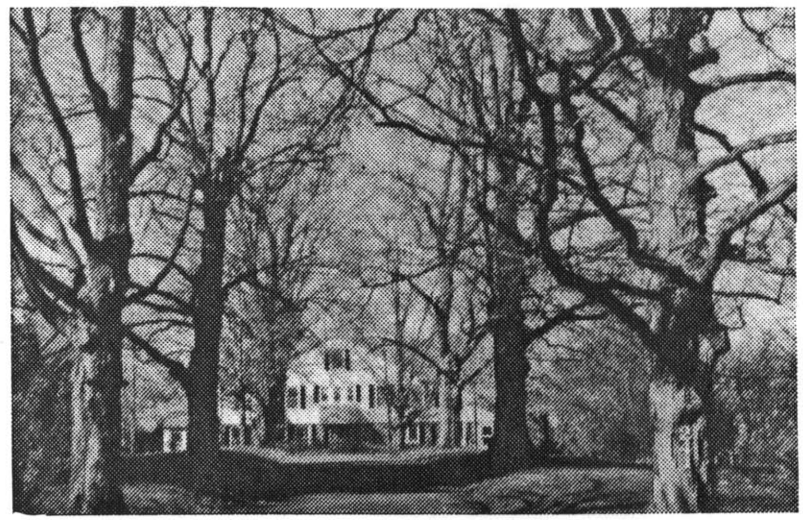
To Sam Bass Warner Jr, they were the streetcar suburbs of the middle and working class of Boston in the late 19th century (see figure 1). To Herbert Gans they were the lower middle class, mass tract homes of Philadelphia (see figure 2). To Seeley, et al. they were the older, upper class suburbs of Toronto (see figure 3).[2] In this thesis the suburbs are the post World War II, middle class developments of single family, detached houses. This environment is typified by relatively equal and repetitious amounts of private investments in land and housing. What one finds are one to two story houses on 1/8 to 1/4 acre lots (see figures 4, 5, 6, 7) -- more of a Lynd's "Middletown" rather than Bennett Berger's working class suburbs of tightly packed bungalows (see figure 8).[3] One also does not find wealthy owners of large homes on acreage. Evidently, one must not forget the enormous diversity of single family, residential, suburban settings. "Suburbs are often treated summarily yet their physical forms and [images] vary greatly." "Aside from a variety of densities which range from [4000] square foot lots to 2 acre lots and more, [a variety of] street widths, setbacks, house types, and the presence of trees and other land-

Figure 2: From Gans, The Levittowners, (frontispiece).

Figure 1

Figure 1a

Figure 2



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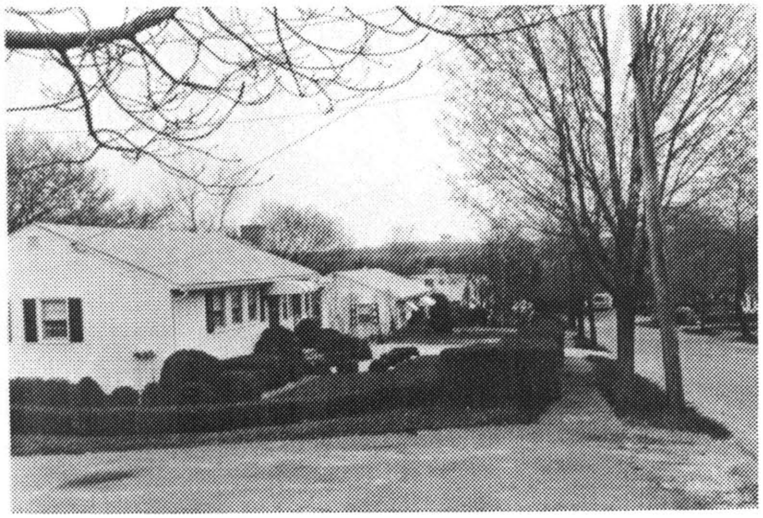


Figure 4

Figure 5

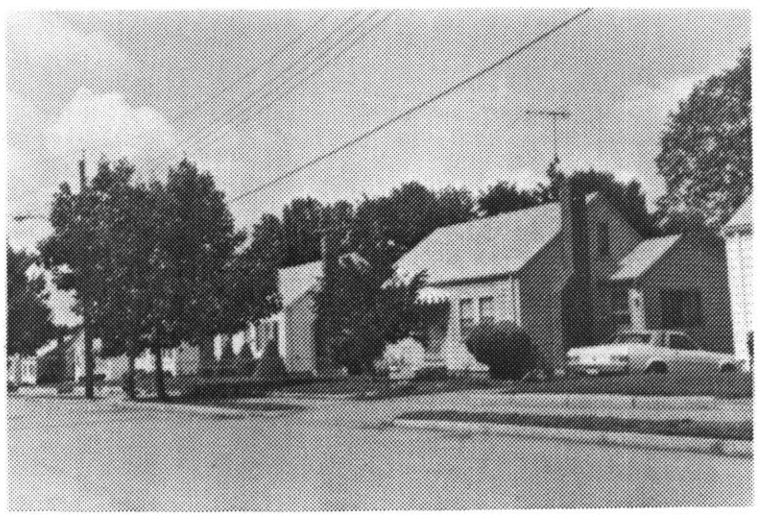


Figure 6

Figure 7

scaping elements, both natural and built contribute to the suburban landscape."[4] Various block forms and sizes and road configurations further differentiate the suburban fabric.[5]

Figure 8

The point of this thesis is to investigate neither those suburban settings of cheek-by-jowl, small, houses which offer no room for simultaneous retention of existing houses and infrastructure and the insertion of additional households nor those settings of such ample space that the physical environment offers no spatial constraints or guiding patterns for change. The idea is to choose suburban settings which offer compelling and prompting constraints for change.

The Central Arguments

central arguments of the thesis

The transformation of spatial form and structure is a requisite concern of all built environments. Such physical change has been occurring and will continue to occur in suburbia as a companion to on-going, fundamental changes of the American society and economy. To a large extent physical change in suburbia is denied and not accepted out of fear of the loss of essential symbolic, functional, social and economic qualities.

In response to this fear is the second argument of this thesis. Physical change ought to be guided by the existing spatial form and structure of the suburban residential area such that the resulting environment manifests similar space and form patterns. To the extent that the qualities characteristic of the suburban physical environment are manifested in patterns of space and form, the qualities can remain essentially unchanged.

The Central Purpose

purpose

Part of the fear and skepticism of physical change may be due in part to a lack of acceptable models of how change might occur. The purpose of this thesis is to bring to conscious recognition and acknowledgement a particular kind of physical change now occurring in suburbia. In order for physical change to be properly managed and accepted it must become a legitimate topic for public discussion. This thesis attempts to enable such a discussion by presenting a rational, systematic understanding of how physical change does/would/could come about in residential suburbia and what the physical environmental consequences are/would be.

Consolidation

consolidation explication

Physical change can occur in many and varied modes. Entire blocks can be leveled and new structures built at a higher density. Old structures can be reclaimed and converted to new forms of tenure. New buildings can be placed on scattered open lots in city and suburb or constructed on open land in the urban fringe in the form of high density clusters, apartments, townhouses, or low density detached houses (see figures 9, 10, 11, 12). Then again, demographic, social, and economic change can have a variety of effects that are not necessarily related to physical change. However, to the extent that transformations of the American society and economy affect housing consumption and supply decisions, physical change of and within residential American suburbs can be a component result and indeed has been occurring.

One particular type of physical change occuring in many lower density, residential, suburban settings is referred to as "consolidation". As used by Sprague and Moudon[6], consolidation refers to the extension of and building from existing public and private residential investments in housing and infrastructure to provide additional housing units. Through a preservation and building off of these existing investments one can provide suburban, physical amenities while providing housing that is less expensive to purchase and maintain than traditional single family houses and tailored in size and design to meet the requirements of many household types.

This is not, however, an exclusive argument for consolidation. It must be kept in mind that there are many ways to provide affordable, appropriately sized housing for today's varied house-

Figure 10: From N.A.H.B. publication, Planning for Housing, (p. 81).

Figure 9

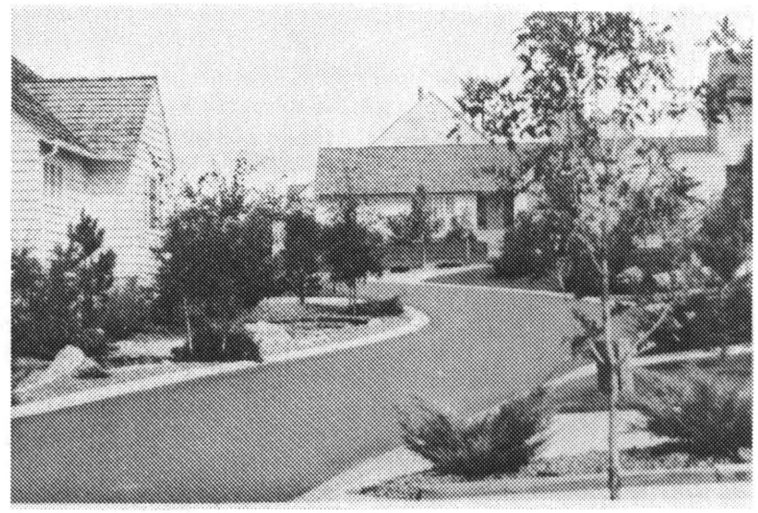


Figure 10

Figure 11

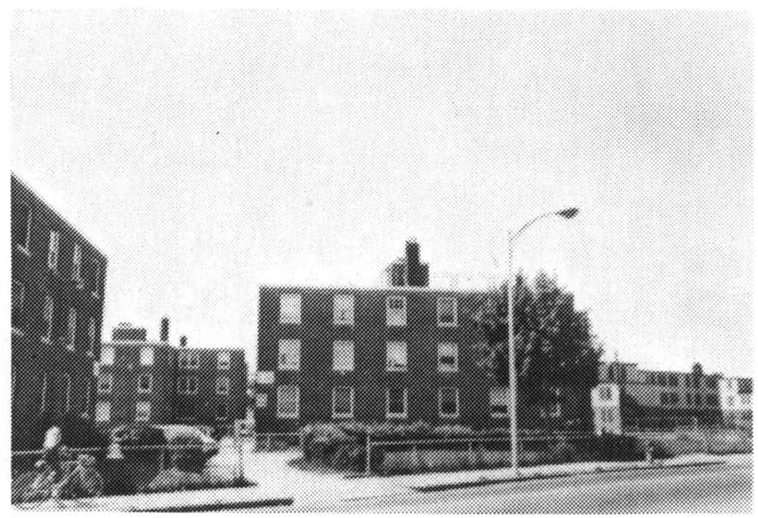


Figure 12

hold types: new traditional subdivisions built at higher densities --smaller lots and houses; new attached houses (townhouses); clustered housing developments; inner city conversions and recaptures of vacant units, etc.

Consolidation occurs and can occur in several ways among which are:

1. The creation of an independent rental unit within the existing single-family house referred to from here on as an accessory apartment unit. This is the most commonly occurring form of consolidation (see figure 13).

2. The building of an addition onto a single family house to accomodate an accessory apartment unit (see figure 14).

3. The building of another house on the same lot, or the moving of a temporary "Echo" unit, on to the lot.[7] This is less common than the first two (see figure 15).

4. The subdivision of a lot into two lots with the building of a new house or the moving of an "Echo" unit onto the new lot. Presently, this alternative is less commonly occurring than options one and two.

This thesis will be concerned with numbers one and four and combinations of these two.

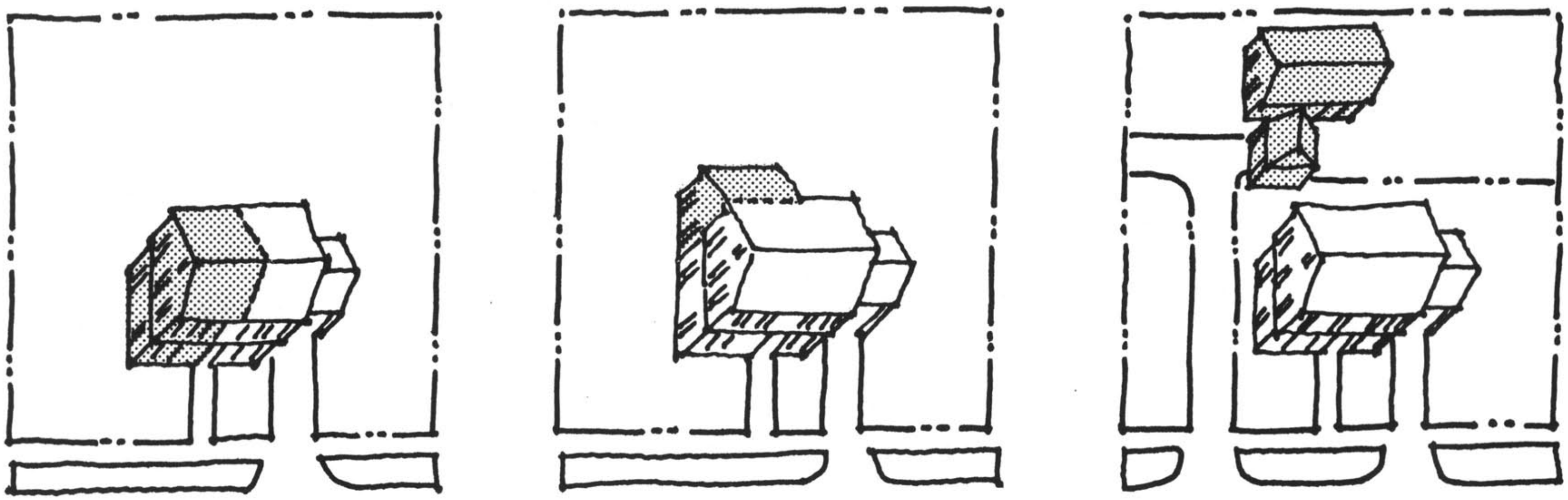


Figure 13: From A.P.A. publication, Accessory Apartments, by Patrick H. Hare, (p. 6).

Figure 13

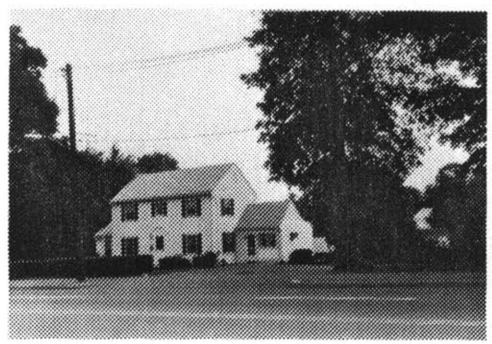


Figure 14

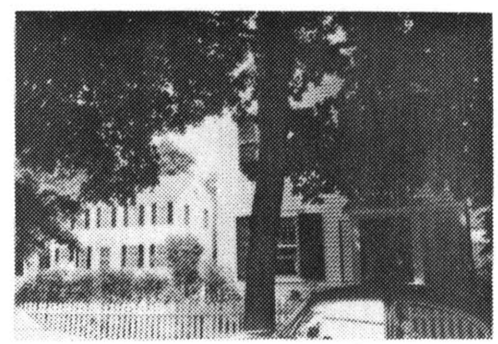


Figure 15

Although both modes of consolidation are lumped under the term consolidation, the physical, social, and economic implications are quite different for each. Accessory units can be provided without major financial investment or community intervention. They can occur without anyone's knowledge particularly to the degree that they may be difficult to pick out in the streetscape. The total number of individuals living in a house converted to an accessory apartment generally does not exceed (and is usually less than) the number for which the house was originally designed. Such a method does not necessarily increase the population of neighborhoods, nor does it have to change the image of the block. Additional cars may be noticed however.[8]

On the other hand, the construction of new houses on the interior of the block behind existing houses brings to issue the physical image of a block and visual change. Such a mode may not necessarily add more individuals to a block than for what it was originally designed, particularly if the majority of the original houses contain fewer individuals than may have occupied them originally. One could conjecture that if an existing lot were to be subdivided for a new house, the household in the existing house would contain no, or few, young children. That is, there would not be a need for a large yard. This house may also very likely contain an accessory unit. Compared to an accessory apartment however, a new house brings about a more or less irreversible change.

Method

method

First of all there will be a consideration of the arguments of consolidation--a bringing to light of some factors and concepts out of which consolidation is born.

Following this will be an analysis of some formal and spatial issues of suburban, lower density, single family settings in order to begin to understand some of the environmental qualities characteristic of suburbia.

An attempt will then be made to identify some of these environmental qualities of suburban areas and to determine how such qualities are physically manifested and how such manifestations can be physically measured.

After having determined such measurable, physical manifestations of suburban qualities there will be an analysis of the degrees to which such physical manifestations can change from the norm while preserving the particular environmental qualities. This analysis will be translated into hypothetical, environmental performance criteria to guide and direct physical change. Complementary functional and dimensional criteria will be discussed as a companion to the environmental performance criteria.

Subsequently will be a discussion of site selection rationale, consolidation guidelines, and assumptions. The method for consolidating and analyzing each existing site and proposed scheme will be outlined.

In the following chapter, the particular environmental qualities of each site will be analyzed, specific environmental performance criteria developed for each site, and consolidation schemes proposed. After each set of consolidation schemes the consequences of the consolidation of each site will be determined and evaluated from both the aspect of maximizing the number of units on a block and from the degree to which the physical manifestations of environmental qualities were altered. The consequences will also be assessed as to the developmental/implementation process, the degree and the nature of shared and private space created, and the quantities of infrastructure required.

In the final chapter the schemes and sites will be compared using the above criteria with the tradeoffs and compromises noted. This chapter will conclude with a reflection on the study, the method, the analysis and findings, and a direction for further study.

In summary, the method identifies several physically manifested, environmental qualities to be used as guides for physical change. The success of each scheme is determined by the extent to which the number of units can be maximized while still maintaining to an acceptable degree the existing environmental qualities of each study site.

Disclaimers

disclaimers

There will not be any discussion of the degree to which the physical environment (or change to this environment) leads to particular types of behavior or social relationships. Conversely, there will be no discussion of the degree to which changes in behavior or social relationships require physical changes to the built environment.[9]

Neither will there be an attempt to distinguish or establish a difference between urban and suburban environments. To the extent that such areas are homes for different types of people and manifest different types of physical and functional amenities, a difference exists. To the extent that there is a difference of spatial and formal relationships, a difference exists. It is, however, difficult and misleading to attempt to identify a point at which a physical environment changes from suburban to urban. At best such distinctions are moot and irrelevant with little analytical purpose in this thesis.

To those who feel that the concept of "consolidation" and "suburban" are contradictory I am responding by saying that to the extent the consolidated environment accomodates and reinforces existing spatial and formal patterns of a suburban neighborhood, this consolidated neighborhood is still suburban.

My Values

my values

1. Physical change and change of use of all built environments is inevitable.
2. Physical environments have the capacity to accept changes in use without changing themselves.
3. People ought to be given a wide variety of choice of how to live.
4. Although low density developments are not inherently undesirable, the infrastructure and land of such areas could be used more intensely, resulting in a savings in duplication of municipal services. Because development is spread out over large areas, infrastructure must traverse relatively great distances while serving a few people. Energy used in construction cannot be minimized through economies of scale or through the use of common walls and floors. Energy is wasted in transporting

people over large areas that are remote from shopping and employment centers.

5. It is inherently good to use land as as efficiently as possible--that is, to get the greatest public/private benefit for the least public/private expenditure.

6. It is desirable to build within the existing infrastructural and built fabric--to build on and off of existing investment in the built environment. This provides for a sense of continuity for residents. It allows existing residents to remain. If development is incremental and changes of use and form come about slowly, the social fabric and image can change without major disruptions to and dislocations of residents.

7. The single family suburban house offers and will continue to offer to many the satisfaction of symbolic and functional aspirations.

8. Yet the physical modification of single family, residential suburbia is desirable if the change can result in environments for a wide variety of household types, aspirations, and incomes.

9. Planning for change is desirable.

10. Proposals for "what ought to be" in the built environment ought not to be initially restrained by existing zoning regulations or building codes. If the change to "what ought to be" is beneficial, the regulations and codes can be changed.

To Whom is this Thesis Directed?

For whom is the thesis written?

This thesis is written for several different types of groups, the first being students of housing and settlements and planning in lower density residential settings. This thesis will begin to give such a group an understanding of the process of incremental changes within existing residential areas, building from and protecting existing investments in houses and infrastructure. They will be given some insight into the manner in which people may perceive their environments and how such perceptions can guide physical change while preserving some of the essential physical characteristics of the lower density, residential, suburban setting.

Another group would be local planners who may be concerned with physical changes occurring in their communities, and who may find it useful to to assess the physical consequences of alternative methods of physical transformation. He or she may desire a structured or systematic method for analyzing changes and consequences in order to prepare policy statements, refine zoning regulations, or structure community debate.

Community residents considering initiating such changes to their properties may find this useful in presenting a framework within which to consider alternatives and assess personal consequences of such change. They would be able to better plan such an initiation of consolidation if they could place their scheme within the context of change at the block level.

For the general community resident concerned by changes taking place this thesis may allow him/her to think about consolidation in a systematic manner and better assess change by having a structured understanding of the consequences. It may relieve those apprehensions and fears that are not grounded on fact. It may provide such a person with a framework within which to articulate his/her concerns to planners and community officials.

CHAPTER 1:

CONSOLIDATION ARGUMENTS

Chapter 1

SOME ARGUMENTS OF CONSOLIDATION: WHAT IS PROMPTING THE CONSIDERATION OF CONSOLIDATION?

Introduction:

introduction

This chapter points out some of the arguments out of which suburban physical change in general and consolidation in particular have emerged. Also considered are specific incentives for consolidation and neighborhood objections to consolidation.

Consolidation has been proposed as a means to: achieve limited growth in mature suburbs in which little developable land is left; achieve a more cost effective use of infrastructure and public utilities by increasing the number of households living within existing suburban municipal boundaries thereby putting more citizens on the tax rolls; to use such resources amid shrinking municipal capital and operating budgets to maintain and update existing public utilities, services, infrastructure; provide for incremental population growth in communities in which the demand for more housing is not so great as to warrant the construction of mass quantities of housing in subdivision types of developments; obviate expensive outlays by municipalities and developers for infrastructural extensions; reduce pressure to develop outlying, agricultural land and environmentally sensitive lands and to preserve open space in general; accomodate households desiring to live near suburban employment and commercial centers, saving on commuting time and transportation energy costs; preserve the existing built fabric of neighborhoods and recapture physically declining, single family houses.[1]

Arguments

fundamental changes in housing consumption and supply behavior

The first argument, and perhaps the most compelling, is that consolidation (as accompanying other forms of housing development) can arise to the challenge of fundamental changes in national housing consumption and supply behavior. Such changes in the housing market are coming about as a product of across the board national, social, demographic, and economic transformations that are expected to have long lasting and permanent effects on housing consumption and supply.[2] Such changes are dramatically opposed to the conditions that brought about suburbia in the first place.

Initial suburban development and expansion were based on the immutable belief that growth was desirable and financially self sustaining.[3] The suburban growth of the 1940's through the 1960's was an aberration resulting from the coincidence of a favorable development climate, abundant resources, and high demand. In fact, Rothblatt, et al.,[4] compares the emerging social and economic context with that of the late 19th century as portrayed by Sam Bass Warner and Richard Sennett[5]--a period of severe economic constraints, irrepressible housing costs, increasing transportation costs, and a transforming domestic and occupational role for women.

A confluence of pent-up demand among young nuclear families after World War II; federally subsidized home loan programs; subsidized freeway construction; vast quantities of inexpensive land, low energy prices, and a lack of housing alternatives within cities promoted development of the fringe. The opportunities for home ownership with a low initial outlay and affordable, subsidized financing were primarily in suburban and peripheral neighborhoods where cheaper land prices kept sale prices lower and where vast quantities of open land allowed builders to take advantage of economies of scale to reduce unit prices. Promulgated on the continuing presence of such factors and on the continual rejuvenation of the nuclear family as the raison d'etre of suburban housing, suburban residential areas developed unabated until the collapse of the housing industry in the early 1970's.

At about this time (the early 1970's) our nation began experiencing fundamental demographic, social, and economic transformations that are expected to have long lasting impacts on housing consumption and supply behavior in the U.S.[6] Such across the board changes call into question the ability of any one geographical area or metropolitan suburb to avoid being affected by the consequences. Recognizing that over 40% of the nation's housing stock is in suburban areas (80% of this being single family, detached houses)[7], national social and economic changes have important implications for the role of the single family, detached house of suburbia.

Such changes are:[8]

1. The decline of the dominance of the nuclear family and the rise in the number of non-typical households composed of fewer members--singles, never married singles, divorcees, one parent families, single elderly households, and young couples without children

2. A declining rate in the phenomenal growth of households in the past decade as the baby boom settles into household formation and the baby bust cohorts move into the household formation stage in the 1990's

3. The decreasing need to satisfy large, immediate, pent-up demand for new housing; less of a role for the mass subdivision method of development

4. A trend to increased consumption of housing (in terms of the amount of space owned) as cohorts age, leaving fewer, single family units available for younger households

5. Federal divestiture from setting housing policy and from maintaining housing subsidy programs; the deregulation of financial institutions leading to the demise of easily attained, cheap investment money and a shortage of capital for housing investment as industry and other sectors compete on equal terms for capital

6. The decline of residential space consumption as an investment motive and the growing attractiveness of other investments

7. Growing risks associated with trading even or trading down by those with large houses and locked in equity; the retaining of large houses by empty nesters and the elderly with resulting inequities in space allocation

8. Resulting in a stagnation of the market for existing houses

9. The increases in the cost of housing in general[9] and new housing in particular compounded by the cyclical nature of the housing industry

Other transformations socially and economically have been:[10]

1. The demise of the economics of mass suburban developments in those areas experiencing little in-migration and population growth

2. Municipal growth retrenchments further aggravated by declining municipal revenues with a consequent inability to maintain existing public services and infrastructure

3. Increasing environmental restrictions on open land on the urban fringe which contributes to the increased cost of development

4. The end of the era of freeway expansion and the expansion of metropolitan trunk sewer and water lines

consolidation as a presently occurring phenomenon

Another very compelling argument for consolidation is that it is an occurring phenomenom. Changes in use, form, and density are actually occurring or under consideration in many municipalities in the two modes under consideration in this thesis. Legal and illegal occurances of accessory apartment units are quite common in many municipalities. Furthermore, the trend in new residential construction is to smaller houses on smaller plots of land. Several communities are considering as legislation the subdivision of suburban lots and the use of interior, residential block space for additional single family housing units.[11]

The concept of the no-frills, downsized house on a small lot, as well as zero lot line housing, have been actively proposed by the National Association of Home Builders (N.A.H.B.) for the past several years. This concept has been gaining gradual but perhaps grudging support by consumers who by and large typify their ideal home as of 2000 s.f. on one-half acre lots.

A recent (1979) N.A.H.B. survey pointed out that home buyers are more willing to sacrifice land than to sacrifice quality or space inside the house. Most are willing to forego large front lawns. Most will even accept a smaller than standard lot to keep the price of the home within their means.[12]

For the past several years The Professional Builder magazine has been offering awards for the "Smaller Yet Smarter" house. At least one issue per year has been devoted to the design and construction of smaller houses on smaller lots[13] (see figure 1).

In 1982 The Professional Builder magazine announced that for the first time in nine years the average price consumers were willing to pay for a new house had dropped by 1% over the previous year. The year before that the price had risen by 11.6%. For the first time in history in 1982 fewer than 90% of consumers surveyed preferred a single family house. The average size of a seller's best selling units had dropped from 1831 s.f. in 1981 to 1782 s.f. in 1982. The median offering price was \$82,880. In 1976 the average size of the best selling houses was 2000 s.f. with a median price of about \$45,000.[14]

The quite widespread occurrence of illegal accessory apartments

Figure 1

Figure 1: From New York Times article, "House Trend: Downsized", by Peter Kerr, 23 September 1982, (p. C1).

within the past decade has prompted many municipalities to grant accessory apartments legitimate status. What up until just recently had been a surreptitious phenomenon is now the object of special zoning consideration.[15]

Preliminary data from the 1980 census indicated there may have been as many as 2.5 million conversions of single family houses into accessory apartments.[16] There may be as many as 18.3 million households in which two or fewer persons occupy a house with more than five rooms.[17]

Through several estimating methods, Chester Sprague and Anne Vernez Moudon[18] predict that between 3.38 million and 8.46 million accessory units could be produced from single family homes with excess space. According to Professor Phillip L. Clay[19], although the estimate of potential units may be small [the significance of accessory apartments] lies in the fact that they would fill one niche in the market for which new construction or rehabilitation may not be forthcoming.

All in all, the two modes of consolidation (small houses or small subdivided rear lots and accessory apartments) must take their place among other housing options in redressing the changing functional, social, and economic needs of America's households.

consolidation as a component of the urbanization of the suburbs; infrastructure and housing as durable goods

The third argument is that consolidation is a logical component of the "urbanization of the suburbs"[20]- the strengthening of the identities of a suburban nuclei as self-sufficient centers containing many of the same services as the central city. Through the insertion within and building on existing, long-lived investments in building and infrastructure, consolidation reinforces suburban transit nodes and employment and commercial centers by enabling and encouraging people to live near them. Consolidation contributes to an on-going, incremental growth within the long-lived built fabric and infrastructural shell of suburbia thereby increasing the economic viability of suburban employment and commercial nuclei.

In this frame consolidation is seen as a general urban design concept in which a metropolitan area is considered as a continuous tissue of buildings, open space, roads, and other infra-structure. Within this tissue buildings could be incrementally added or subtracted in almost an organic fashion in response to outside stimuli.[21]

This is related to a "capital stock" view of built investments[22] in which housing and the built tissue in general is subject to the eventual and inexorable process of aging. One of the most compelling characteristics of the built environment (housing stock) and infrastructure is that it is a costly, durable good that ages slowly and must adapt the best it can to successive waves of economic, social and technological transformations. "Our suburbs still seem in many ways to be one of the most static parts of our dynamic society, and they seem destined for [technological] obsolescence as we continue into an age of ecology. Not that we will be able to discard them; our current suburbs will almost certainly be with us in substantially their present form for a half century or more to come whether they fit the occasion or not."[23]

Such is the fabric or tissue within which physical change would be guided and within which a further strengthening of multi-nucleation could occur.

a model of economic transformations and the effect on housing supply and consumption behavior; the effect on changes in physical density: a role for consolidation

The fourth argument is related to the previous one in regard to the specific role that consolidation would play in the evolving of these suburban nuclei. First, this argument has to do with the role of consolidation in changes of housing consumption and supply decisions arising out of social and economic transformations. Secondly, this argument has to do with the role of consolidation in changes of the physical density around such nuclei, arising out of social and economic transformations.

As Donald W. Walls reminds us,[24] that even in a city of constant population size, there is still significant housing activity (even without fundamental national social and economic changes).

Household composition changes, population cohorts age, real income grows, housing capital stock depreciates, employment locations change. These all have implications for individual demand and supply decisions that collectively change the configuration of the housing market. In the modified hedonic index approach used by Prof. Walls, new housing units arising from consolidation would be considered as a particular submarket with certain physical attributes. Using his approach one can predict the effects of changes of income, demographics, transportation, and place of employment of this submarket, other submarkets, and the locations of these submarkets. One could also predict the extent to which existing housing markets could provide units in a changing demographic and economic climate.

With regard to the second concern of density we could ask: At what point and why would there be a change in densities in a residential area? When will supply and consumption decisions favor new construction over existing housing stock? To what extent will an increase in the density of new housing occur? Consolidation is a concern to the extent that it leads to an increase in the number of households living in an area.

From the economic model of Professor Wheaton[25] we see that density gradients are always in a state of flux in a metropolitan area, depending on the housing submarket and submarket location.

The most dense areas are not always within the central city (see figure 2). Density is a result of rational reactions of producers and suppliers of housing to housing demand and/or the social, economic, physical obsolescence of existing structures. "The replacement of urban capital will happen only when the passage of time has rendered existing uses substantially out of touch with the current market."[26] That is, a supplier or producer of housing builds at a higher density at the same rent or at higher rent but the same density when the net rent (gross rent minus construction costs) of new construction (or rehabilitation/conversion) is greater than the gross rent of the existing property.

If the density and rent gradients for housing are relatively flat, then redevelopment will always occur at the most central locations. Redevelopment is likely to occur at peripheral locations only when the amount of housing capital in the existing stock sharply decreases with distance while lot sizes sharply increase.[27]

In the perspective of this thesis, consolidation which leads to an increase in the density (households per acre) will occur if the resulting net return is larger than the gross return from the existing lot/house.

The fifth argument is that consolidation can be a vehicle for a more effective use of existing infrastructure and public services. This is based on the assumption that one can determine

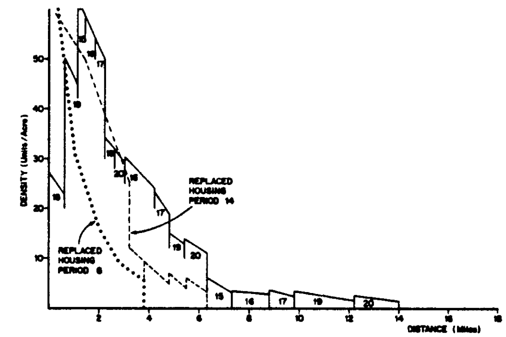


FIG. 2. Simulation 2. Number of time periods: 20. Population growth rate: 0.03. Income growth rate: 0.03. Travel cost growth rate 0.00.

Figure 2

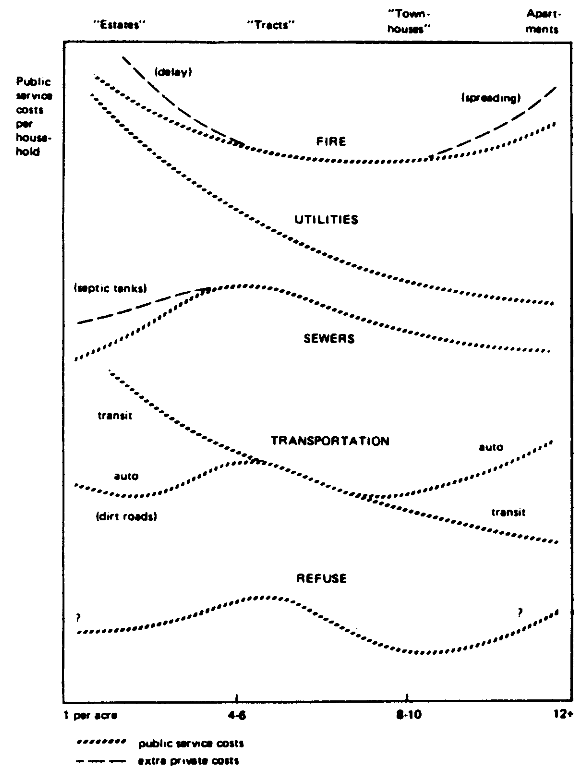
Figure 2: From the <u>Journal of Urban Economics</u>, "<u>Urban Spatial Development with Durable but Replaceable Capital</u>", by William C. Wheaton, Nov. 12, 1982, (p. 66).

the optimal lot size for a municipality at which point public services and infrastructure will produce the greatest public and private benefit for the least public and private cost. Consolidation would be one way of attaining that lot size.

Optimal municipal lot size is perhaps the quintessential concern of town planning boards.[28] Lot size is also the most sacred dictum for a suburban resident in that it symbolizes his/her property status and protects the investment value of his/her property.

The quest for a municipality is to find this supposedly optimal lot size which minimizes costs of public services and maximizes revenue. In figure 3 we see that, theoretically, public service costs drop as density increases. The costs for many services, however, begin to increase beyond a certain density. The theoretically optimal density according to this chart is around eight to ten units per acre.[29]

Such theoretical figures have been disputed as if not inaccurate then at least irrelevant. "The Critique of the Costs of Sprawl"[30] questions the basic assumptions and method upon which the Real Estate Research Corporation based its results.[31] The "Critique" contends that the results were based on trying to minimize costs with a failure to consider both costs and benefits. One must be equally clear about which set of costs one is trying to



SOME GENERAL IMPRESSIONS OF THE NATURE OF PUBLIC SERVICE COSTS AS A FUNCTION OF RESIDENTIAL DENSITY

Figure 3

Figure 3: From ***The Urbanization of The Suburbs*** *by Masotti and Hadden (eds.), (p. 420).*

minimize - private or public or the sum of the two. The sum of private and public costs is most relevant with respect to consumer welfare.[32]

consolidation, optimal municipal density, and lot size: the effective use of infrastructure -- minimizing municipal costs and maximizing municipal returns

Kain[33] disputes the relevance of differences in residential density or urban form from the standpoint of water and sewer service. He contends that engineering specifications are usually less stringent at low densities, lowering unit costs enough to compensate for longer runs.

The ultimate question is to what extent can a municipality legislate optimal lot size (or encourage smaller lots for consolidation) without constraining the market determination of the best (most affordable) lot sizes and locations? The assumption here is that interference in the market determination of land prices, sizes, and locations will raise the price of all land in a municipality.

The National Association of Home Builders stated[34] that "most present day regulations favor low density development. Justification for such zoning is based on the myth that only large lots can provide residents with privacy and room for their needs. It is also based on the belief that only large lot developments can provide a community with high property values and a stable tax base without overburdening the community with a high demand for costly public services."

consolidation as a component of national housing succession and demographic turnover

The sixth argument proposes that consolidation is one component in a process of the housing succession and turnover which is a standard occurrence in suburban neighborhoods. The contention is that consolidation has a role to play in facilitating this social heterogeneity by providing housing environments for a wider variety of household types (age, income, race, size) than were accomodated initially in suburbia. As the Metropolitan Area Planning Council[35] stated, "An objective is to increase the diversity of a community's housing stock in terms of price and availability (of units), helping the community to meet local housing needs and to provide its share of regional needs without significant effects on the character of the community." (in preference to accessory apartments). This argument proposes that suburban neighborhoods are not the bastions of stability they are thought to be. Consolidation is a physical recognition of such instability.

The work of Gans, Berger, et al.[36] of the 1950's and 1960's was conducted among those who had newly arrived from primarily urban areas. The majority had a common background of urban experience, and to the extent that they arrived to suburbia at more or less the same time with similar backgrounds and similar aspirations, homogeneity was common.

However, today many residential suburbs have already undergone several successions of housing turnovers. Few of the "old timers" remain. Today's suburban resident is likely to have been born and bred in suburbia without the fraternal bond of having escaped in common from the city, pioneering in the new suburbia.

As David Birch proposed,[37] "In what was once a hierarchical, fractionated region of city and suburbs "old timers" have always constituted a majority and have been able to resist change. As this urban hierarchy breaks down [and the differentiation fades] it may be more difficult for the parts to maintain [separate identities], and it may seem to be more logical to balance what is good for plans against what is good for people."

To the old timer, an introduction of urban functions and people from central cities will be viewed as a decline. The newcomers may lobby for lower quality services in general to keep taxes down and keep these services within affordable reach. The decline in the quality of services, and in some cases the physical environment, may upset the old timers who moved to suburbia to escape just this situation. However, the risk of physical decline has to be matched against the opportunities it provides for the masses of people to better themselves. This is not to imply that consolidation, which can provide a way for non-nuclear families to better themselves, necessarily results in a decline of the physical qualities of suburban residential areas.

In fact, the social stability represented by the "old timer" has given way to new residents whose aspirations and needs may not necessarily match those of the original residents. The particular meaning and relevance of a neighborhood changes as its population base changes and the landscape context transforms. What at one time may have been an outlying, fashionable suburb may now be an in-lying suburb of shopping centers, offices, industry, and decaying shopping strips.

As Lee Koppelman, executive director of the Long Island Regional Planning Board, stated,[38] "If you design a community as if to lock people in time, not recognizing that they age and grow up and need different kinds of housing at different stages, you are not making provisions for the life cycle, you are automatically sealing the fate of that community."

In summary, this argument proposes consolidation as a positive agent for change, facilitating heterogeneity, providing a means for a variety of household types to "move up", and building in social representation, vitality, and viability by replicating the demographical cross section of the metropolitan region.

consolidation and energy conservation

The seventh argument proposes that consolidation leads to energy conservation through facilitating the compaction of urban form. Such compact form results in reduced costs for transportation.

When reading Heilbrun[39] in regard to transportation costs, one recognizes that time (congestion) is just as an important factor as energy, perhaps more so. To the degree that urban compaction leads to congestion transportation costs will increase. To the extent that urban sprawl allows rapid commuting on uncongested roads, transportation costs will decrease.

Regarding energy use and urban form Van Til[40] reminds us that the optimal urban form depends on future energy scenarios. To the extent that the use of renewable energy sources is successful; that telecommunications reduce the need for face to face contact; that households are able to resort to growing their own food; that energy efficient, cheap transportation is made possible; then the tendency is for sprawl.

On the other hand, to the extent that scarce fossil fuels and nuclear fuels are a source of energy for transportation and housing; that cluster development and attached housing can save on materials and energy in construction and energy in operation; that compact developments make better use of centralized district heating systems; and the extent to which energy sources are in scarce supply, compact forms will result.

To the extent that the present locations of infrastructure and buildings dictates future growth, an intensification of multi-nucleation will result in any one of a number of combinations with the above scenarios. There could be a simultaneous compaction around suburban employment/commercial centers and sprawl. To the extent that suburban nuclei compact in terms of physical and household density, consolidation has a role to play.

consolidation as reducing development costs by building from existing investments in infrastructure

The eighth argument proposes that consolidation is a less expensive means of development because it builds off of existing investments in infrastructure. At the same time the pressure to develop agricultural and environmentally sensitive land or scarce open space is reduced.

The Real Estate Research Corporation[41] reminds us that, although construction costs are reduced because the infrastructure is in place in developed residential areas, the costs of land and property taxes associated with these infill sites negate some of the initial advantages of existing infrastructure. Not only that, but land assembly of infill sites is more time consuming and involved (and more expensive) than purchasing large tracts of contiguous land on the fringe. Then again, the real value in allowing development on (infill) lots may not be that a necessarily low cost housing alternative will be opened up, but rather scarce resources of buildable land in the "city" will be expanded to allow imaginative development of small, hopefully affordable houses on small lots.[42]

When considering the costs of building on infill sites one must take into account the costs and benefits of doing so from the perspective of the municipality, the developer, the neighborhood, and the ultimate resident of that property.

The Real Estate Research Corporation maintains that it is not advisable to force all future growth onto infill sites because there is also a need for development on the fringe. "That to avoid unacceptable inflation of land prices, the market must remain competitive in terms of locational choice and quantity of supply."[43]

Such a conclusion regarding new construction on infill land (the building of a new house on a subdivided, existing, residential lot in the case of this thesis) does not apply to accessory units. Developer involvement and the price of land is irrelevant. Accessory units are more apt to be a result of individual, owner investment than developer production.[44]

consolidation as relieving pressure to develop environmentally sensitive and agricultural land

This brings us to the next proposition of the same argument in which consolidation relieves the pressure of the development of land on the urban fringe which is of agricultural or environmental significance. One must ask the question, to what extent can enough units be developed through the consolidation of land within the existing infrastructural shell so as to significantly reduce the pressure to build on fringe land? Reports by the Real Estate

Research Corporation[45] have reflected concern over the amount of land being irreversibly developed for residential and other uses. However, a recent report by the President's Commission on Housing disputes this concept.[46]

Robert Lemire contends that development on the fringe can co-exist with agricultural and conservation uses. It is his thesis that the protection of our needed resources must be achieved in cooperation with and not in competition against the monumental economic and political forces that this "last wave" of housing will exert.[47] The way to achieve this is to sensitively plan new, high density, cluster developments that transfer development rights from sensitive land to concentrated areas of the site, achieving the same number of units per acre as if they had been spread out over the site but leaving the vast percentage of the site open to public or agricultural use.

consolidation and the re-examination of housing concepts

The concluding but not necessarily the final argument of consolidation is that the very fact of the occurrence of consolidation phenomenon is a very visible statement that the role of housing in suburbia is under re-examination.

In his book, On Streets, Stanford Anderson reminds us that even though the suburban myths of conformity, isolation, and subscription to a way of life have been disspelled and dismissed by Herbert Gans, Bennett Berger, and others we ought not to be led into a feeling of complacency about the goodness and immutability of life in suburbia.[48] "Peoples' notions of good life, income, health, and space are social products that must be constantly reexamined for themselves and especially for their possible change or inversion in relation to a changing cultural universe."[49]

Rothblatt, et al.[50] contend that women and non-traditional households (singles, couples without children, single parents, elderly) suffer from a lack of the services and the means that could bring them into contact with one another. They criticize suburbia as spatially isolating such individuals while not housing people at a high enough density to support community activities that are within walking distance.

Environmental factors (physical) are important, they say, to the extent that they can contribute to a "convenient and generally supportive" physical context.[51] What is needed are environments that can support a wide variety of public services and communal activities such as child care, elderly group activities, programs for young couples and divorcees and open space that can be reached by foot. They feel that the environments typifying such characteristics are the older, urban residential, single family neighborhoods of quite high density, and higher density, planned suburban developments.

Rothblatt, et al. predict that such a change to spatially restricted, higher density development is inevitable in an era of personal and municipal fiscal restraint. They suggest that a difficult period lies ahead in the adjustment of residential areas to new types of demographic structures and economic constraints. "We must focus on the most successful and adaptable elements of what now exists in the suburban environment to set the stage for a new agenda."[52] "It is the challenge of the urbanized suburb of the future--a vista of increasing densities and escalating housing costs."[53]

The draft report on the nation's housing outlook by the Joint Center for Urban Studies[54] calls into question whether the economy and changing social structure of American households can sustain the reality of the suburban dream--the detached single family house. The report contends that housing policy, which in the past was geared to meeting housing needs by rapidly expanding the supply through new construction can be directed to more efficiently managing the larger and better quality inventory to meet shifting demands. There ought to be a supply of different types of units to accomodate our demographic as well as economic future. New houses must be downsized to better suit today's different and smaller sized households built on smaller lots while simultaneously building in the amenities which households have come to expect.

The Council on Development Choices for the 80's recently urged that, "local governments permit and encourage increased overall densities by reducing the requirements for lot sizes and setbacks and street widths, and by assessing adequate amounts of land zoned for varying densities."[55]

The above arguments are not exclusive to consolidation but rather pertain to any one of a number of companion and complementary efforts to redress transforming housing needs and behavior in an era of economic and fiscal retrenchment. The recapture of abandoned inner city housing, high density townhouse/cluster developments on urban infill land, conversions of nonresidential buildings to residential use as well as new construction on the fringe are all to be considered as partners with consolidation.

specific consolidation incentives

This brings us to consider some incentives for consolidation, specifically:

1. Accessory apartments and interior lot houses enable children and their parents to remain living near one another. Consolidation can create an opportunity for elderly, handicapped owners, or others with special needs to bring in renters, friends or family to assist them in providing upkeep and maintenance of the property and in providing security and companionship.[56]

2. Accessory apartments and interior lot houses can provide a means for home owners, particularly the elderly and those of low or fixed income, to derive income from their properties to help pay increasing property taxes and operating/maintenance costs.[57]

3. Accessory apartments and interior lot houses can provide an increase in the supply of affordable units particularly in communities where rentals are being converted to condominiums and where single family homes are not coming on the market.[58]

4. Accessory apartments and interior lot houses increase property values and generate additional property tax revenues.[59] Increased property values could mean, however, increased taxes for the resident concerned (holding the mil rate constant).

5. Accessory apartments (and modular "Echo" units) can respond relatively quickly to shifts in the rental housing market (compared to new construction). They are easily installed or for that matter removed.[60]

6. Accessory apartments can help young couples pay off the mortgage on their single family house.[61]

7. Accessory apartments redistribute excess space in single family houses presently owned by those who do not use the excess space and/or who cannot financially/physically afford to maintain this excess space.[62]

8. As a corollary to #7, interior lot houses allow suburban residents to sell off yard space that is not being used and that may be a tax burden.[63]

objections to consolidation

Conversely, the objections raised by neighborhood residents to consolidation are:[64]

1. Consolidation will result in a decline in the physical qualities of suburban neighborhoods. There is a fear that accessory apartments will be visible in the streetscape, destroying the single family identity of the houses concerned. There is a concomitant fear that interior lot houses will volumetrically dominate the streetscape resulting in spatial/visual congestion and a blocking of sunlight. There is a fear of traffic congestion and visible over-parking on the street and/or on driveways. There is concern that an increased number of households will result in a decline in the privacy of individual yard space.

2. Resulting from this fear in the decline of suburban physical ammenities is the concern over a decline in property values and the status of ownership of those properties adjacent to a consolidated property.

3. However contradictory to number 2, there is the fear of increased property taxes (hence, increased property value) even for those not choosing to add an accessory apartment or an interior lot house.

4. Consolidation (accessory apartments in this case) is objected to in that it will decrease the number of single family houses available for young families.

5. There is a fear of speculation and absentee landlords.

summary

In this chapter we have seen that the arguments for consolidation and the corallaries of the incentives for and objections to consolidation touch all levels of decision making from municipalities, to individual neighborhoods, from developers to individual entrepeneurs and housing consumers. Issues related to social, demographic, and economic transformations, housing consumption and supply patterns; incremental physical change within the existing built fabric and transformations of environmental quality; density, lot size and cost effective use of public services; neighborhood social instability; energy consumption and urban form; and others are all interactive considerations when speaking of consolidation.

CHAPTER 2:

MORPHOLOGICAL GROUNDING

Introduction

This chapter develops a morphological base for consolidation. The following questions are asked. What are the underlying spatial and formal principles of lower density, residential suburbs? How can such principles guide the nature and extent of physical change of these settings? What are the outward, measurable, physical manifestations of these principles that can be used to control the physical change of lower density, residential settings?

If the term, "morphology" is taken to mean a study of the spatial form and structure of a physical setting, and if one proposes to change this physical setting one must:

1. Know something about what constitutes the existing spatial form and structure
2. Know the degree to which to maintain the existing spatial form and structure of the setting - What constituent parts are changed and by how much? How much change is desirable?
3 The constituent parts of the physical setting and how they interrelate
4. What one is trying to achieve by changing the physical setting

5. A method of assessing the consequences of the change

First of all, let us investigate what conceptually constitutes the existing spatial form and structure of lower density, residential suburbia.

Issues of Spatial Form and Structure in Suburbia

Issues of spatial form and structure

In the reading of the publications of J. B. Jackson, D. W. Meinig developed a summary of Jackson's attitudes to studying landscapes. Among others, four of the concepts are as follows:[1]

1. "Just as the elementary unit of mankind is the person, the elementary unit of the landscape is the individual dwelling, the oldest and by far the most significant man made element in the landscape." In the study of landscape first comes the house. It is the "most reliable indication of man's essential identity." "The ordering of [this], man's most intimate world", is the prototype of how he orders his larger world. "Landscape study moves outward from the dwelling also because other basic elements are related to it, both functionally and historically."

2. The contemporary American house is just as authentic a vernacular tradition as the dwelling of the Pueblo or Greek peasant.

3. "In the broadest view, all landscapes are symbolic. [Every] landscape is a reflection of the society which first brought it into being and continues to inhabit it," and ultimately, "landscapes represent a striving to achieve a spiritual goal..."

4. Inevitably, landscapes are ever undergoing change. "There is no such thing as a genuinely static human landscape," and because landscape is a reflection of society, if we wish to change the landscape for the better we will have to change the society which created it."

Yi-Fu Tuan, in reference to European landscapes, tells us that "images of landscape are potentially infinite, yet they have a family likeness. The family likeness is not so much the result of shared elements in the landscape as of a common principle of organization..."[2]

This common principle of organization has also become reified and sanctified in the credo of zoning regulations and bylaws, symbolizing physical and social stability, seeking to perpetuate the character of a neighborhood and to insure the appreciation of the home owner's investment.[3] In addition and a companion to explicit regulations is the social convention and unwritten law of communal maintenance of property to insure property values. Home ownership in this country "amounts to a national system of property maintenance: an individualistic, handcraft industry, single owner by single owner, investing time and money as each sees fit, but each still utterly dependent on the others in their block for resale prices."[4] Perin stresses the importance of a "correct chronology of life" so that acts of transition and "rites of passage" become important as people move from "mundane" apartments to "sacred" houses. House ownership and the type owned become invested with deep significance. Different types are kept apart to reflect the separation of social grouping. There is an underlying congruence between physical space and social space, and the purpose of land use controls, regulations and codes is to preserve the social order and assure tranquility.[5]

In this sense the following relationships indicate the suburban paradox. The mass housing of a typical suburban development, even as far back as the latter 19th century, was usually conceived by a few individuals, imposing to a certain degree their values of how people ought to live upon many different types of individual owners. All of these individuals are now, theoretically, entrepeneurs with more or less total private control over their properties yet they are constrained by the ideas of a few men, the developers. Furthermore, they are all subject to the dictates of written and unwritten social codes and zoning regulations.

Purportedly the focus is on the individual investment in house and property at the expense of a community plan. The house is the focus. Yet the weight of communal opinion and social control is a paradox. The house has come to represent the evidence of a person's labor and thrift. "There a family is raised in an environment that is created as an expression of that family's unique individuality. The house represents a link to the community."[6] Equal increments of property investment, equal access and physical stature along similar public ways express an equal access to and standing in the community. "As an objectification of tradition and a realization of property, the house is a bulwark against threats to political stability."[7]

In a description of suburban residential settings, N. J. Habraken[8] sees "the suburban house as not only the result of one technical system but one value system as well. This implicit system has its rules of selection and distribution as clearly as any vernacular [the importance of the individual plan with the sacrifice of a community concept]. [The implicit system] has as much to do with the house itself as with its position on the lot and the treatment of space around it. The house stands in the middle of the lot, yielding a good deal for public scrutiny." "The total visual effect is one of delightful contradictions; the strong suggestion of a building in a natural landscape" [unfettered by] "formal flower beds, fences, and geometric patterns." Despite the lack of the discipline of a formal theme is the discipline of the artificial: "The clipped bushes and well clipped lawn." "The lack of fences or a garden wall either in front or on the sides (suggests) a studious avoidance of any overt expression of territorial boundary." The house stands in a wide open prairie in which one's yard is an extension of all other yards - an equality in investment in which space as a common property is unhindered by formal boundaries (see figure 1). In lower density, residential settings, vis-a-vis urban areas, space tends to be ubiquitous. Property and ownership of space is not defined to a large extent by built form. Space is not defined by buildings, but rather buildings are defined by space. Property is defined by the relative positions of one house to another.

However, with openness comes implicit social control as a regulator of space. The front yard provides the separation within which vigilance and surveillance can become adequate keepers of privacy and security. The stranger cannot come upon the house suddenly, but rather the owner is allowed a certain amount of time within which to visually accept or reject the stranger. In this setting, the front yard not only becomes an implicit moat, a transition point between private and public, but also a space of visual relief for the property owner and for people in the public way.

Figure 1

Figure 1: From N.A.H.B. publication, Planning for Housing, (p. 10).

The front yard becomes part of the public way. Moore, Allen, and Lyndon, elaborating further, state that the house and its main entry and porch which were at one time genuine participants in the streetscape (see figure 2) are now only titular, figurative symbols. (see figure 3)[9]

> In ...the unsullied residential areas which remain here and there from the early part of this century, houses were placed rather near the street and were connected to it and to the sidewalks by walkways from their front doors, which were actually used. Often these houses had front porches from which the inhabitants could survey the passing scene.
>
> Now most houses in town are shoved back from the street, the sidewalks have been abandoned, and the porches removed. The front door has become an unconvincing symbol, useless because of the more immediate access to the back which the automobile allows. The result of all of this readjustment is that all vestiges of human habitation have vanished from the facades of houses, and instead of claiming their front lawns, they blankly ignore them. The lawns become wasteful foregrounds for stage-set houses along streets void of anything but passing cars.
>
> [With the front yards generally not actively used], family and neighboring activities are often enclosed within the house or private backyard, leaving little scope for the street space to absorb these in the process of socialization.

Figure 2

Figure 3

> ...Although few spontaneous activities contribute directly toward the place orientation of the street, those that center on the use and care of automobiles take precedence.[10]

Side yards, on the other hand, are a pivotal space in that not only are they transitions between front and back yard, but they serve to separate two properties. The side yard is the space that symbolizes detached living. Yet rarely does the house relate in any way to the side yard. Few activities occur here other than as passing through from front yard to back yard or use for storage space. The side yard accents the front yard-back yard distinction. Without a viable functional purpose as the front yard or back yard, the side yard is, however, an important symbolic element of the suburban block (see figures 4, 5, 6).

Not only are zoning regulations and social codes a perpetuator of physical norms, so too is infrastructure. Roads and utilities are generally long-lived, relatively durable, and expensive so much so that any radical relocation of them is unfeasible. This fixity of infrastructure and its determination of block size, shape, and location is a formal constant, leading to the perpetuation of block forms and to the economics of how a block was initially developed and what the nature and economics of further development could be.

In his analysis of suburban residential development in Boston in the late 19th century, Sam Bass Warner comments on the rectan-

Figure 4

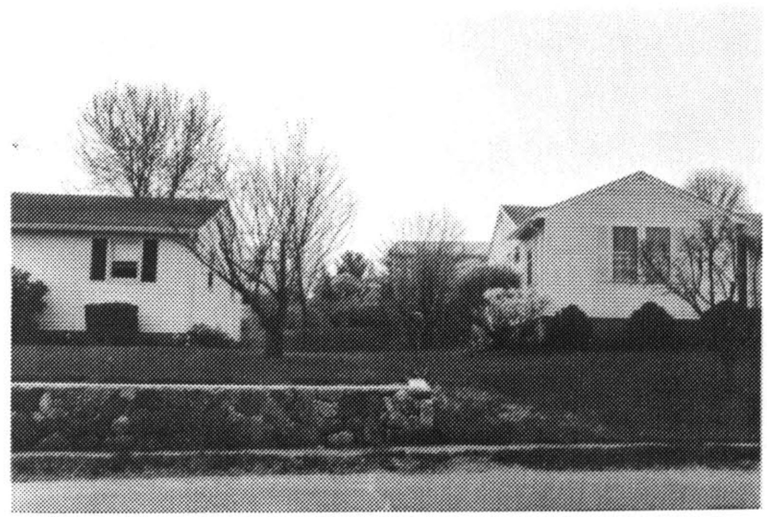


Figure 5

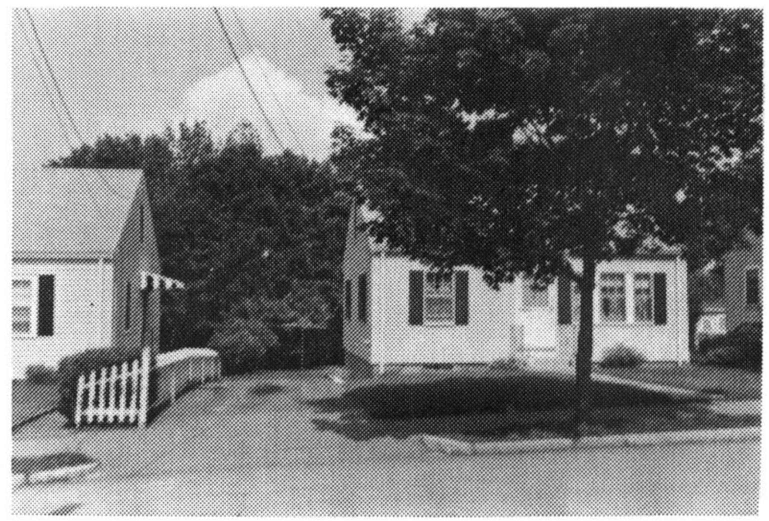


Figure 6

gular grid system as having opened up the greatest amount of interior lot area for development while minimizing the costs of roads and utilities. The developer got the greatest number of frontage lots for the least street area.[11] The grid street and frontage lot also represented what middle class home buyers had come to demand as the minimum for a satisfactory residential environment. "They demanded equal access to a neat, graded street, equal light and air, and a somewhat uniform facade for the entire street.[12]

Environmental Qualities of Suburbia and Their Physical Manifestations

Environmental qualities of suburbia and their physical manifestations

As a built environment undergoes physical change it is difficult for such environments to maintain exactly the same environmental qualities or characteristics (spatial form and structure) exhibited originally. If one identifies the outward, measurable, physical manifestations (setbacks, patterns of house size to lot-size, etc.) and one knows the degree and extent to which such manifestations can change before the environmental qualities (the performance of the physical environment in spatial and formal terms) themselves transform, the type and degree of physical change desired can be identified. This section attempts to identify some of the environmental qualities characteristic of suburban settings and point up the physical manifestations of such qualities that can be measured and used as guides for change. The intent is not to argue for an exclusive set of qualities or manifestations. The intent is to begin to think systematically about how such suburban settings may be perceived by people-what they see and how they see it - to develop tools to be tried out and tested and not to be used as a final analytical answer. The purpose in developing such a set of tools is to guide the development of various consolidation scenarios in the upcoming chapters. The assessments of what are viable sets of environmental qualities and their physical manifestations was based on what the literature seems to bear out as important characteristics of the suburban environment stated in the immediately preceeding section and on personal experience, intuition, rules of thumb, and common sense.

The following sums up the component parts of the analysis:

1. <u>The performance of the physical environment as characteristic of lower density, suburban, residential settings--the environmental qualities:</u> This would be constituted of such things as the nature and degree of identities of property ownerships; the nature of the relationship of the properties to one another and to the street or public way; the nature of the relationship of the house to its yard; etc.

2. The physical, measurable manifestations of these environmental qualities: Some of these would be setbacks, visual openness of the site; the size of visible (from the street) increments of building compared to increments of open space; the volume of the house to the size of the lot (F.A.R.); the overall pattern of relationships of one house to another, etc.

3. The limits of change to these manifestations before the actual quality of the environment changes, that is, before the actual spatial/formal/visual performance changes -- the performance criteria for the modified physical environment

Such an approach is taken to task when one realizes that the greatest concern expressed by residents of suburban communities is the fear that physical change of their neighborhood will change the quality of their neighborhood--the neighborhood being the major factor in what they experience as the quality of life and a sound, stable investment in property.[13]

What are some of the environmental qualities implied by the concerns of suburban residents and by the survey in the previous section of the spatial and formal issues underlying lower density, residential settings?

1. The nature and extent of the visual openness of a block; the extent to which one's vision can penetrate through the block as viewed from the public way, down the center of the block or from one side of the public way to the other (see figure 7);

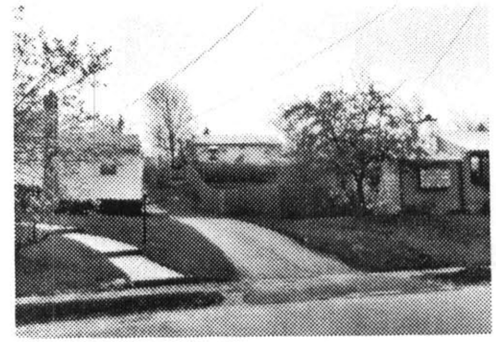


Figure 7

From the public way, the spacing between houses and the size of the houses themselves allow a considerable view of back yard areas and the houses on lots beyond. One's visual cone is not completely consumed by building mass when viewing houses head on from the public way or from a skewed angle from the public way (see figures 8 and 9).

That is, the size of the increments of built space along the public way combined with the spacing between them and their setback from the public way allows one's view to penentrate beyond them. In a similar respect such visual penetration allows all houses to be viewed as separate and distinct entities whether such houses are in the front of the visual field or toward the rear on the next lot over.

A view down the interior of the block is generally unobstructed accept for garages, utility sheds, etc.

Both the public apprehension of the block, as viewed down the public way, and the private apprehension, as viewed down the center of the block, are important components of existing environmental

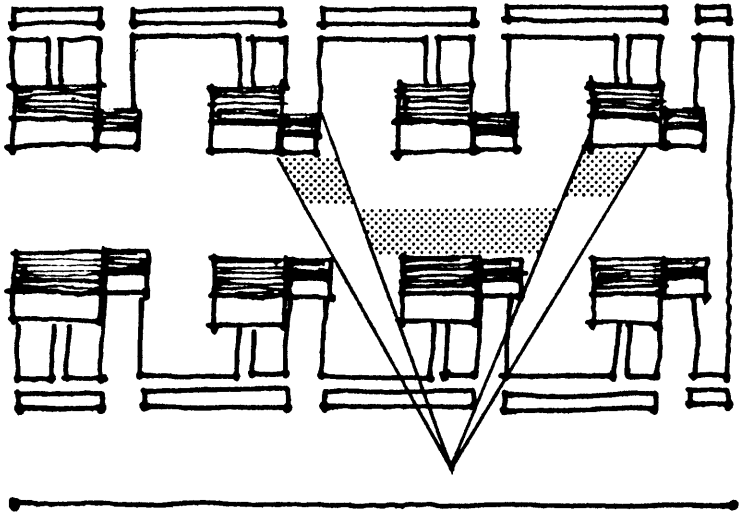


Figure 8

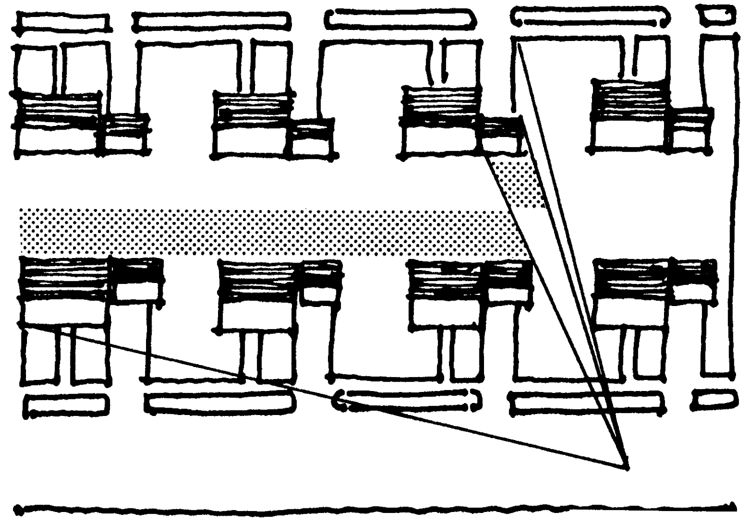


Figure 9

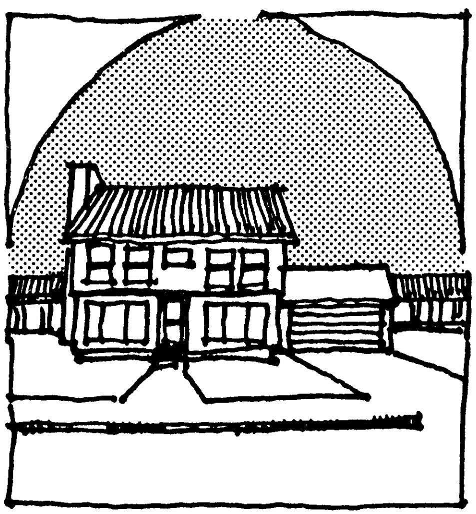


Figure 8a

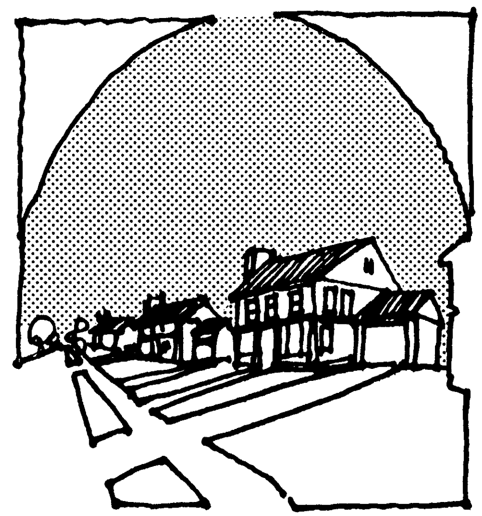


Figure 9a

quality of a neighborhood.

2. <u>The nature and extent of individual property ownerships and of the relation of individual private properties to the public way and to one another (see figure 10):</u>

The equality of property ownership (house size and lot size) and the repetition of space modules (equal proportions of lot size to house size) helps to establish a spatial pattern from which lot lines can be inferred. The main, symbolic entry, the curb cut, the auto parked in front on the public way or in the driveway serve to identify one property ownership from the next. The clear and repetitious hierarchy of house to yard to public way enforces the visual equality while isolating each property as a distinct unit in this uniform pattern. The equal increments of property ownership and the uniformity of property relationships suggest that all residents of a block or neighborhood are of equal status in the community. All have equal access to the public way,and all gain similar status in the degree to which the auto is identified with their property.

Figure 10

The side yard setbacks, front yard setbacks, and the orientation of main entrances also contribute to the language of the relationship between properties and properties and the public way. Fences, walls, shrubs, or just unbroken planes of grass suggest the degree of surveillance over the property that is necessary to maintain privacy and to guard against the intrusion of strangers and neighbors.

3. <u>The nature of the distinction between back yard and front yard - the pattern of fronts and backs</u>:

The orientation of the house on the lot, the location of the house on the lot, and the location of the main entrance, usually leaves little question as to what is the front and what is the back of a house. The built mass of the house itself serves to guarantee the privacy of the back yard from the front yard. The sizes of the front yard and back yard vary by the size, location, and orientation of the house on the lot. The back yard becomes a general purpose activity area and the front yard becomes a space that participates in the streetscape, acting as a moat to set off the house facade and as ground to be traversed under surveillance by the owning party.

4. <u>The nature and extent of the use of the public way for parking</u>: Parking on the street takes on a rhythm framed by driveway locations and house spacings. Adequate parking on the lot results in a not particularly intensive use of the street for parking.

5. <u>The nature and extent of parking on the lot itself</u>:

It is taboo to park on the lot in direct view of the front windows of the house. Rather, parking is always kept off to the sides of the house in carports or garages that are either attached to the house, at the side of the house but not attached to it, or to the rear of the lot and off to the side. Extra parking is accomodated directly in the driveway. Rarely are there more than two cars visibly parked in the driveway.

6. <u>Perhaps of lesser pertinence in a discussion of spatial and formal principles but of some pertinence nonetheless is the nature and extent of solar access and ventilation</u>:

The equal spacing of similarly sized homes ensures a certain equality of solar access (or lack thereof) and ventilation. The substantial front to back spacing of houses ensures adequate daylight (if not direct sunlight) during most of the day and during most seasons of the year. The provisions made for space as a privacy buffer between properties ensures sufficient spacing to guarantee solar access and ventilation.

7. <u>Of questionable pertinence is the inclusion of vegetation as a dominant formal element, particularly to the extent that it may not be mature or used systematically as a space divider</u>

In this case I am assuming that the house is still the major formal element and that vegetation is not used with enough formal clarity, regularity, or consistency to have much of an impact on spatial division. This is not to suggest that the presence of vegetation is unimportant in all cases (see figure 11).

Performance Criteria Derived From the Environmental Qualities of Suburbia

Environmental performance characteristics

How can these environmental qualities/characteristics of suburban residential areas be measured? What do people see? How do they see?[14] What criteria can be developed by which to evaluate the environmental qualities of a suburban neighborhood and set limits to the degree of physical change? What are some performance criteria for physical change? Is minimizing the extent of physical change really the intent in consolidation when trying to maintain existing suburban, physical, environmental qualities? Or is the issue more one of replicating existing patterns of space and buildings? The following numbers correspond to the sequence of environmental qualities considered previously.

1. How do we begin to determine the visual openness of a neighborhood and the degree to which such openness can be modified through physical change?

One method of analyzing what we see in regard to the visual openness of a suburban neighborhood block is to think of our field of vision as extending outward in a 60° cone. There are two

Figure 11

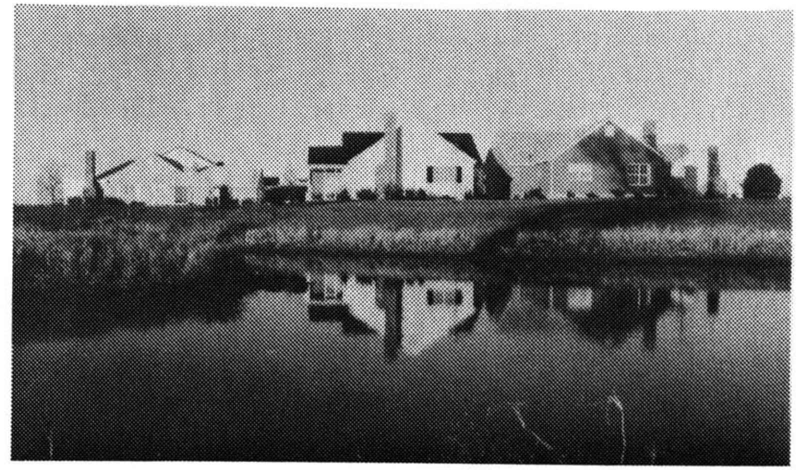


Figure 11a

concepts that are being considered in the use of this field of vision which will be referred to as the cone of vision. One concept analyses the degree to which the cone of vision is occupied by buildings and the degree to which new development can infringe on the norm. The second concept analyzes the extent to which visual permeability is maintained around new structures on the lot and the replication of existing house spacings, depths, and relative proportional sizes among the new structures.

Figure 11: From N.A.H.B. publication, Planning for Housing, (p. 28).

The first concept can be formed from several vantage points. From one vantage point the observer would be located in the public

Figure 11a: From N.A.H.B. publication, Planning for Housing, (p. 58).

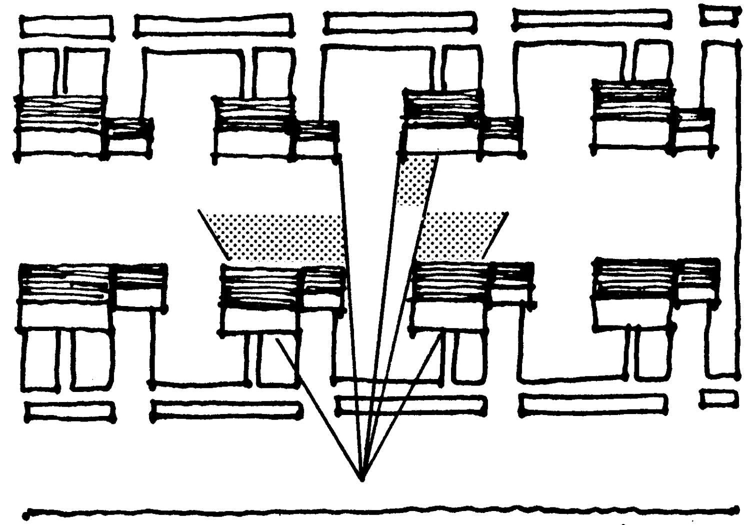


Figure 12

way viewing the row of houses head on at a 90° angle to the public way. The intent is to measure the percentage of the visual cone that is filled by building. The point at which the maximum percentage of the visual cone would be filled would occur when the viewer is situated directly in front of the house (see figure 8). The vantage point at which the minimum percentage would be filled would occur when the viewer would be situated between houses (see figure 12). The houses taken into consideration would be both those immediately to the front of the visual field and those on the opposite side of the block in the background of the visual cone.

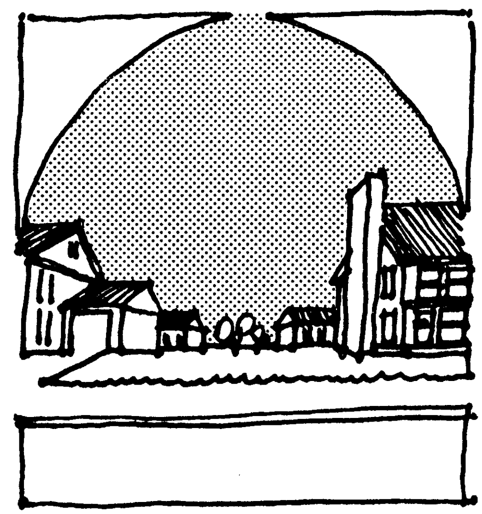


Figure 12a

Other vantage points from which to measure the percentage of the visual cone filled by houses would be from the front windows of the houses across the public way (see figure 13); from the rear windows of the houses on the opposite side of the block (see figure 14); and from the public way looking between houses (see figure 12). In general, when determining the degree to which new construction can be placed within the visual cone it is being reasoned that new construction ought not to exceed the average percentage contributed by the foreground buildings and the background buildings. Such a stipulation would theoretically allow new construction while retaining a view of background buildings. The intent here is to retain some partial view of the house on the opposite lot of the same block. The houses on adjacent blocks are not be taken into consideration.

An appropriate question to ask would be: Is the existing (or norm) percentage of the visual cone which is filled a reasonable limit when sizing and locating new houses on the rear of existing lots? Does not the norm percentage become more and more restrictive as one moves from higher density settings to lower? We know that as the physical density of the environment decreases--as houses become smaller and spaced farther apart--less and less of the visual cone is filled with houses. After all, the less dense the environment, the greater the capacity of the block to accept additional structures, yet the more restrictive the visual cone

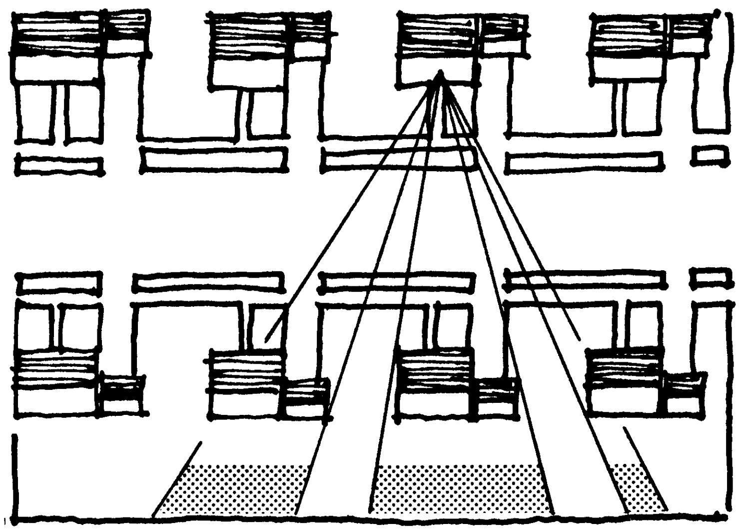


Figure 13

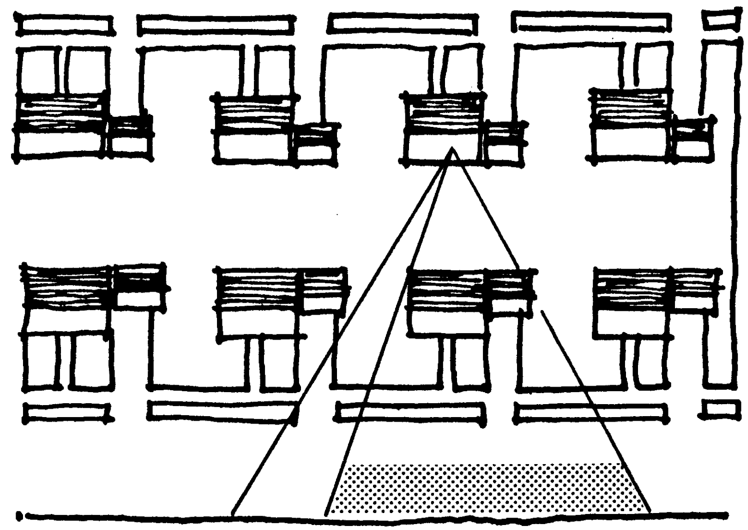


Figure 14

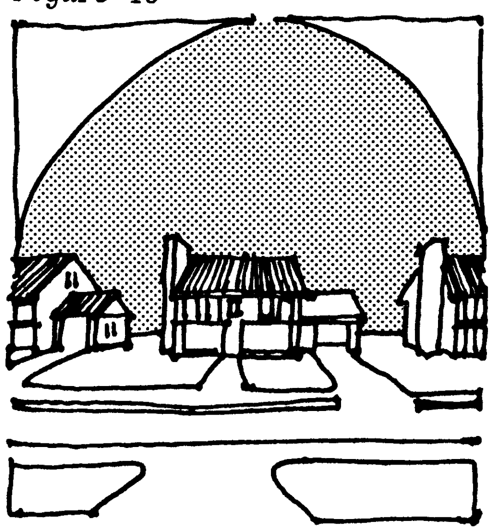


Figure 13 a

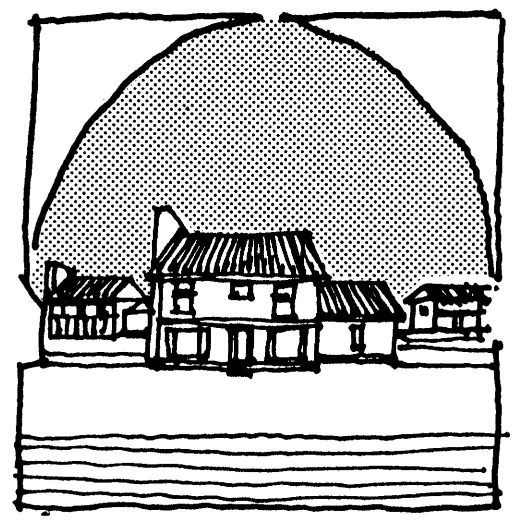


Figure 14 a

analysis becomes, and the less we can build without deviating from the existing norm.

One way around this dilemma would be to stipulate that the visual cone norm for the block cannot be exceeded by 50% if the norm is below 66%. If the existing visual norm for the block is greater than 66%, the new visual norm can exceed the existing by 50% of the difference between the existing norm and 100%[15] This criteria would apply to the visual cones from all the above mentioned vantage points.

It should be noted that this visual cone analysis limits the vantage points to those that are perpendicular to the plane established by the fronting row of houses. This limitation is artifical in that it denies a full visual sweep of the houses and the space between houses. The greater the visual sweep that is taken into account the more restrictive the criteria become to the point where nothing could be built on the rear of a lot except immediately behind the existing house. Yet, however, these vantage points present visual cones that are the most restrictive in terms of what and how much can be built. That is, it is from these vantage points that the least amount of existing building will be in the visual cone, providing the greatest restrictions on new development.

The second concept related to the visual openness of a suburban neighborhood block is the extent to which visual permeability is maintained around new structures on the lot, that is, the degree to which one is still able to see around the new structures to the existing houses on the opposite side of the block. This concept does not concern itself so much with how much is built rather than where.

In this concept the viewer is moving down the public way and viewing the houses not in a perpendicular fashion but rather with his head turned toward the houses at a 30° angle, thereby still maintaining a peripheral view of the public way itself. A peripheral view of openness is maintained between new houses on the rear of the lots and the existing houses (that is, one is able to see around the new house to the houses on the opposite side of the block) if the new house falls well within the 60° cone of vision or well removed from the cone (see figure 15). Such a visual angle is a function of the existing house spacing and house depth. This concept uses the spatial precedent established by existing house depth and spacing to determine the locations of new construction.

The lower the density of the existing environment, the greater the degree to which such house spacing and house depth falls within the 60° cone and the greater the degree to which a more substantial amount of building can be constructed. In these lower density

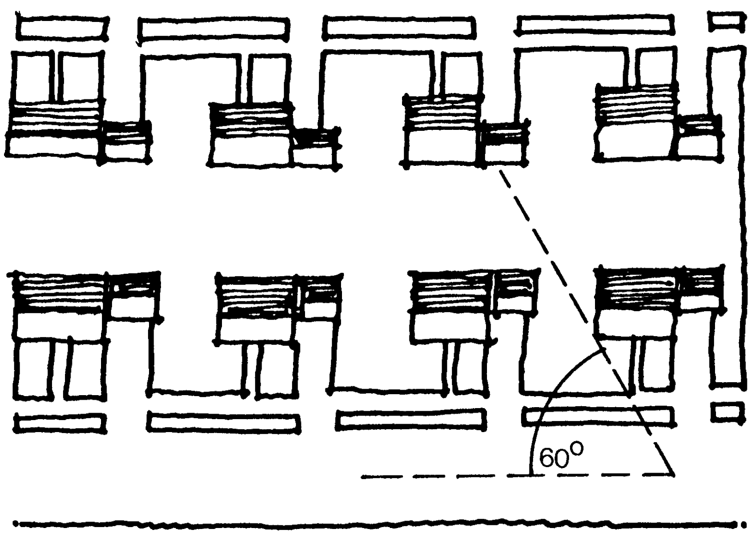


Figure 15

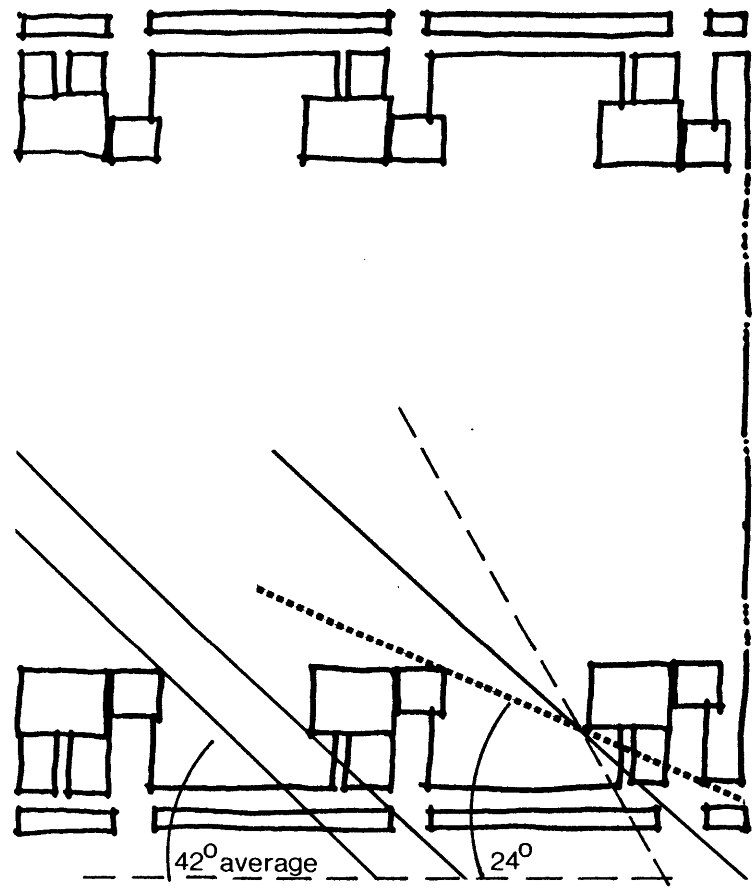


Figure 16

environments, attempting to build within the maximum 60° visual cone would result in too radical an image change from the existing. Therefore, in such settings one ought to first determine the existing angular relationship between house depth and house spacing and set the maximum angle for visual cutoff as an average between this angle and 60° (see figure 16). This angle is used in establishing a diagonal visual alley determined by drawing tangents at this angle to the front corners of adjacent houses. As a rule of thumb I will assume that one can intrude by 30% into this visual alley with new construction. The intent of this concept in general is to indicate rhythm and spacing as a function of existing house depth and spacing.

One less restrictive concept of visual openness would be that one must, in general, provide for views around any new construction to houses on the opposite side of the block. This would not restrict views to any any particular angle but stipulate instead that a view must be maintained through the block at some angle and vantage point.

2. First let us concern ourselves with the issue of distinct and identifiable yard and house ownerships. As a corollary to number one, a view between all houses must be maintained so as to assure a visual distinction of one house from another. It would be preferable to allow for such visual separation so that even houses on the

opposite side of the block would appear as separate entities.

Also, to allow for visual distinction between houses, it seems to be important to have the main entrance of the houses visible from the public way. To the degree that the main entrance to a house with an accessory unit dominates all other entities, a single family identity will be retained.

Another principle of suburban, residential settings is the ability to use yard space independently of the concerns of others; to have direct access to the public way (pedestrian and/or auto); and to be able to operate one's car independently of others. To the degree that the car lends identifiable status and distinction to a property, some connection between the property and the auto is important. Access from the public way to an accessory unit or a new interior lot house must occur as independently as possible with the least disruption to other properties.

In order to maintain similar relationships between a new house and the public way as existing properties,the new house ought to face the public way to the extent that the original houses do presently. The less identifiably related the new house is to the existing house , the greater the overall distinction between properties. Providing a direct, head-on view of the new interior lot house from the public way would facilitate this.

With respect to the relationship of one yard and house to another and to the extent that privacy and control over existing property is achieved without physical barriers such as fences, hedges, etc., such ought to be maintained in the new. Sheer spatial separation ought to be adequate to provide a similar modicum of privacy between new houses and old as presently exists. Also, the major orientations of homes ought to result in similar dimensional separations between front facades as exists presently. The major dimensional separations between new houses ought to occur between their front facades (that is, if they face one another).

Another concern is that of the rhythm and spacing of houses. The spacings between new houses and new and old houses should not be any less than 2/3 of the average sideyard spacing between existing houses. Similarly, the increments of new structures should not exceed the dimensions of existing built increments by more than one third. Breaks in the plane of the facades of the new ought to occur in similar increments as the existing (see figure 17). The intent here is to also replicate and represent the equality of existing property investments in the development of the new properties (that is, to the extent that the existing context is marked by such equality of ownership).

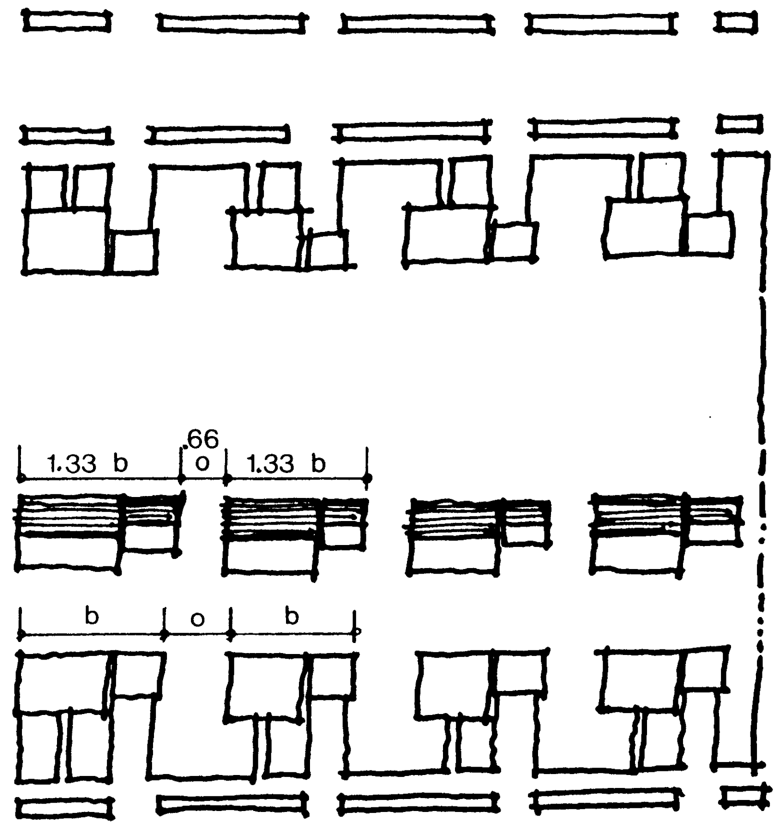


Figure 17

Related to this is the proportion of the built volume of the house to the size of the lot. When a new house is constructed on a subdivided lot, the existing house and the new house establish a new proportional convention of house volume to lot size (F.A.R.). One rule of thumb is that the F.A.R. (volume of building to lot area) of the new house on its subdivided lot ought not to vary by more than one third from the F.A.R. of the original house on its, now smaller, lot.

In summary, for number two, we concerned ourselves with the suburban environmental qualities and the physical manifestations that have to do with: the establishment of identifiable distinctions between houses and yards; the maintenance of similar relationships of yard spaces and houses to one another and the public way; the maintenance of similar rhythms and patterns of built space to open space.

3. In considering the issue of back to front relationships,several concerns come to mind. When a new house is built on an interior lot the new house ought to be oriented on the lot in a similar manner as the existing house is on the lot. The house ought to divide the lot such that the proportions of back yard to front yard are similar to the existing. The front yard of the new house ought to relate to the public way in a similar manner as the existing house.

New, interior lot houses are going to disrupt the privacy of existing back yards to some extent and, of course, decrease the size of the back yards that are affected. (But, then again, with today's smaller household sizes, how large a back yard is needed?) There would be, perhaps, less disruption of existing back yard spaces and a maintenance of a certain amount of visual openness in the back yard if the mass of the new house(s) is perpendicular to the mass of the existing house(s). In this way, in which one's back yard does not become another's front yard, a greater distinction can be maintained between front yard and back yard from one property to another.

4. We come now to the environmental quality concern of on-street parking.

In many cases in suburban, residential areas roads are not wide enough to allow parking on both sides and still permit two lanes of travel. Very often, permanent street parking is forbidden. At times the street needs to be free of autos for plowing, street cleaning, and repairs.

For those municipalities allowing on street parking an accomodation of street maintenance and repair is necessary. Allowing parking on only one side of the street would ensure that a majority of the street would be open for maintenance and repair at any one time.

The capacity of the street for parking varies by household density and curb cut frequency. In physically dense neighborhoods even one car per household on the street would present problems for parking given that only one side of the street is used for parking. In lower density neighborhoods proposing the parking of one car per household on the street would not necessarily lead to functional congestion, but it could lead to a radical change of the streetscape for those neighborhoods in which few park on the street now.

Perhaps the greatest functional and visual concern along the streetscape with regard to accessory apartments is the addition of automobiles along the public way. This concern also arises with interior lot houses although in many cases the auto will have direct access to the interior lot, and street parking will not be required. A municipality could require that all parking be on the lot. This would, however, duplicate unused paving in the street and sacrifice yard area. Therefore, a concern over street parking is warranted.

For neighborhoods of relatively high density in which parking already lines the street, one ought to determine the number of cars that can be added to the street parking areas before functional congestion results. Such a limit to car parking might suggest the limit to the number of accessory apartments that can be developed in any block. This does not necessarily hold true if one considers public transportation as an option to driving.

For lower density neighborhoods, in which on street parking is not common and in which on street parking would result in radical image changes, suggesting an increase in on street parking leads one to consider methods of mitigating visual encroachment of the autos within the streetscape. Rather than specifying a set number of cars per household that can park on the street, one could think in terms of what amenities and screening could be provided along the public way. Such concepts might include defining parking strips within built out curb returns; providing for parking between extended boulevard strips, recessing parking within existing boulevard strips; staggering parking from one side of the street to the other; or throttling the width of the travel lanes at the midpoint of the block to discourage public use. (see figures 18, 19, 20). One could then apply each concept to the site to determine how many parking spots each would allow, thereby suggesting the number of accessory units and/or new houses that could be supported by on street parking. In this way a potential loss in the streetscape would be offset by providing an amenity of widened boulevard strips, reduced travel lanes to discourage public through traffic, and screening vegetation.

5. To the degree that on street parking is unfeasible or is a companion to parking on the lot, the image of additional cars

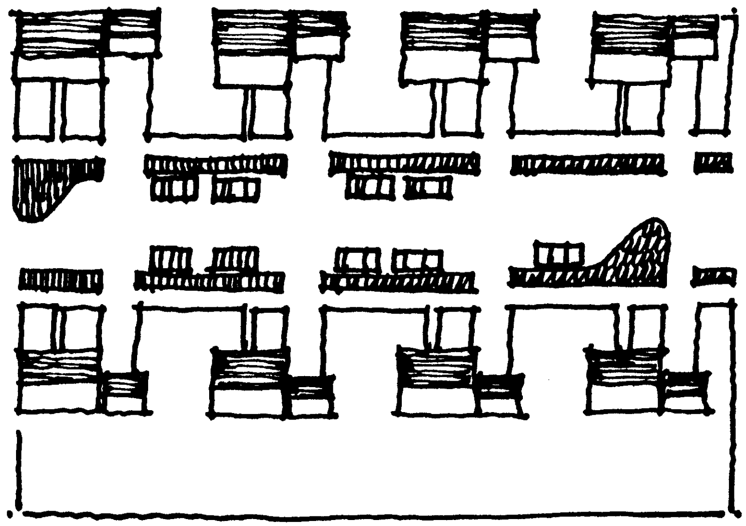


Figure 18

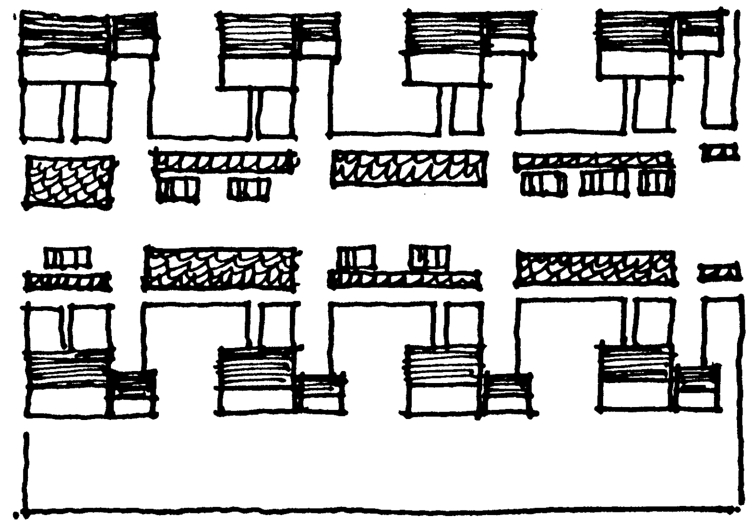


Figure 19

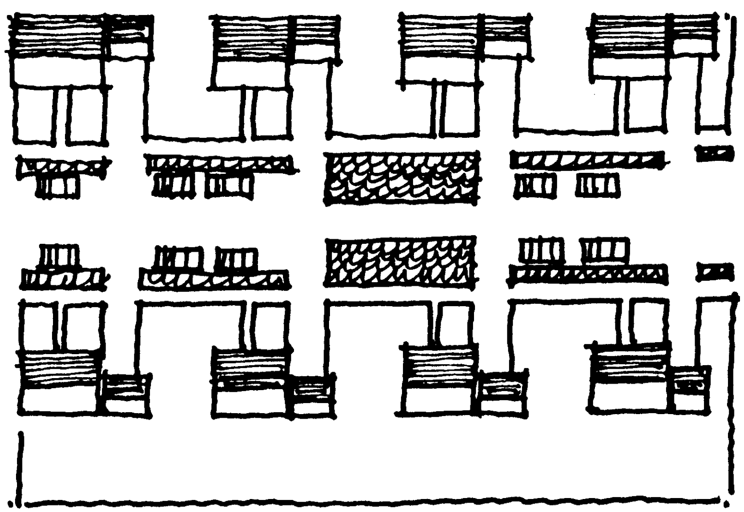


Figure 20

parked on the lot is just of as much concern as that posed by parking on the street.

In any suburban neighborhood one will see few cars parked on the lot directly in front of house. Parking tends to be kept off in the side yard areas. To the extent that this is the case, consolidation proposals ought to avoid doing otherwise in that a substantial change in the streetscape may occur. Futhermore, in any suburban neighborhood each household is able to operate its auto(s) independently of other households. Parking in tandem may be acceptable if all autos belong to one household. However, if an accessory apartment is added, tandem parking may be quite a hardship in that the two households could not operate their cars independently. In this case additional paving would have to be provided for a parking spot for the additional auto.

In determining the number of additional cars that can be accepted in the streetscape parked on the lot,one could establish a norm based on the number of cars usually parked in driveways. For those homes below the norm, an additional car parked in the driveway or somehwere in that vicinity may not present a visual problem out of the ordinary. Furthermore, one could safely assume that those households converting to accessory apartments would be small to begin with, more than likely without children, and more than likely with unused parking capacity in the existing driveway. An additional car owned by those in the accessory unit could be placed either in the driveway (if not hampering the movement of the car of the other household) or adjacent to it.

6. In the case of solar access, I will assume that the minimum dimensions for usable outdoor space and for maintaining privacy separation will automatically insure daylight if not direct solar access during the majority of the day.

7. To the degree that an increase in the extent of vegetation would be seen as an amenity by area residents, additional vegetation ought to be provided, mitigating the visual effects of increased parking, accenting building and open space rhythms, yet not obstructing the visual openness of the neighborhood block.

Functional, Dimensional Criteria

Functional and Dimensional Criteria

In summary, the last section attempted to illustrate some of the physical manifestations of the seven (certainly not exclusive) environmental qualities outlined previously. Performance criteria were developed by which to evaluate the environmental qualities of suburban neighborhoods and set limits and guidelines for physical change such that a reasonable semblance of existing environmental qualities could be retained. The environmental qualities and performance criteria represent hypothesis to be tested out in the upcoming consolidation schemes.

This last section of the chapter grounds these performance criteria, which are meant to guide formal and spatial development, in a dimensional and functional framework.

Perhps two of the more salient dimensional considerations are those of the size of accessory units and new interior lot houses.

Many municipalities limit the size of accessory apartment units with the intent that if an apartment unit within a house is visible it must appear to be and will actually be a subordinate unit in relation to the main house structure. Such a unit size also ought to reflect the practical aspects of easily dividing a house into a separate apartment unit.[16] Communities with accessory apartment legislation limit the size of the unit to a certain percentage of the floor area of the entire house or as a minimum or maximum square footage. Weston, CT limits the size to 600 square feet.[17] Portland, OR stipulates that new units cannot exceed 25% of the gross house square footage.[18] By the estimation in the Seattle report[19], a 25% stipulation does not lend itself well to the configuration of most houses. Typically new units are sized between 400 and 800 square feet.[20] Seattle stipulates that no more than 1/3 of the total floor area be given over to accessory use. For the purposes of the thesis, the size of a typical accessory apartment will be 500 square feet. The smallest size house that can be subdivided will be one whose footprint area is 1000 square feet.

New houses constructed on subdivided, rear lots will be assumed to be subdividable into an accessory unit. Therefore the minimum footprint size of a new house will be 1000 square feet. The size of the lot, the performance criteria, and raw dimensional criteria related to minimum setbacks and minimum, usable yard area will determine the absolute size of a new rear lot house.

It is assumed that each existing house has parking requirements for two cars in the driveway area and garage. Each accessory unit ought to have at least one parking space on or off the street. Each new rear lot house ought to have one parking space on the lot plus room for one guest parking spot on the lot. The Multnomah

County, OR report[21] states that four on site parking spaces ought to be provided (two for guests). I am assuming that extra guest parking spaces ought to be provided on the street. If a new, rear lot house is to be subdivided into an accessory apartment the parking for this unit can be either on the lot or on the street. Garages for new houses will be 10 feet wide by 20 feet deep.

Car parking and driveways shall extend as little as possible into the lot and not disrupt the contiguousness of yard space. Parking on the lot shall be located so as not to be directly visible from the major house orientation (that is, kept off to the side yard areas). If it is in the line of view it ought to be at least 20 feet distant.

Due to needs for municipal cleaning and the maintenance of the public way, it is assumed that all cars will park on one side of the street. Driving lanes on the public way will be assumed to be 10 feet wide. Parallel parking strips on the public way will be assumed to be 8 feet wide. Alleys and access roads will be 20 feet wide to allow access for emergency and delivery vehicles.

In the design of open space, particularly private outdoor space, the intent is to protect the privacy of this space by keeping it out of direct view of other units, by shielding it with the respective house, and by providing enough of it so that it acts (through sheer physical separation) as a moat to adjoining properties. In his book, The Hidden Dimension, E. T. Hall mentions that at 20 feet facial expressions and normal conversation becomes indistinct. This dimension is being considered as a nominal separation between public and private areas. A usable yard space by one household will be assumed to be 20 feet in depth and as long as the house.

Yard space also ought to provide for direct sunlight penetration into the habitable spaces of dwellings during winter, and maximize the access of direct sunlight to outdoor spaces. As a rule of thumb, continuous, parallel rows of buildings with north/south exposure should be spaced two and one half times as far apart as their walls are high.[22] Daylight access to units ought to be assured by providing an 80 foot, unobstructed view from windows for 50° in one continuous arc.[23]

CHAPTER 3:

SITE SELECTION, CONSOLIDATION GUIDELINES, ASSUMPTIONS

A formal categorization and typification of residential, suburban morphological characteristics can be a vexing foray frought with the multiple levels at which form can be apprehended. At the macro-level of apprehension any one of a number of forms can be perceived derived from various aggregations of street patterns and block shapes: the orthogonal grid form (square and rectangular blocks); the minimal curvilinear to the extreme and amorphous curvilinear that almost defies the concept of morphology; circular and radial forms; and cul-de-sac configurations. Of course there can be any one of a number of possible combinations of these forms in any particular setting.

At a more intimate level of apprehension we contend with various shapes and sizes that are to an extent dictated by the block and street form: square, rectangular, trapezoidal, and wedge shaped.

At a more intimate level of analysis we find the house and the manner in which it helps to divide the lot: house size and shape, the orientation of the mass of the house on the lot, and the location of the house on the lot. All of these have a bearing on the final, spatial configuration of the lot.

The orthogonal form is under consideration in this thesis. By limiting the investigation of consolidation and the physical consequences to the orthogonal type, the variables that come into play can be more easily controlled. When the variables of form are few, identifiable, and controllable the reasons for variances in consolidation consequences between one site and another are more easily comprehended. Furthermore, the formal variety within the orthogonal type offers endless opportunites for comparison. Figures 1 - 5 illustrate just a fraction of possible orthogonal formal types of residential suburban neighborhoods. These permutations are the result of only the following variables: two lot shapes, three lot sizes, one house size, two house shapes, two orientations of the house on the lot, and three locations of the house on the lot. Each permutation implies varying potentials for on site car parking, house access, house orientation, varying sizes and configurations of yard space, and ultimately different potential uses for such space and different types of relationships between one lot and another.

In selecting study sites within which to analyze consolidation methods and consequences, the intention was to pass by neighborhoods in which houses were so densely situated that no room remained for simultaneous retention of existing structures and the insertion of additional households. Also passed up were those

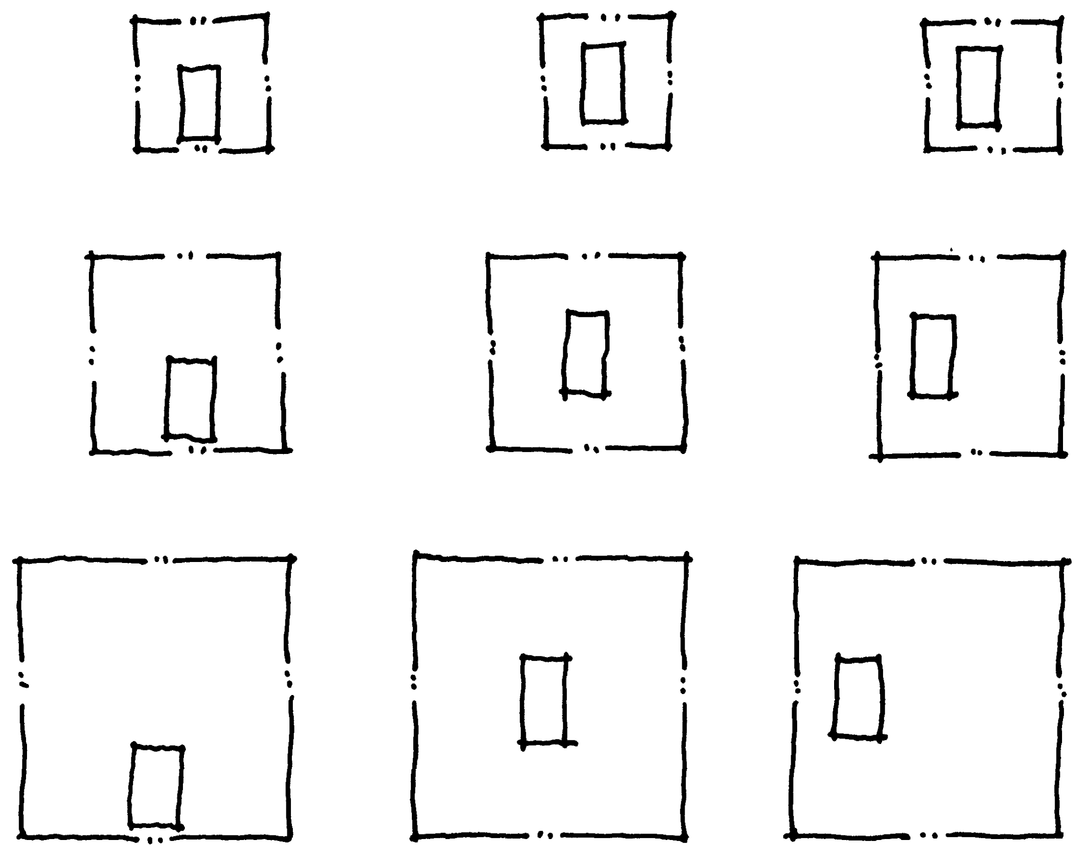


Figure 1

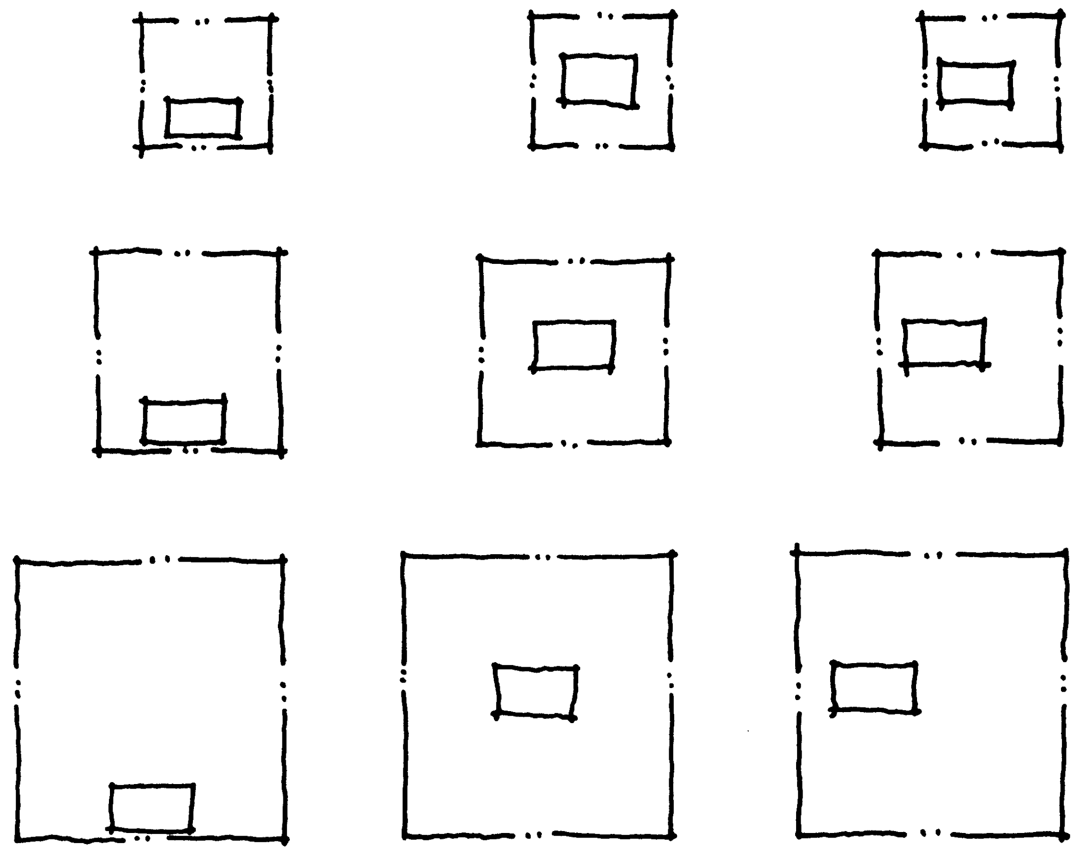


Figure 2

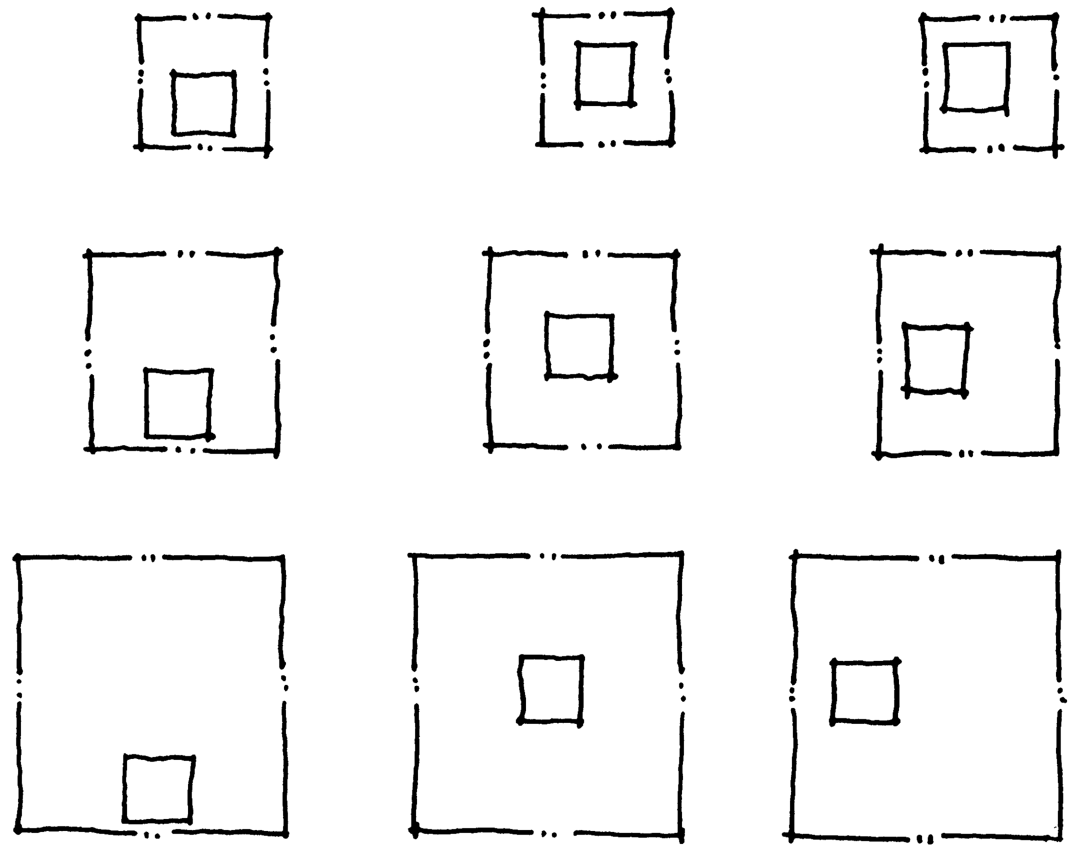


Figure 3

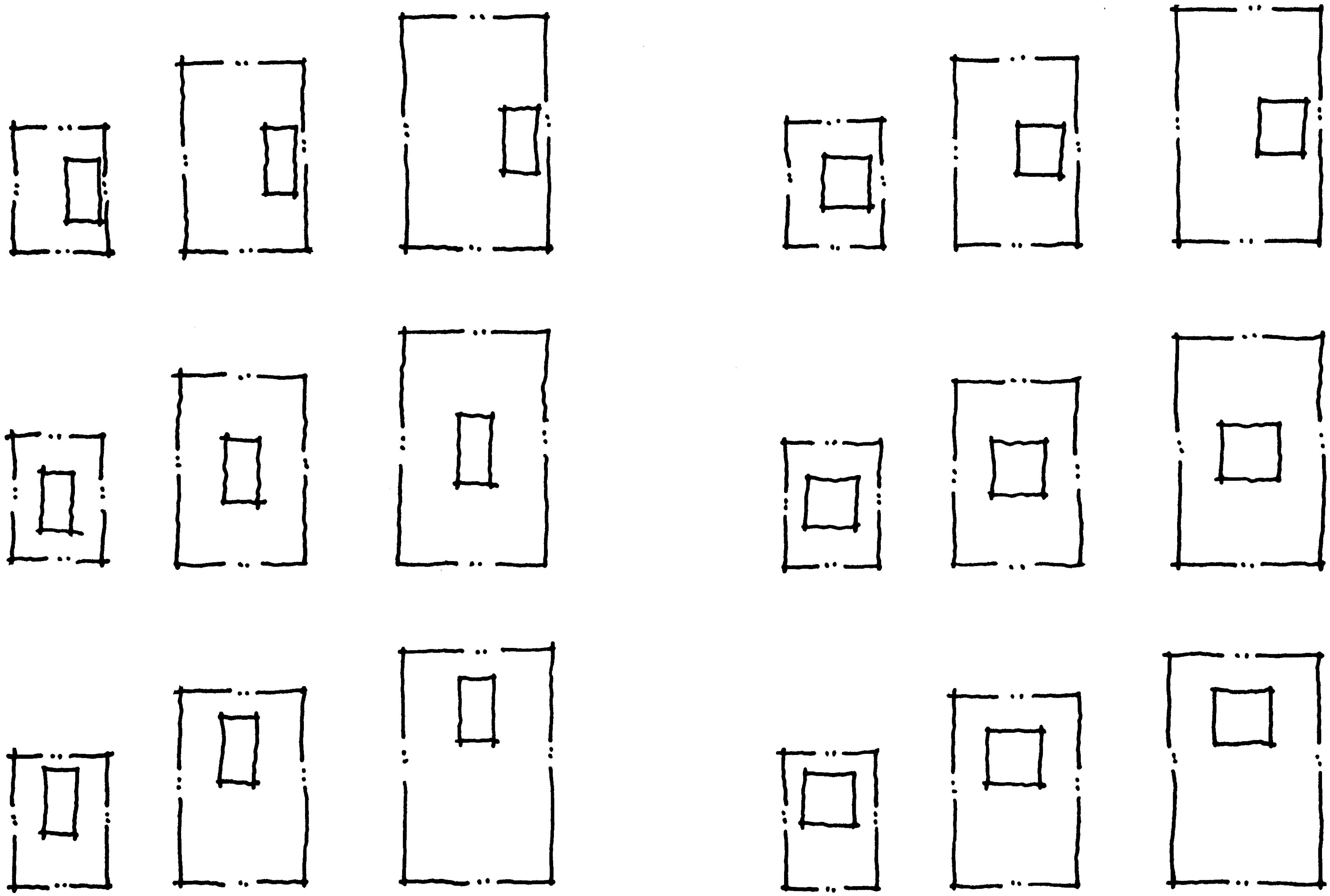


Figure 4

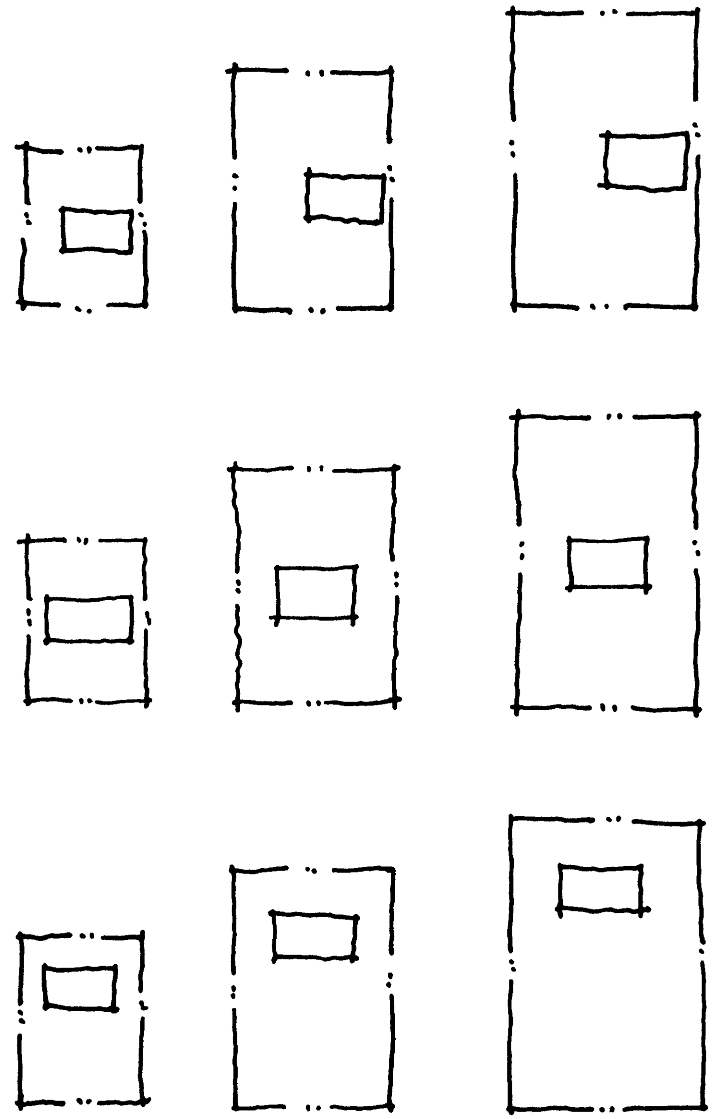


Figure 5

neighborhoods of such anonymous and ample space which offered no overall spatial pattern or constraining physical form to guide physical change. On such sites, multiple dwellings, town houses, and apartments would probably be a more viable development alternative than one or two story single family houses.

In the sites chosen, I sought to control for changes in proportions of rectangularity of lots, lot size, ground coverage (size of house footprint -vs- lot size), the number of lots per block, and the general availablity of yard space within which to park cars or subdivide lots. The intention was to choose lots offering varying ranges and types of spatial constraints. The block and the lot constitute the levels and modules of investigation. The similarities between sites are the public way sizes and configurations, house locations on the lot, and the basic rectangularity of the lot. The basic types of lots represented in the study sites are typified in figure 6.

The study sites will be considered as unaffected by intervening variables such as major traffic arteries, highways, schools, parks, commercial, and other discontinuities in the residential fabric. In portraying and analyzing the sites, each block will be placed within the context of the half block all around the block in the question. Because the public way serves both sides of the street, this half block perimeter strip is an important considera-

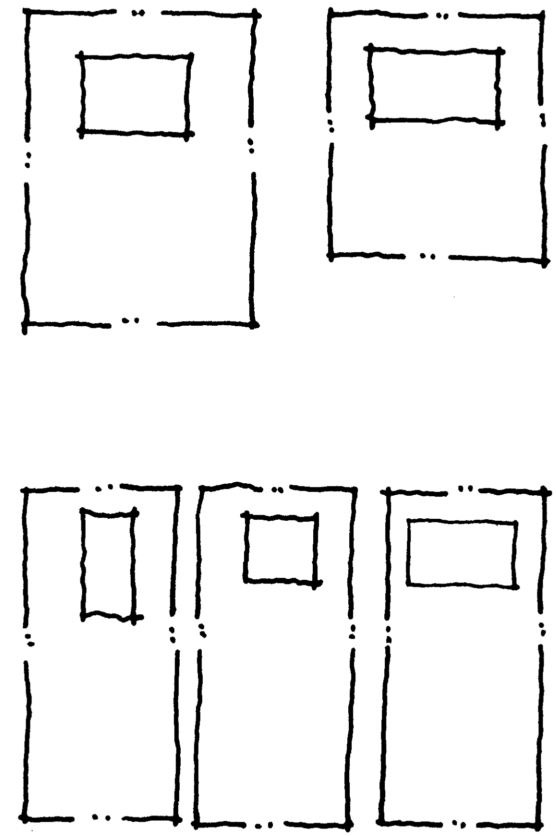


Figure 6

tion in its contribution to the public way in terms of parking and the spatial modulation of the public way.

CONSOLIDATION GUIDELINES AND ASSUMPTIONS

The guidelines set up a rule structure to be used in the development of consolidation schemes:

1. In this thesis, the intent is to attain the maximum number of new units on a site while satisfying the environmental performance criteria for that site, that is, guaranteeing that physical change does not result in a substantial alteration of the essential, existing environmental qualities. In this regard, the size and number of units added through consolidation is to a large degree a product of the capacity for physical change of each site.

2. Consolidation ought to be able to occur through individual effort or the cooperation of adjoining property owners. Whether a consolidation scheme is the result of individual or cooperative effort, it ought not destroy or limit the consolidation possibilities for adjacent property owners. This assumes that some forms of consolidation are incremental in nature.

3. If the consolidation of a neighborhood occurs in stages, the environmental performance criteria for each successive stage is based on the environmental qualities established in the most recent stage.

4. Property demolition ought not occur, although garages can be moved, demolished, or rebuilt if the parking space so changed is accounted for in the consolidation scheme. New easements ought to be able to be introduced.

5. On any lot, consolidation can occur as an accessory apartment to the original house; as a new unit on a rear lot; as an accessory unit to the existing house combined with a new, rear lot house; or as accessory units to the existing house and the new house.

6. At the scale of the block, consolidation can occur as individually developed enterprises on a lot by lot basis; adjacent property owners can cooperate in consolidating their lot and sharing parking areas and driveways; or an entire block can consolidate at once.

7. At the scale of the block aggregations, all lots in a block could consolidate at the same time or over time, and only certain blocks in a municipality could consolidate in this manner; or, only a certain percentage of the lots in any block could consolidate applied over all blocks or only certain blocks; or there could be a combination of the two in which some blocks are fully consolidated, some partially consolidated, and some not consolidated at all.[1]

ASSUMPTIONS

1. The neighborhoods chosen for the design schemes were assumed to be neither wealthy to such an extent that residents could afford to maintain large houses and yards nor neighborhoods in which consolidation and multiple family dwellings are common already.

2. The neighborhoods are assumed to be subject to a decline in household size with the net result being a large population of elderly, empty nesters, young couples, and families with few children.

3. Because of the reduced population in such areas, it is assumed that public services and infrastructure are under utilized.

4. All sites are considered to be flat. Topography is an important factor. However, in the case of this thesis,it does not occur with enough regularity and consistency to be a controllable variable.

5. Assumption number five applies to vegetation also. Vegetation is not of enough maturity or used regularly as a space definer to affect spatial form. I will assume that it does not occur with enough regularity and consistency to be a controllable variable.

6. Houses and garages will be considered as volumes or masses. The floor plan and the explicit design of new or existing units will only be considered to the extent of garage location, entrance location, and the orientation and location of major glass areas.

7. When determining lot coverage, the area of the garage is considered.

8. Accessory apartments will be considered as developed on an individual, owner basis. New houses will be considered as individual, owner investments or as developer packages.

9. Those moving into units resulting from consolidation, although expecting a certain degree of environmental suburban qualities, will not be aware of or used to the existing qualities of the neighborhood. They are not expecting to encounter a full extent or range of qualities that originally typified the neighborhood. They are probably more willing to accept changes in the existing, physical environment and accept modifications of typical physical relationships (e.g., living in a house built in the interior of the block not directly on the public way).

CHAPTER 4:

METHOD, SCHEMES, ANALYSIS

Introduction

In this chapter the study sites are analyzed, consolidation schemes are illustrated, and the physical consequences are evaluated. Initiating this is an outline of the method used for analyzing the physical environmental qualities of the study sites, for developing consolidation schemes, and for analyzing these schemes.

Method

The method is a three step procedure which commences with a spatial and visual analysis of each study site with the intent of developing environmental performance criteria to guide the consolidation of each site (that is, for those performance criteria that are site specific). These criteria will be summed up in drawings, indicating building envelopes (house size, spacing, and location) for new, rear lot houses.

The second step develops individual consolidation schemes that attempt to maximize the number of units on the site (through combinations of accessory apartments and new, rear lot houses). The building envelopes will be used as guides not absolute dicta. These schemes will attempt to work within the other (non-site specific) environmental performance criteria as well as the basic functional and dimensional considerations. Rather than working through all schemes on one site and then proceeding to the next site, one scheme concept will be carried through all sites before proceeding to the next scheme.

Following the exploration of one consolidation scheme concept for all sites, the sites will be compared on the following basis, keeping in mind the objective of maximizing the number of units:[1]

1. Neighborhood (at the block level) image and physical amenities-environmental performance criteria satisfaction

2. The ease or difficulty of development; the development process; public and private costs/benefits

3. The nature and extent of created shared space vs. the nature and extent of created private spaces

4. Infrastructural quantities:

   a. Grade A infrastructure: that infrastructure that tends to be of higher quality and unit cost, such as an alley

   b. Grade B infrastructure: that infrastructure that tends to be of lower quality and unit cost such as a driveway or a boulevard strip

5. The trade offs from one site to another and the inherent spatial/physical differences between sites, contributing to different consideration consequences and different numbers of units

Site Analysis

The analysis of the physical environmental qualities of each site will be composed of the following:

1. Visual, spatial, site descriptions (photos) public way streetscape, front yard relationships and property set-backs, the extent of continuous facade planes, the spatial relationships of one house to another, the nature and extent of the space between houses
2. Site dimensions, house sizes, lot sizes, lot coverages
3. Visual cone analysis
4. 60° visual alley analysis of the space between houses and resulting new building envelopes
5. Built and open space increments

Consolidation Schemes

Each consolidation concept will be based on a particular combination of lot access, parking, house groupings, and intensity of development. These schemes will try to maximize the number of units on the sites while working within the site specific performance criteria and the functional/dimensional considerations. The building envelopes developed in the site analysis section will be used as guides not as absolutes:

1. Access method
   a. Flag lots - individual driveways
   b. Alley
   c. Accessway - shared, private street
2. Parking
   a. All on the street
   b. All on the lot
   c. Some on the street and some on the lot
3. Groupings
   a. Individual efforts within existing lot lines
   b. Individual efforts straddling existing lot lines
   c. Clusters in which the new houses are built within existing lot lines

d. Clusters irrespective of existing lot lines

4. Intensities

Only one intensity of development will be considered--a maximum intensity through the develpment of rear lot houses and accessory apartments in the existing houses and the new rear lot houses.

Site Analysis:
Site Descriptions

Site Descriptions

Site 1

(Refer to figures 1 - 4, drawings 1.1 and 1.2, and charts 1 and 2)

1. The public way is quite narrow - two 10' wide driving lanes and two 10' wide boulevard strips with minimal and poorly maintained sidewalks.

2. Cars parking on the street tend to restrict vehicular movement.

3. In addition, there is little on-street parking. For every eight houses, one car is parked on the street.

4. Most households park one or two cars in the driveway. Roughly 50% of the households have garages.

5. There is some use of hedges, fences, and walls at property lines. Vegetation, in general, is used in a haphazard manner, and does not help to create or enhance spatial divisions.

6. Views generally are not greatly obstructed by vegetation or fences.

7. The lack of regularity of house shape and orientation is readily apparent.

8. The houses are of 1 to 1-1/2 stories.

9. The average lot size is 10,000 s.f. The largest lot is 11,500 s.f., and the smallest is 7,500 s.f.
10. The average house footprint is 1,800 s.f. The largest is 2,000 s.f., and the smallest is 1,600 s.f.
11. House coverage on the lot averages at 17%. The smallest coverage is 14% and the largest is 28%.
12. Front yard setbacks vary from 25' to 40' from the pavement. Side yard setbacks between houses vary from 20' to 60'. Setbacks between the rear of houses vary from 80' to 120'.
13. Individual lots are not large enough (depth wise) for new houses. New houses would have to straddle two or four lots.

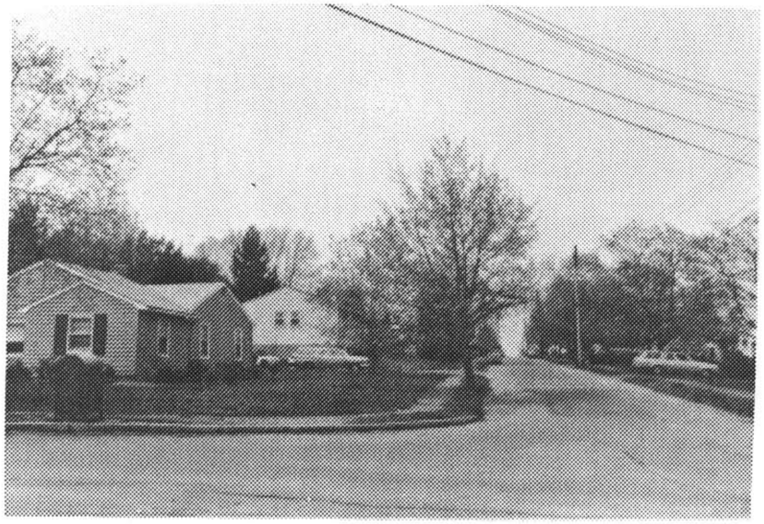


Figure 1

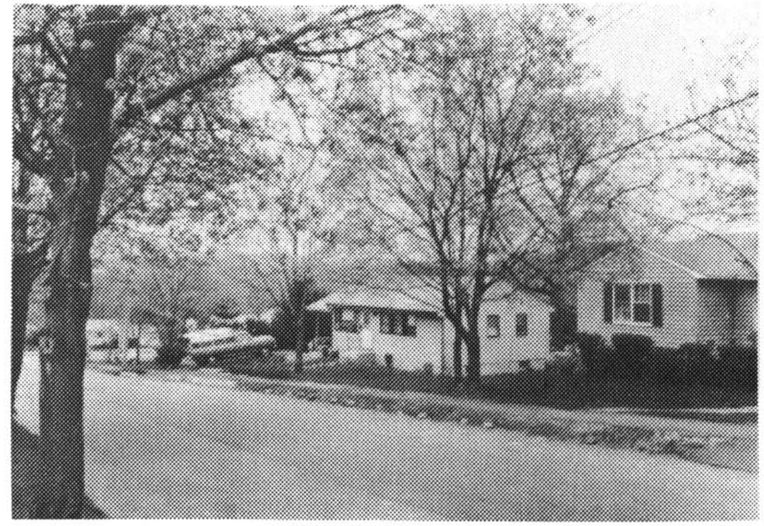


Figure 2

Figure 3

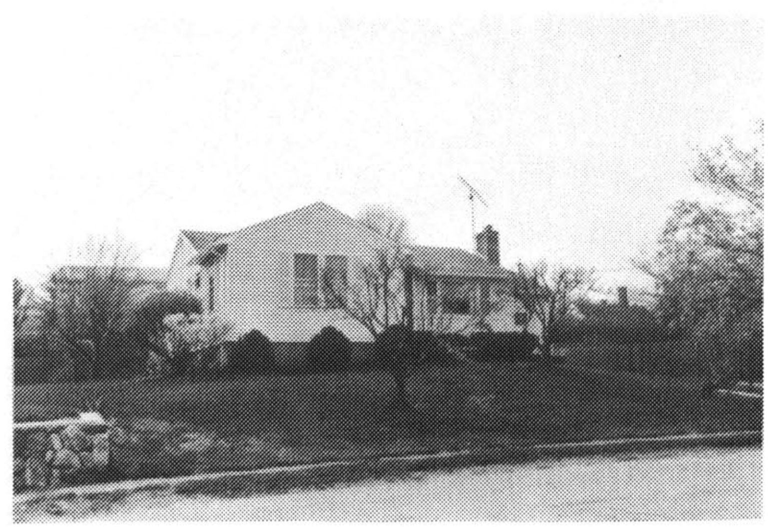
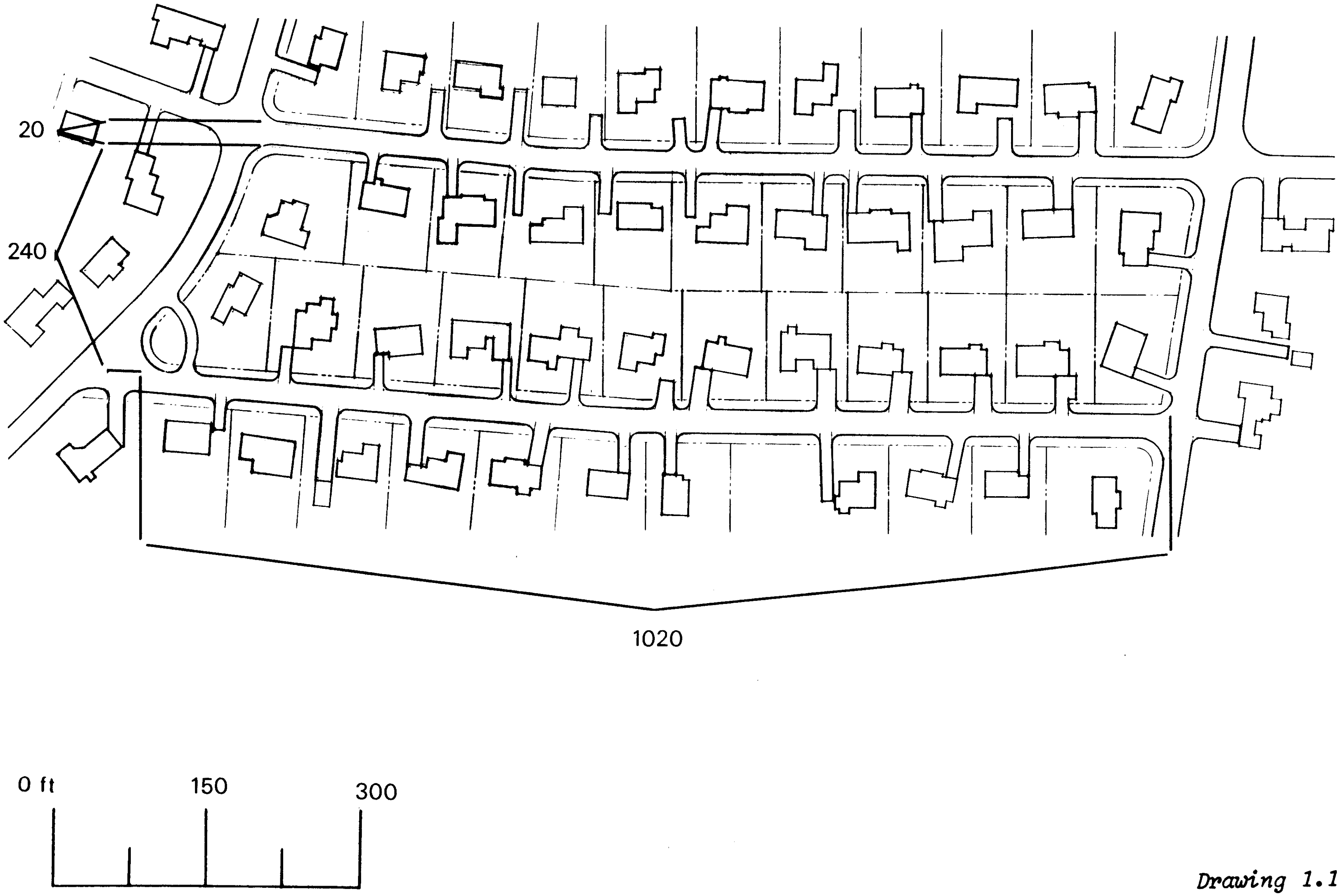
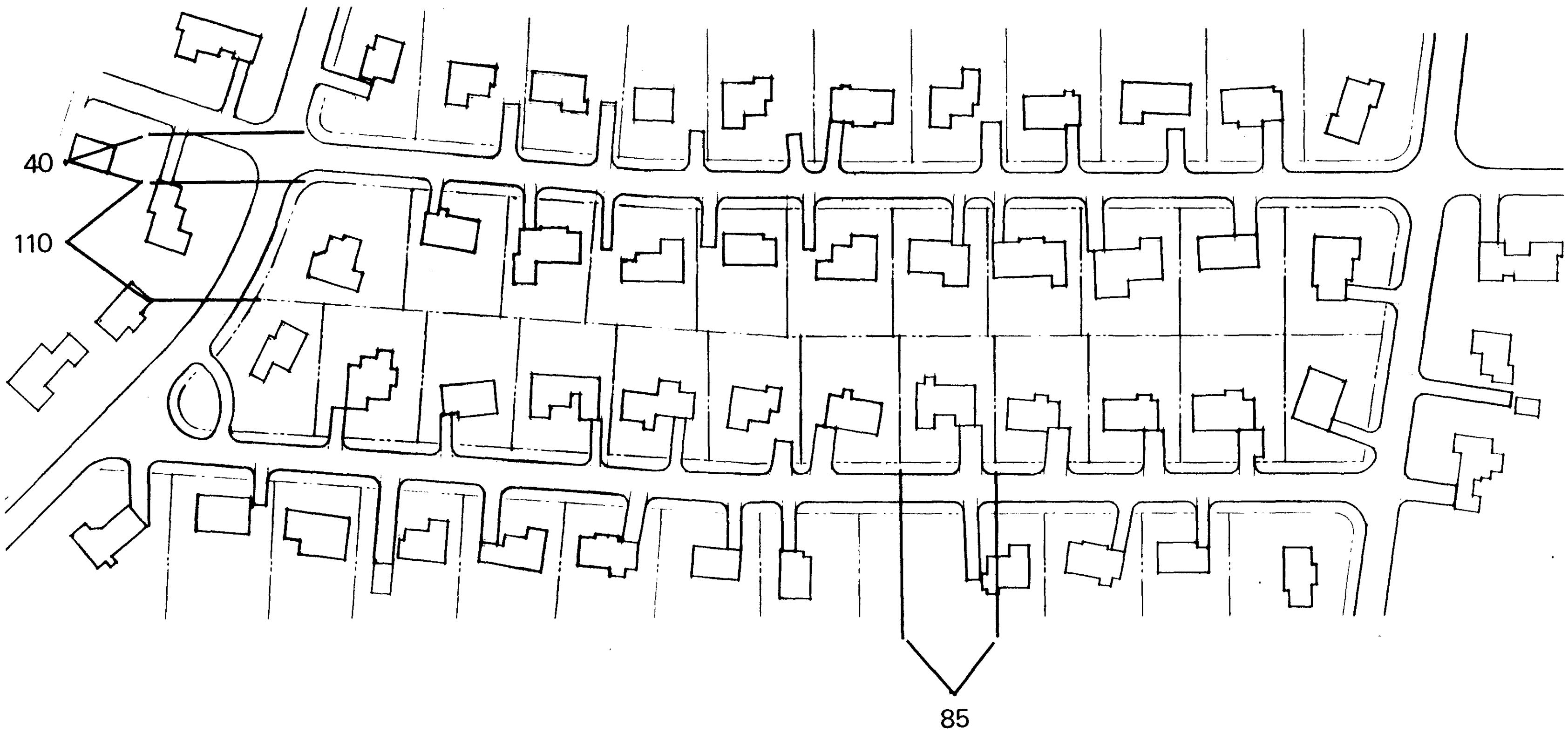
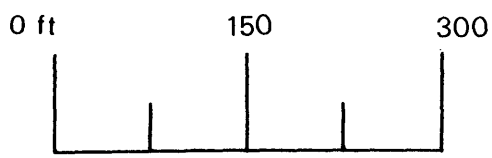


Figure 4



Drawing 1.1





Drawing 1.2

Site 2

(Refer to figures 5 - 8, drawings 2.1, 2.2, and charts 1 and 2.)

1. The public way is of moderate width -- two 14' driving lanes and two 10' wide boulevard strips with no sidewalks. The boulevard strips are an integral part of the front lawn space opposed to site 1 in which the boulevard strips are identifiably distinct due to fence, vegetation, and sidewalk separations.

2. Parking on one side of the street does not totally restrict two way vehicular movement as in sites 1 and 3.

3. There is little, apparent on-street parking. For every 12 houses one car is parked on the street.

4. Most households park one to two cars in the driveway. A majority of houses have garages.

5. There is some use of hedges and fences at property lines. Vegetation, in general, is used in a haphazard manner, and does not create purposeful spatial divisions. Although the interior of the block is heavily wooded, I will be assuming that the interior of the block is open and treeless. The reason is that many such suburban tracts are altogether barren of original vegetation. The consideration of vegetation in this analysis would add another, uncontrollable variable.

6. Views down the public way are more obstructed with front yard vegetation than in sites 1 and 3.
7. House orientation and size are apparently regular from the public way. Shapes vary noticeably however.
8. Houses are of 1 to 1-1/2 stories.
9. Lot sizes are very regular at 20,000 s.f.
10. House footprints average 1600 s.f. The maximum size is 1,950 s.f., and the minimum size is 1,350 s.f.
11. House coverage of the lot is quite regular at 8%. The maximum coverage is 10%, and the minimum is 7%.
12. Front yard setbacks from the pavement are quite regular at 30' - 35'. Side yard setbacks between houses are quite regular at 15' to 20'. Setbacks between the rear of houses varies from 260' to 180'.
13. Individual lots have ample room for new rear lot houses.

Figure 5

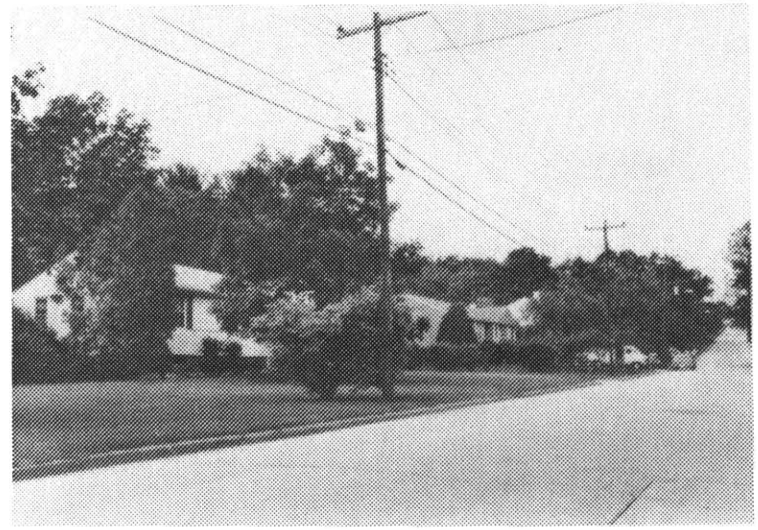


Figure 6

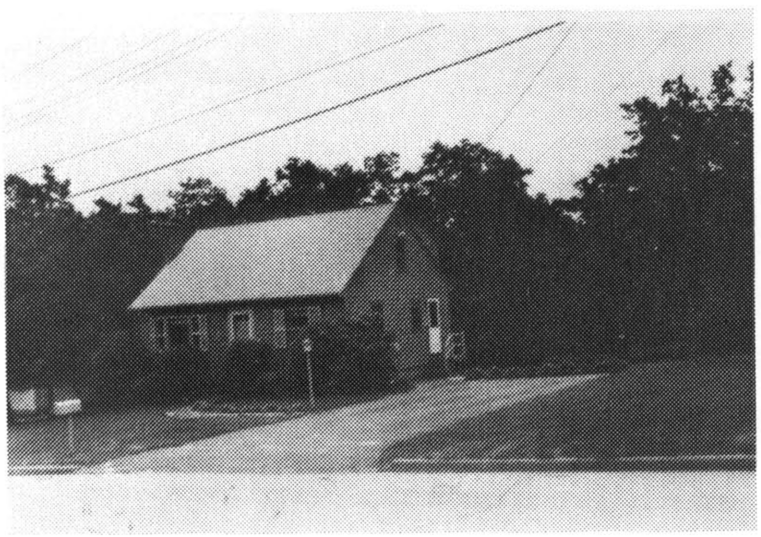


Figure 7

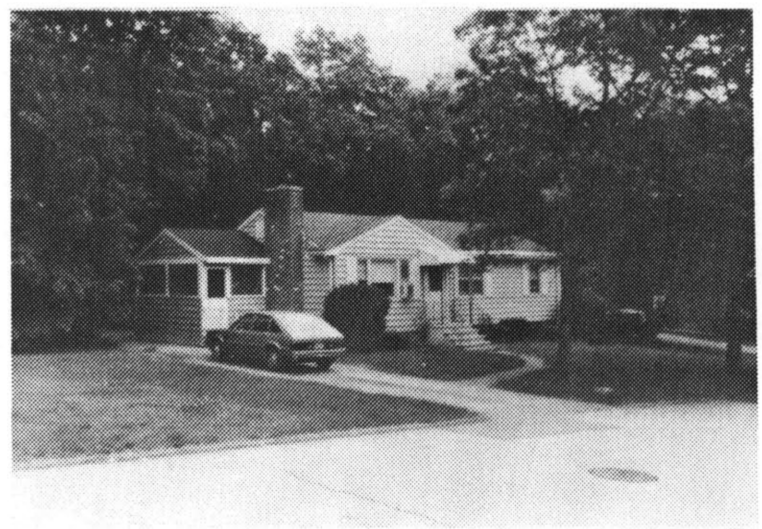
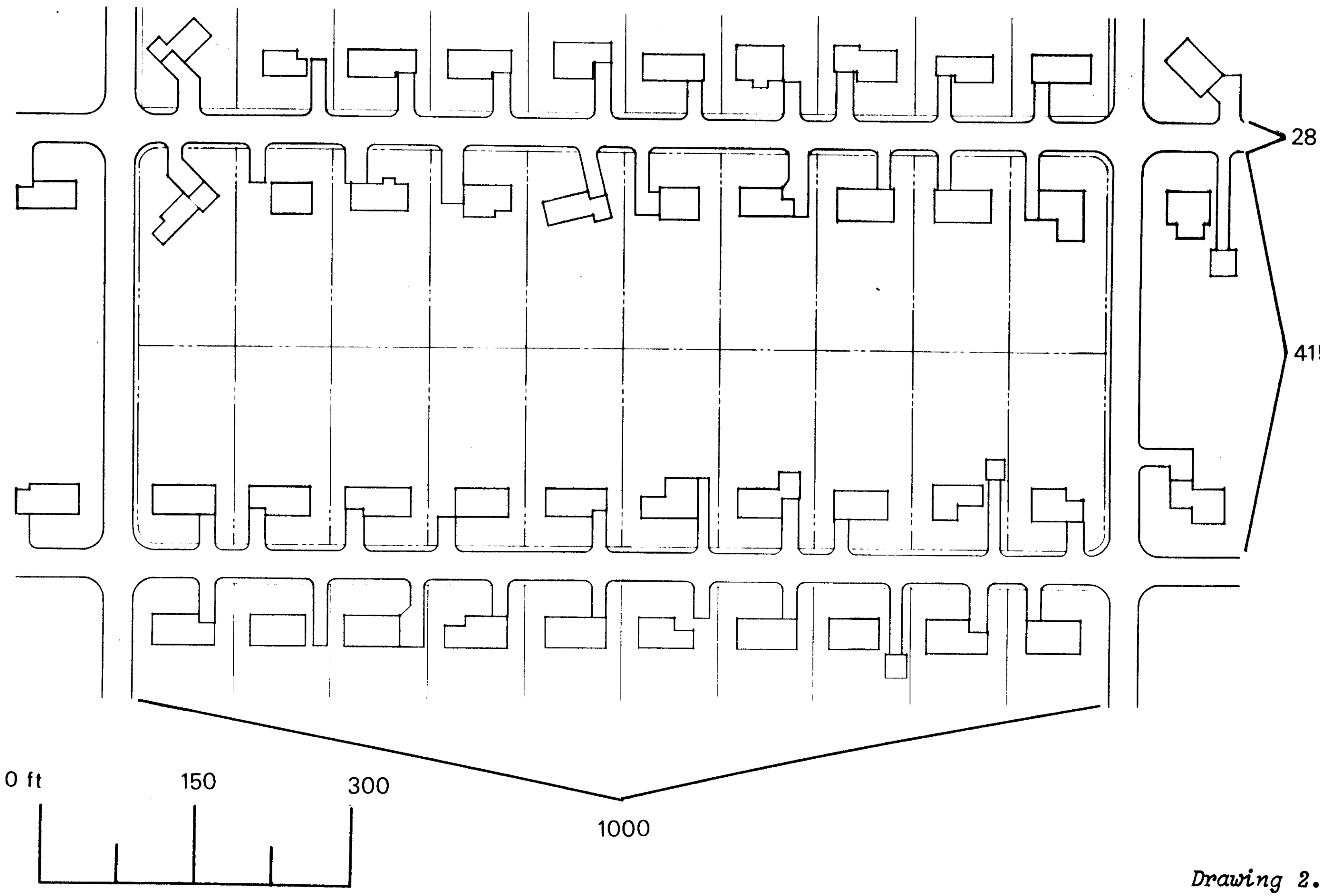
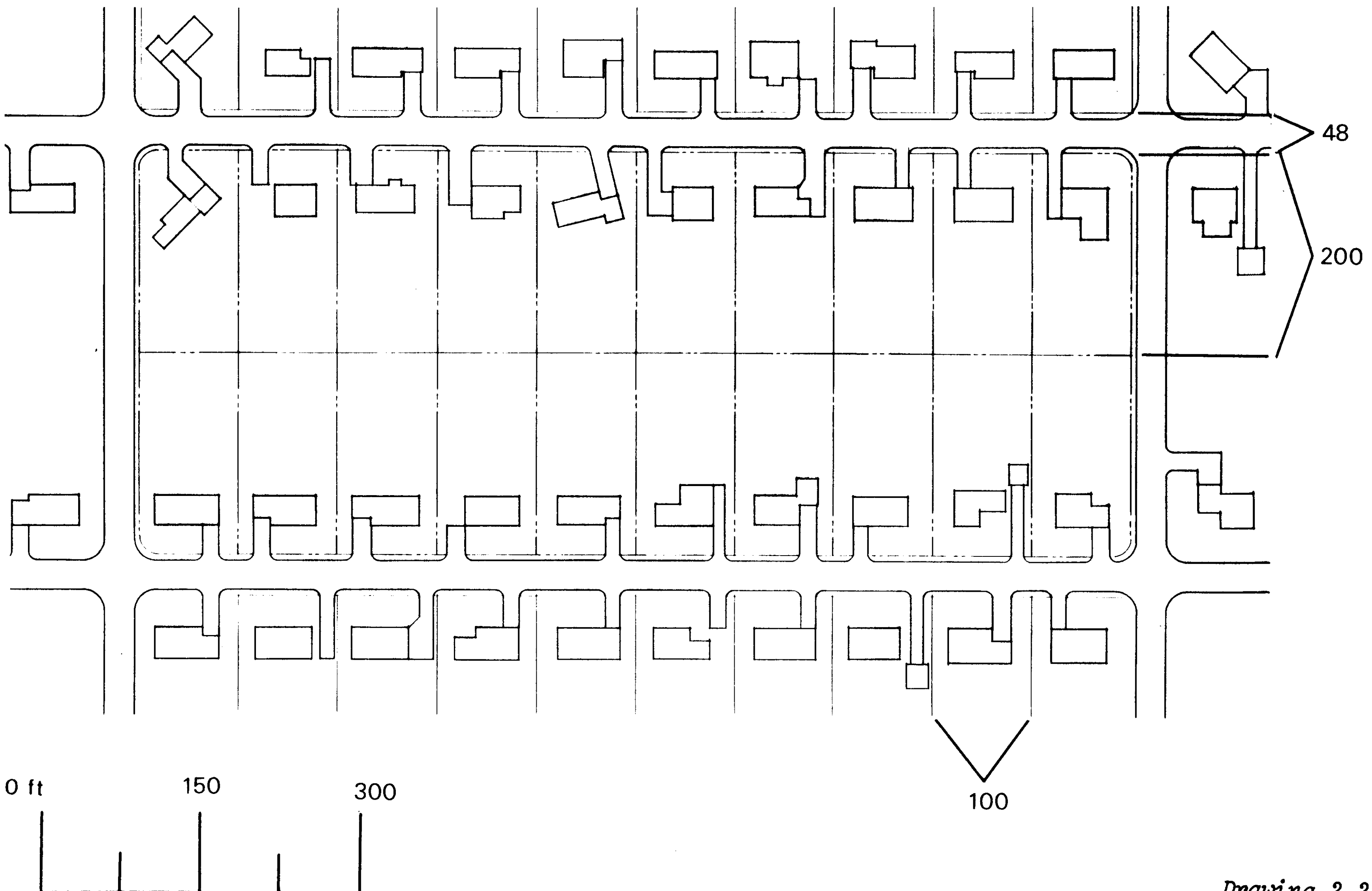


Figure 8



Drawing 2.1



Drawing 2.2

Site 3:
(Refer to figures 9-12, drawings 3.1 and 3.2, and charts 1 and 2.)

1. The public way is quite narrow as in site 1 -- two 10' driving lanes and two 10' wide boulevard strips with minimal sidewalks. The boulevard strips are identifiably separated from the front yards.
2. Vehicles parking on the street restrict two way movement.
3. There is little on street parking although there is more than in sites one and two. For every six households one car is parked on the street.
4. Most households park one car in the driveway. Only one household owns a garage.
5. There is some use of hedges, fences, and walls at property lines. Lawn vegetation in general is used in a haphazard manner, and does nothing to create or enhance spatial separation.
6. Views are not obstructed by vegetation or fences.
7. House shape, orientation, and size are apparently regular along one side of the block. House size and shape varies quite perceptibly on the opposite side of the block.

8. The houses are of 1 to 2 stories.

9. The average lot size is 8250 sq. ft. The largest lot is 14,450 sq. ft., and the smallest lot is 7200 sq. ft.

10. The average house footprint is 800 sq. ft. The largest footprint is 2585 sq. ft, and the smallest is 700 sq. ft. The majority of the houses are too small for division into accessory apartments.

11. House coverage of the lot averages 10%. The largest coverage is 18%, and the smallest is 8%.

12. Front yard setbacks vary from 20' to 30'. Side yard setbacks between houses vary from 10' to 25'. The setbacks between the rear houses varies from 190' to 220'.

13. Individual lots have quite ample space for new rear lot houses.

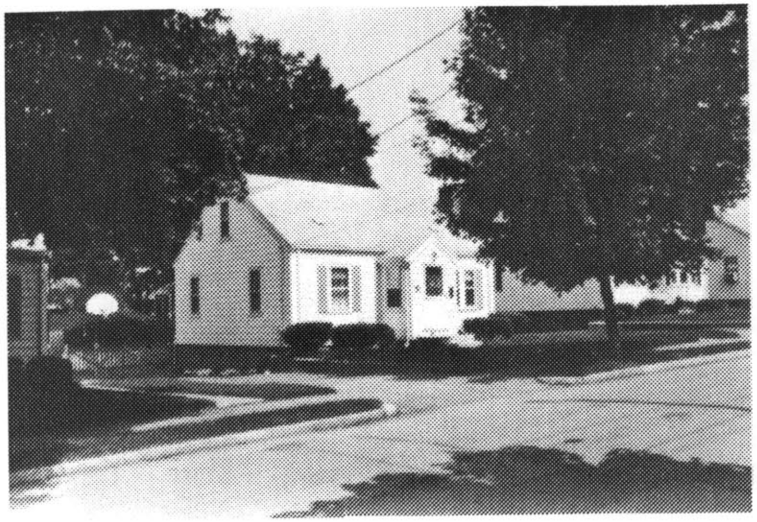


Figure 9

Figure 10

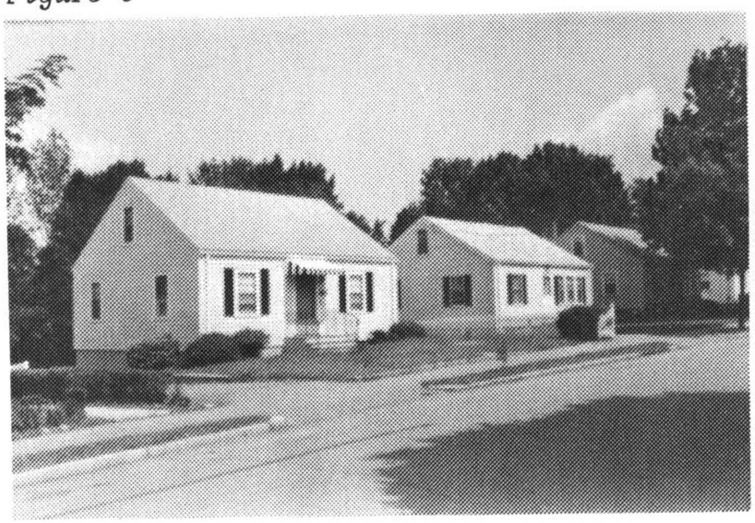
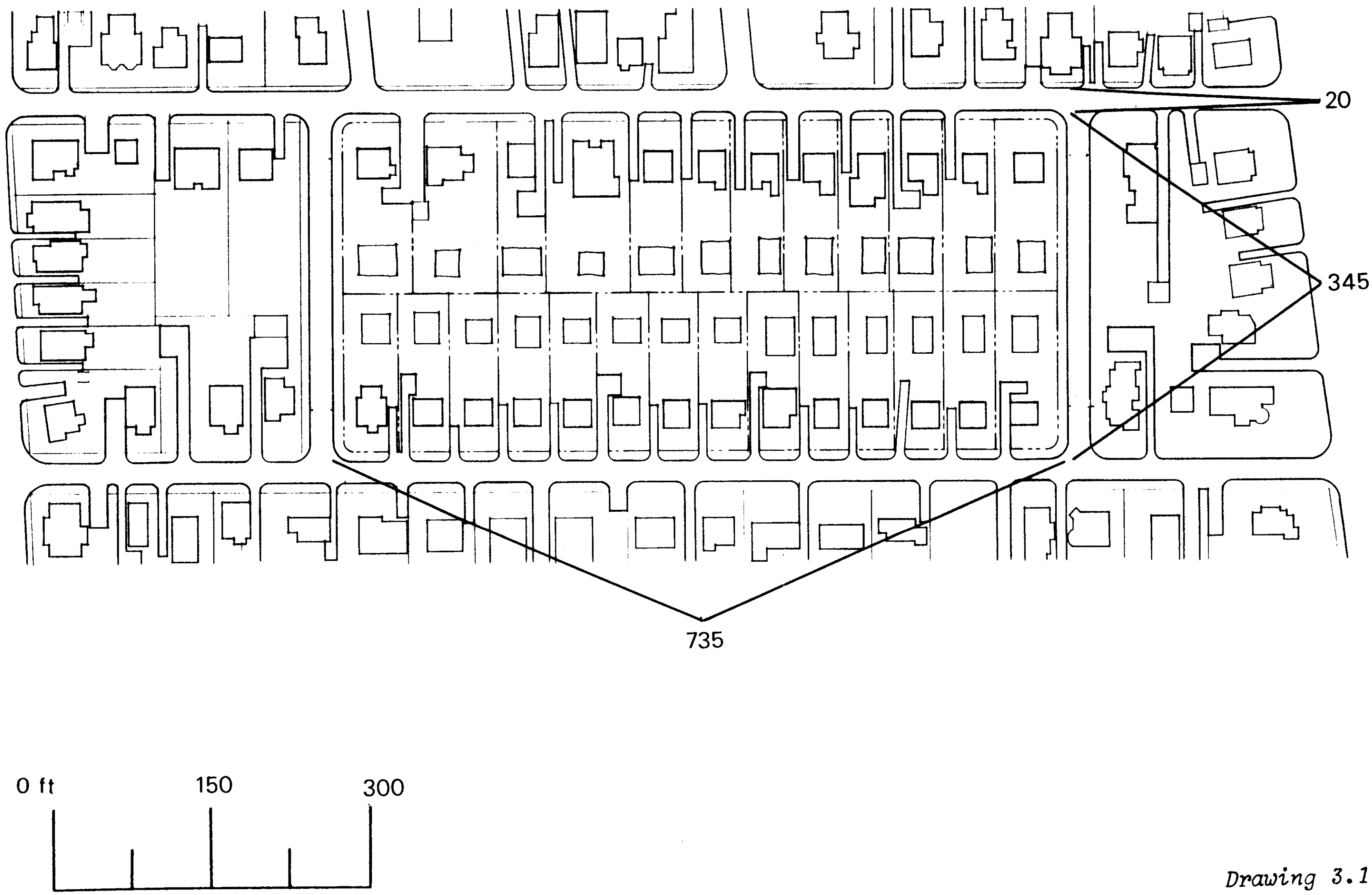
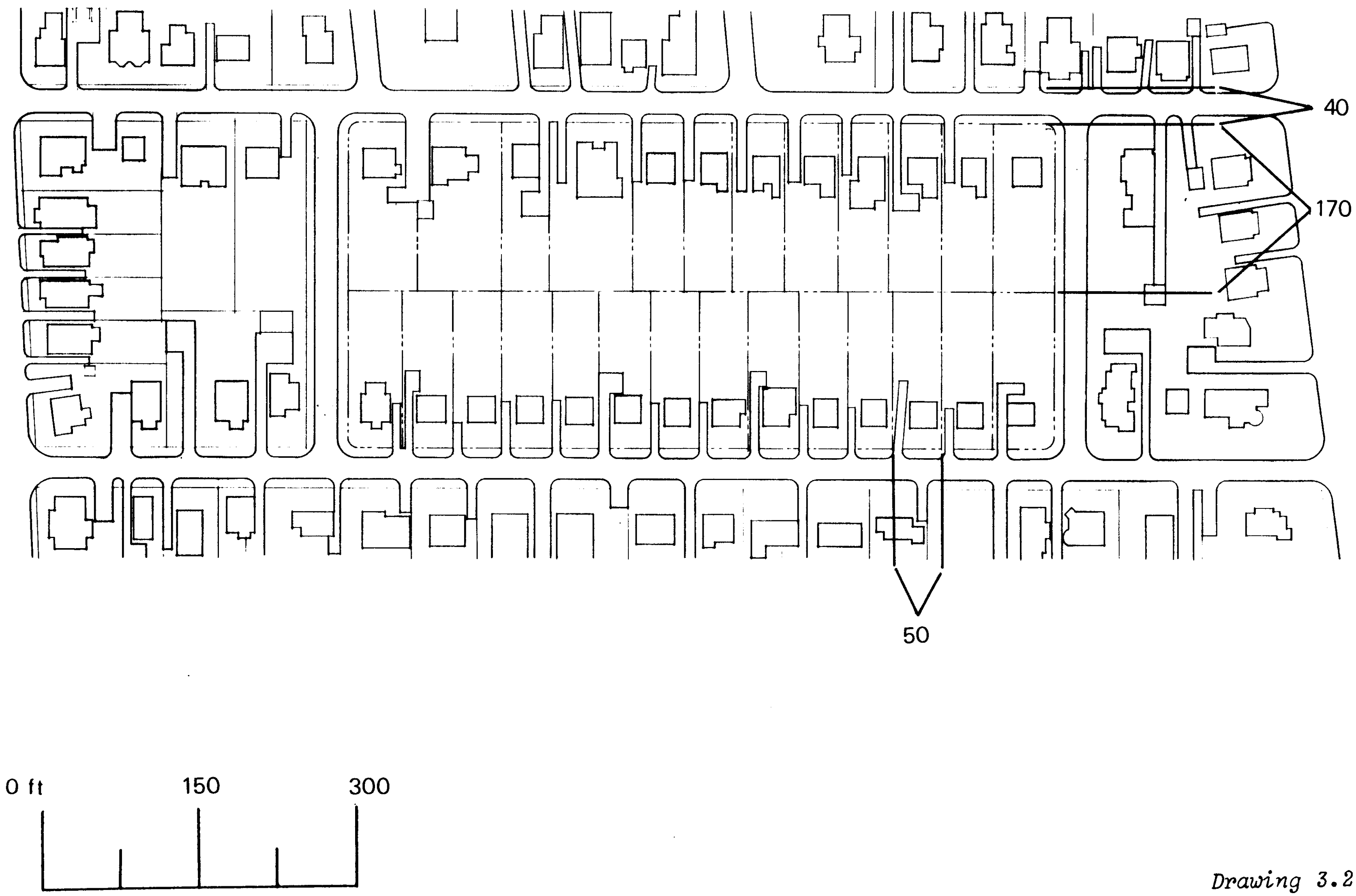


Figure 11

Figure 12



Drawing 3.1



Drawing 3.2

* footprint size in s.f.		coverage			lot size			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1		17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
site 2		8	10	7	20000	20000	20000	1600	1950	1350		35	30	40	60	35	28'	48'	1000'	415'	200'	100'		
site 3		10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		

Site descriptions, dimensional summary — *Chart 1*

Site Analysis:
Environmental Performance of
Existing Physical Context

Environmental Performance of Existing Context

The analysis is composed of the following:

- Visual cone analysis from the vantange points of directly in front of the houses or the public way; from the public way looking between houses; from the front windows of the houses across the public way; from the rear windows of the houses on the opposite side of the block
- Establishment of the 60° visual alleys from the public way
- Statistical summary charts follows. Refer to chart 2.

Discussion of existing visual cones analysis: (Refer to Chart 2)

Site one has larger increments of building closer together than sites two and three. The forward most row of houses has the greatest visual impact due to their length and proximity to the public way. The houses on the lots on the opposite side of the block contribute another 14% of buildings to the visual field. (when viewing the houses from the public way).

Although in sites two and three the front rows of existing houses contribute less to the visual field immediately in the foreground, the houses in the background contribute an additional 17% to the visual field.

Nomenclature for Statistical Summary (Chart 2):

F. The cone of vision from the public way, viewing the houses perpendicular to the public way

G. The cone of vision from the public way, viewing the space between houses perpendicular to the public way

H. The cone of vision from the houses on the opposite side of the public way, viewing the block in question perpendicular to the public way

I. The cone of vision, viewing from the rear windows of the house on the opposite lot

1. A break out of the contribution to the cone of vision of each successive plane of houses receding from the vantage point -- The top number represents the (%) contribution to the visual field of the forward most row of houses. Each

Even though the amount of open space is greater in site two than in site three, the two sites have similar percentages in column F. The sizes of the increments of built space to open space are proportionally similar in sites two and three.

When viewing between houses along the public way, the narrower spacing of the houses of site three vis-a-vis sites one and two, is noticeable in column G of the chart. Seventy-four percent of the visual field is occupied by houses in the foreground. The regularity of built and open increments within site three is apparent when comparing columns F and G.

Although the built increments are greater in sites one and two, so too are the open increments of space between houses, resulting in lower percentage of occupied foreground. Suprisingly, site two which appears to be more open than sites one or three registers the highest contribution (25%) of background houses to the visual field in column G. This is also the case in column H for site two.

Overall, one cannot consistently rank order the sites from column F through I to the degree of the visual field filled by houses. This depends on the vantage point.

number under this represents the percentage of the visual field filled when considering each successive, receding row of houses (within one block only).

2. The average percentage of the visual field filled by all successive rows of houses within one block--Even though the consideration of the farthest receding plane of houses may result in an effective filling (100%) of the visual field, the average will result in something less than 100%. This method reasons that the forward most row of houses takes priority in the visual field (if all houses in all receding planes are of similar mass and height), and that the effect of each receding row of houses is discounted to some extent.

a. When viewing the row of houses on the opposite lot across the back lot line, there is only one row of

<u>Discussion of the 60° visual alley from the public way:</u>

Drawing 1.7 illustrates the construction of the angle bisecting (or the average of) the 60° visual angle along the public way and the angle formed by the front corner of one house and the back corner of the adjacent house (a function of house spacing and house depth). This angle establishes the visual alley for that lot and vantage point. The more closely spaced and the deeper the house, the more the angle approaches the 60° visual limit.

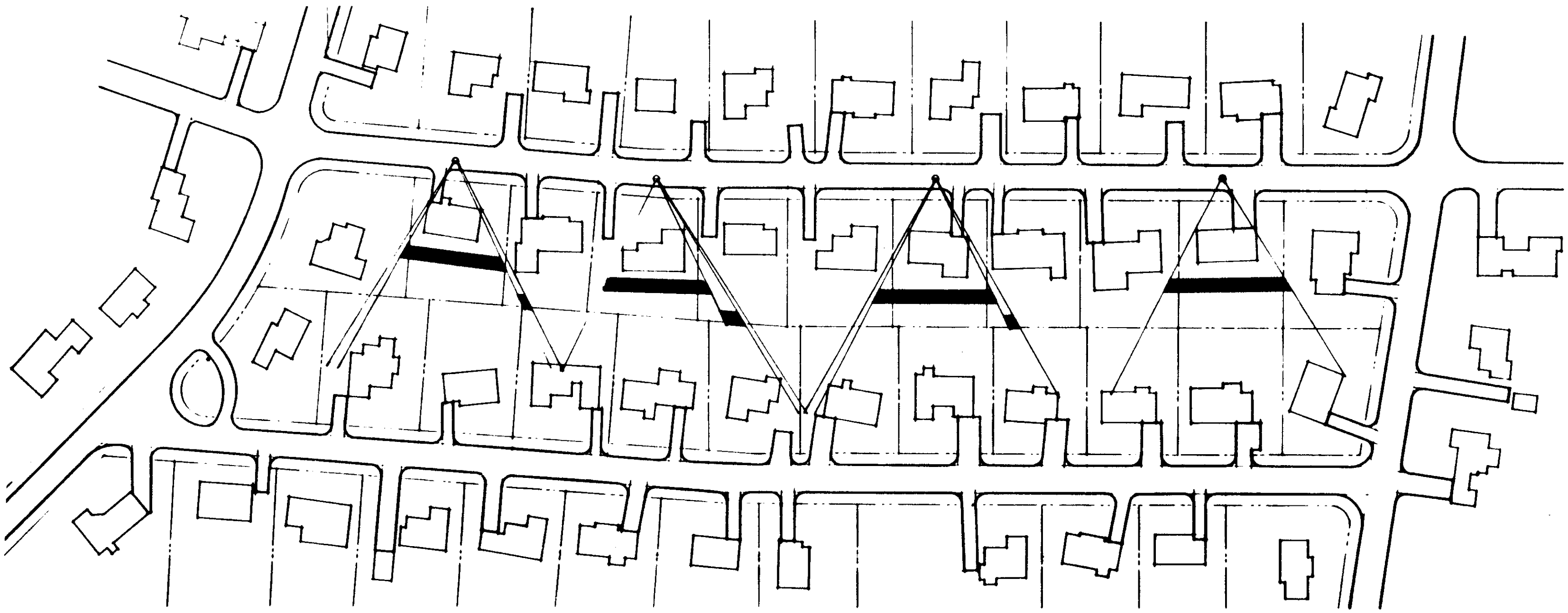
The intent in the use of the 60° visual alley is to replicate in new housing similar existing house spacing and depths while maintaining a view around new construction and existing houses. It is reasoned that such a viewing angle from the public way is more commonly occurring than a view which requires that one face the houses directly.

In sites two and three the visual alley is of a shallow enough angle in relation to the length of each lot that it spans two lot lines. The irregularity of house orientation and size in site one and the irregularity of house size in lot three are reflected in disjointed and inconsistent 60° visual alley patterns.

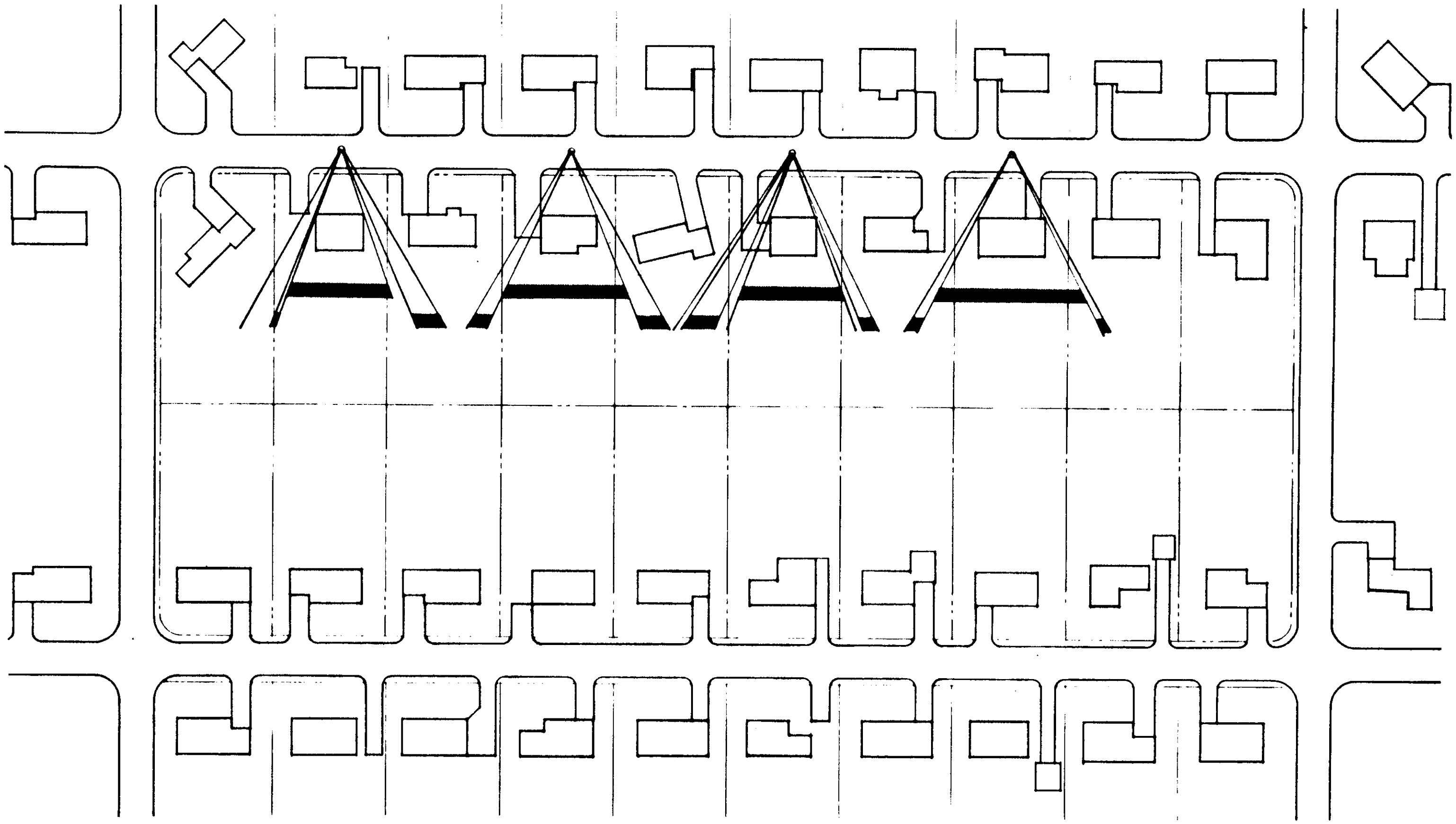
houses (in the existing context) to consider. Therefore, only one percentage is listed.

Site Analysis:
The Environmental Performance of the Existing Physical Context

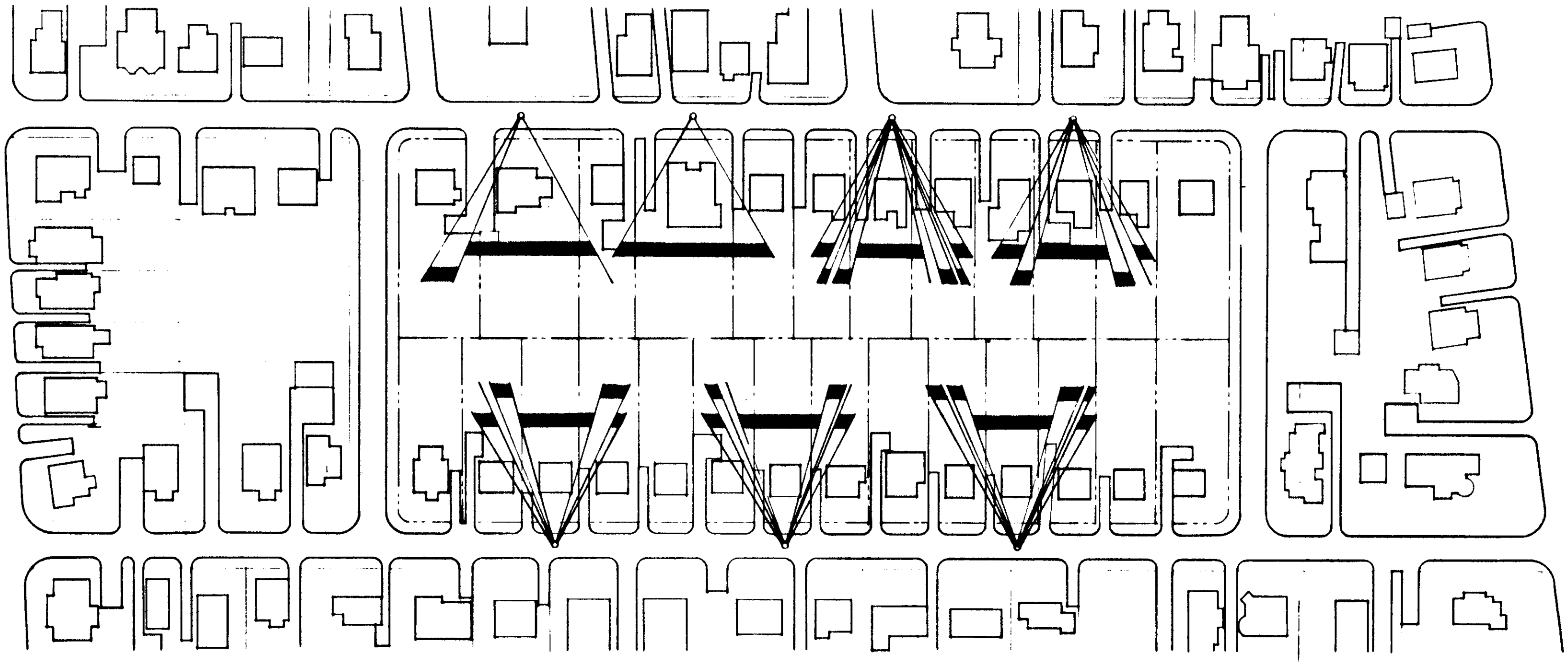
Cone of vision looking directly at houses from public way



Drawing 1.3



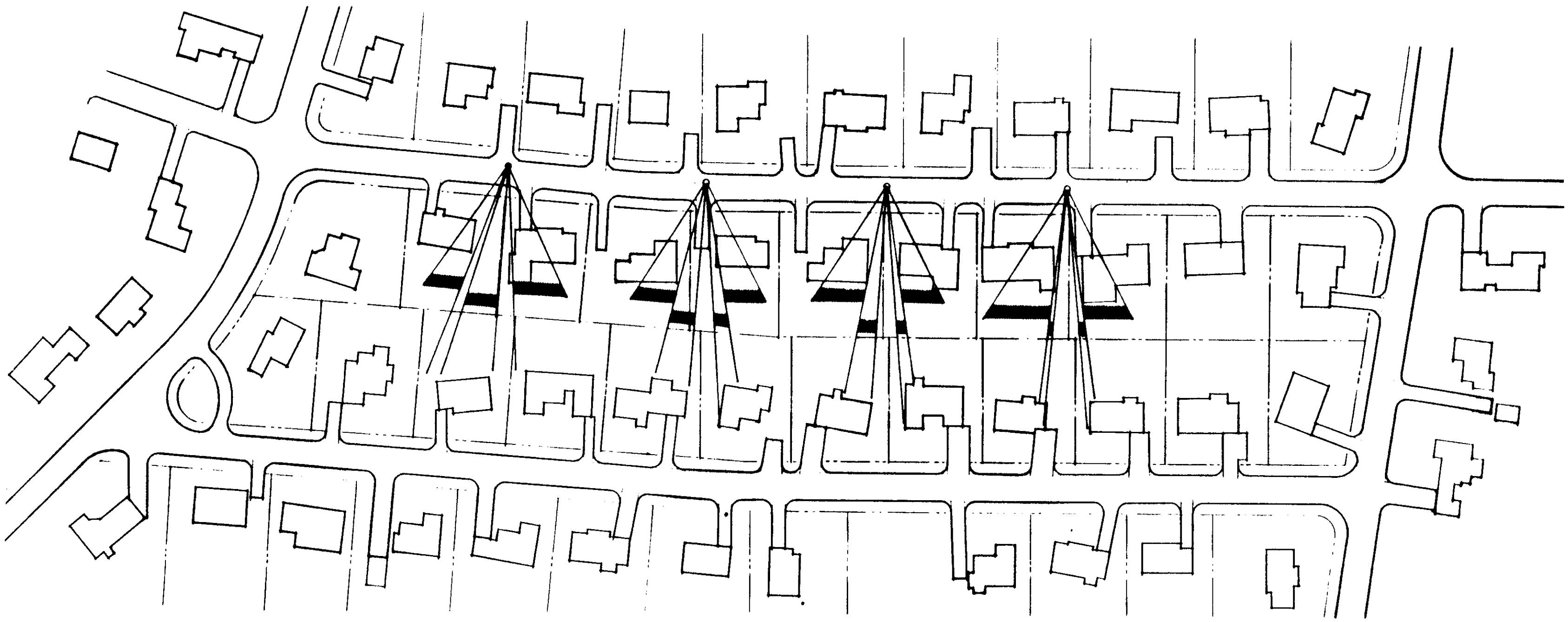
Drawing 2.3



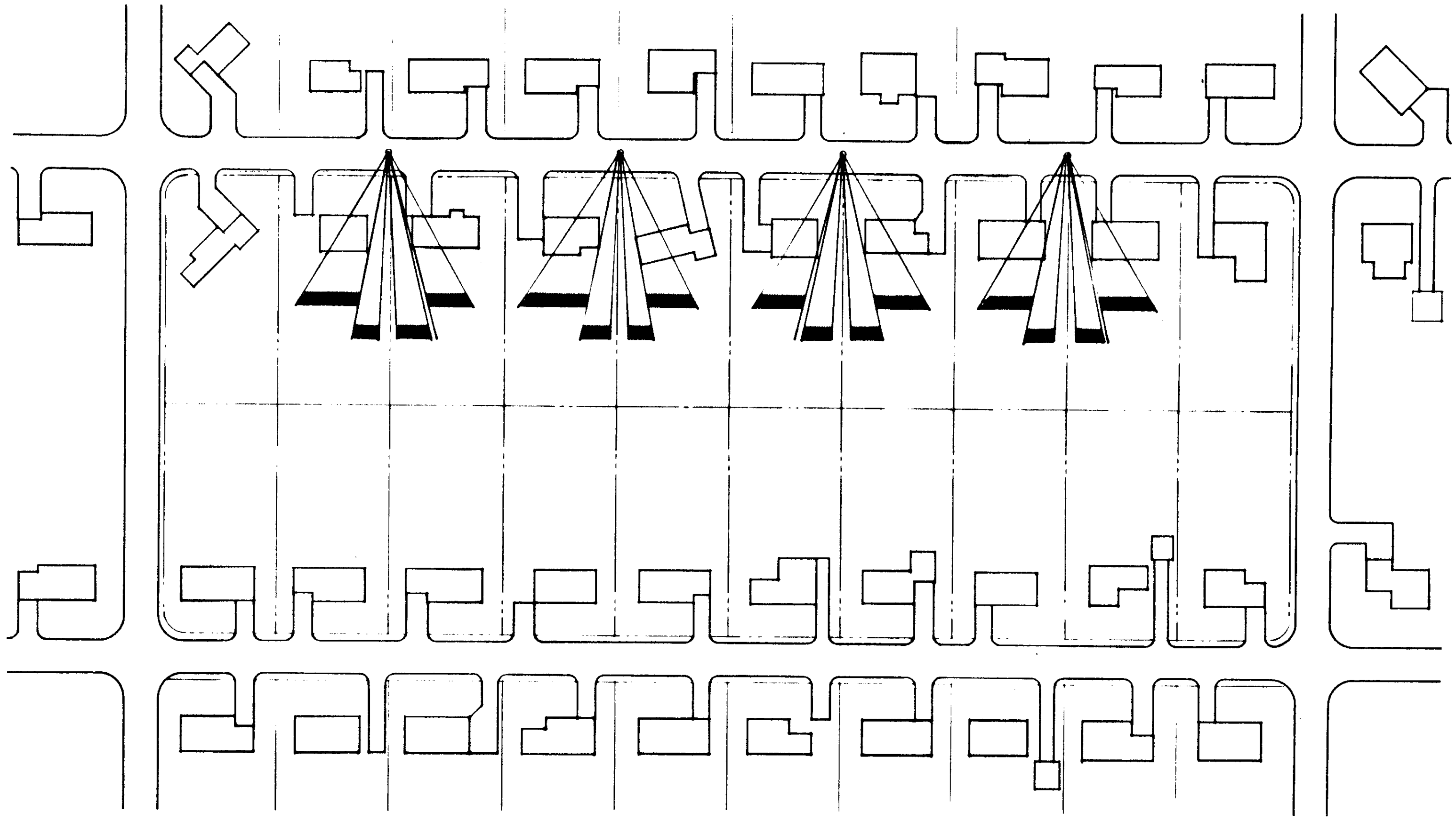
Drawing 3.3

Site Analysis:
Environmental Performance of Existing Physical Context

Cone of vision looking directly between houses from the public way



Drawing 1.4

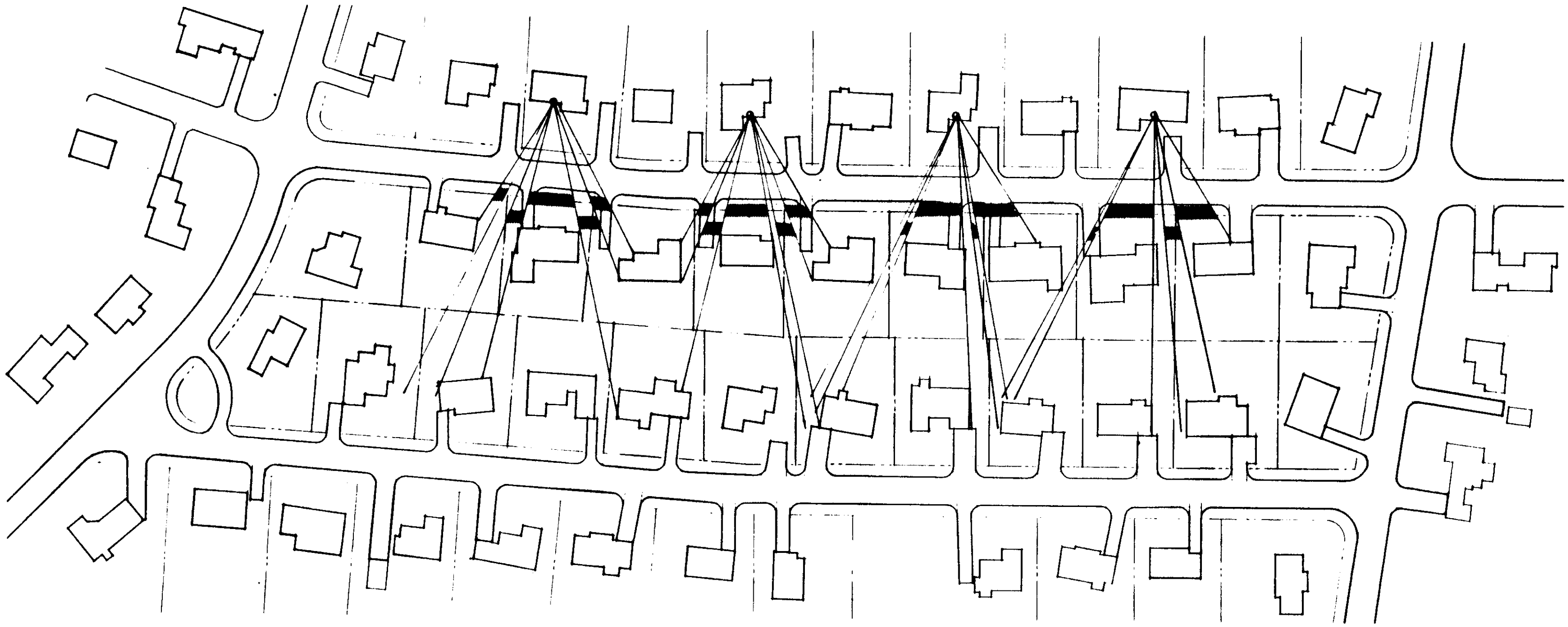


Drawing 2.4

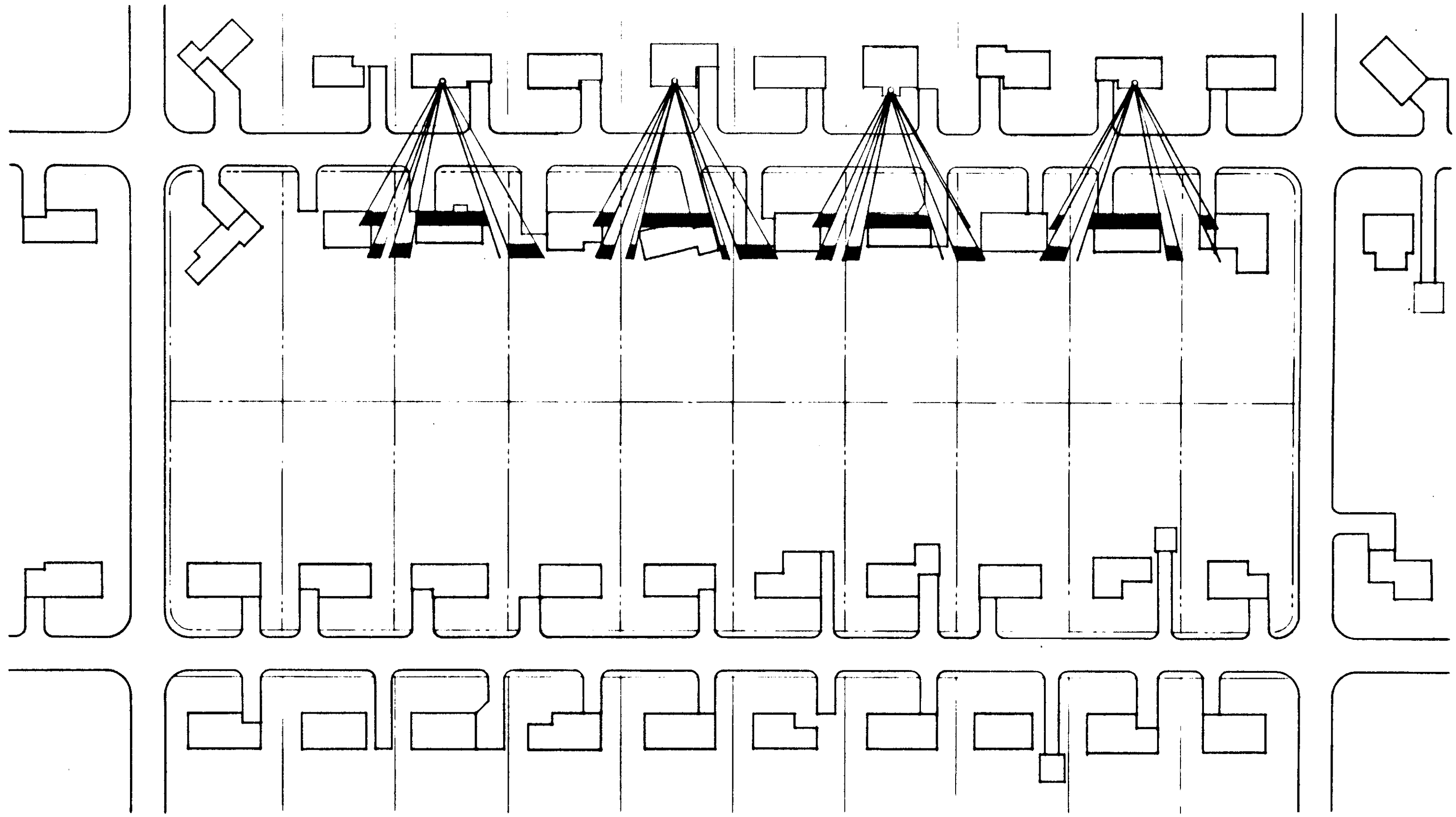
Drawing 3.4

Site Analysis:
Environmental Performance of
Existing Physical Context

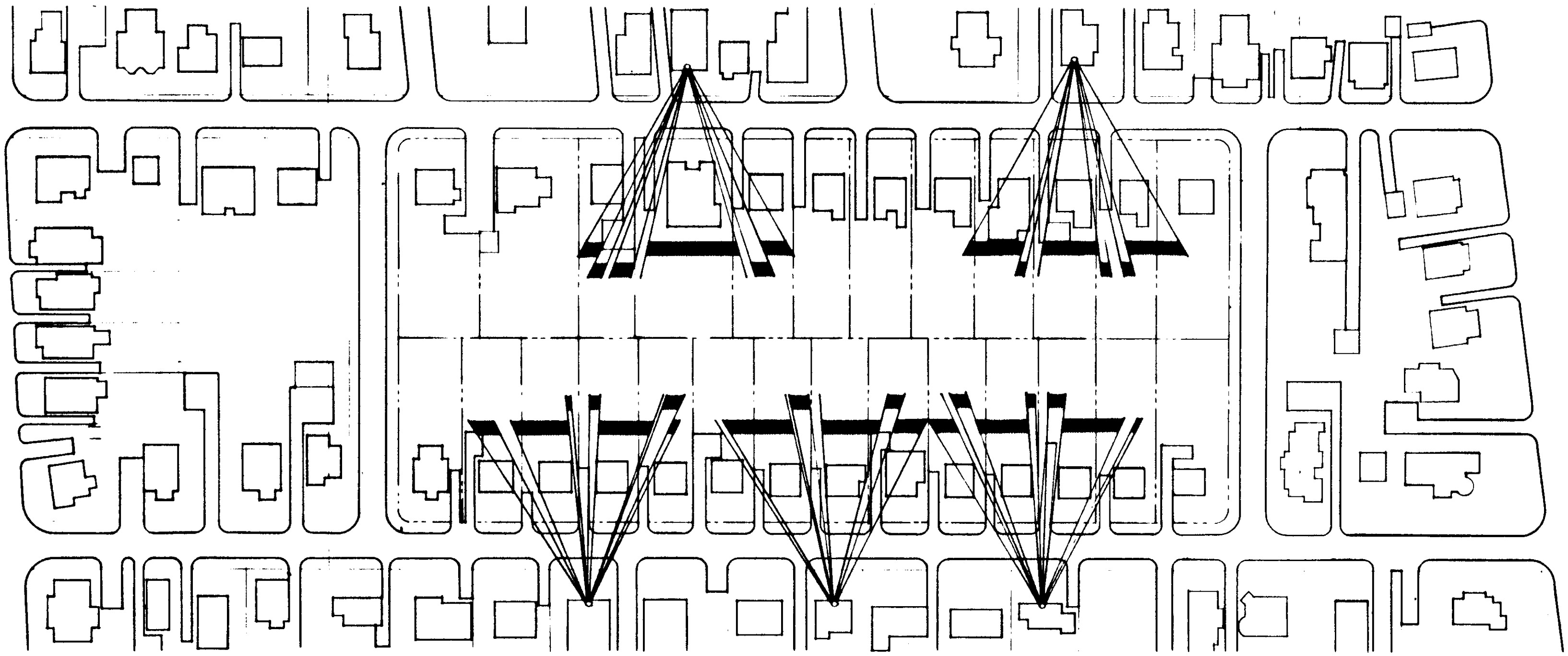
Cone of vision from houses
across public way



Drawing 1.5



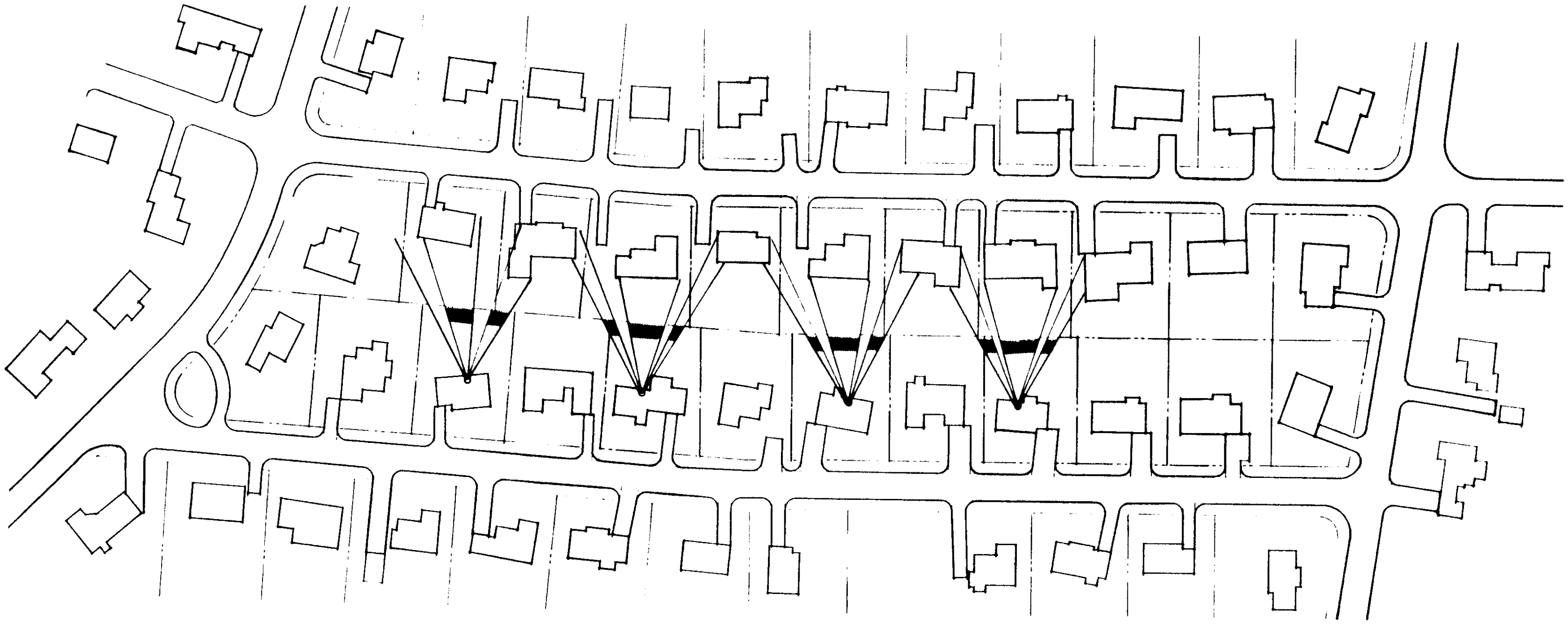
Drawing 2.5



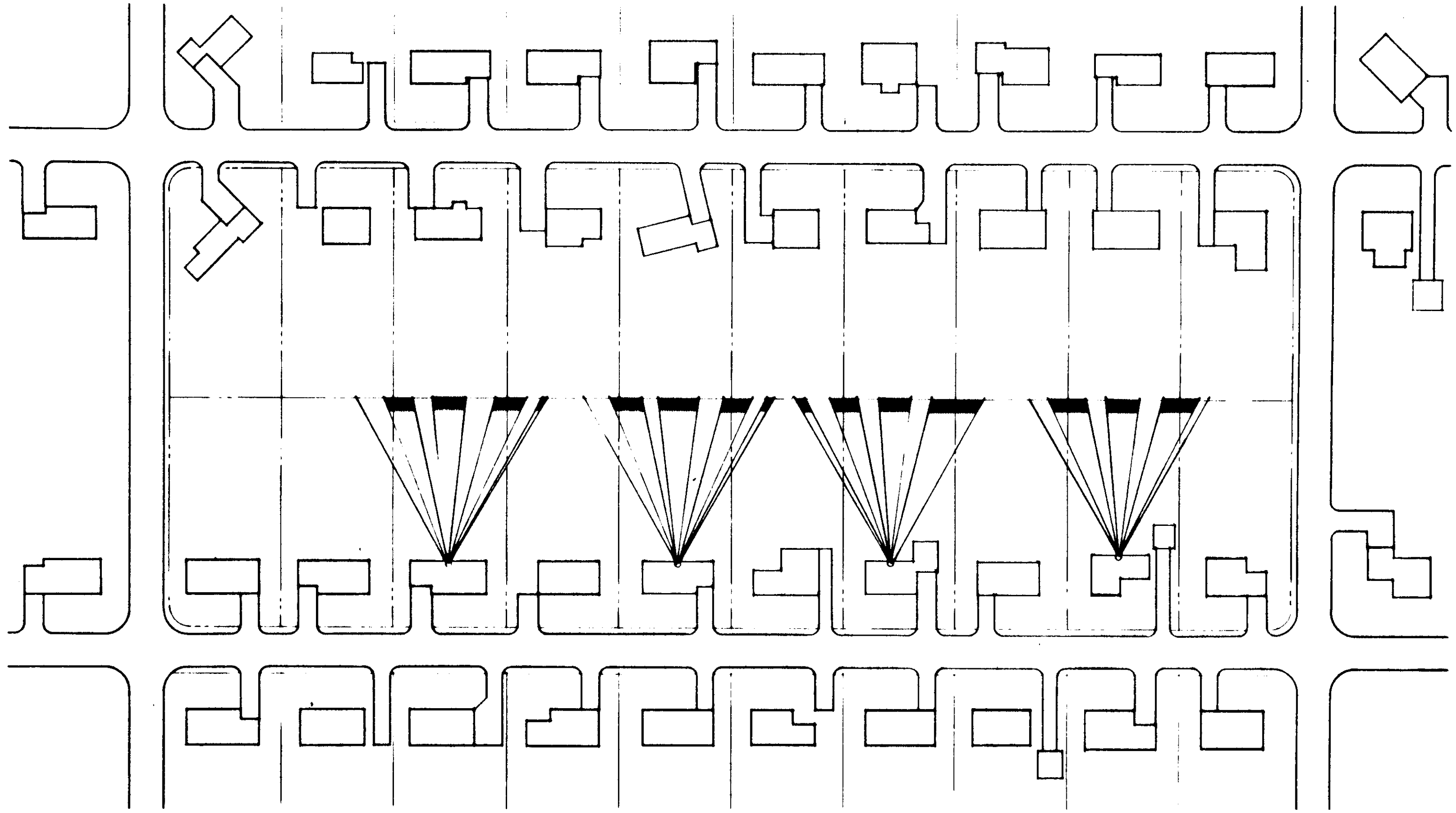
Drawing 3.5

Site Analysis:
The Environmental Performance of the Existing Physical Context

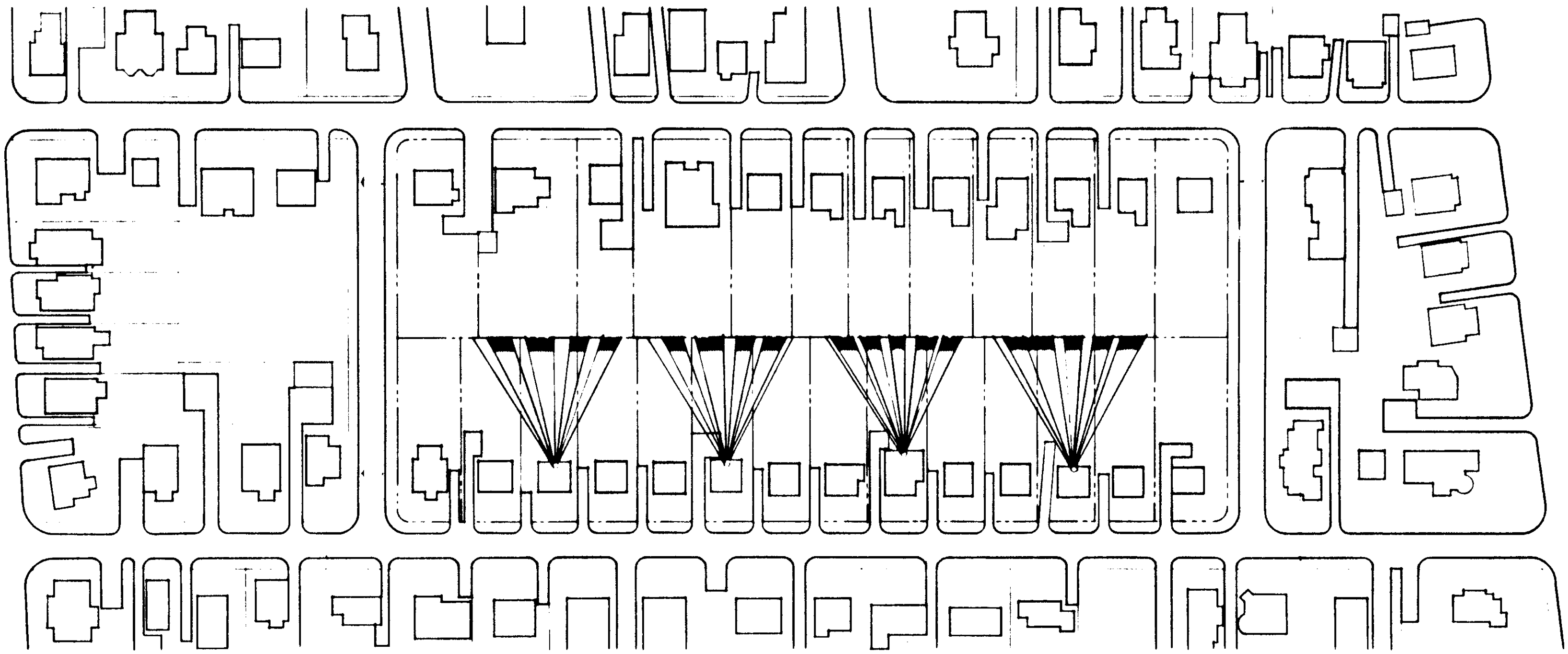
Cone of vision from rear windows of house on opposite lot



Drawing 1.6



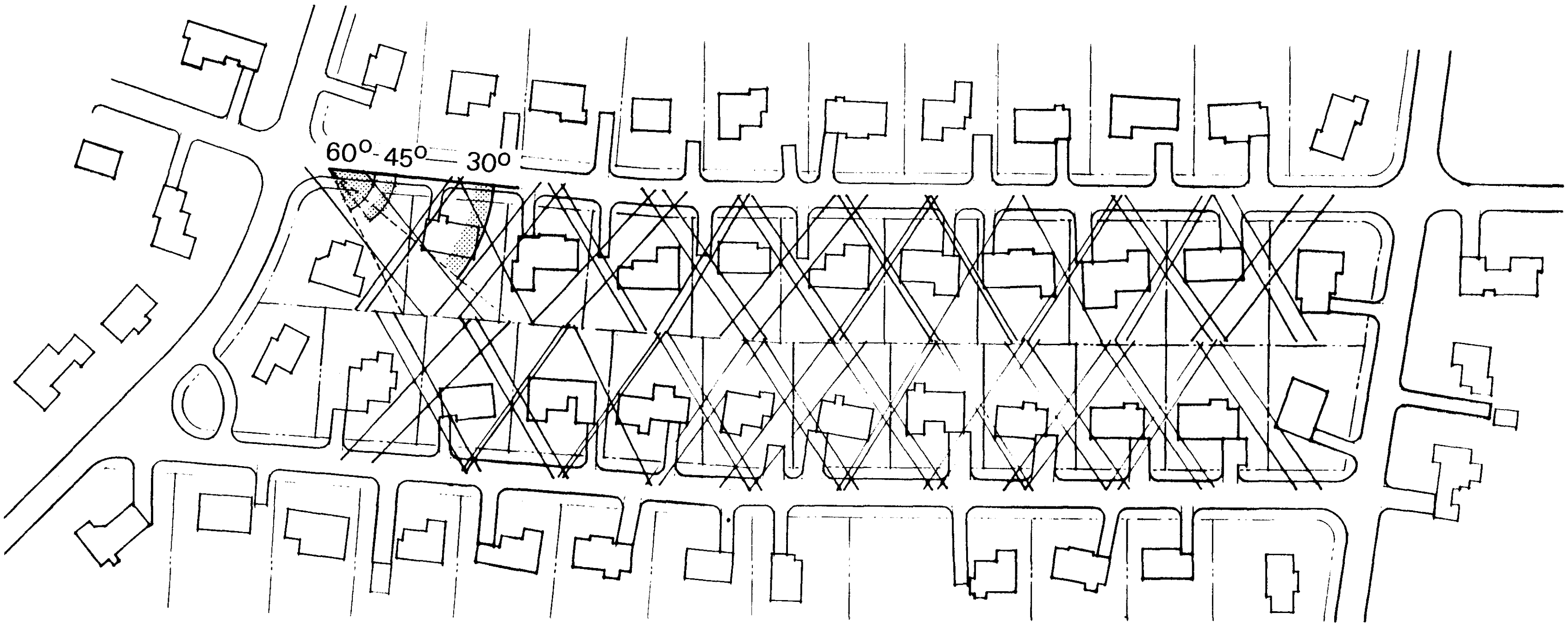
Drawing 2.6



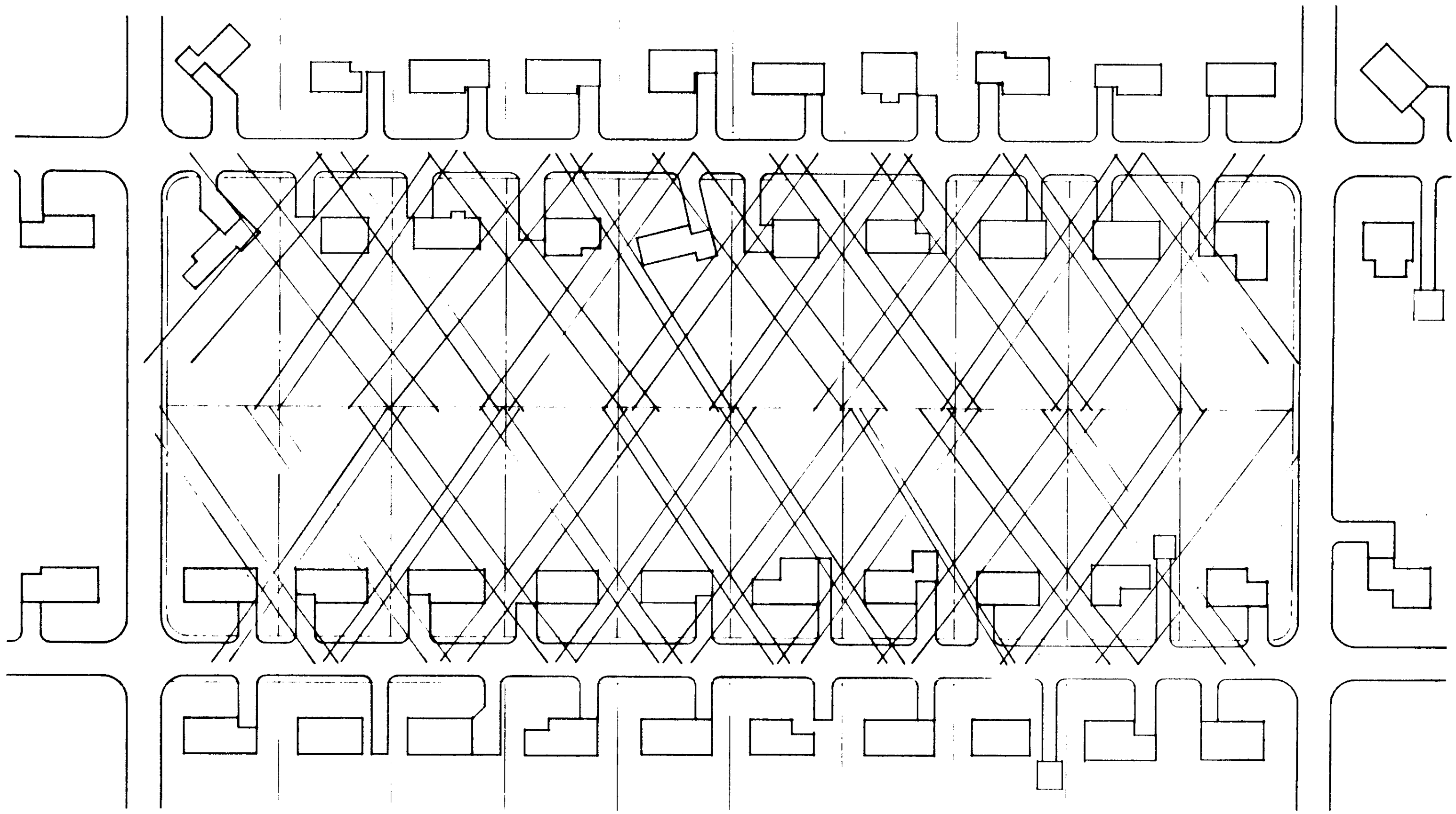
Drawing 3.6

Site Analysis:
Environmental Performance of
Existing Physical Context

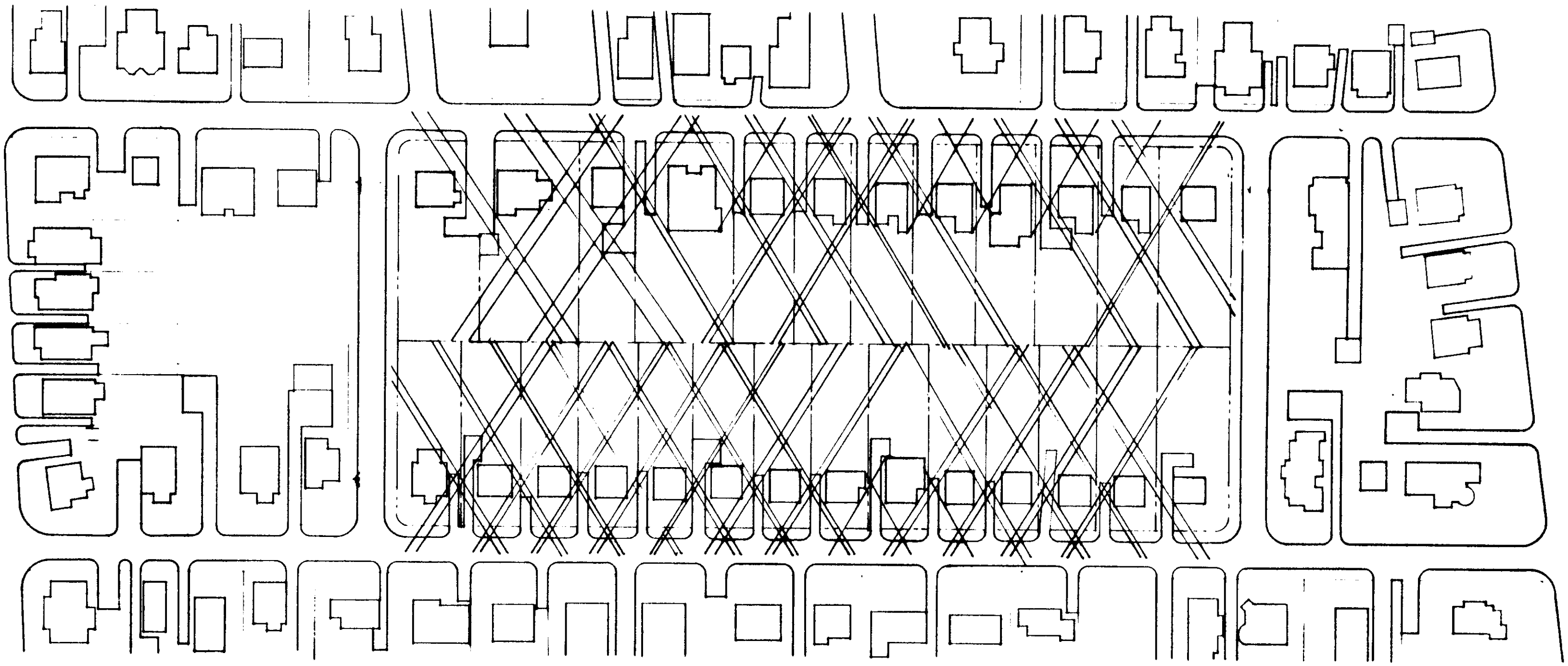
60° visual alley



Drawing 1.7



Drawing 2.7



Drawing 3.7

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1	existing																85 99	92	68 84	78	67 89	78	71[a]	71[a]
	new																							
site 2	existing																72 89	80	60 85	72	61 88	74	58[a]	58[a]
	new																							
site 3	existing																74 91	82	74 91	82	69 84	76	62[a]	62[a]
	new																							

Chart 2

Note:
In each of the following consolidation schemes the plans of the actual physical changes are overlayed on top of and also separated from the base site plan to more clearly isolate and illustrate the particular changes.

Consolidation Scheme Analysis

Parking Alternatives

1. Continuous parallel parking around the block perimeter:
   (Refer to drawings la.1, 2a.1 3a.1).

One of the more obvious and apparently simple methods of accomodating additional parking, requiring little or no overt public or private expense, is to maximize the parking capacity of the existing pavement through continuous, parallel parking. Parking must only be kept to one side of the street to provide a travel lane and to accomodate street repair and maintenance.

Statistical Summary

Site One:

- Seventy-five parking places are created.
- Eight parking places are reserved for existing households
- Sixty-seven parking places remain for acccessory units and/or rear lot houses
- There are 45 lots fronting the public ways within the block in question and within the flanking blocks -- all are potential candidates for accessory units
- Therefore, twenty-two parking spots remain.
- Forty-four parking places would remain, however, if only those houses within the block in question were to develop accessory units

Site Two:

- Sixty-three parking spaces are created.
- Six are reserved for existing households
- Fifty-seven parking spaces remain for accessory apartments or/and rear lot houses
- Forty lots front the public ways -- all are potential candidates for accessory apartments
- Therefore, seventeen parking places remain if these 40 accessory units were to park on the street
- If only the 20 lots within the block in question developed accessory units, 37 parking spaces would remain

Site Three:

- Thirty-three parking spaces are created.
- Six spaces are reserved for existing households
- Twenty-seven remain for accessory units and/or rear lot houses.
- There are 47 lots fronting on the public way within the area in question, yet only seven lots within the block in question are large enough to accept accessory units (lots a, b, d, i, j, m, u)

- Twenty-one houses on surrounding lots could be converted to accessory units
- A total of 28 parking spaces are required for accessory units - one short

Environmental Consequences:

- There is a major visual impact and radical visual change from the public way
- No screening of parking is possible along the public way
- There is a major visual affront from the vantage point of the fronting households, although some screening is possible and does exist in the form of hedges and fences
- Cars are no longer identifiable as necessarily belonging to the household whose house in front of which they are parked

Developmental Concerns:

- Parking capacity is limited by the frequency of curb cuts. Curb cut frequency ironically increases as the physical (and household) density increases and the need for more parking on the street becomes more immediate.

- Little or no public or private intervention is necessary. No disproportionate costs or benefits accrue to anyone household other than the indirect effect of the length of frontage of each lot
- There is a public cost of one way, one lane travel
- No additional paving needs to be added or subtracted.
- There are few physical controls to determine who parks where, and some lots may have to contend with a disproportionate number of cars parked on their frontage.

  If that household chooses not to consolidate and its neighbors do, such a situation would be less than desireable.
- Such a concern points up a benefit of parking on the lot, although in most cases this would result in additional paving expense.

The Nature and Extent of Shared/Public Space and Private Space:

- The less the front setback of the house the greater the privacy intrusion on that household and the greater the need for fences or hedges that would disrupt the inherent visual openness of all sites.

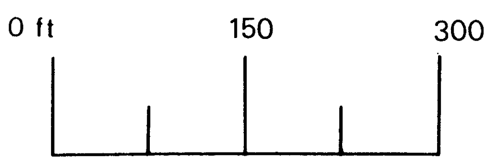
- Street parking removes the cars as a possible space consumer of front yard activity areas.
- Areas to be shared by neighbors would not be necessary, although an informal agreement between neighbors may be needed as to who parks where.

Infrastructure:

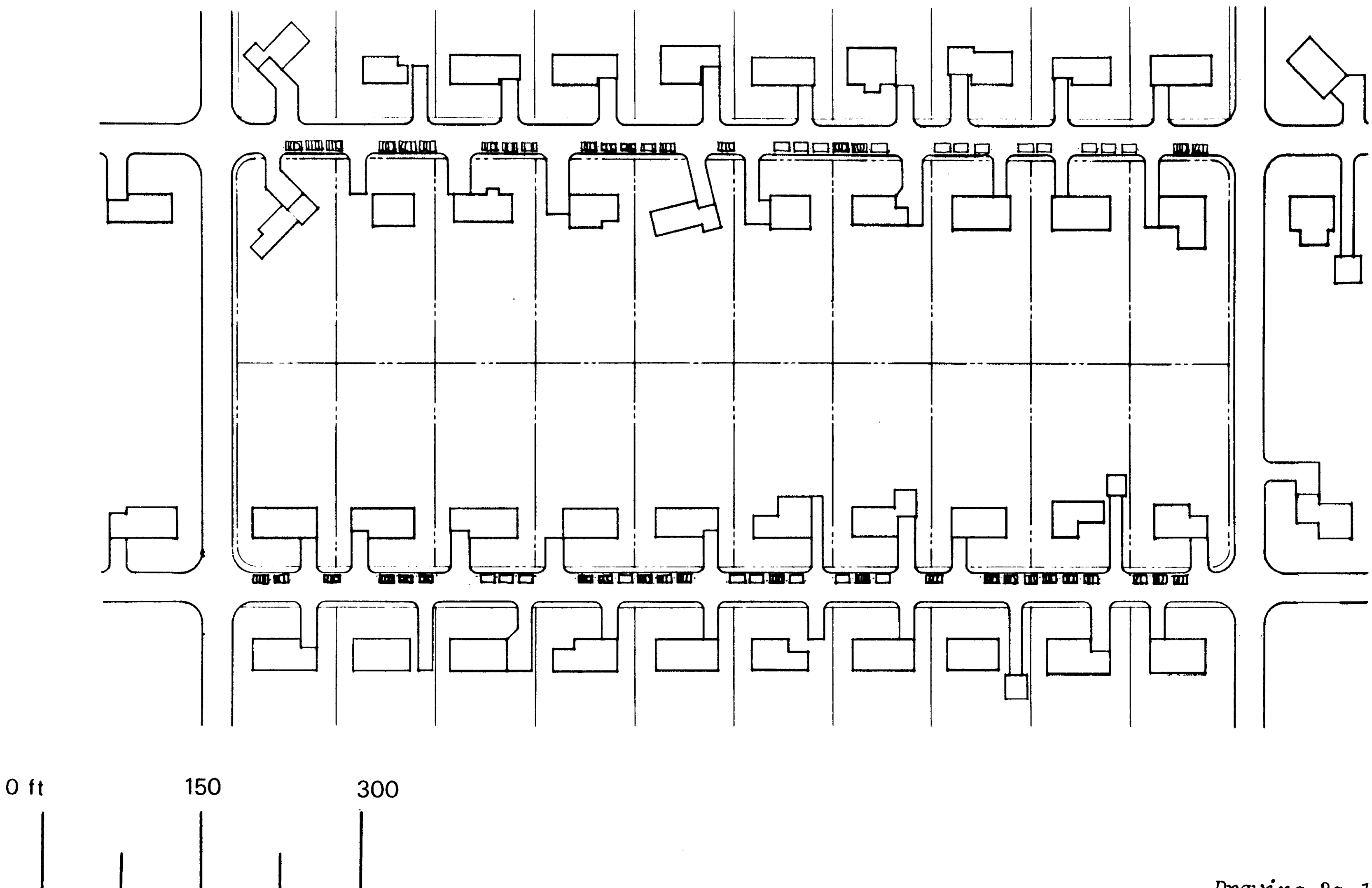
- None is required. Although if each site were developed to capacity, resulting in increased localized traffic, parking, pavement, curb, and, boulevard deterioration may occur more rapidly.
- Curbing may be required in those areas without it.

Site Comparisons, Trade Offs:

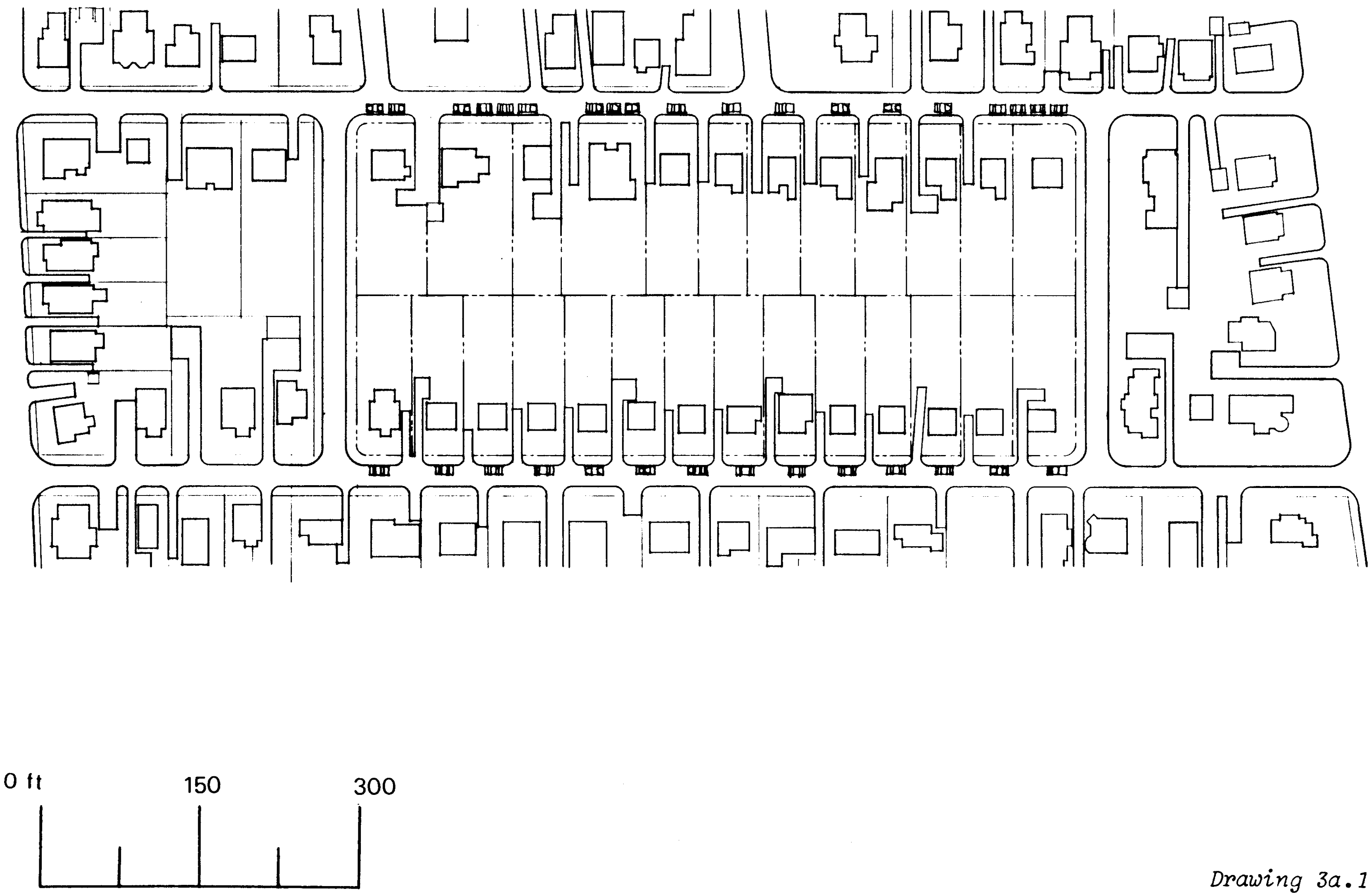
Both sites one and two have a greater parking capacity than is required for maximum development of accessory units. The parking capacity of site three is already overtaxed, although the small frontages mitigate the visual impact of several cars parked in a continuous row. Because the frontages allow for the parking of only one car in front of each household (site 3), the car is more identifiable with the household and house in front of which it is parked. With this less degree of anonymity it may perhaps be more controllable as to who parks where.



Drawing 1a.1



Drawing 2a.1



Drawing 3a.1

2. Parking within the city owned boulevard strip
   (Refer to drawings 1a.2, 2a.2, 3a.2).

These schemes illustrate the carrying to an extreme the option of increasing the amount of pavement within the public way. In most cases such an option would require an intrusion into an area which has very much become part of the front yard of many households.

Statistical Summary:

Site One:

- 132 parking places are created.
- This is three times the number of parking spaces required for every accessory unit (45).
- If new rear lot houses with accessory units (within the block in question) were considered in addition to accessory units within the existing houses, 91 parking spaces would be required.
- An excess capacity of 41 parking spaces exists.

Site Two:

- 115 parking spaces are created.
- 111 remain if 4 are reserved for existing households.

- A total of 80 spaces would be required if new rear lot houses with accessory units were considered in addition to the accessory units within the existing houses (if all new households parked on the street).
- This would create an excess capacity of 31 parking spaces.

Site Three:

- Seventy-seven parking spaces are created.
- If 5 were required for existing households, 72 would remain.
- Fifty-two parking spaces would be required if new rear lot houses with accessory units were considered in addition to the accessory units within the existing houses.
- There would still be an excess capacity of 20 parking spaces.

Environmental Consequences:

- The effect would be a visibly wider street, although the parked cars would not be as much in the center of vision when looking down the public way as in the previous option.
- Little or no screening of the cars along the public way would be possible.

- There would be less vegetation visible along the public way now that both sides of the public way are parked on and that the boulevard strips are removed.
- The visual affront from the vantage point of the households would be even greater than in the previous option. Two rows of vehicles would be in view.
- The boulevard strips, which are effectively sections of front lawn area, would be removed.
- With an excess capacity of parking space, it is more likely that households can park directly in front of their lots and gain some status from their automobile being identified with their lot.

<u>Developmental Concerns</u>:

- Parking capacity is again limited by the frequency of curb cuts.
- Although the boulevard strip is owned by the city, such a parking option would require cooperation from each property owner in that the front lawn of each would be reduced. Such an option would be developed with less ease than option one.
- There would be no disproportionate costs or benefits accruing to any one household other than the effect that

lot frontage would have. Households may be assessed for such alteration on the basis of lot frontage.

- The removal of sidewalks would be required. New sidewalks could not be built unless there was an infringement directly on individual properties.
- Two way travel could be maintained on the public way.
- Excess parking capacity would result in sites one and two.
- Driveway aprons and curb cuts would have to be rebuilt.
- There are few physical controls as to who can park where. Some lots may have to contend with a disproportionate number of cars parked on their street frontage. If such households choose not to consolidate and neighboring households do, such a situation would be less than desireable.
- Such a concern points up a benefit of parking on the lot in which additional paving would also be required although it would be a private expense and privately initiated.
- Such an option could probably not occur unless the majority of the households in the block agreed to it (hence would derive some financial benefit through the development of accessory apartments and/or rear lot houses.)

- It would be relatively difficult to effect such a change compared to each individual household creating its own parking apron on its lot.

The Nature and Extent of Shared/Public Space and Private Space:

- With less of a buffer between parking and houses, privacy intrusion would be a concern. With no boulevard strip to act as a physical buffer, some physical deterioration of front lawns, shrubs, etc. may occur.

- There would be no reason for the development of shared spaces with such an option. With excess parking capacity, informal agreements between neighbors as to who parks where would not be necessary.

Infrastructure:

- Because all infrastructural changes would occur within the public right of way, it would be of a higher (Grade A) quality than a private development:

Pavement:

Site one - 49,000 s.f., 371 s.f./car
Site two - 39,200 s.f., 340 s.f./car
Site three - 28,600 s.f., 371 s.f./car

Curb and gutter:

Site one - 4250 l.f., 32 l.f./car

Site two - 3320 l.f., 29 l.f./car

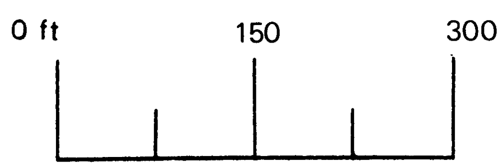
Site three - 2460 l.f., 32 l.f./car

Driveway aprons:

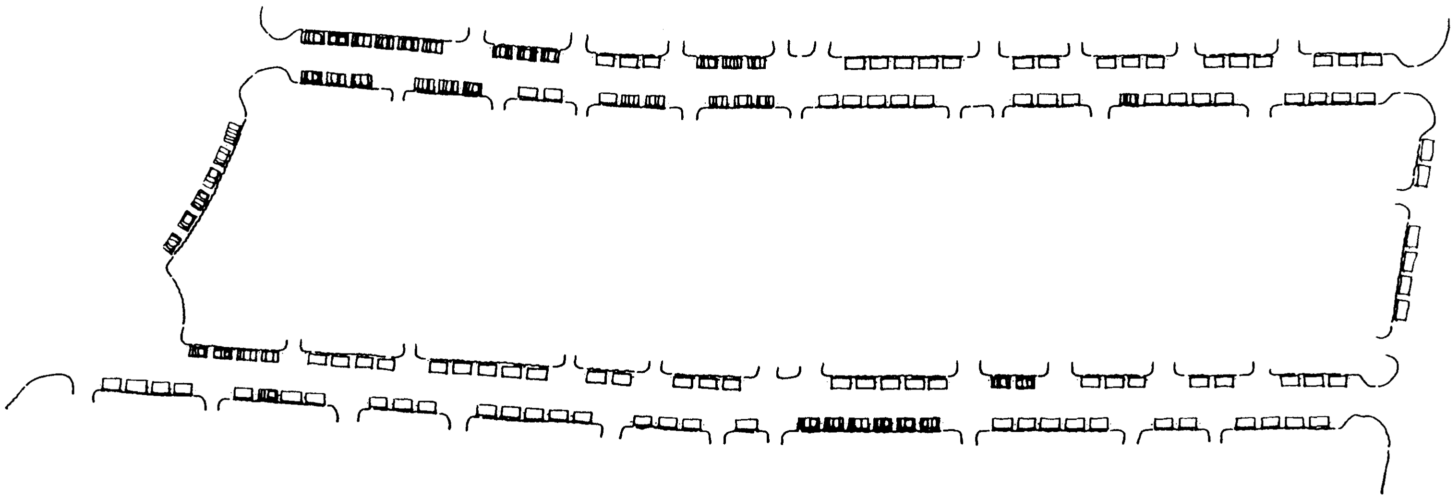
Site one - 42	.32/car
Site two - 40	.34/car
Site three - 40	.6/car

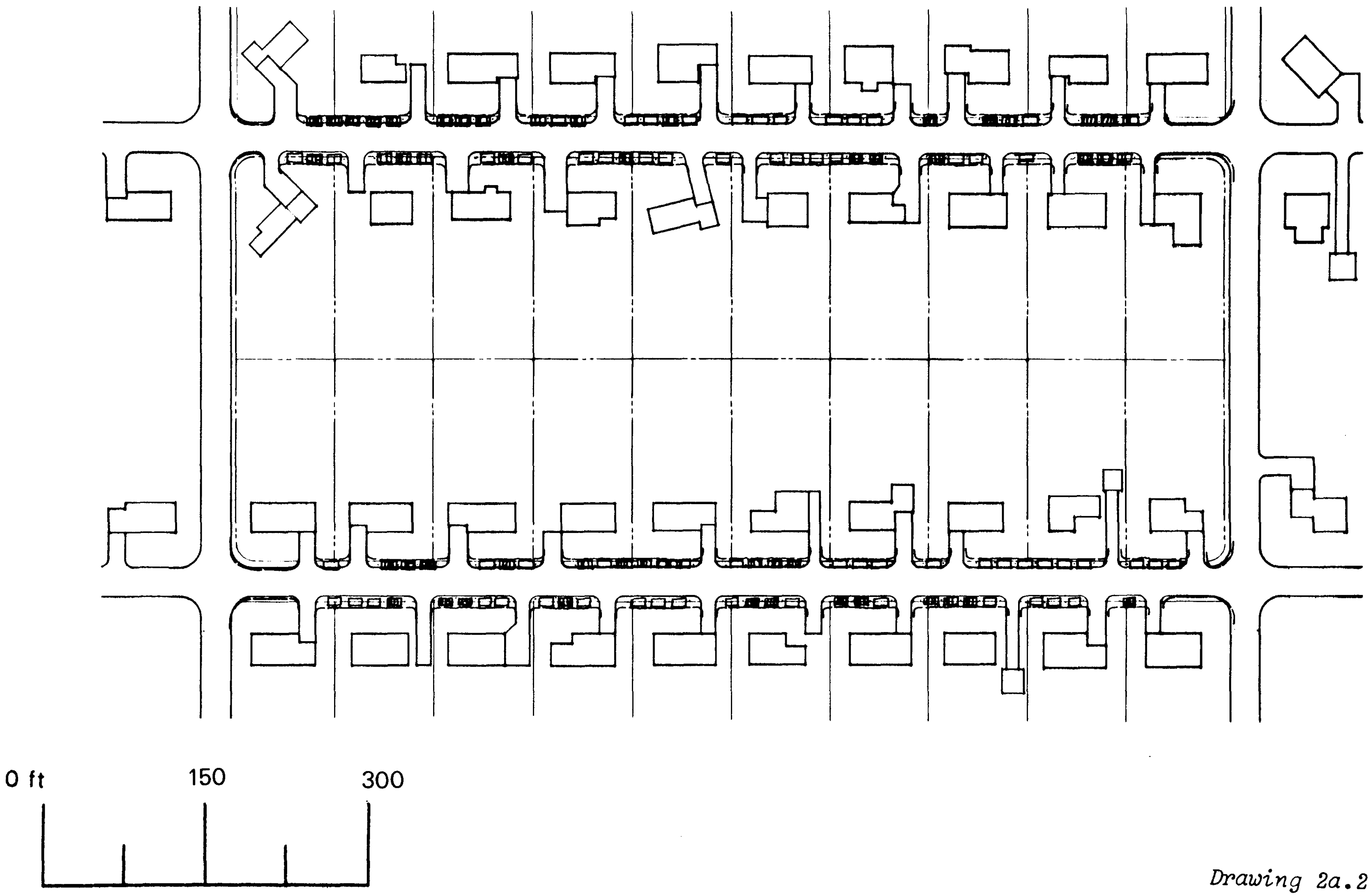
Site Comparisons, Trade Offs

Again sites one and two have a greater parking capacity than required for the development of both accessory units and rear lot houses. Greater front setbacks in site two would help to mitigate privacy infringements within the boulevard strip.

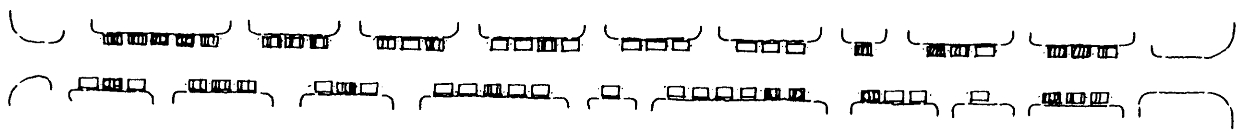


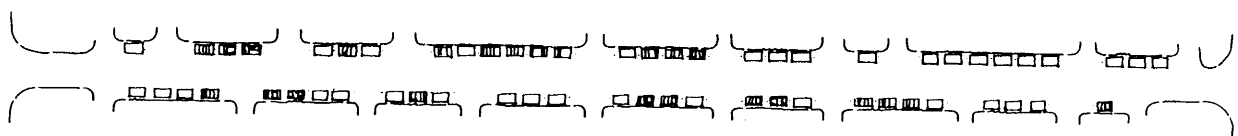
Drawing 1a.2

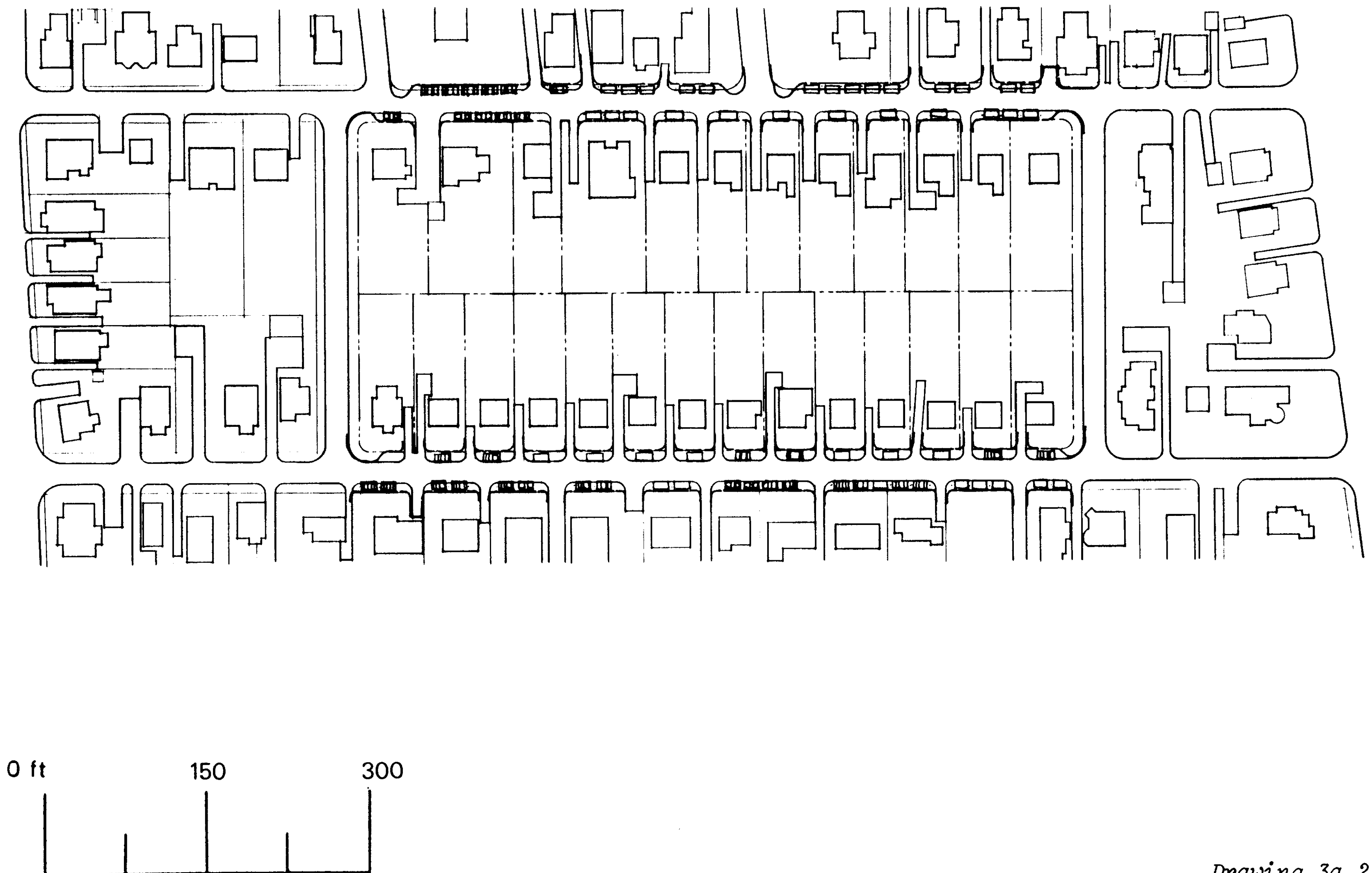




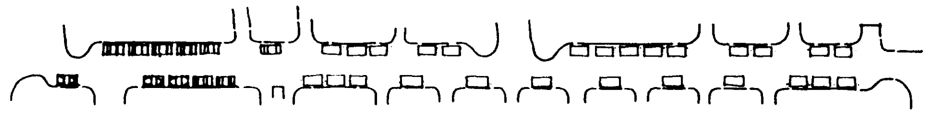
Drawing 2a.2

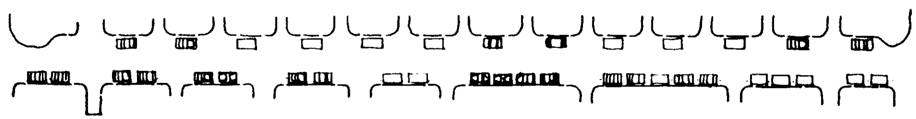






Drawing 3a.2





3. Parking between curb cut extensions, staggered from one side of the public way to the other (refer to drawings 1a.3, 1a.4, 2a.3, 3a.3, 3a.4).

The intent with these schemes is to arrive at a parking capacity similar to that in option one yet mitigate the visual infringement of a continuous row of parked vehicles. Such an effect is achieved by staggering the parking and building out curb returns as in drawings 1a.3, 2a.3, and 3a.4 to screen the parking strips. an alternative would be the extension of the boulevard strips farther out into the public way as in drawings 1a.3, 2a.3, 3a.3.

Because the width of the public way pavement remains the same, the travel lanes would become one way alternating from one side of the public way to the other. A certain amount of frontage is lost when making this lane transition and to the curb returns and built out boulevard strips.

Statistical Summary:

Site one, drawing #3

- Forty-nine parking spots are created.
- Eight parking spaces are reserved for existing households.
- Forty-one parking spots are left for accessory units and/or rear lot houses.

- There are 45 potential accessory units -- four too few parking spaces.

Site one, drawing #4:

- Fifty-four parking spots are created.
- Eight parking spaces are reserved for existing households.
- Forty-six spaces for accessory units and/or rear lot houses remain.
- This leaves 1 space more than required for accessory unit development of the existing houses, fronting on the public way.

Site two, drawing #3:

- Forty-two parking spaces are created.
- Six are reserved for existing households.
- Thirty-six remain for accessory units and/or rear lot houses.
- There are forty potential accessory units -- 4 too few parking spaces.

Site three, drawing #3:

- Thirty-one parking places are created.

- Six spaces are reserved for existing households.
- Twenty-five remain for accessory units and/or rear lot houses.
- There are twenty potential accessory units -- 3 parking spaces short.

Site three, drawing #4:

- Twenty-eight parking places are created.
- Six spaces are reserved for existing households.
- Twenty-two remain for accessory units and/or rear lot houses.
- There are twenty potential accessory units -- 6 spaces short.

Environmental Consequences:

- Because parking would only occur within certain, physically defined areas, parking could be more controllable. The visual impact could be orchestrated.
- The curb returns and/or built out boulevard strips provide an amenity in return for increasing the intensity of use of the public way.
- For those without parking on their frontage, the physical

image is unchanged. There is a visual affront however for those with parking within their lot frontage.

- o The curb returns and the visually throttled right of way may help to discourage through traffic however.

<u>Developmental Concerns</u>:

- o How is it determined which lots will have a parking area at their front lawns? For those with an accessory unit or rear lot house this may not be a concern and indeed may be desirable. For those with parking on the public way in the front of their house but without any intention of adding an accessory unit, such a situation would be undesirable. Also, it would be difficult to add or remove a curb return and parking strip in the front of a house if the tenure of the household changes. Furthermore, the alternating parking pattern would be disrupted.

- o One criteria for the frequency and location of curb cuts is purely a function of driveway curb cut spacing. Once a staggered pattern is established for a block, the pattern dictates where all curb returns and parking areas will fall. In a block in which lot frontage widths and curb cut spacing varies radically on both side of a public way some lots with expansive, continuous frontages will go unused while the lot frontage on the opposite side of the public way, which may be of a small dimension, will be developed for parking. One criteria to alleviate this problem may be to develop only those frontages that can accomodate four or more cars. Some households may not be able to park adjacent to their properties. In such cases perhaps only those houses with adjacent parking areas in the public way could add accessory units. Perhaps those not benefitting from parking on the street in front of their house could receive a property tax break subsidized by those choosing to add accessory units to their lots.

- In most cases such parking strips span two lot frontages. Neighbor cooperation and agreement may be required to effect such a change.

The Nature and Extent of Shared/Public Space and Private Space.

- There would be a certain amount of privacy intrusion into the front yards by adjacent parking strips. Foot traffic on these front lawns may be a concern particuarly if the sidewalks are non-existent or minimal.

- Where parking areas span across two lot frontages some informal agreement may have to be reached by adjacent households as to who parks where.

- Those properties with extended boulevard strips or curb returns would benefit from an increase in their front yard area.

Infrastructure:

- o No new paving is added.
- o Built out boulevard strips and curb returns are necessary.
- o Curb and gutter will be required at parking areas.
- o Curb and gutter work represents a relatively high grade of infrastructure.
- o Building out curb returns and boulevard strips is perhaps more costly per unit than removing and paving over an existing boulevard strip (option 2).

Site one, drawing #3

- o Built out boulevard strips - 7 @ 430 l.f., 8.7 lf/car.
- o Curb returns - 8, .16/car.

Site one, drawing #4

- o Built out boulevard strips - 1 @ 30 l.f., .55 l.f./car
- o Curb returns - 23, .42/car.

Site two, drawing #3

- o Built out boulevard strips - 1 @ 40 l.f., .95 l.f./car.
- o Curb returns - 17, .4/car.

Site three, drawing #3

- o Built out boulevard strips - 7 @ 320 l.f., 10 l.f./car.
- o Curb returns - 6, .19/car.

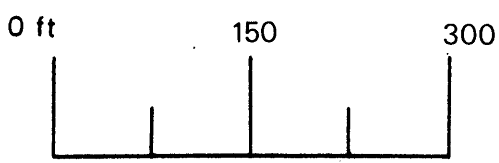
Site three, drawing #4

- o Built out boulevard strips - none.
- o Curb returns - 18, .64/car.

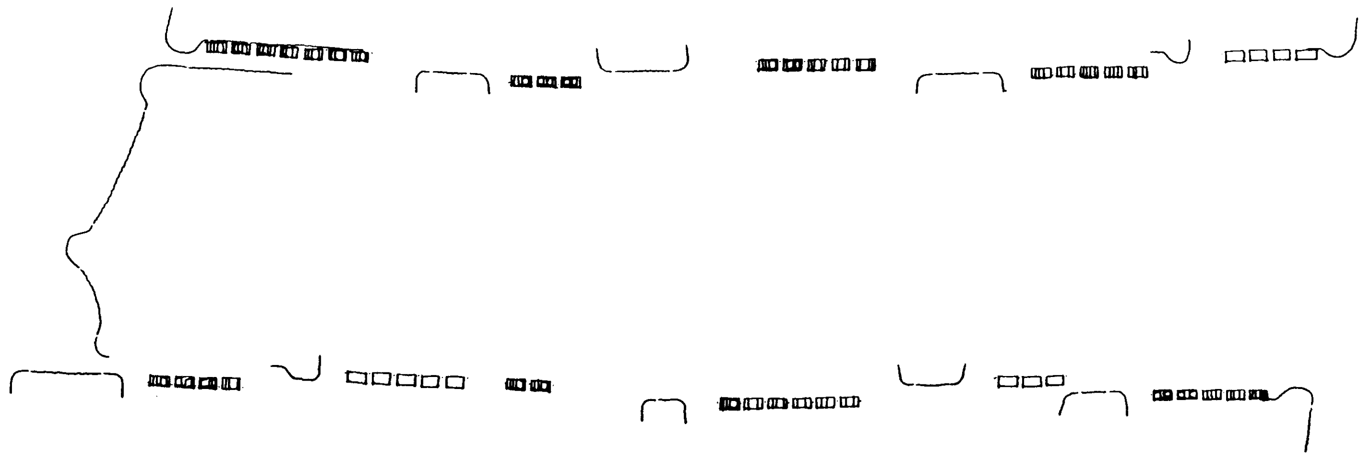
Site Comparisons, Trade Offs:

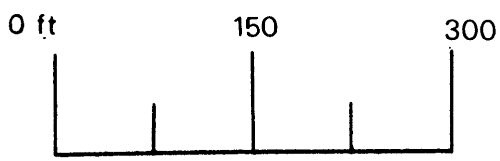
- o Staggering parking from one side of the public way to the other and the use of curb returns and built out boulevard strips mitigates an increase in the intensity of use of the public way while providing an amenity of greater vegetation. Despite some public inconvenience in reduced travel lanes and one way streets, the neighborhood benefits from a possible reduction in the volume and speed of traffic.
- o There may be an undue physical benefit accruing to those whose front lawns are effectively extended by such alteration and who choose to consolidate their properties. Conversely, there may be undue costs to those not consolidating their properties yet with public parking areas directly on their street frontage.

- Such parking options provide barely enough parking spaces or just fall short of providing the parking spaces required to accomodate all potential accessory apartments within the existing houses. Some parking on the lots would be required. One trades off the requirements for some parking on lots for the visual, physical amenities on the public way -- a trade off between the private costs of some reduced yard-space and the public benefit of a visually enhanced public way.
- Site one, drawing #3 makes the most cost effective use of curb returns where site three, drawing #4 makes the least cost effective use.
- Site one, drawing #4 makes the most cost effective use of boulevard strips, where site 3, drawing #3 makes the least cost effective use.

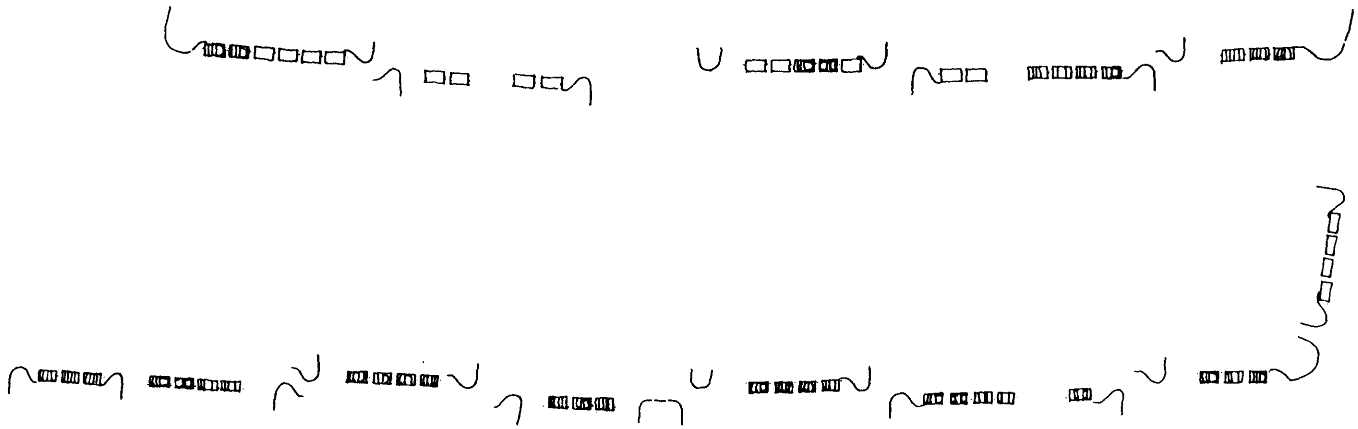


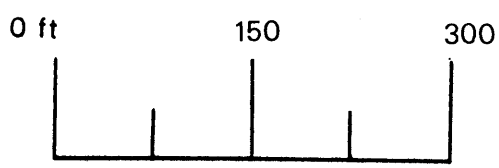
Drawing 1a.3



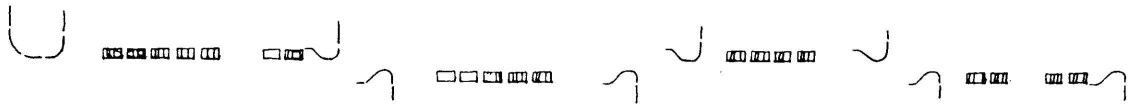


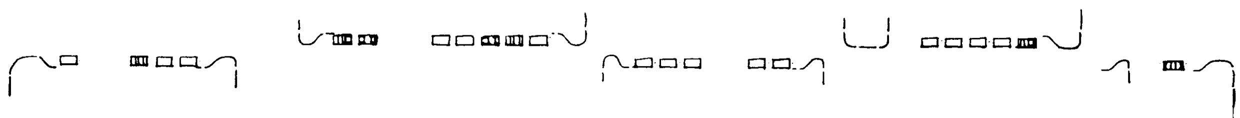
Drawing 1a.4

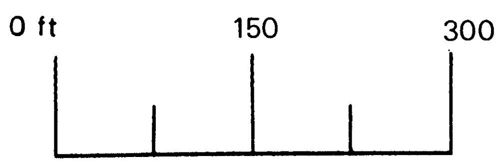




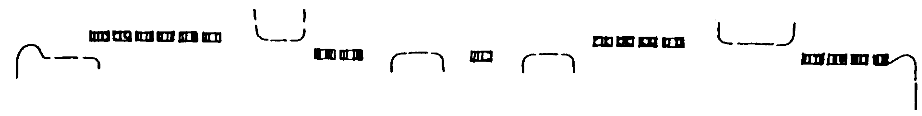
Drawing 2a.3

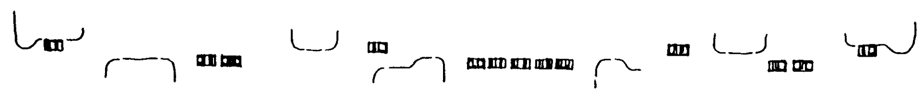




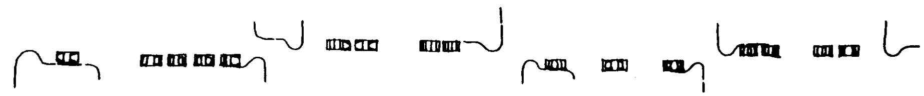


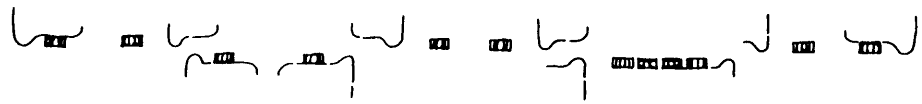
Drawing 3a.3





Drawing 3a.4





4. Staggered parking within the boulevard strips:
(Refer to drawings 1a.5, 2a.4, 3a.5).

The intent here is to again physically and visually define and confine designated parking areas while maintaining two way travel along the public way. Without curb returns and alternating the travel lane from one side of the public way to the other, it is hoped that more parking space can be gained.

Statistical Summary:

Site one, drawing #5:

- o Sixty-five parking spaces are created.
- o Eight spaces are reserved for existing households.
- o Fifty-seven spaces remain for accessory units and/or rear lot houses.
- o There are 45 potential accessory units in the existing houses within the block and the other blocks fronting the public way.
- o There are still 12 more parking spaces than required.

Site two, drawing #4:

- o Fifty-seven parking spaces are created.
- o Six are reserved for existing households.

- Fifty-one remain for use by accessory apartments and/or rear lot houses.
- There are 40 potential accessory units -- 11 more parking spaces than required.

<u>Site three, drawing #5</u>:

- Thirty-seven parking spaces are created.
- Six spaces are reserved for existing households.
- Thirty-one remain for accessory apartments and/or rear lot houses.
- There are 20 potential accessory units -- 3 parking spaces more than required.

<u>Environmental Consequences</u>:

- Because parking would be recessed within existing boulevard strips and screened from view by the remaining boulevard strips, the street may not appear to be any wider.
- The view down the public way would not be screened and throttled by vegetation as in option 3.
- Two way travel would remain in effect, and the public would not be as discouraged from driving here as in option 3.

- o Additional pavement would need to be added.
- o The removal of the boulevard strip is an effective removal of the front lawn of the concerned properties.
- o Such parking may be a visual affront for these concerned properties, particularly now that parking on the street is even closer to the house.

Developmental Concerns:

- o Physically, such an option is more attainable than Option 3 in that there are fewer, complicated curb returns and alterations of the driving lane.
- o Administratively and practically such an option is more difficult to effect. Again, who is willing to accept a loss of front yard space to accomodate parking from which there may be little personal benefit. Refer back to "Developmental Concerns" for option 3.
- o Neighbor cooperation and informal agreement may be necessary when developing a parking strip that spans across two lot frontages.
- o The continuity of sidewalks would be disrupted unless private frontage were annexed for public sidewalks.

The nature and extent of shared/public and private space:

- o The removal of the boulevard strips would result in a privacy intrusion on the front yard and front rooms of the house. Foot traffic on the front lawn may be a concern, particularly with the removal of existing sidewalks.
- o Parking strips spanning across two lot frontages may require informal agreements among neighbors as to use.
- o The public way itself may not be as quiet, private and as free of traffic as in option 3 in which through traffic may be discouraged.

Infrastructure:

- o All infrastructure would be of Grade A quality.
- o New paving is required.
- o New driveway aprons are required.
- o Curb and gutter is required.
- o Some curb returns are required at street intersections.

Site One:

- o Paving - 1470 l.f. x 10' = 14,700 s.f., 226 s.f./car.
- o Driveway aprons - 28, .43/car

- Curb and gutter - 1620 l.f., 25 l.f./car.
- Curb returns - 3.

<u>Site Two</u>:

- Paving - 1400 l.f. x 10' = 14,000 s.f., 246 s.f./car.
- Driveway aprons - 27, .5/car.
- Curb and gutter - 1500 l.f., 26 l.f./car.
- Curb returns - 2.

<u>Site Three</u>:

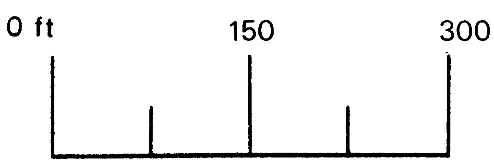
- Paving - 1155 l.f. x 10' = 11,550 s.f., 312 s.f./car.
- Driveway aprons - 31, .8/car.
- Curb and gutter - 1200 l.f., 3.2 l.f./car.
- Curb returns - 1

<u>Site Comparisons and Trade Offs</u>:

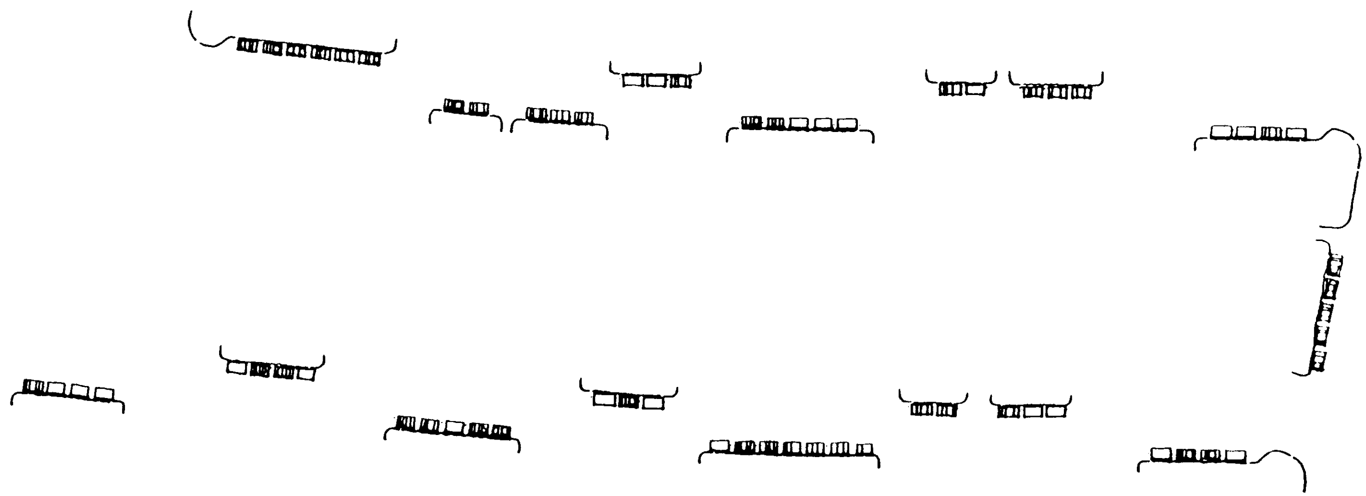
- Comparing this option with option 3 one trades additional pavement and loss of front yard space for more circuitous travel and complicated curb cuts and curb returns. Option 3 is superior over option 4 in that it does not doubly penalize (by removing part of their lawn area) those who must accept parking along their frontage yet are not able to benefit through consolidation of their property.
- Then again circuitous travel and curb cuts that intrude into the public way may be desirable from the standpoint

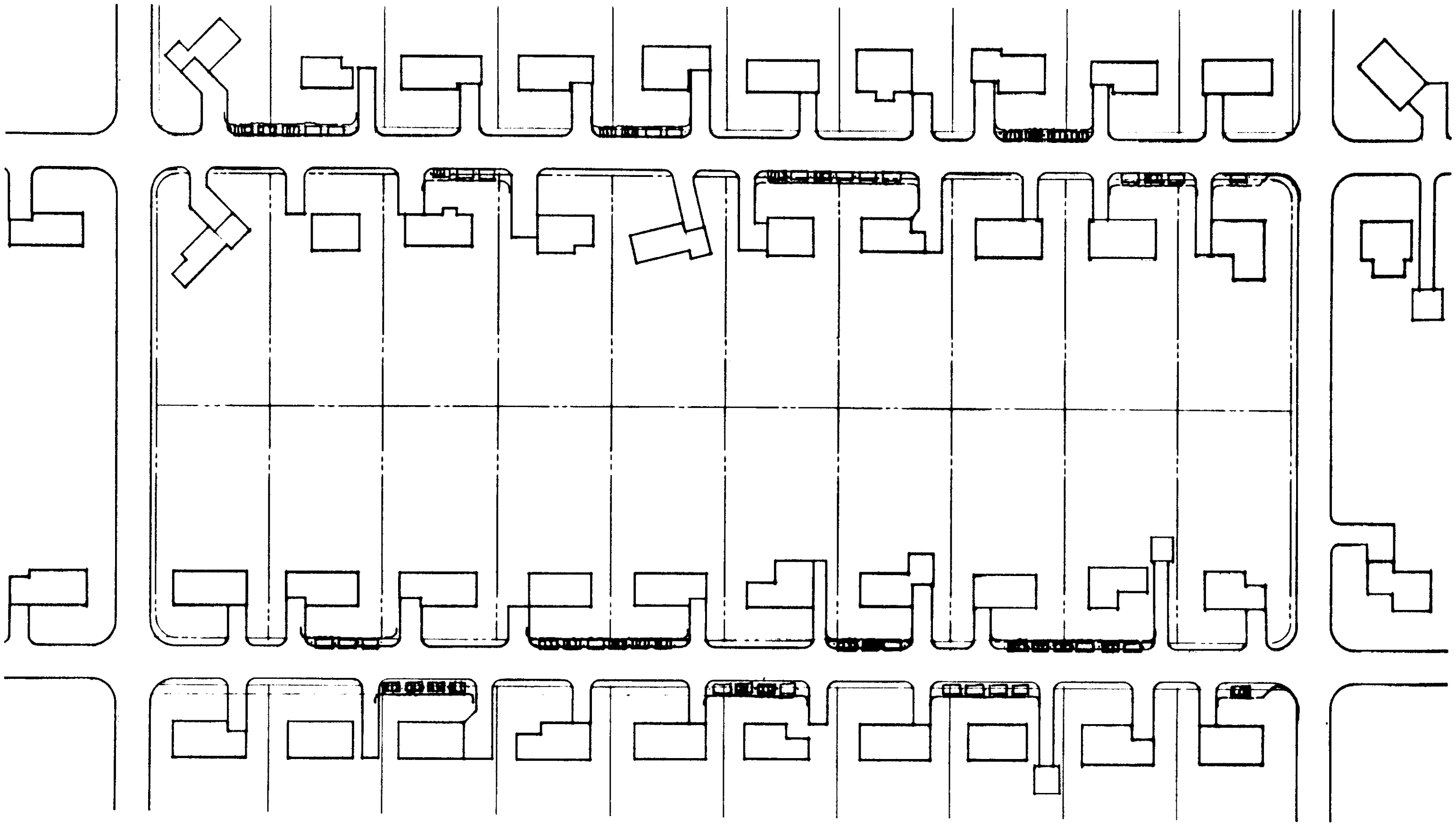
of reducing through traffic.

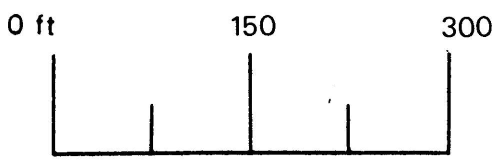
- Site one makes the most cost effective use of this infrastructure where site three makes the least. This may be due to the great irregularity of existing driveway spacing and lot frontage in site three combined with very narrow frontages that yield few parking spaces.



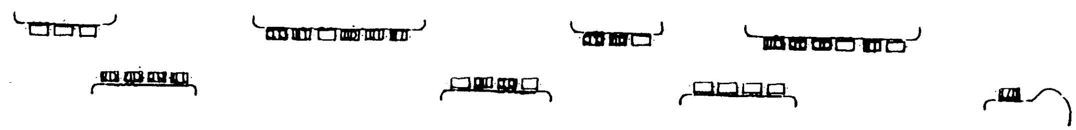
Drawing 1a.5

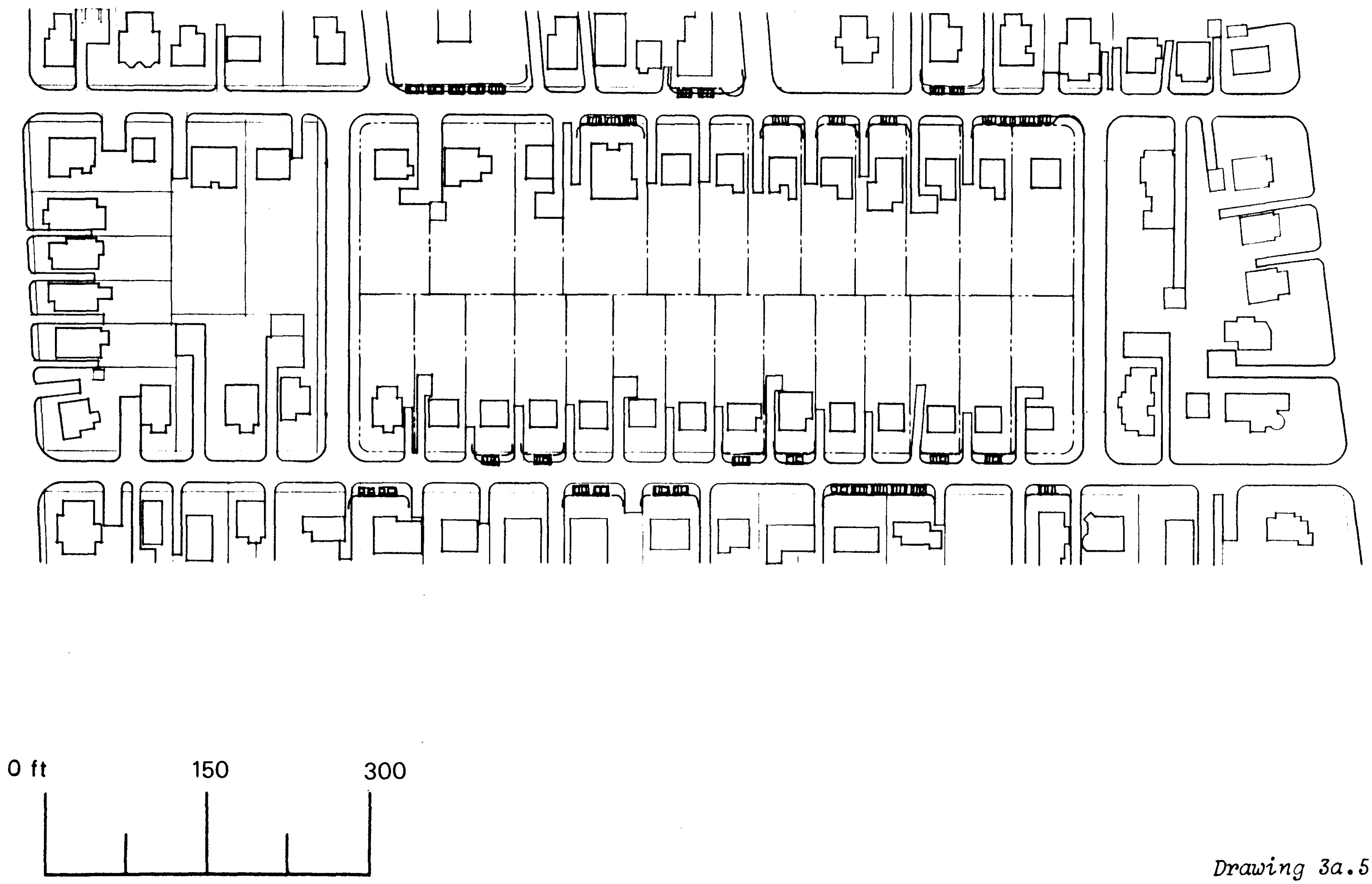




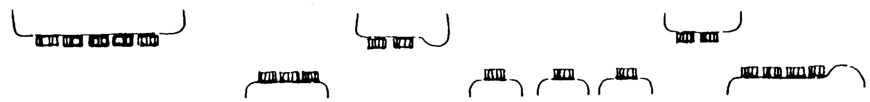


Drawing 2a.4





Drawing 3a.5



Consolidation Scheme Analysis

Consolidation Option One:

60° Diagonal Visual Alley
and Building Envelope

House Location in Building
Envelope

Note:
In each of the following consolidation schemes the plans of the actual physical changes are overlayed on top of and also separated from the base site plan to more clearly isolate and illustrate the particular changes.

Garage

Entry

"Front" of House, Main View

Property Lines

Utility Lines

Housing envelope location within the 60° visual alley:
(Refer to drawings 1a6, 2a.5, and 3a.6.)

Because of some inequality in the size and spacing of the existing houses, the visual alleys from the public way on one side of a block do not necessarily match up with the visual alleys on the other. A compromise building envelope must be reached such as in site one. The visual alleys on both sides of the block in site two aligned quite well, and little compromise was required in laying out building envelopes that satisfied both visual alleys.

Site One:

The compromise envelope locations within the visual alleys in this site place the houses straddling four properties and visible between existing houses with a direct view to the street. All the envelopes shown are large enough to contain houses that could be divided into accessory apartments. Given the criteria established by the visual alleys, any houses built on lots a, b, l, m, n would obstruct the view.

Such house shapes and locations do not necessarily satisfy the other environmental performance standards, and may even conflict with them (such as the criteria having to do with the cone of vision from the public way viewing the space between houses). Such housing location would radically obstruct such a view.

The house sizes and shapes do not necessarily build off of the sizes, shapes and orientations of existing houses.

Site Two:

Although the angle of the visual alley in sites one and two are similar, the greater lot depth in site two results in a greater number of intersections of visual alleys, creating more numerous pockets within which to slip new houses. All possible housing envelopes are shown. The visual alleys from both sides of the block coincide quite well, resulting in few compromise house locations. All of the housing masses shown are large enough for accessory units.

Site Three

The great discrepancy between the regular shape, size and spacing of the houses on one side of the block and the very irregular shape, spacing and size of houses on the opposite side of the block is reflected in the mismatch between the visual alleys at the rear property line. In determining the location of the housing envelopes, only the 60° visual alley for that side of the block was considered. The resulting optimal number of houses is shown in drawing 3a.6. If houses were located within all of the diamond shaped areas (as in drawing 2a.5), the new and existing houses would have less than 20 feet between them. Two rows of new housing presents the optimal number of units within the envelopes.

House location within the 60° visual alley envelope: Consolidation option 1.
(Refer to drawings 1a.7, 2a.6, 3a.7, and 2a.7 and charts 3-6).

The intent here was to use the 60° visual alley as a guide in locating houses within the context of a flag lot development without concern for providing for all 1000 s.f. houses and houses divisible into accessory units. The question here is: what house sizes, orientations, shapes, and locations are determined by the 60° visual alley? In turn another question is, how does this affect the other environmental performance concerns of visual cones, increments of built and open space, house relation to public way, etc.?

Discussion:

Site 1, Drawing 1a.7:

All new houses are large enough to permit subdivision into accessory units. Each new house owns its driveway to the street. A parking apron is needed to replace the original driveway, parking spaces used by the existing households. Each new house is diagrammed as providing an exposed parking area for an accessory unit. Parking for accessory units within existing houses is assumed to be on the street. New lots do not fall within existing lot lines.

Site 2, Drawing 2a.6:

All houses are more than adequately sized for accessory units. The number of houses shown is not, however, the maximum number that can occur within the 60° visual alley envelopes. The intent is to show two flag lot options (drawings 2a.6 and 2a.7) that are possible within these envelopes. New and existing lots are all of the same size if the contribution of the driveways is not taken into account. All new lots fall within existing lot lines.

Site 2, Drawing 2a.7:

This drawing portrays a second flag lot option for the 60° visual alley envelope, approaching a more optimum number of units for the site. New lot sizes are all equal. Existing modified lot sizes are smaller than new lot sizes but are all equal among themselves. Not all new houses are large enough to accomodate accessory units (lots b,f). The new lots do not fall within existing lot lines due to the new house locations that straddle existing side yard lot lines.

Site 3, Drawing 3a.7:

Few houses are large enough to permit subdivision into accessory units (only lots a, h, j, u, v). However, these same lots are quite constrained in size to the point where adequate parking for an accessory unit is difficult to attain. New lots are built within existing lot lines. Because the 60° visual alleys do not coincide from one side of the block to the other, the house location on either side of the block corresponds to the 60° visual alley for that side only. On the north (top) side of the block the garages do not fall within the prescribed building envelope. On the south side they do. This difference was diagrammed to illustrate the effect on garage location. The site has few existing garages. New garages would not be a visual necessity, and may even be out of place. The environmental performance analysis, however, takes the garages into consideration.

Nomenclature for statistical summaries of environmental performance (Charts 5+):

A. Coverage:
existing, unmodified lots

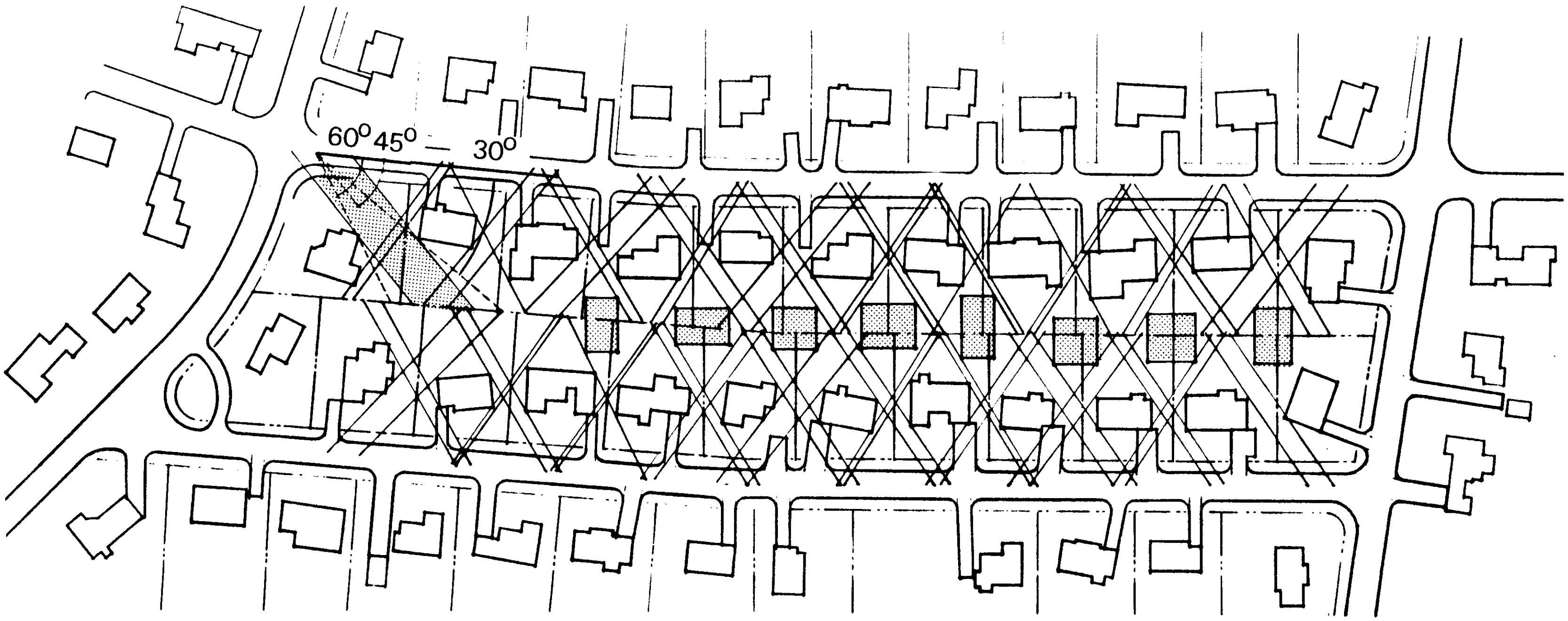
B. Coverage:
existing, modified lots

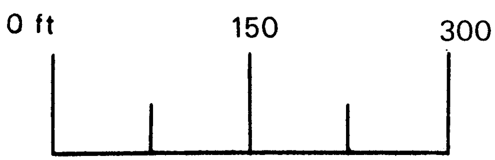
C. Coverage:
new lots

D. Built increments

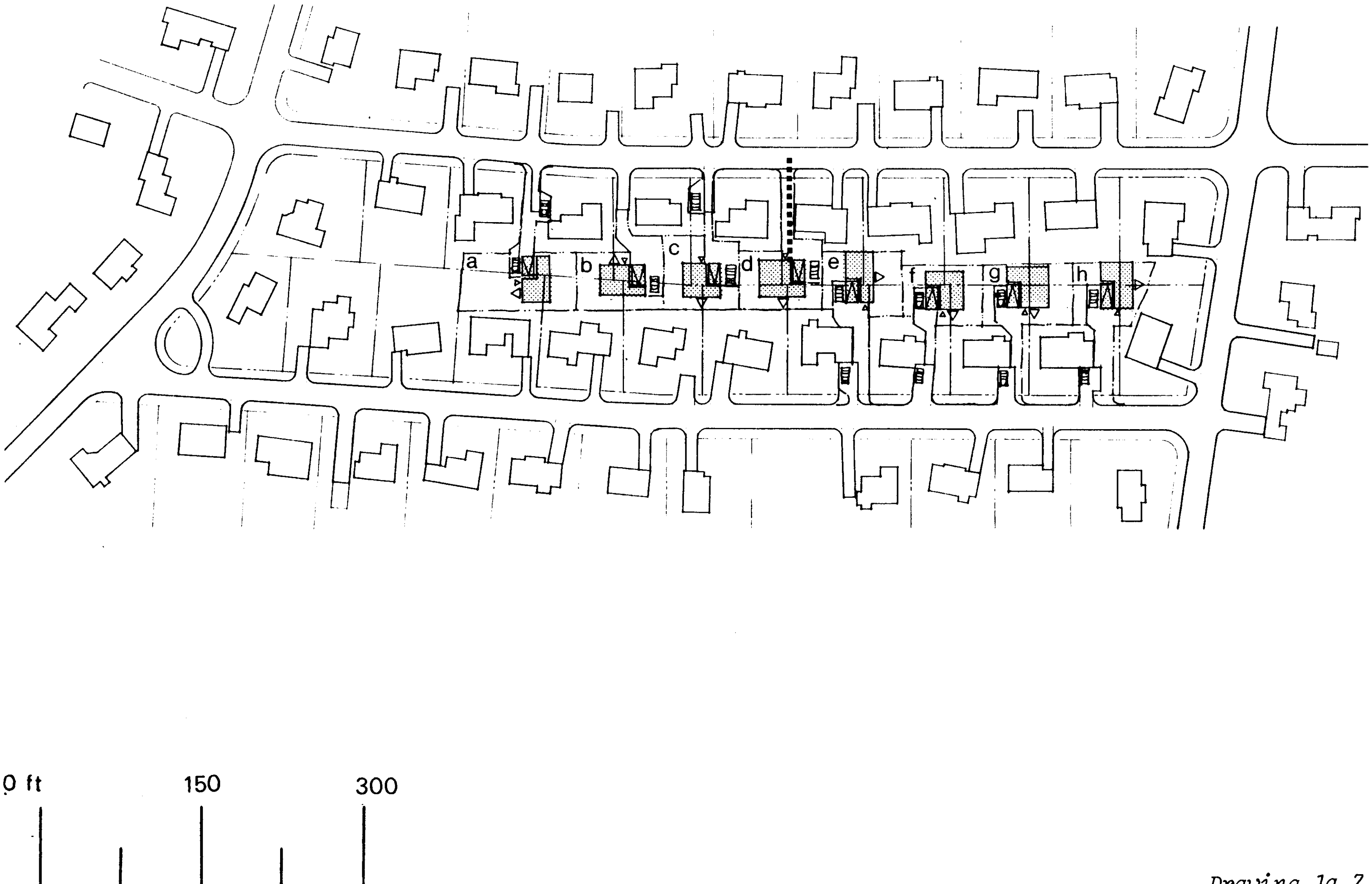
E. Open increments

F, G, H, I, 1, 2, a: refer back to the nomenclature for chart 2.

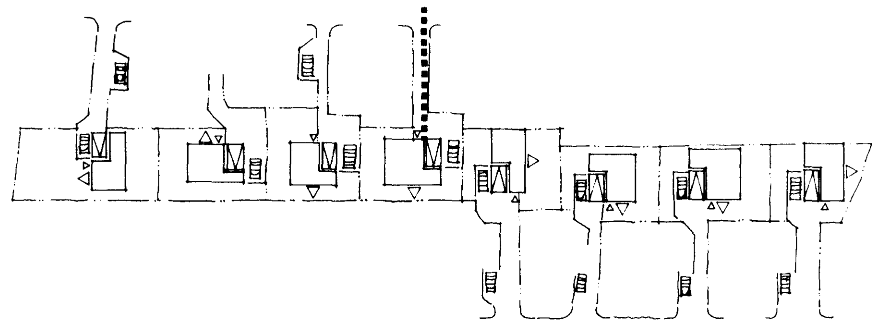


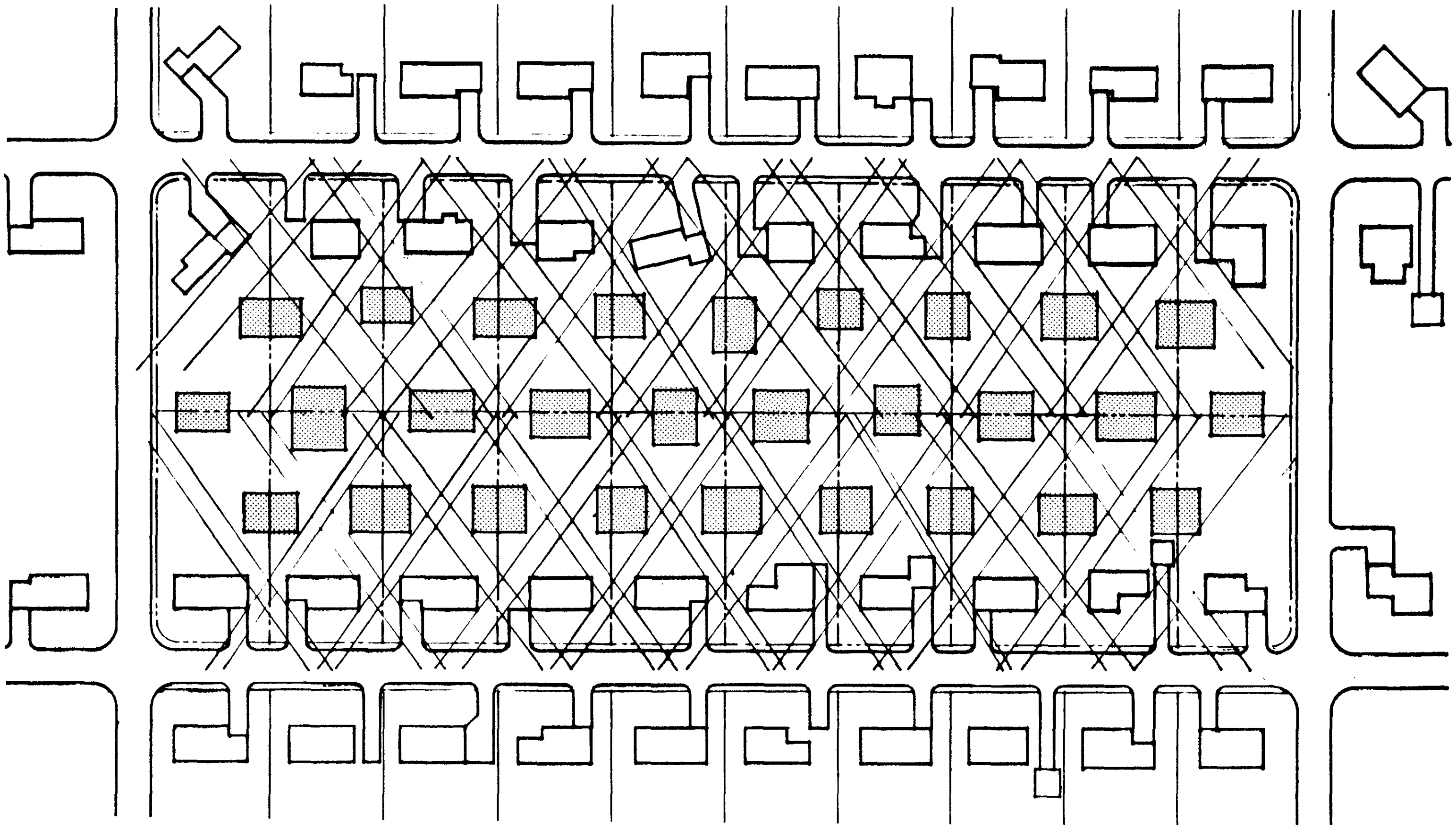


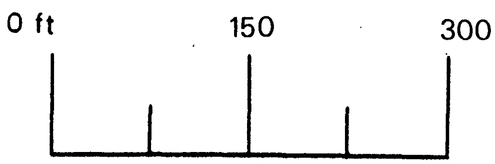
Drawing 1a.6



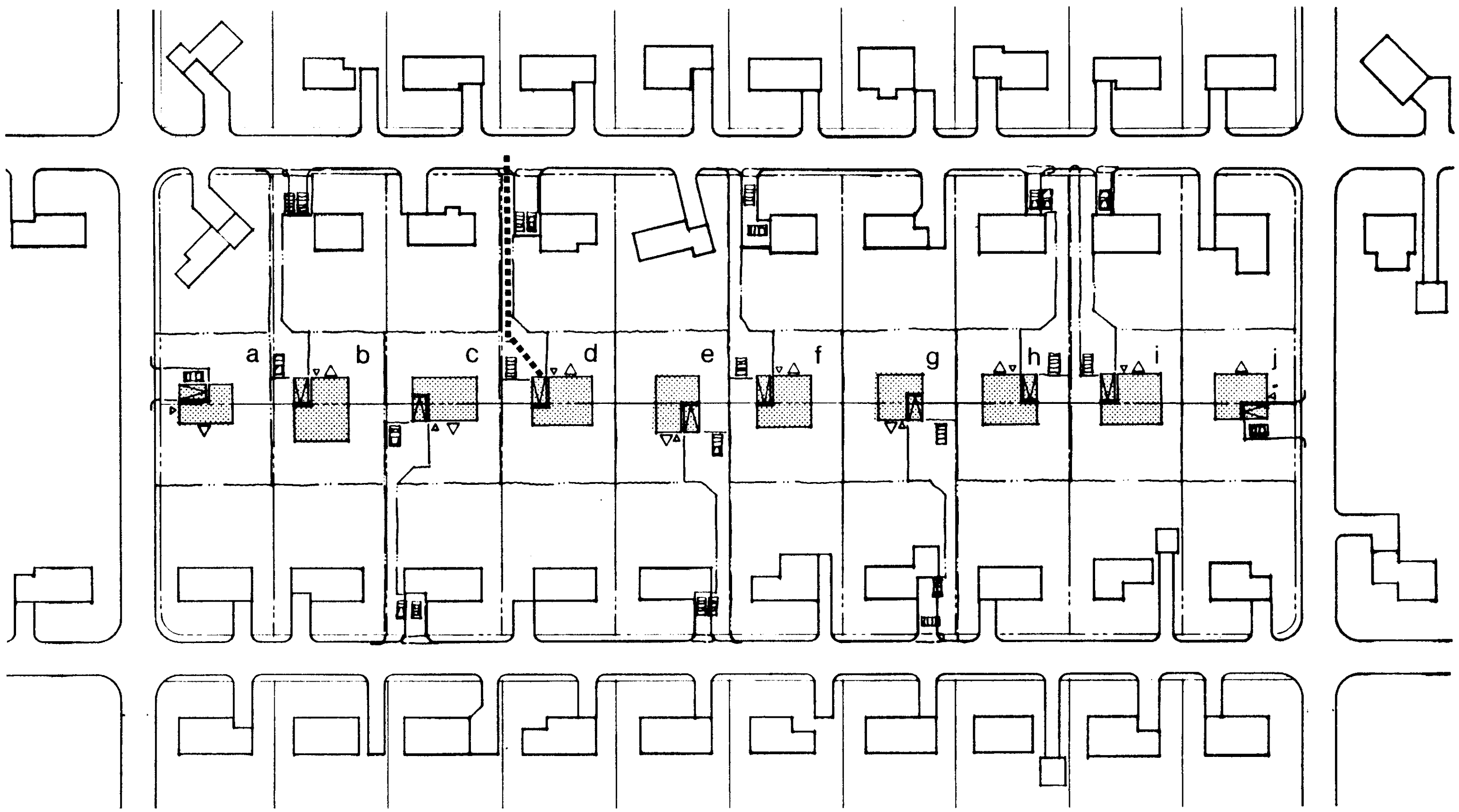
Drawing 1a.7

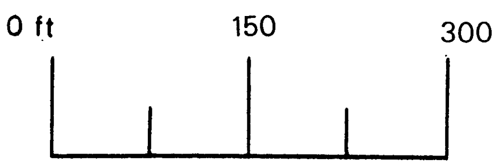




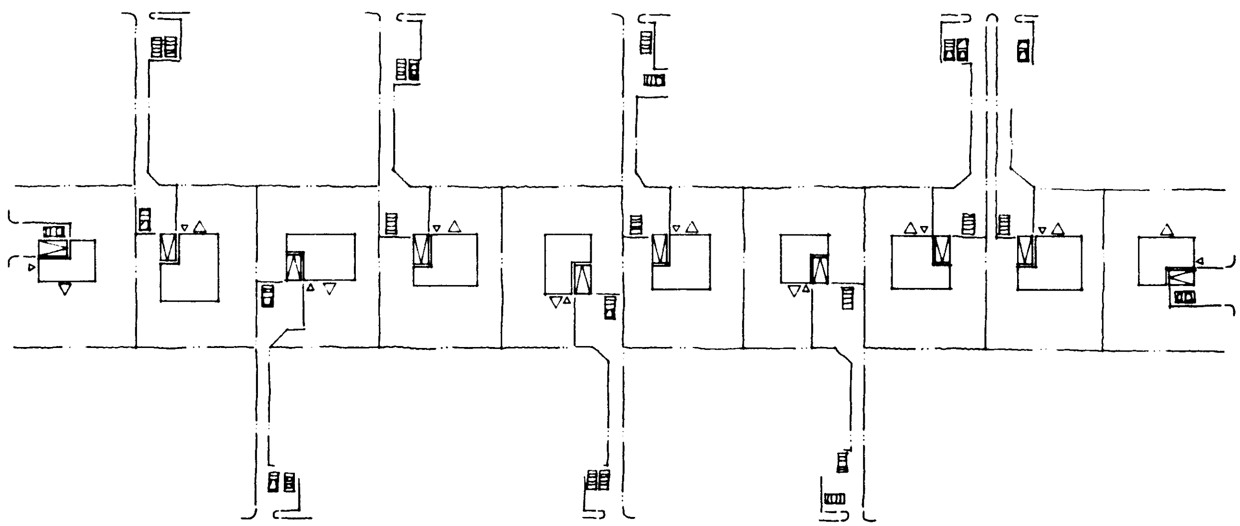


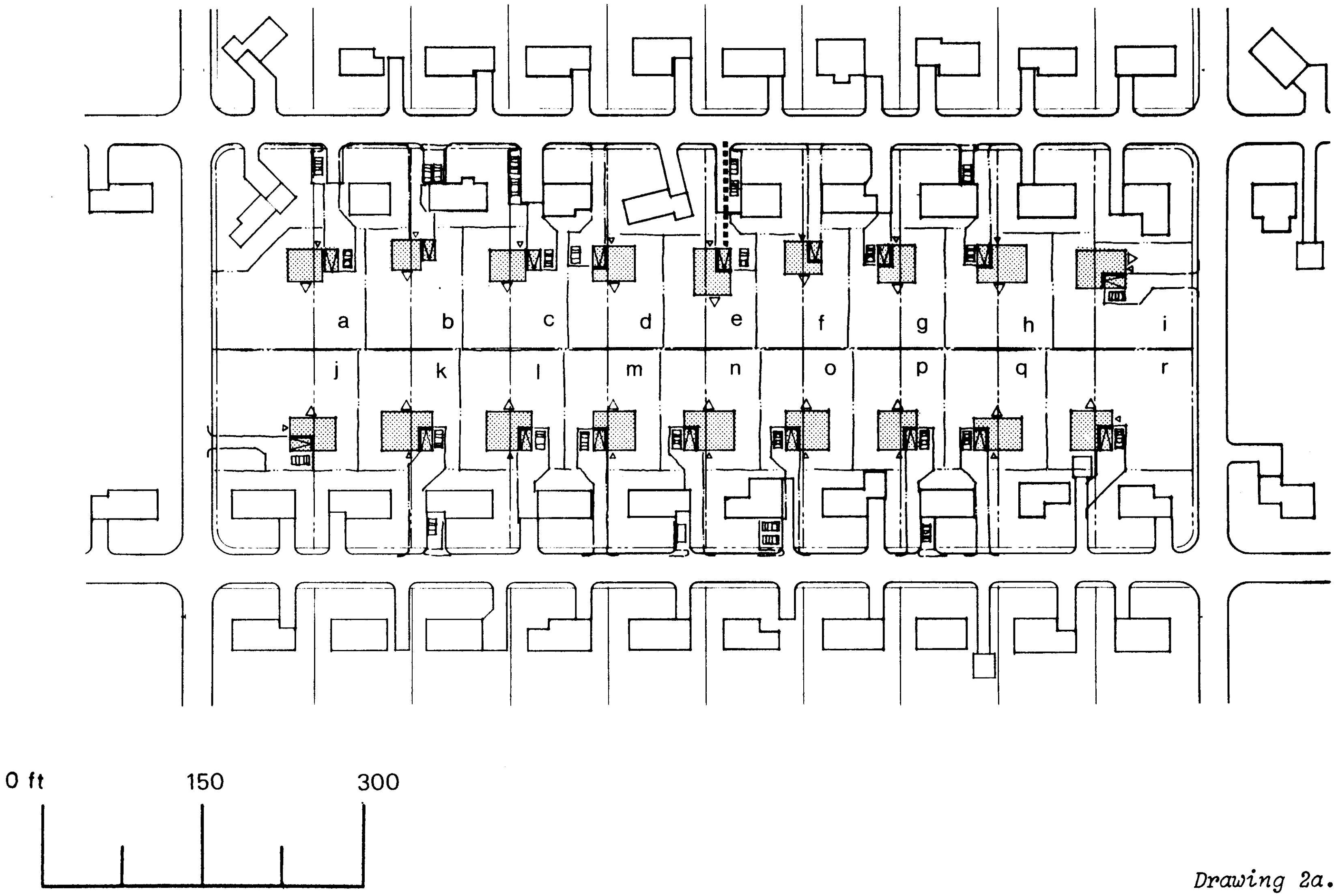
Drawing 2a.5



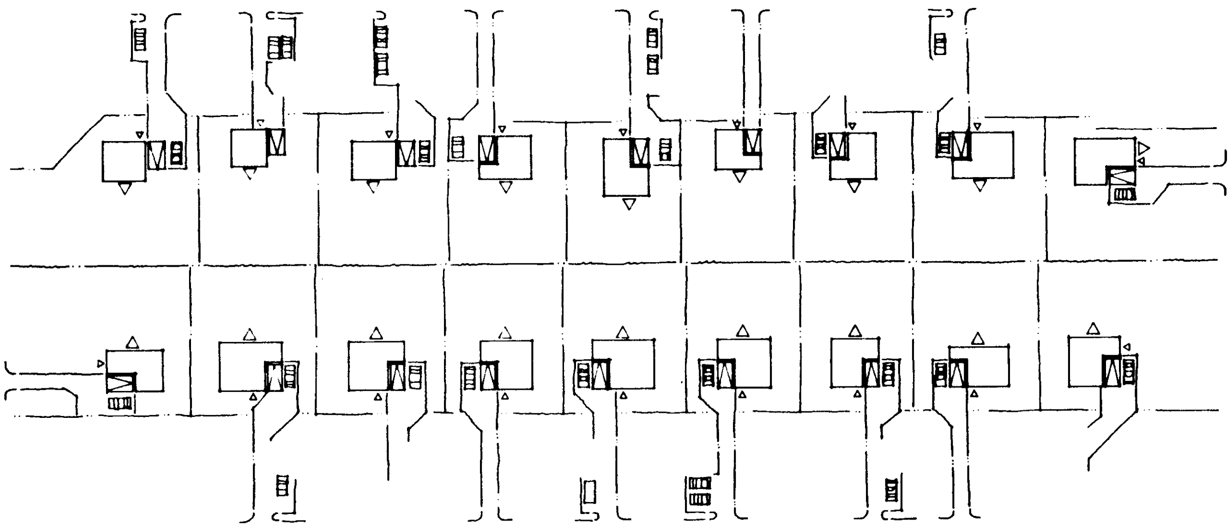


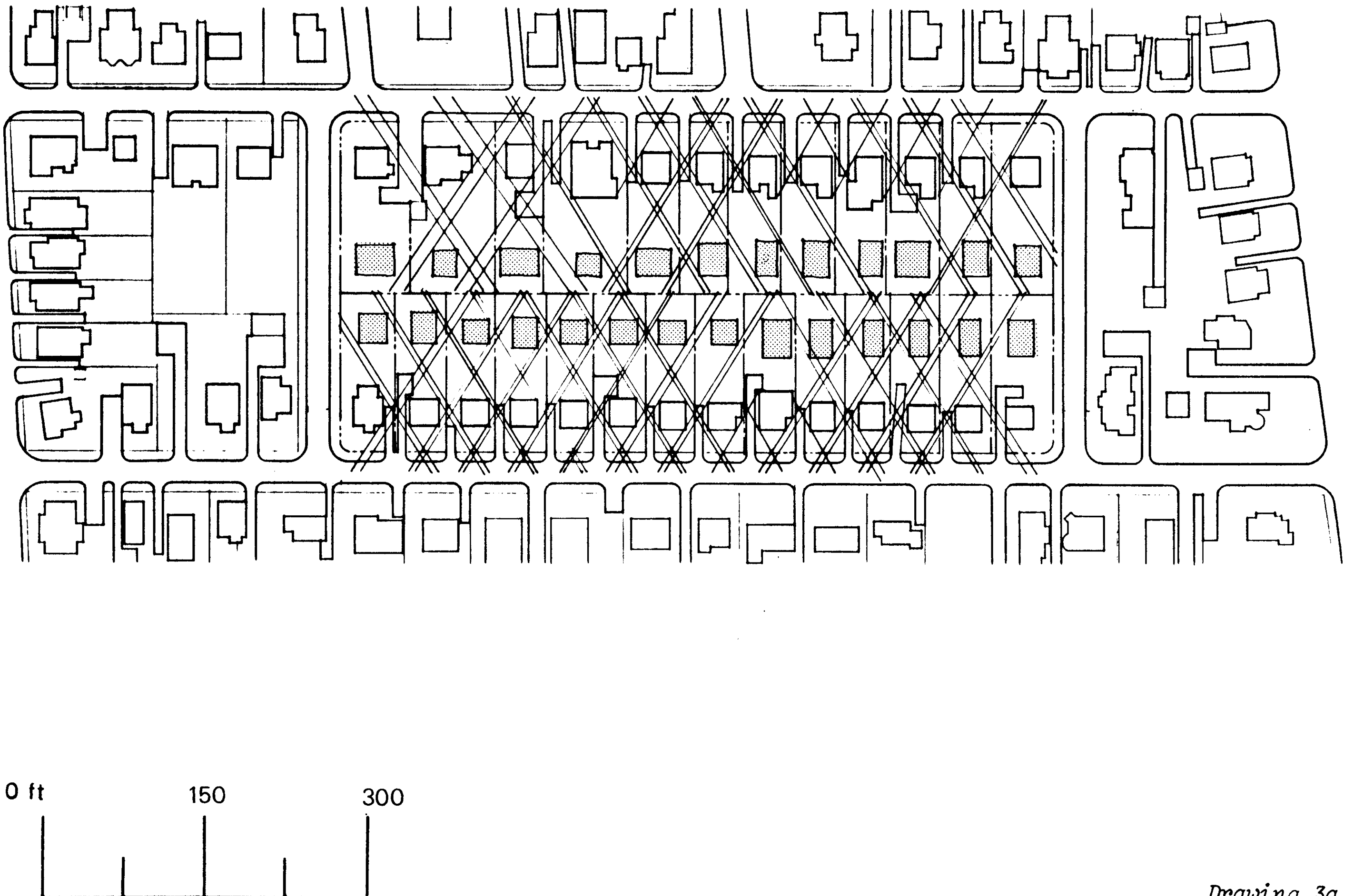
Drawing 2a.6





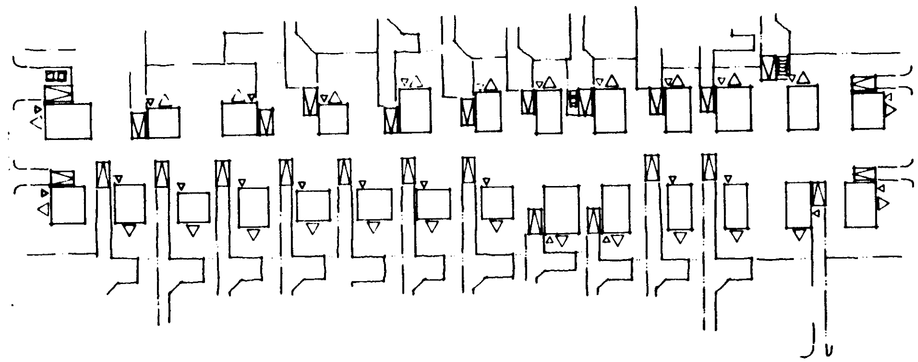
Drawing 2a.7





Drawing 3a.6

Drawing 3a.7



* footprint size in s.f.

		coverage			lot size in s.f.			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1 1a.7	existing	17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
	new				5800	7200	4200	1550	1920	1300	28	60	10	9	25	0					80'	75'		
site 2 2a.6	existing	8	10	7	20000	20000	20000	1600	1950	1350		35	30	40	60	35	28'	48'	1000'	415'	200'	100'		
	new				13000	13000	13000	2000	2640	1470	45	55	40	27	32	20					130'	100'		
site 3 3a.7	existing	10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		
	new				4500	7225	4000	1060	1375	825	24	30	15	12	25	5					90'	50'		

Chart 3

* footprint size in s.f.

		coverage			lot size in s.f.			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1		17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
site 1																								
site 2 2a.7	existing	8	10	7	20000	20000	20000	1600	1950	1350		3 5	30	40	60	35	28'	48'	1000'	415'	200'	100'		
site 2 2a.7	new				12000	13000	11500	1863	2585	1150	65	70	55	28	35	22					120'	100'		
site 3		10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		
site 3																								

Chart 4

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1 1a.7	existing	17	28	14							423'	58'		227'	30'		85 99	92	68 84	78	67 89	78	71[a]	71[a]
	new				30	43	19	18	26	14	307'	43'	- 25%	307'	45'	+ 50%	85 90 100	92	64 93 100	85	73 95 100	89	49 88	70
site 2 2a.6	existing	8	10	7							550'	55'		414'	46'		72 89	80	60 85	72	61 88	74	58[a]	58[a]
	new				13	15	12	15	19	12	470'	47'	- 14%	481'	53'	+ 15%	71 95 98	88	56 81 91	76	62 91 100	84	52 92	72
site 3 3a.7	existing	10	18	8							387'	24'		306'	20'		74 91	82	74 91	82	69 84	76	62[a]	62[a]
	new				25	32	13	22	33	15	434'	28'	+ 17%	240'	15'	- 25%	75 97 100 100	93	76 87 95	86	69 95 100 100	91	75 95	85

Chart 5

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1	existing																85 99	92	68 84	78	67 89	78	71[a]	71[a]
	new																							
site 2 2a.7	existing	8	10	7							550'	55'		414'	46'		72 89	80	60 85	72	61 88	74	58[a]	58[a]
	new				21	24	17	13	17	8	406'	45'	- 18%	453'	57'	+ 24%	83 97 99	93	59 89 94	81	68 89 99	85	52 82 98	77
site 3	existing																74 91	82	74 91	82	69 84	76	62[a]	62[a]
	new																							

Chart 6

Environmental Performance[2]

For the following set of schemes, the analysis (environmental performance, developmental concerns, the degree and quality of public/shared space and private space, and infrastructure) of each scheme will be provided in detail. The intent is to illustrate the issues to consider under each analytical point and elaborate on the method. For the subsequent schemes, however, only a summary of the site comparisons and analysis will be attempted.

1. Coverage

Site 1, Drawing 1a.7

- The coverages of the modified lots with existing homes is increased substantially over the coverages of the unmodified lots and the lots of the new houses.
- This is particularly apparent when realizing the degree of side yard consumed by individual driveways and when realizing the great reduction (50% - 75%) in the backyards of existing lots.
- The existing house sizes are 15% greater than the new, which contributes further to increased coverage on the existing modified lots.

Site 2, Drawing 2a.6:

- We see that the new house sizes are 25% greater than the existing houses. That even though the sizes of the new and modified existing lots are equal, the larger sizes of the new houses contribute to an increased coverage of the new lots.

Site 2, Drawing 2a.7:

- The sizes of the new lots are 40% greater that the existing modified lots. In turn the size of the new houses is only 12% greater than the existing. Yet the coverage of the houses on the new lots is 25% less that the coverages of the existing houses on their modified lots.

- The average coverage is increased by 125% over the existing situation. In drawing 2a.6 the new coverage exceeded the existing by 75%

- It is difficult to reduce the size of the new lots to equalize the coverage between new and existing houses because of the location of the new houses on the lots. The property line setbacks between the old and the new are already approaching a minimum.

Site 3, Drawing 3a.7:

- Lot sizes have decreased by about 35%, and house sizes have increased by about 25%. Coverages have increased by 110%.
- Again, as in the preceding sites, the coverages of the existing houses on their modified lots is greater than the coverages of the new houses on their lots.
- The coverages are beginning to approach a maximum limit as in site 1, that is, to the point where little usable yard space remains as both a space for activities and as a physical buffer.

2. Visual Cone Analysis

Site 1, Drawing 1a.7:

- Satisfying visual openness criteria from one vantage point does not guarantee the satisfaction of all criteria from all vantage points. Indeed, conflicts occur. For example, by placing new houses within the envelopes defined by the 60° visual alleys, one sacrifices visual openness as perceived when looking directly between houses or directly at the existing houses from the public way.

- We see that the average percentage in Column F remains the same, and the portion contributed to the visual cone by the new houses is less than that contributed by the houses on the far lot originally. On the other hand, the percentages increase dramatically in Columns G and H. The increase in Column H is within the allowable of the average of the norm and 100%. These are the vantage points from which building between existing houses is more readily noticed.

- The percentage drops in Column I in which the vantage point places the visual field between the new houses such that they contribute less to the foreground of the visual field (49%) than did the houses on the far lot in the existing situation.

- From the vantage points represented in Columns G and H, the average percentage does not increase beyond the stipulated percentage point of the average of the existing norm and 100%. However, the percent figure corresponding to the contribution to the visual field of the new houses exceeds the percentage represented by the contribution of the houses on the opposite side of the block in the existing context.

- In Column F, however, the percentage figure represented by the row of new houses (90%) is less than the average percentage in the existing context (92%). The same is true for Column I.

Site 2, Drawing 2a.6:

- In terms of visual openness, the location of the houses represents the best of many vantage points -- from the public way looking between houses and directly at houses and looking within the 60° visual alley. It must be remembered, however, that an optimum number of houses (vis-a-vis the 60° visual alley envelopes) is not provided in this scheme.
- Only from the vantage point represented in Column H does there result a complete closure of the visual field by the last row of houses in the background.
- From all vantage point the percentages fall short of the criteria limit of the average of the exist-

ing norm and 100%.

- o The contribution of the new houses to the visual field does not exceed the contribution of the existing houses on the far lot in the existing context from vantage points F and H.
- o In Columns G and I the percentage represented by the row of new houses (81% and 52%) is less that the percentage figure for the existing houses on the opposite side of the block in the existing context (85% and 58%).

<u>Site 2, Drawing 2a.7:</u>

- o The new houses again straddle the side yard lot lines, increasing the percentages in all columns vis-a-vis drawing 2a.6.
- o In all columns, the percentages contributed by the two rows of new houses is quite in excess of the percentage contributed to the visual field by the existing houses on the far lots in the existing context.
- o In column F, the average between the site norm (80%) and 100% is exceeded. From the vantage point represented in columns G,H,I, this average percent-

age is not exceeded.

- In no case is there full closure to the visual field as in drawing 2a.6.

<u>Site 3, Drawing 3a.7:</u>

- Because of the lack of continuous 60° visual alleys through the block, closure of the visual field occurs more often.
- From all vantage points, except column G, the new percentage exceeds the average of the norm for the existing site and 100%.
- Only from the vantage point represented in column G is the percentage represented by the row of new houses (87%) less than the percentage contributed by existing houses on the opposite side of the block (91%) in the existing context.

<u>3. Visual Permeability</u>

<u>Site 1, Drawing 1a.7:</u>

- Although the new houses are placed visually between the existing, the continuity of the 60° visual alley through the block and around the new houses provides for a view around most of the new houses to the existing houses on the opposite side of the block. A continuous opening right through the block is not possible however. Only 5% to 10% of the visual field is filled by the existing houses on the opposite side of the block.

Site 2,, Drawing 2a.6:

- o Again, the continuity of the 60° visual alleys from one side of the block to the other and the placement of the new houses within the envelopes defined by these visual alleys assures some visibility around the new houses to the existing houses on the opposite side of the block.
- o Closure of the visual field occurs only from the vantage point of the houses across the public way.
- o Yet the existing houses on the opposite side of the block are screeened out to a certain degree by the new houses. Only 5% to 10% of the visual field is occupied by these houses. Originally, 15% to 20% of the visual field was occupied by the existing houses on the opposite side of the block.

Site 2, Drawing 2a.7:

- o Visual permeability around the new houses is assured. Because there is no closure to the visual field from any vantage point, some visual permeability is maintained through the block.

- o The existing houses on the opposite side of the block still contribute as much as 12% to the visual field.

<u>Site 3, Drawing 3a.7:</u>

- o The lack of continuity of the 60° visual alleys through the site sacrifices one vantage point for visual permeability. This diagonal permeability exists only for that row of new houses on one side of the block at a time.

- o Total visual closure of the visual field is attained within a half block of the public way from The vantage point represented by Columns F and H. The vantage point placing one looking between existing houses affords some degree of visual permeability through the entire block.

<u>4. Distinct and Identifiable Yard and House Ownerships</u>

<u>Site 1, Drawing 1a.2:</u>

- o Because the entire mass of each new house is directly visible from the street and because each new house lies within the envelope circumscribed by the 60° visual alleys, each house is identifiable as a separate object.

- However, because the new houses straddle existing lot lines and face onto the side yards of the existing houses, confusion may arise as to where the lots of the new houses end and the lots of the existing houses begin. Because the new houses visually occur between the existing houses, one midleading perception may be that yard ownership extends from this new house through the side yards of the existing houses to the public way.

- Because of the closure of the visual field attained from most vantage points, the existing houses on the opposite side of he block are not perceived as individual, isolated units.

<u>Site 2, Drawing 2a.6:</u>

- Although located behind the existing houses, the new houses occur far enough back on the block to be viewed as separate entities. Because each new house lies within the envelope circumscribed by the 60° visual alleys and because the 60° visual alleys are continuous through the block, both the new and existing houses can be viewed as separate entities.

- Only from the vantage point represented in Column H is closure of the visual field at the opposite side of the block. In such a case, the existing houses on the opposite side of the block will not appear as separate entities.

- Because the new lots occur within existing lot lines, new lot ownership may be more easily inferred than in drawing 1a.7 or 2a.7.

Site 2, Drawing 2a.7:

- Again, the diagonal, 60° visual alley vantage point is favored. The first row of new houses is perceptible as composed of distinct units due to the fact that they occur visually between the existing houses. They contribute from 14% to 30% to the visual field, leaving the new houses behind them to contribute only 2% to 10%. In other words, the second row of new houses on the opposite side of the block is not perceived as being composed of units that are fully apprehendable from any, one vantage point.

Site 3, Drawing 3a.7:

- Only the first row of new houses can be perceived as being composed of units that are fully apprehendable from any one vantage point.

- Full visual closure is attained by the second row of new houses.

5. Entry and Orientation of the New House

Site 1, Drawing 1a.7:

- The main doorway entry area, the main visual orientation and "front" facade, and garage front all together in concert help to label the "front" of a house. The greater the degree to which these elements are grouped together on one side of a house the stronger the image of the front of the house becomes to the degree that these elements are assembled together in the existing context so ought to be the relationship in the new houses. Furthermore, the relationship to the street ought to be the same.

- Only in lots b, f, and g are these elements grouped together facing the street. In lots a and e the houses do not even face the street. The grouping of the elements and the degree to which they face the street is dependent on the size and shape of the lot, the most praticable shape and orientation of the house or that lot, and the degree to which a major house orientation may result in overlooking into the private yard or windows of the neighboring house(s).

Site 2, Drawing 2a.6:

- Because the majority of the facades are long enough to accept garage, entrance, and major glass area, they can all be grouped together on one side of the house (except perhaps lots a and j), reinforcing existing entry and orientation relationships.
- This means that the "back" side of the house must face the other public way. When flag lot driveways are staggered, as in this site, one visually experiences an alternating back and front relationship. Because all new houses are in the same plane, this waffling back and forth may weaken the strength and identity of those houses facing the public way and disrupt some of the affinity between old and new.

Site 2, Drawing 2a.7:

- The majority of the houses are oriented toward the block interior, looking onto their respective major yard areas. Such an arrangement provides greater privacy than if the orientation were toward the street, overlooking only a small yard area and the neighbors' side yards.
- The relationships of the elements of garage, entry, and major orientation of the new houses is consistent and perhaps gains in visual strength and clarity of organization as a result. Such consistency among the new houses (even if of a different orientation than the existing) may help to set off the relationship of the existing houses to the public way.

Site 3, Drawing 3a.7:

- The long and narrow lot shapes dictates orientation toward either the front or back of the lot.
- The majority of the new houses orchestrate all three elements of entry, garage, and main visual orientation toward the street as to the existing houses.

- Because the new houses are placed behind the existing, the main fronts may be obscured.

<u>6. Distinction between Front and Back</u>

<u>Site 1, Drawing 1a.7:</u>

- The greater the degree to which the elements of garage, entry, and main visual orientation are orchestrated along the same facade, the greater the distinction between what is the back and what is the front of a house.

- The front yard of a house is not always the largest yard area although the new lot ought to be divided into similar proportions of back yard, front yard, and side yard as the existing.

- Less confusion arises over front yard - back yard relationships between properties if one's front yard does not directly face or border on another's back yard.

- The front and back distinction is quite clear in lots b, f, g.

- lots b, d, f, g are divided into outdoor yard areas in similar proportions to the existing modified lots.

- In order to set off the fronts of houses, a certain amount of yard space is assumed to precede the facade and belong to that given house. Given this, some confusion may arise over assumed property line location in lots c, d, f, g, h.

<u>Site 2, Drawing 2a.6:</u>

- In all cases, except the end lots, the garages, entries, and major visual orientation of the house occur on the same facade.

- The alternation of front and back from one side of the house to the other could cause some confusion as to the relation of the new houses to existing.

- However, it is impossible in this scheme to keep the front yards of the new houses from overlooking the back yards of the existing houses. The size of the front yards of the new and the back yards of the existing provide enough (over 20') physical space separation to offer some privacy between yard areas.

- The proportions of yard space of the new lots is similar to the yard space proportions of the existing modified lots.

- The front yards of the new houses provide sufficient setback from neighboring property lines to set off the front facades. This coincides with one's expectations that property ownership extends out from the front facade to sufficiently set off or present the front facade and house itself.

<u>Site 2, Drawing 2a.7:</u>

- Although the main visual orientation is on the opposite side of the house from the entry and garage, the consistency lends clarity to what could be considered front and back. In this case the main entry and garage could be considered the front of the house.
- In such a case the front yard does face on to the back yard of the existing house.
- The front yards of the new houses do have at least 20' within which to properly present the front of the house to the street.
- The proportions of yard space of the existing modified lots is not similar to the yard proportions of the new lots.

Site 3, Drawing 3a.7:

- Although the majority of the new houses have identifiable fronts, the full relationship of all the elements of garage, entry, and major visual orientation cannot be grasped fron any one vantage point. The existing houses obscure this relationship to some extent.
- The front yards of the new houses view directly into the backyards of the existing houses. In some cases the front yards are not only less than 20' (lots i, j, u), but the view is directly onto the parking apron of the existing house.
- In the majority of the cases, though, the front yard dimension is consistent with one's expectations of the depth required to set off the front facade.
- Although the lot sizes and shapes of the new and existing are similar, it is in those new lots where the new house is not of the same size, shape, and orientation that yard proportions of the new and existing are dissimilar (lots d, e, m, v, w, x, y, z).

7. House Rhythm, Spacing, and Massing

Site 1, Drawing 1a.7:

- The new houses do not replicate the existing houses in terms of orientation and massing.
- However, by occurring within the 60° visual alley envelopes, the new houses do replicate the spacing and depth of the existing houses.
- The massing, shape, and orientation of the houses carved out of the 60° visual alley envelopes is in part a product of just what lot shapes are possible within the block interior. This in turn is a function of the degree to which one respects existing lot lines and curb cuts. In lot a, the long narrow house oriented perpendicularly to the long direction of the lot provides a large, uninterupted yard area. If any other shape or orientation of house were used, the yard area would become partitioned into unusable spaces.
- The increments of built and open space are well within the guidelines mentioned before. The built increments are less than the existing, and the open increments are greater.

- There is, however, a lack of parity in the size of lot and house ownerships between the new and existing. In the existing context, however, rough parity was achieved.
- The new houses do not replicate the existing in terms of shape and size. Yet, by occurring within the envelopes circumsized by the 60° visual alleys, the spacing and rhythm of the new houses respects the spacing and rhythm of the existing.
- The increments of built space are less than the existing, and the increments of open space are greater than the existing.
- However, because the new houses are larger that the existing (depth wise), the new increments of built space may appear to be more equal to the existing increments of built space.
- The parity in the ownership of equal amounts of property investments exhibited in the existing context is replicated among the new lots. There is a slight lack of parity in the equality of house investments (size) between the new houses and the existing, however.

Site 2, Drawing 2a.7:

- The new houses do not replicate the existing in terms of shape and size. Yet, by occurring within the envelopes circumscribed by the 60° visual alleys, the spacing and rhythm of the new houses respects the spacing and rhythm of the existing.
- The increments of built space are less than the existing, and the increments of open space are greater that the existing.
- However, because the new houses are larger than the existing, the new increments of built space may appear to be more equal to the existing increments of built space.
- The parity in the ownership of equal amounts of property investments exhibited in the existing context in replicated among the new lots. There is however a gross lack of parity in property ownerships between the new and the existing modified lots.

Site 3, Drawing 3a.7:

- The new houses are more proportionately similar to their existing parent houses than in the preceding schemes. This appears to be due to the correspondence between new lot size and shape and 60° visual alley envelope location and shape.

- o The increments of built space are larger than existing, although not by 1/3. The increments of open space are smaller than existing although not by 1/3.

- o By occuring within the envelopes circumscribed by the 60° visual alleys, the spacing and rhythm of the new houses respects the spacing and rhythm of the existing.

- o The extreme lack of parity in the size of house ownerships in the existing context is represented and replicated in the new. Parity of lot ownership sizes is maintained however.

<u>8. House Volume and Lot Size (F.A.R.)</u>

<u>Site 1, Drawing 1a.7:</u>

- o If all houses are considered as of the same height, the F.A.R. relationships are the same as the coverages.

- o The coverages (and F.A.R.s) are similar between the existing houses on the unmodified lots and the new houses on the modified lots. The F.A.R.s of the existing houses on the modified lots exceeds the F.A.R.s on the other two lots.

Site 2, Drawing 2a.6:

- The F.A.R.s of the existing houses on the modified lots is similar to the F.A.R.s of the new houses on the new lots.

Site 2, Drawing 2a.7:

- The F.A.R.s of the existing homes on the modified lots exceeds by 62% the F.A.Rs of the new houses on the new lots. This is due to the very reduced lot size for the existing houses.

Site 3, Drawing 3a.7:

- The F.A.R.s of the existing houses on the modified lots is similar to the F.A.R.s of the new houses on the new lots.

9. Independent Operation of Automobiles and Independent Use of Yard Space

Site 1, Drawing 1a.7:

- The provision of a parking apron for the existing household allows for independent operation of automobiles by both households.

- Sufficient parking on the lot for accessory apartments in the new houses allows for independent auto operation.
- To the extent that the new houses do not overlook the yard spaces of the existing houses (and vice versa), independent use of yard space is possible (lots a, b, e, h). Unwanted, personal interaction can be avoided.

Site 2, Drawing 2a.6:

- The provision of a parking apron for the existing households compensates for the loss of their parking area due to the driveway extension, and it enables independent operation of automobiles by both households.
- Sufficient parking exists on the new lot for accessory units to allow for independent auto operation.
- Yard spaces are of sufficient dimension to prevent overlooking, facilitating independent use of the yards.

Site 2, Drawing 2a.7:

- Refer to the preceeding scheme.
- Because the major yard space and house orientation of the new houses does not border or even look on the back yards of the existing houses, relatively independent use of yard spaces for new and existing houses is maintained.

Site 3, Drawing 3a.7:

- Parking aprons, compensating for a loss of parking space due to driveway extensions, can be provided for the existing houses, although at times such aprons visually infringe on the new or/and existing house (lots e, j, n-x).
- Independence of auto operation is difficult to achieve in this scheme, particularly if accessory unit parking must be provided to the new lots (lots e, j, u, v).

Developmental Concerns

Site 1, Drawing 1a.7:

- The cooperation of four households is required in the development of these flag lots. The share of land that each contributes to form a new lot is disproportionate, particularly that household sacrificing land for a driveway extension and/or a completely new driveway.

- To more fairly equalize the land contributed by existing households, those not providing yard area for a driveway ought to sacrifice a greater portion of their back yard until rough parity is achieved.

- Due to the complexities in assembling land for lots and the necessary cooperation of adjacent, prospective builders, development may occur more expeditiously if a developer purchases land and asssembles lots. In this case flag lots with individual driveways may not expedite a developers plan as effectively as some other type of access method.

- If development was to occur on an individual basis, each prospective buyer would have to deal with four, existing households and two, adjacent prospective buyers.

- The existing households facing undue costs are those who sacrifice land for driveway extensions and whose back yards border on the front yards of the new houses.

- Alternating the location of flag lot driveways from one side of the block to the other, every other house, would have reduced the visual impact of four driveway extensions in a row along the public way.
- Not all houses are located to maximize the location of existing curb cuts (lots b, d, e).
- Individual driveways create a redundancy in access and parking areas and lend to contorted boundaries between lots that could have shared one driveway (lots d and e).
- The majority of the infrastructure is privately financed. Curb cut modifications and utility corrections in the street would probably all be privately assessed costs. The costs of the first 70' of driveway extension would be shared by the two owners concerned.
- Zero lot line development occurs in lots e and h. These lots are the smallest on the block. Through zero lot line development, one can consolidate two small, unusable yard spaces into one larger yard.

Zero lot line development may be difficult to achieve in a neighborhood in which it has never existed. Furthermore, zero lot line development runs contrary to the existing block visually.

Site 2, Drawing 2a.6:

- o To the extent that only two existing households need to cooperate to develop a rear lot house, and the fact that prospective builders do not have to cooperate with one another (the new lots do not violate side yard lot lines) results in development which can occur on a more or less individual basis and is more easily attainable that scheme 1a.7.
- o As in scheme 1a.7, a dispropotionate share of yard space is contributed to the new lot by those sacrificing their side yard space for driveway extensions.
- o Additional costs may accrue to those same existing lots due to the overlooking of the front yard of the new lot onto their backyard areas.
- o Not all houses are located to maximize existing curb cuts. This results in garage approach and turn-around areas that are larger than necessary

even to accomodate accessory unit parking.

- The redundancy of driveway access and parking turn-around areas is evident in lots b and i.
- The land resource is not fully utilized.
- Alternating driveway extensions from outside of the block to the other preserves a certain degree of streetscape character and reduces the inpact of many curb cuts in one row.
- Infrastructural costs would be the same as those mentioned in scheme 1a.7.
- The complexities and cooperation would be similar to that in scheme 2a.6 in which the cooperation of two existing households is required.
- Refer to schemes 2a.6 and 1a.7 for similar, applicable comments.
- The redundance of driveways is particularly apparent in those cases in which one existing lot must contribute yard space for two driveways (lots c-d, l-m, p-q).
- Infrastructural lengths are reduced, while a

greater number of units is provided vis-a-vis scheme 2a.6.

Site 3, Drawing 3a.7:

- All development can occur on an individual basis. No inter-lot cooperation is required between existing households or between prospective housesholds.
- The greater discrepency in size and shape of new houses is representative of the outcome of individual, entreprenuerial activity rather than an overall, developer consolidation of all interior block land.
- Because both sides of the block are developed and because all development lies within existing lot lines, there are no apparent disparities in costs or benefits from one lot to another.
- There is, however, a disparity in lot quality between the new house and its existing parent house. In order to provide a driveway extension to the rear lot, the existing lot must sacrifice its parking space and transfer this space to its backyard. In the majority of cases the back yard

is entirely consumed by a parking apron.

<u>Shared/Public Space and Private Space</u>

<u>Site 1, Drawing 1a.7</u>

- Shared, semi-private space occurs only within the first 50' of driveway entension (between new and existing households).

- If all new and existing houses contain accessory units, the yard areas and outdoor paved areas would be shared space. The amount of shared space inherently created by a flag lot development such as this is minimal and more or less equal between lots.

- The size and quality of private space is quite disparate, particularly when comparing the new lots with one another and the new lots with the existing, modified lots.

- Discrepencies in new house orientation result in differences between the quality of the privacy of existing and new house and yard spaces. Indoor and outdoor privacy is perhaps more easily attainable in lots a, e, h.

- o The orientation of the other new houses, focussing between existing houses, attain some measure of privacy for the front yards and back yards of the houses concerned. There is no direct in looking into front yards and back yards. Privacy is not attained to the degree that it is in lots a, e, h.

- o The side yard spaces of the new houses have greater privacy than either the front or back yard spaces.

<u>Site 2, Drawing 2a.6</u>

- o Shared, semi-private space occurs again within the first 70' of driveway. All of these shared spaces are of similar size and quality.

- o Half of the existing, modified lots do not contain any type of space shared with the new lots. This is the same for site 1a.7, and it is due to the need for driveway extensions only at every alternate lot.

- o Within each new lot, the yard and the parking area would be shared if each were to have an accessory unit.

- o The sizes and qualities of outdoor private areas for both the new and existing households are equal and generous. Sheer spatial separation provides an effective privacy buffer.

Site 2, Drawing 2a.7

- Shared, semi-private space occurs within 60'-70' of driveway. All existing lots (except the end lots) have this shared area, all of which are of similar size.
- If the front yard spaces of the new houses are considered to be located toward the interior of the block, all new lots have a similar modicum of privacy which is attainable due to the sheer spatial separation.
- The back yards of both the new and existing houses are minimal. However, neither new or existing houses face directly on to the back yard of neighbors. This allows some degree of privacy.

Site 3, Drawing 3a.7

- Shared, semi-private space occurs within the first 60'-70' of driveway. All existing lots (except corner lots) have this shared space all of which are of similar size.

- The quality and size of the back yard spaces of the existing houses is quite reduced by direct overlooking from the new houses and by the parking aprons. Similarly, the size and quality of the front yards of the new houses is reduced. Direct in looking into houses is more likely in this scheme than in scheme 1a.7.
- The size of back yard spaces is relatively equal and privacy more easily attainable.
- Sheer spatial separation may not provide adequate privacy in any outdoor yard area which is less than 20' in depth.

<u>Infrastructure</u>

(All infrastructure quantities are expressed in terms of units/s. f. of lot area or units/lot.)

<u>Site 1, Drawing 1a.7</u>

<u>Grade A infrastructure:</u>

- <u>Curb Cuts and Driveway Aprons:</u>

  5 or <u>.6/lot</u>

Utilities:

o 800 l.f. or $\frac{880}{46400}$ = .02 l.f./s.f.

Grade B infrastructure:

Paving:

o 13,200 s.f. or $\frac{13200}{46400}$ = .28 s.f./s.f.

Site 2, Drawing 2a.6

Grade A infrastructure:

o Curb Cuts and Driveway Aprons:

10 or 1/lot

Utilities:

o 1680 l.f. or $\frac{1680}{130{,}000}$ = .01 l.f./s.f.

Grade B infrastructure:

Paving:

o 34,660 s.f. or $\frac{34{,}660}{130{,}000}$ = .266 s.f./s.f.

Site 2, Drawing 2a.7

Grade A infrastructure:

- <u>Curb Cuts and Driveway Aprons:</u>

  12 or $\frac{12}{18}$ = .666/lot

<u>Utilities:</u>

- 1930 l.f. or $\frac{1930}{240,000}$ = .008 l.f./s.f.

<u>Grade B infrastructure:</u>

<u>Paving:</u>

- 32,400 s.f. or $\frac{32,400}{240,000}$ = .135 s.f./s.f.

<u>Site 3, Drawing 3a.7:</u>

<u>Grade A infrastructure:</u>

- <u>Curb Cuts and Driveway Aprons:</u>

  5 or $\frac{5}{26}$ = .20/lot

<u>Utilities:</u>

31,320 l.f. or $\frac{3,120}{117,000}$ = .026 l.f./s.f.

<u>Grade B infrastructure:</u>

Paving:

o 36,600 l.f. or $\frac{36,600}{117,000}$ = .31 s.f./s.f.

Infrastructure Summary:

In general, the more densely built the block the greater the repetition of infrastructure (the greater the units/s.f.). Site 3 exhibits the greatest number of units of infrastructure per s.f. of lot area. Therefore, the more densely built the the environment the greater the costs are for individual lot by lot development. Similarly, the greater the savings that can be achieved by combining utilities and paving.

Scheme 2a.7, which is suprisingly not the least dense of all the schemes (2a.6 is), makes the most effective use of infrastructure.

Site Comparisons and Compromises:

If we consider only the new houses proposed in each scheme, scheme 3a.7 produces 26 houses with 5 accessory units for a total of 31 units. The total housing s.f. is 27,560. The average coverage of all houses is 23.5%.

In scheme 2a.7, 18 houses are produced each with an accessory units for a total of 36 units. The total housing s.f. is 33,534. The average coverage of all houses is 17%.

In scheme 2a.6, 10 houses are produced each with an accessory unit for a total of 20 units. The total housing s.f. is 20,000. The average coverage of all houses is 14%.

In scheme 1a.7, 8 houses are produced each with an accessory apartment for a total of 16 units. The total housing s.f. is 12,400. The average coverage of all houses is 24%.

Scheme 2a.7 produces the greatest number of total units at moderate coverage while making the most effective use of the new infrastructure. Full closure of the visual field does not occur from any of the vantage points considered, and the increase in the percentage of the visual field that is filled is well within the limit stipulated (the average of the norm and 100%) from any vantage point except F.

Because the size, spacing, and location of the new houses has been determined by the size, spacing, and location of the existing houses, the spatial form of the new houses will reflect the regularity (or lack thereof) of the existing spatial context. This, combined with repetitive lot shapes and sizes contributes to repetitive increments of property ownership in the new situation. In scheme 2a.7, however, the site is still developed with a less than optimal number of new units. While sacrificing a certain strength of identity of the front facade, by separating the main visual orientation of the house from the entry and garage, the relationship is consistent and preserves some privacy for whatever back yard space remains for the existing houses.

In general, for all schemes in which the new houses are visible between the existing houses, some visual permeability through the block is sacrificed for a clarity and identifiability of each house as a distinct, autonomous property. In all cases and schemes, the existing houses on the opposite side of the block are no longer apprehendable as individual objects. Also, the less repetitive the new houses and new properties become, the greater become the disparities in the costs and benefits from one property to another. That is, the greater the disproportions in coverage, usability of yard space, length of access and easements, and the nature and extent of private space become the less equally the costs and benefits are shared. Flag lot development (because it occurs on individual basis) tends to perpetuate these disparities.

Consolidation Scheme Analysis

Consolidation Option Two:

Flag Lots

Flag Lots

There are two differences between the following schemes and the previous set of schemes. One, the intent is not to specifically locate the new houses with respect to visual field criteria. Two, the intent is to control for house size and not to let the house size be determined by visual criteria in this case. Schemes 2a.6 and 2a.7 are reconsidered in with these new schemes in their unaltered state, however, because it was reasoned that new flag lot developments, with house size and location controlled according to functional arrangement (rather than visual criteria), would not differ substantially in terms of functional arrangement or site impact. (Although in scheme 2a.7, all lot sizes could become more equal.) Given the spaciousness of the site, a decrease in the footprint size from 2000 s.f. and 1863 s.f. to 1000 s.f. would not physically challenge the site or produce a different set of constraints.

The house sizes in site one and three are 1000 s.f. The garages are 250 s.f. each. All new houses are just large enough for subdivision into accessory units.

Discussion:

Site 1, Drawing 1a.9

All development occurs within existing, side yard boundaries. The new lots, however, straddle rear lot lines. New lot lines are placed equidistantly between old and new houses. New lots and existing modified lots are all roughly equal in size. A parking apron is required to replace the parking area for the existing house that was taken over by the driveway extension.

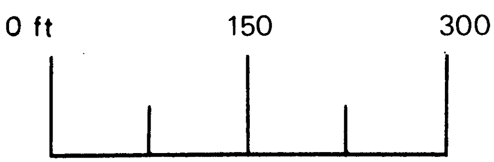
Parking for the new house, accessory units occurs on the new lot. Parking for those accessory units that are within existing houses is assumed to occur on the street.

Site 2, Drawing 2a.6 and 2a.7

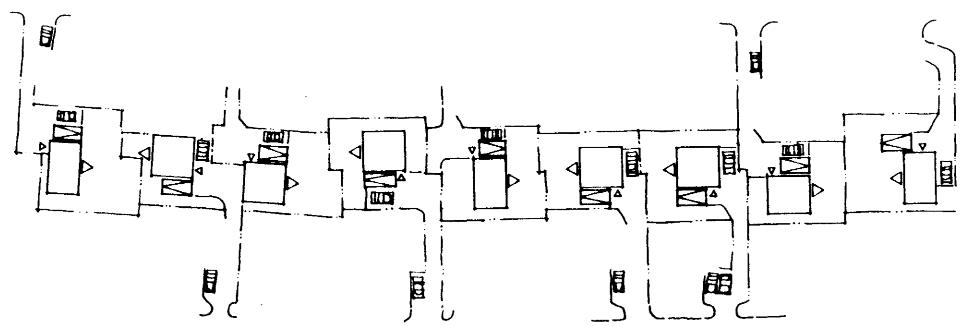
Refer to the discussion in the previous section.

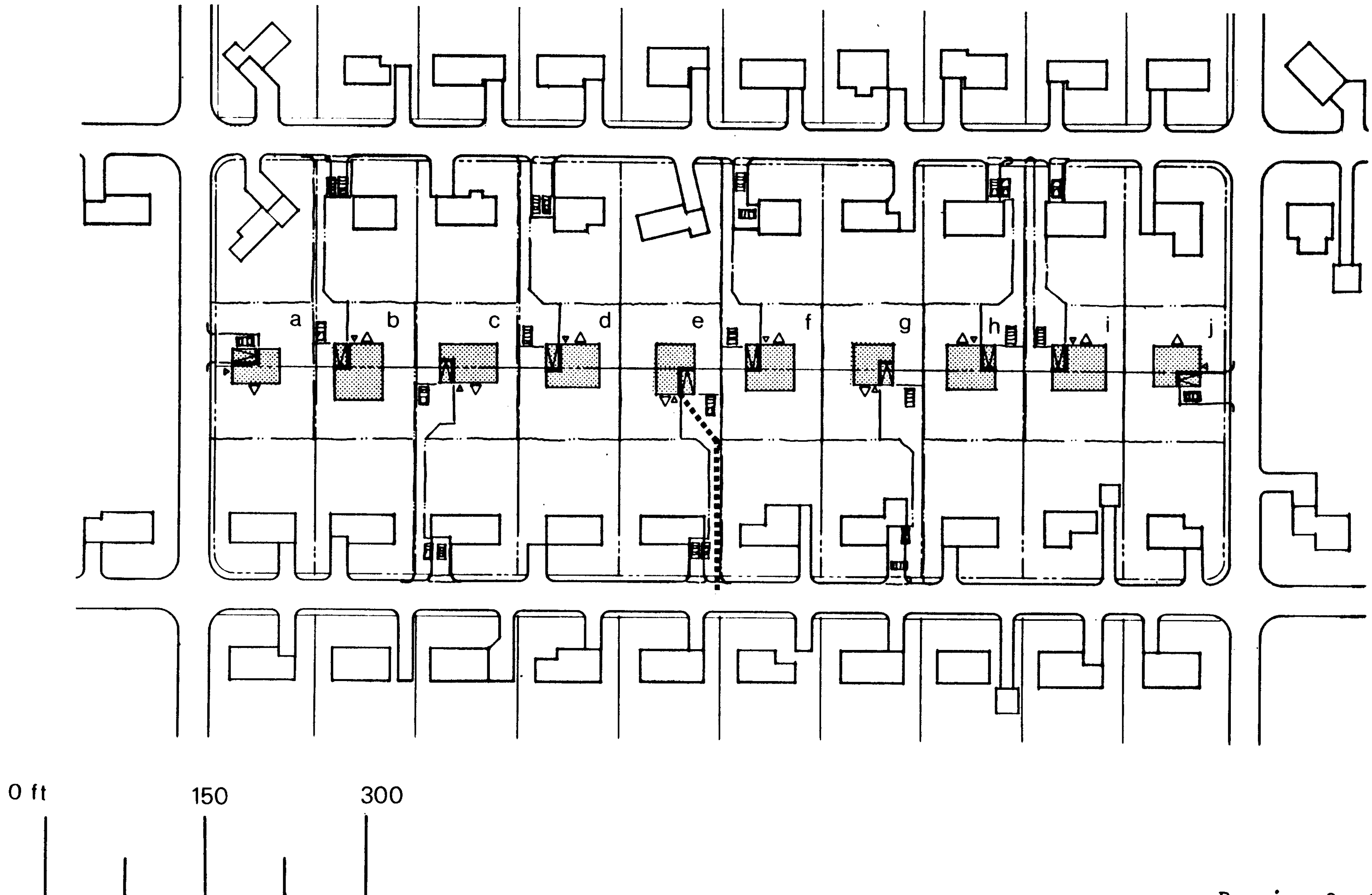
Site 3, Drawing 3a.9

All development occurs within existing lot lines. New lot lines between old and new houses are placed to keep the parking apron for the existing houses at least 20' away from the new and old houses. Parking for accessory units that are within the new houses must occur in tandem behind garages in all cases except lots b, d, l, m, z.

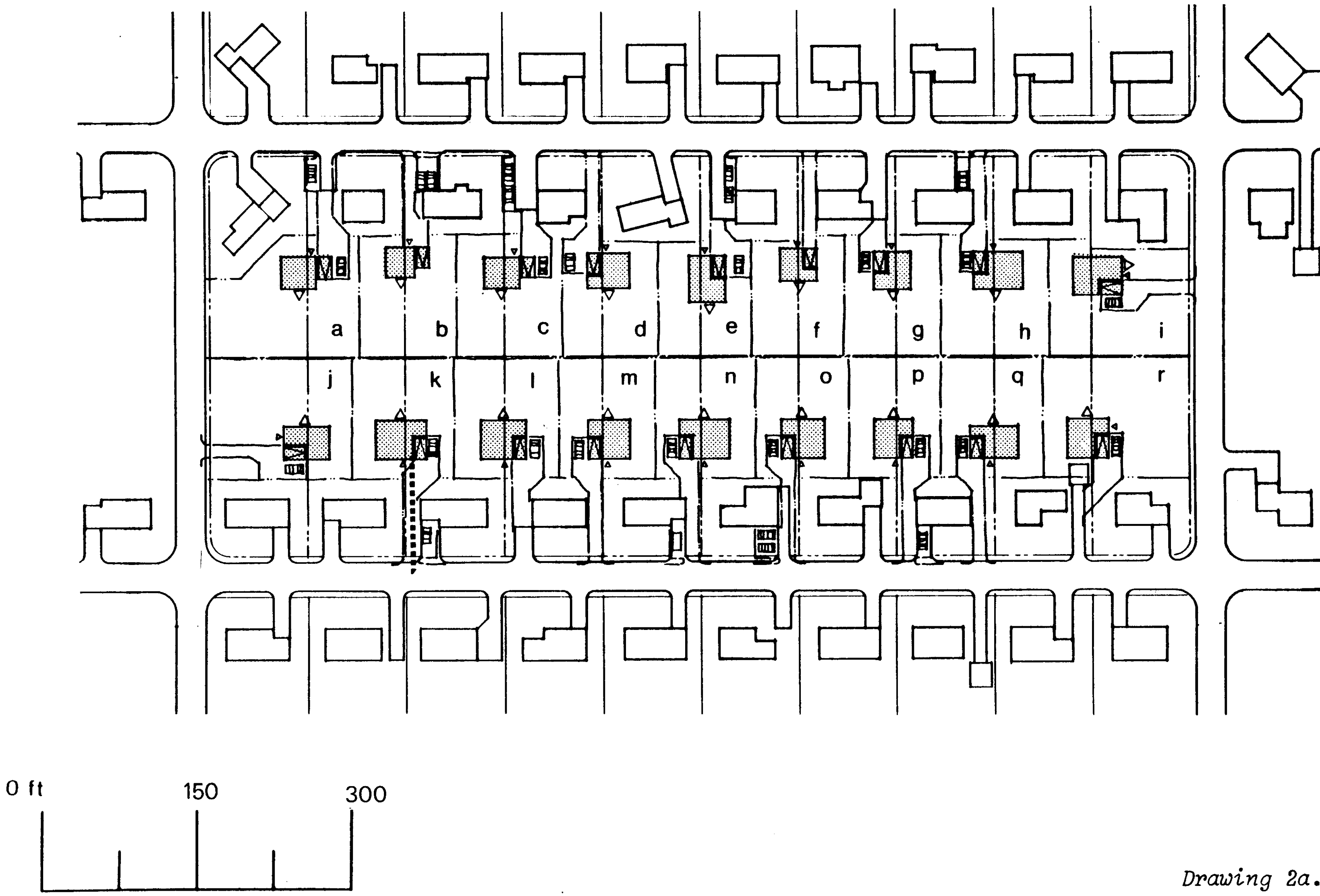


Drawing 1a.9



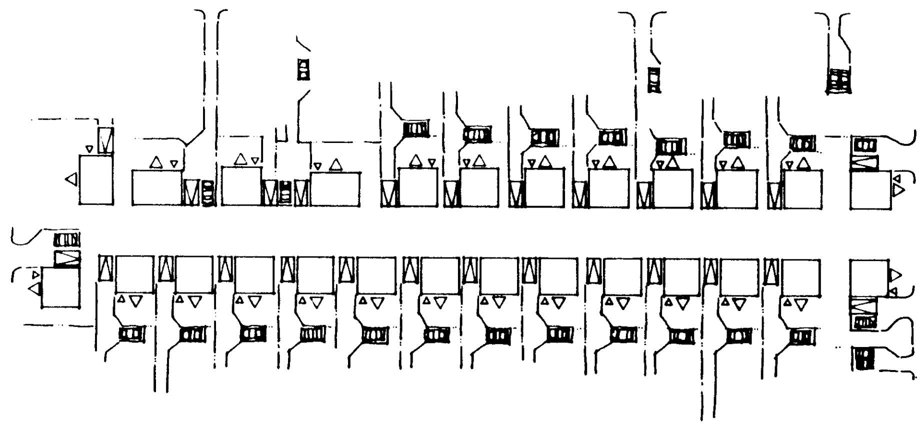


Drawing 2a.6



Drawing 2a.7

Drawing 3a.9



* footprint size in s.f.

b house plus garage

		coverage			lot size in s.f.			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1 1a.9	existing	17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
	new				5850	6500	4800	1250	b 1250	b 1250	34	50	20	8	15	0					85'	70'		
site 2 2a.6	existing	8	10	7	20000	20000	20000	1600	1950	1350		35	30	40	60	35	28'	48'	1000'	415'	200'	100'		
	new				13000	13000	13000	2000	2640	1470	45	55	40	27	32	20					130'	100'		
site 3 3a.9	existing	10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		
	new				4100	6375	3250	1250	b 1250	b 1250	25	45	10	5	8	0					80'	50'		

Chart 7

* footprint size in s.f.		coverage			lot size in s.f.			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1		17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
site 2 2a.7	existing	8	10	7	20000	20000	20000	1600	1950	1350		3 5	30	40	60	35	28'	48'	1000'	415'	200'	100'		
	new				12000	13000	11500	1863	2585	1150	65	70	55	28	35	22					120'	100'		
site 3		10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		

Chart 8

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1 1a.9	existing	17	28	14							394'	66'		245'	31'		85 99	92	68 84	78	67 89	78	71[a]	71[a]
	new				28	35	21	17	21	14	275'	30'	- 60%	450'	50'	+ 61%	77 93 98	89	68 79 89	78	74 85 95	85	73 93	83
site 2 2a.6	existing	8	10	7							550'	55'		414'	46'		72 89	80	60 85	72	61 88	74	58[a]	58[a]
	new				13	15	12	15	19	12	470'	47'	- 14%	481'	53'	+ 15%	71 95 98	88	56 81 91	76	62 91 100	84	52 92	72
site 3 3a.9	existing	10	18	8							347'	29'		253'	23'		74 91	82	74 91	82	69 84	76	62[a]	62[a]
	new				20	30	14	29	34	20	540'	45'	+ 55%	60'	5'	- 78%	74 98 100 100	93	74 93 100 100	92	70 98 100 100	92	90 100 100	97

Chart 9

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1	existing																85 99	92	68 84	78	67 89	78	71[a]	71[a]
	new																							
site 2 2a.7	existing	8	10	7							550'	55'		414'	46'		72 89	80	60 85	72	61 88	74	58[a]	58[a]
	new				21	24	17	13	17	8	406'	45'	- 18%	453'	57'	+ 24%	83 97 99	93	59 89 94	81	68 89 99	85	52 82 98	77
site 3	existing																74 91	82	74 91	82	69 84	76	62[a]	62[a]
	new																							

Chart 10

Environmental Performance Summary[3]

(Refer to the previous set of schemes for applicable comments for schemes 2a.6 and 2a.7. They will not be repeated in the following analysis.)

The average, new house size in scheme 1a.9 decreases by 19% from scheme 1a.7, and the average new lot size increases by less than 1%. However, the coverage decreases by only 1%. In scheme 3a.9, the average lot size remains the same compared with scheme 3a.7. The coverage of the new houses increases by 7% however.

Because the new houses are smaller in scheme 1a.9 and because they do not visually fall between existing houses, the percentage of the visual field that is filled by new construction falls substantially, particularly in column G. Perhaps because these new houses are located behind existing houses we notice an increase in the percentage in column I. In all columns, except column I in scheme 1a.9, the new houses contribute less to the visual field than did the existing houses in the existing context.

The reverse is generally true for scheme 3a.9. Increases in the average (new) percentages of the visual field filled occurs from all vantage points except column F. The stipulated limit (the average between the norm percentage and 100%) is breached in all cases. All garages are now attached to the houses, closing up remaining visual alleys though the block.

Due to the larger sized new houses in scheme 3a.9 and the location of the new houses behind the existing houses in scheme 1a.9, the visual permeability around new construction is such that each house is not fully apprehendable as an entity from any one vantage point. Greater visual permeability is however provided in scheme 1a.9 than in 1a.7, from the vantage point between the existing houses.

With the new and existing houses located so closely together in scheme 1a.9 and with no view possible between existing houses, looking from the new houses, the major orientation of the new houses is down the center of the block. Garages and main entry areas are also not directly visible from the street, being tucked behind the existing houses. The new houses not only do not have a strong front side and a clear distinction between front and back, but they also do not relate to the public way in the same manner as the existing houses. The functional necessities of garage and parking apron location sacrifice these aspects of environmental performance in scheme 1a.9.

In scheme 3a.9, the new houses have a strong front side, and they relate to the public way in a manner similar to the existing houses. Being generally larger than their parent houses and contributing a greater percentage of built increments to view than in scheme 3a.7, the front side of the new houses in scheme 3a.9 may be more readily apprehended than they are in scheme 3a.7.

The consistency of the relationships between the new houses in scheme 3a.9, however, is not representative of the inconsistencies among many of the existing houses.

With the overall increase in new house size in scheme 3a.9, there is a 55% increase in the amount of built frontage vis-a-vis the existing context. Concomitantly, there is a 78% decrease in the open area between the new houses.

With a decrease in house size and the orientation of new, long, rectangular houses perpendicular to the alignment of existing houses, there is a 60% decrease in the built frontage of the new houses compared to the existing houses. Concomitantly, there is a 61% increase in the amount of open space between houses. For schemes 1a.9 and 3a.9 there is an overall parity in the sizes of property ownerships among new houses and lots (except lot b in 1a.9). There are however, discrepencies in the size of property ownerships between new and existing houses in both schemes. In scheme 1a.9, however, the variation in size and shape of existing houses is reflected in a variety of lot shapes, some more practicable than others (such as lots a, f, g, h, i).

The F.A.R. relationships between new and existing houses and lots is not on par in either scheme 1a.9 or 3a.9. The F.A.R.s of the existing houses on their modified lots in scheme 1a.9 is over 50% greater than the F.A.R.s of the new houses on their lots (assuming that all houses are of the same height).

In scheme 3a.9 the reverse is true. The F.A.Rs of the new houses on their new lots is almost 50% greater than the F.A.Rs of the existing houses on their modified lots.

The proportional sizes of yard space vary substantially between the new houses, the lots themselves, and the existing houses on their modified lots in scheme 1a.9. Much greater clarity and consistency of yard proportions exists in scheme 3a.9 between the new properties themselves and the existing.

The increase in house size in scheme 3a.9, to enable accessory units within the new houses, ironically prevents the development of separate parking aprons for accessory units. Furthermore, the on-street parking schemes that provide some type of screening for the parking, provide only enough parking places to accomodate the accessory units in the existing houses. The only area left for accessory unit parking for the new houses in scheme 3a.9 is in front of the garages. This disrupts the independent operation of cars. On the other hand, scheme 1a.9 provides quite adequate on lot parking for new house accessory units.

Both schemes enable independent operation of automobiles for the new house and its parent, existing house. Although, in scheme 3a.9, this results in a certain loss of quality of the backyard space of the existing house.

Independence of the use of the major yard areas, in scheme 1a.9, is relatively assured in most cases (except lot b). This is facilitated by activity orientation away from the back yards of existing houses and by the existence of a major yard area that has a depth of at least 20'. With backyards facing front yards and with minimal dimensional separation between them, a certain loss of independent use of these yard spaces is assured.

Developmental Concerns Summary

(Refer to the previous set of schemes for applicable comments. They will not be repeated in the following analysis.)

Because the cooperation of only two households is required in scheme 1a.9 and because no cooperation is required between prospective households, scheme 1a.9 is perhaps easier to achieve developmentally than scheme 1a.7. However, neither scheme would be as easy to develop, in this respect, as scheme 3a.9 in which all development can occur on an individual basis. For both schemes, however, cooperation is required in the development of the driveway extension. Lots l, m, and z are the easiest to develop because of no need for cooperation in driveway extension.

The location of existing curb cuts in an irregular fashion in scheme 1a.9 prevents rigid adherence to a pattern of driveway extensions that alternate from one side of the block to the other (lots f, g, h, i). To more fairly equalize the land contributed by existing households, those not providing yard area for driveway extensions in scheme 1a.9 ought to sacrifice a greater portion of their back yards.

In scheme 1a.9 the lack of cooperation between prospective households results in the perpetuation of the jogged side yard lot lines in the new lots. As a result, some new lots suffer from a lack of quality, outdoor areas (lots b and c). Also, such lack of cooperation results in the inability to redistribute anomolous pieces of land and redundant garage approach areas (lots b, c, d, e, g, h).

Shared/Public and Private Space Summary

(Refer to the previous set of schemes for applicable comments.)

Shared, semi-private space occurs only within the first 40' of driveway in schemes 1a.9 and the first 100' in scheme 3a.9. The proportion of shared space to private yard space is greater in scheme 3a.9 than scheme 1a.9.

The amount and quality of private space varies considerably among the new houses in scheme 1a.9 and among the new and existing houses. The amount and quality of private space is more regular in scheme 3a.9, although the overlooking of back yards and front yards and the intrusion of parking aprons reduces the quality of these spaces.

Infrastructure:

(All infrastructural quantities are expressed in terms of units/s.f. of lot area or units/lot).

Site 1, Drawing 1a.9:

Grade A infrastructure:

Curb and Cut Driveway Aprons:

7 or .7/lot

Utilities:

1080 l.f. or $\frac{1080}{52,650}$ = .02 l.f./s.f.

Grade B infrastructure:

Paving:

21,600 s.f. or $\frac{21,600}{46,400}$ = .465 s.f./s.f.

Site 2, Drawings 2a.6 and 2a.7:

Refer to the previous set of schemes.

Site 3, Drawing 3a.9:

Grade A infrastructure:

Curb Cuts and Driveway Aprons:

7 or .27/lot

Utilities:

16,070 l.f. or $\frac{16,070}{46,400}$ = .35 l.f./s.f.

Grade B infrastructure:

Paving:

30,450 s.f. or $\frac{30,450}{46,400}$ = .66 s.f./s.f.

Infrastructural Summary:

All utilities are assumed to be placed within the driveway easement. As in the prior set of schemes, those sites with lower coverage made the more efficient use of infrastructure on a per square foot basis. This is true only to a point however. Remember that although scheme 2a.6 had the lowest coverage, it did not make as efficient use of infrastructure as did scheme 2a.7. Furthermore, the greater the number of individual properties within a given area, the more they can collectively profit from combined easements.

Site Comparisons and Compromises:

In general, with flag lots, each owner may choose when to subdivide his lot without reliance on the other owners. Flag lots provide quiet house sites away from traffic. Although if the house does not view the street directly (that is, straddling side yard lot lines) and is isolated from the public way, the household gains no status from being connected with the public way, and such households may not view themselves as having as equal a status in the community as those directly fronting on the public way. By using existing curb cuts, flag lots pave over a minimal amount of surface area, and the drives are scaled to use. Although in physically dense settings, such paving becomes redundant.

However, driveway strips on both sides of an existing home means some noise and invasion of privacy. The relationship of the existing home rear yard to the front yard of the new house can mean some loss of privacy for both households. This is mitigated somewhat if the new houses are situated visually between existing houses, and therefore view upon existing side yards and the public way.

Scheme 1a.9 produces 9 units, each with accessory apartments for a total of 18 units and a total housing square footage of 9000 s.f. The average coverage on the block of all houses is 23%. Each lot is able to provide accessory unit parking.

Scheme 2a.6 produces 10 houses, each with an accessory unit for a total of 20 units. The total housing s.f. is 20,000. The average coverage of all houses on the block is 14%. Each lot is able to provide accessory unit parking.

Scheme 2a.7 produces 18 houses, each with an accessory unit for a total of 36 units. The total housing square footage is 33,534. The average coverage of all houses is 17%. Each lot is able to provide accessory unit parking.

Scheme 3a.9 produces 26 houses, each with an accessory unit for a total housing s.f. of 26,000 and a total of 52 units. The average coverage on the lot of all houses is 24%. However, few lots are able to accomodate accessory unit parking.

Although scheme 3a.9 provides the greatest number of total units for the least number of total s.f. of built area, it does the least to optimize the use of infrastructure (followed by schemes 1a.9 and 2a.6). Scheme 2a.7 provides the second highest number of total units for the highest number of total built square footage while optimizing the use of infrastructure -- the fact that the more spacious a site becomes, the larger the size of units that can be constructed while relying essentially on the same amount of infrastructure.

Furthermore, the new houses in scheme 2a.7 are built quite closely to the public way. Their proximity and high visability to the public way; their orientation of private yard space toward the block interior away from view and overlooking conflicts with existing properties; the relative equality of property ownerships and built-open increments among the new houses; and the relative consistency of the facades facing the public way (although with a certain loss of strength and lack of replication of the existing houses due to the lack of the main orientation of the house to the public way) are all positive attributes of scheme 2a.7.

Scheme 2a.7, however, sacrifices the back yard space of the existing homes, resulting in a disproportion in the size and quality of new and existing modified yard spaces. A certain degree of visual permeability is maintained through the site although the houses on the opposite side of the block are obscured partially due to the location of the new houses so close to the public way, visually situated between existing houses.

Consolidation Scheme Analysis

Consolidation Option Three:

Alley Access

Alley Access:

Inadequate lot depth in Site 1 requires that all new development straddle the rear lot lines, precluding the use of alley access in this scheme.

Site 2 is developed to its optimum number of units as defined by the 60° visual alley envelopes in scheme 2a.9. This scheme is controlled for house location within these envelopes and not for house size. This scheme is a continuation of schemes 2a.7 and 2a.8.

Site 3, in scheme 3a.10, is controlled for house size as a continuation and modification of scheme 3a.9.

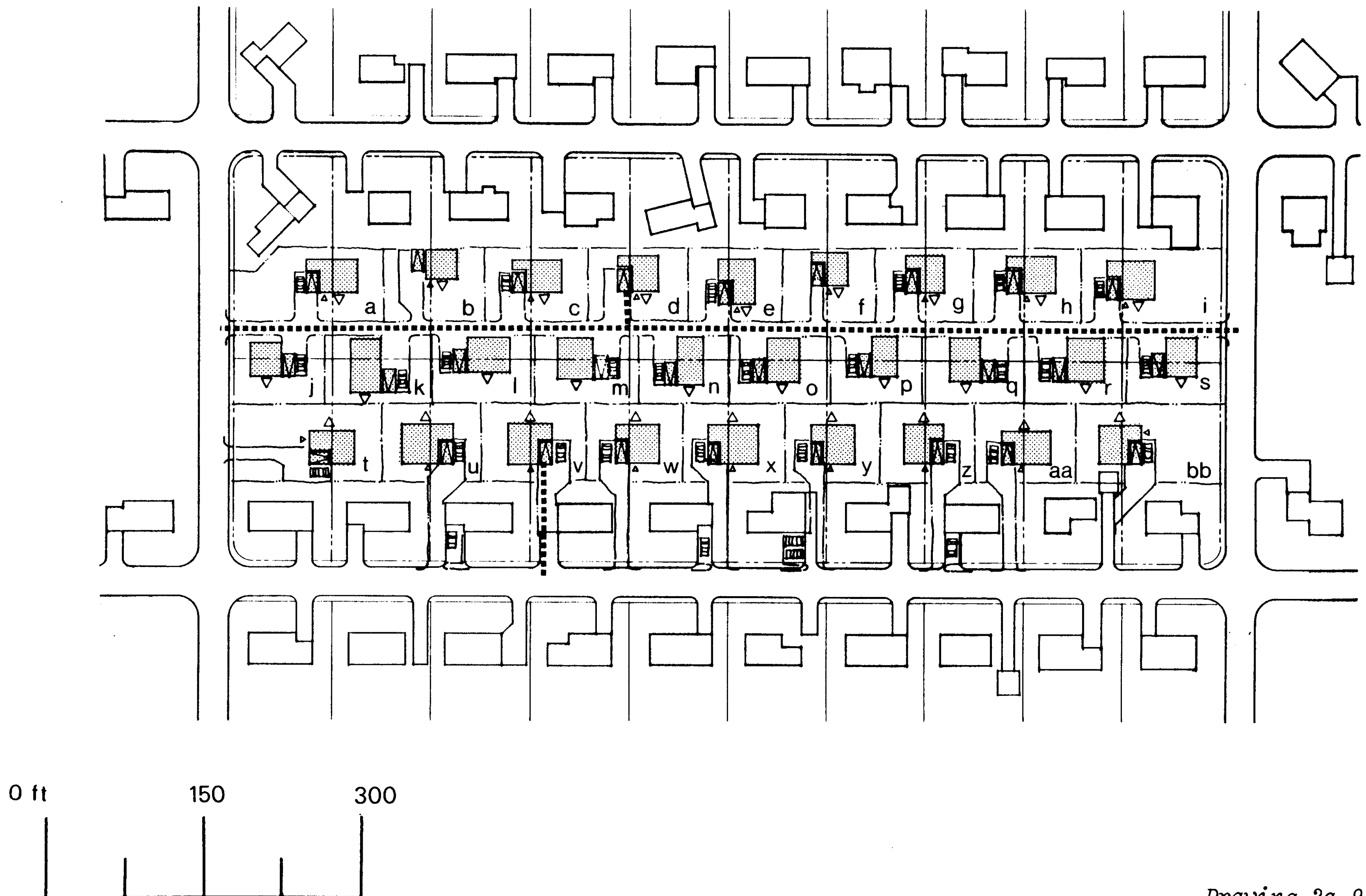
Discussion:

Site 2, Drawing 2a.9:

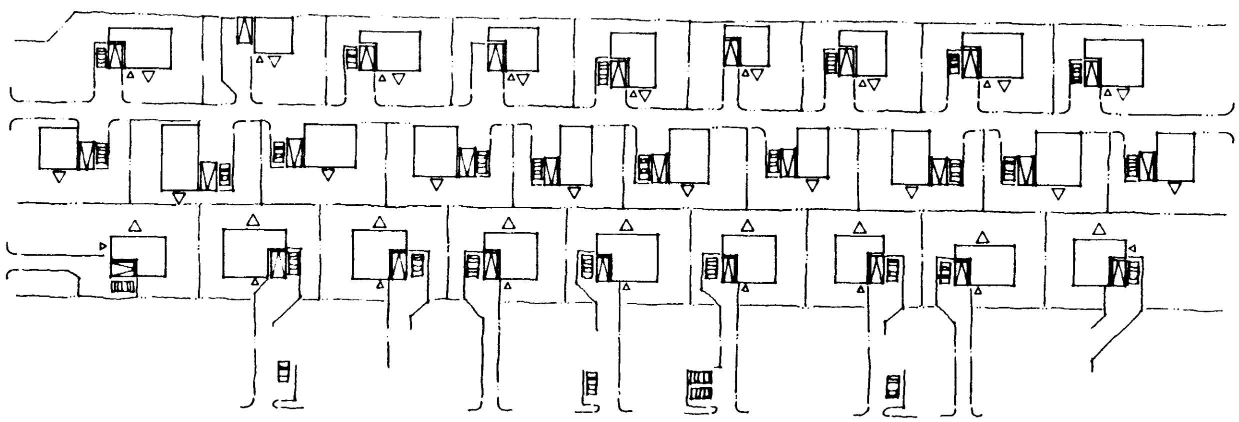
This scheme combines the house layouts of schemes 2a.6 and 2a.7, creating an interior, isolated row of houses difficult to access by the traditional flag lot process. The bottom row of houses is still accessed as per scheme 2a.7. The orientations of the two outside rows of new houses remain as they were in scheme 2a.7. Only two, new houses are too small to be subdivided into accessory units -- lots b and f. The view of all new houses is between houses. No houses face one another directly.

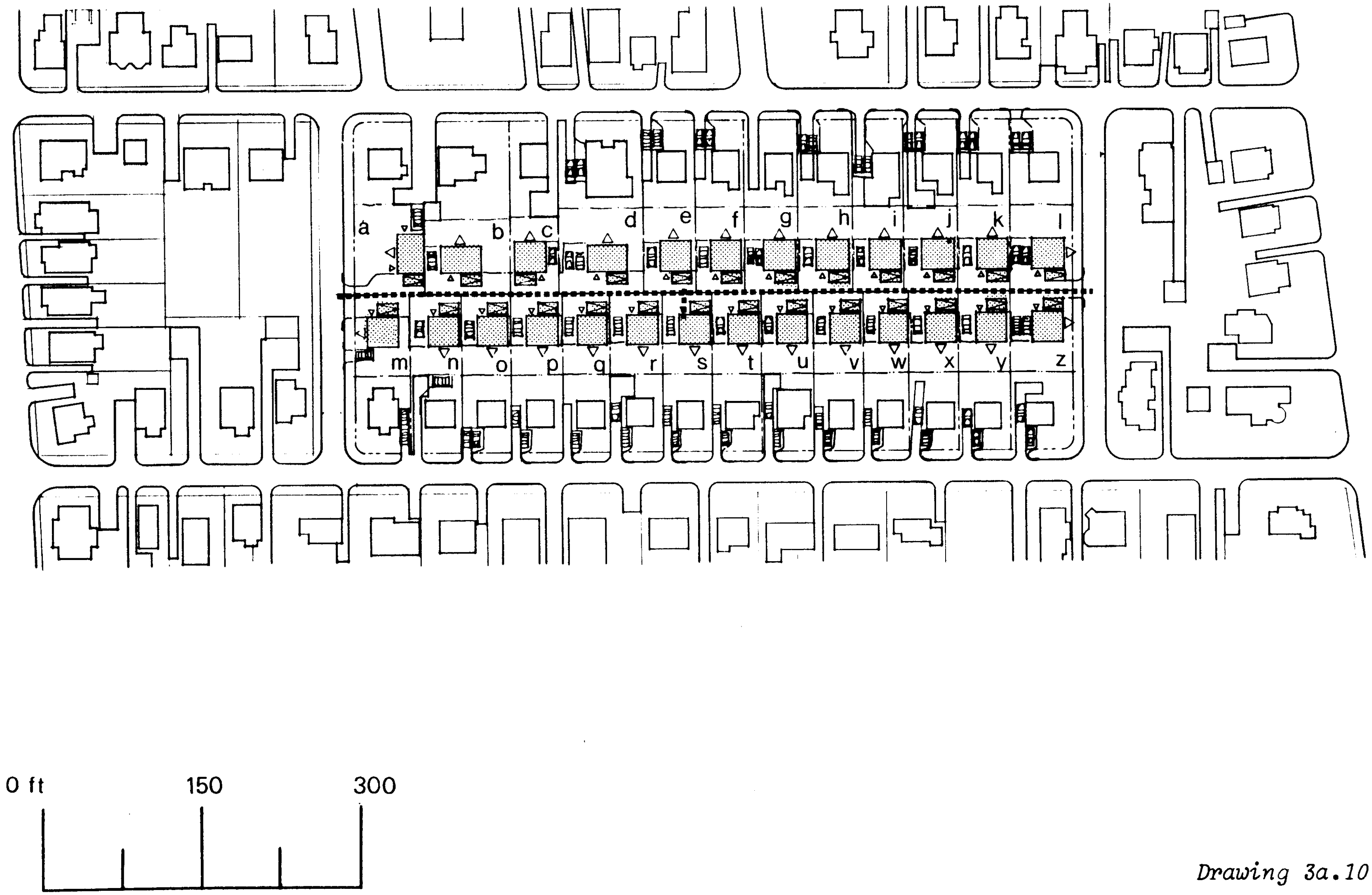
Site 3, Drawing 3a.10:

The intent here is to still provide 1000 s.f. houses, but to open up the side yard for accessory unit parking. The intent is to also provide a maximum degree of physical separation of the new from the old and a major yard area upon which the new houses can view. In this case the alley is much like a typical alley in that the house turns its back to the alley. By maximizing the space between new and existing, the garage and house directly front the alley. Placing the garages parallel to the alley, however, necessitates one way travel on the alley (proceeding from left to right).

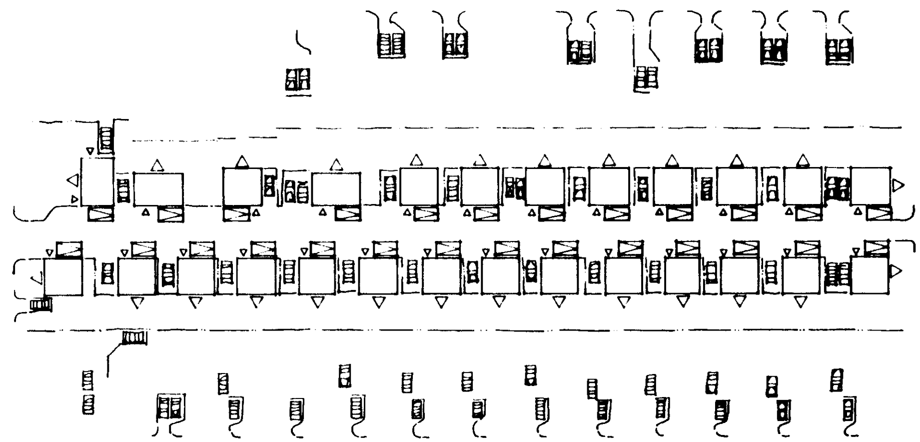


Drawing 2a.9





Drawing 3a.10



* footprint size in s.f.

		coverage			lot size			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1		17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
site 2 2a.9	existing	8	10	7	20000	20000	20000	1600	1950	1350		35	30	40	60	35	28'	48'	1000'	415'	200'	100'		
	new				7266	8000	6800	1954	2640	1150	25	40	15	29	35	23					100'	65' 70' 80'		
site 3 3a.10	existing	10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		
	new				3900	5525	3500	1000	1000	1000	30	30	30		18	3					70' 75'	55' 50'		

Chart 11

[b] from scheme 2a.7

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1	existing																85 99	92	68 84	78	67 89	78	71[a]	71[a]
site 1	new																							
2a.9	existing	8	10	7							550	55		414	46		72 89	80	60 85	72	61 88	74	58[a]	58[a]
site 2	new				21	24	12	22	33	9	406[b]	45	- 18%	453[b]	57	+ 24%	85 96 97 97 99	95	59 92 100 100 100	90	65 90 97 98 99	90	52 70 90 99	78
3a.10	existing	10	18	8							347	29		253	23		74 91	82	74 91	82	69 84	76	62[a]	62[a]
site 3	new				22	36	15	28	31	17	344	34	+ 17%	227	21	- 9%	74 96 97 99	92	74 90 97	87	69 88 93 95	86	76 92 100 100	92

Chart 12

Environmental Performance Summary:[4]

The average new lot size drops 45% from scheme 2a.6 and 40% from scheme 2a.7. Coverage increases 50% over schemes 2a.6 and 29% over scheme 2a.7. Compared with scheme 2a.7, there is a rough parity in lot coverages among new and existing modified lots.

Average, new lot size in scheme 3a.10 drops 5% over scheme 3a.9. The coverage of existing houses increases somewhat, and the coverage of new houses remains roughly the same. This phenomenon is probably due to the fact that the average, existing house size is smaller than 1000 s.f., leading to a greater impact on coverage when lot size changes. There is a slightly greater parity of coverage between existing houses and new than in scheme 3a.9.

The percentage of the visual field filled in scheme 2a.9 increases over scheme 2a.7 from all vantage points, (from 1% to a maximum of 11%) particularly, and not unexpectedly, from the vantage point between existing houses (column G). In column I, however, the increase is slight due in part to the fact that the contributions to the visual field of the first and second row of new houses in scheme 2a.10 is less than the contributions of the back row of new houses and the back row of existing houses in scheme 2a.7. In scheme 2a.10 complete closure of the visual field is attained only from the vantage point represented in column G.

The increase in the percentages over the site norm is greater than the stipulated limit of 50% of the difference between the norm and 100% except in column I.

In scheme 3a.10, the percentage of the visual field filled decreases over scheme 3a.9 by as little as 3% and by as much as 7%. Complete closure on the visual field occurs only in column I, the vantage point that does not benefit to the same degree as the others by the aligned space between existing and new houses. The existing houses on the far side of the block contribute only 2% to the visual field from most vantage points.

From all vantage points in scheme 3a.10, visual permeability through the lot is attained to a degree greater than in scheme 2a.9. Visual permeability on a 60° diagonal in scheme 2a.9 is not reflected in the figures however.

Only the front rows of new houses in scheme 2a.9 are identifiable as separate entities from any one vantage point. The houses behind this first row are not identifiable as separate entities from any vantage point. In scheme 3a.10 the front row of new houses is more readily identifiable as composed of distinct, discrete units from any one vantage point than scheme 3a.9 due to the fact that the new houses are moved farther back on the lot. Because the new and existing properties are separated to a greater degree in scheme 3a.10 that 3a.9, each property maintains its individual indentity as one ownership unit. In no case however are the houses behind these readily distinguishable as separate entities.

Both schemes lack well defined fronts due to the location of the garages, entries, and major orientation on different facades. In 3a.10, however, such orientation and facade definition more closely matches the existing situation in which garages are not part of the context anyway. Although lacking the well defined front facade, the location of the new houses, such that they are directly visible from the public way, gives them greater identity with the public way vis-a-vis the new houses in scheme 3a.10. However, the alley location necessitates that the garages of the top row of new houses face the alley because the fronts (vis-a-vis scheme 2a.7), and their backs now face the public way.

The orientation of major view and the front yards of each of the new houses is directed toward the lot interior in scheme 2a.9. There are no back yard-front yard conflicts with the existing houses. The major views and orientations of the new houses in scheme 2a.9 are directed between houses on to one anothers' side yards, mitigating somewhat the relative proximity of one house to another and alleviating somewhat the overlooking of one front yard into another. The alley provides some physical barrier between the backs of the middle row of new housing and the front yards of the top row of new houses. The assymmetry produced by three rows of houses and two types of access methods in one scheme results in an inconsistent back to front definition from one row of new houses to another in scheme 2a.9.

The back to front definition (although weak) in scheme 3a.10 is consistent and predictable. Some back yard-front yard conflict may occur between the new and existing houses mitigated to some extent by the relatively large front yards of the new houses.

As observable from the public way, the yard spaces of the new and existing houses in both schemes are divided into similar proportions of yard area although the side yards of the new houses in scheme 3a.10 are reduced somewhat due to the larger than existing house size.

The front yards of the new houses in scheme 3a.10 are of sufficient depth to set off the facade (the major house orientation). This coincides with one's expectations that property ownerships extend out from the front facade to sufficiently set off or present the house. In scheme 2a.9, the first row of new houses view into the block interior, and do not present their main orientation or front to the street. The fronts of the inner row of new houses is partially visible from the street, and the front yard depth is sufficient to present the house. However, the front property line location may not coincide with one's expectation due to the apparent visual penetration of this inner row of houses through the side yards of their fronting neighbors to the public way.

The new houses in scheme 2a.9 replicate the spacing and depth of the existing due to their location within the envelopes circumscribed by the 60° visual alleys. Sizes of property ownerships in scheme 2a.9 are similar between the new and the new and old (other that lots b, f, j, p). The increments of open and built space in scheme 2a.9 (as visible from the public way) are not similar to the existing situation however. The amount of built space is less (due to the square shape of the new houses), and the amount of open space is greater.

The new houses in scheme 3a.10 replicate the existing in spacing but not in size. The regularity of the new does not match the irregularity of the existing. The increments of built space exceed the existing but not by as much as 33%. The increments of open space decrease but not by 33% however.

The F.A.R. relationships between the new houses on their lots and the existing houses on their modified lots is quite similar in scheme 2a.9. There is quite a disparity however in scheme 3a.10. This disparity in scheme 3a.10 is due to the great irregularity in house and property size among existing properties, and due to the stipulation that all new houses are of the same size on roughly, similarly sized lots.

Sufficient on-site parking exists in scheme 2a.9 to enable accessory unit parking for all houses large enough to be subdivided into accessory units. The sames holds true for scheme 3a.10 in which on site, accessory unit parking is diagrammed for the existing houses as well. Independence in auto use is assured for all households.

Independence in the use of front yards in the top row of new houses is relatively assured in scheme 2a.9 due to the physical separation provided by the alley. Where front yards border one another in scheme 2a.9, the yards are of sufficient depth (over 20') and not facing one another directly, mitigating unwanted interaction between neighbors and assuring some independence of use of front yards.

Although the front yards of the new face the back yards of the existing in scheme 3a.10, the front yards are all greater than 20' in depth, assuring some mitigation of unwanted interaction between neighbors and some measure of independence of yard use.

Developmental Concerns Summary:

For an alley straddling rear lot lines to be successful, the cooperation of all existing households is a must. New households must be willing to dedicate 10' of their property to an alley. An alley would be constructed all at one time and would require the assembly of many properties. An alternative to private cooperation between individual owners and the city would be the purchase of the inner strip of the block by a developer who, in cooperation with the city, would resubdivide the land and build the alley and utility easement. This still depends on the willingness of all existing homeowners to sell part of their property to a developer. A developer buying up the interior of the block and resubdividing could re-adjust lot allocations and side yard lot lines to equalize lot shapes and area. This would not be possible under flag lot developments.

In an attempt to equalize the shapes and sizes of new lots and to provide a continuous lot line between new and existing, some existing houses may suffer disproportionate losses of their back yards. The more irregular the existing situation the more true such a result would be. Such owners may be less willing to negotiate with a developer. The developer would have to re-adjust lot lines every so often and perhaps adjust house size and shape. (See lots d - k in scheme 3a.10)

In scheme 2a.9, the alley location results in a disproportionate loss of yard space for the middle row of new houses. If the alley were more centrally placed between the houses, the result would be relatively unusable strips of back and front yard areas. If the lots lines between all three rows of houses were re-adjusted, the dimensional influence of the alley would unfairly reduce the size of the flag lots houses which do not benefit from the alley.

Flag lot development in scheme 2a.9 could not necessarily occur independently of the alley development. The lot line location between the alley lots and flag lots would have to be arrived at by cooperation between the alley lot developers and the pairs of individual home owners contributing land to a flag lot. Once this lot line was established only cooperation between two households would be required to develop a flag lot. If the entire scheme was to be developed at one time, each existing owner (in the bottom row of existing houses) would have to negotiate with three parties -- the developer of the alley lots (or consortium of home owners) and the neighbors on either side.

Alley and easement development would be an expense shared by all new properties. Individual connections to the utility easement under the alley would be privately financed. The alley access eliminates frequent curb cut modifications and multiple utility easements and driveway extensions while eliminating the visual impact that multiple driveway extensions may have on the street-scape. The alley would become a semi-private way owned equally by all abutting households and maintained by the city with maintenance charges assessed to the respective households.

Shared/Public Space and Private Space

The alleys in both schemes are semi-private, with shared spaces maintained by the city and paid for by the abutters. The first 40' of driveway extension in scheme 2a.9 would be a shared, semi-private space entirely privately built and maintained by the two households concerned. Within each lot, the parking areas would be shared by the owning household and the accessory apartment household.

The alley in scheme 3a.10 would perhaps be of lower quality due to the orientation of the fronting houses away from the alley to their major front lawn space. The alley in scheme 2a.9 would have to be of higher quality, and is certainly more spacious, due to the orientation of the major front yard spaces of the top row of new houses toward the alley. It would certainly not tend to be as utilitarian a space as the alley in scheme 3a.10.

The extent of private, outdoor space in the top row of houses in scheme 2a.9 is perhaps less than in the other lots of the same scheme. Privacy may, however, be more attainable than in the other new lots due to the separation provided by the alley (unless the alley is a place to socialize and is used by through traffic) and due to the fact that the middle row of houses has no back yard space to visually intrude upon the front yards of the top row of new houses.

Similarly, due to minimal overlooking from the new houses, the back yard spaces of the existing houses ought to remain relatively private. The front yards of the bottom two rows of new houses will attain a lesser degree of privacy than the yard spaces of the other lots. However, two lots in the bottom row of existing houses must endure two flag lot driveways within their property lines.

In scheme 3a.10 the extent and quality of the private spaces is quite disparate on the top half of the block, particularly among the backyards of the existing houses. The regularity of private yard space is well assured due to the regularity of house size and shape of the existing houses. Although the back yards of the existing overlook the front yards of the new, the sufficient depth of each allows a certain degree of privacy from unwanted interaction.

Infrastructure

(All infrastructure quantities are expressed in terms of units/s.f. of lot area or units/lot.)

Site 2, Drawing 2a.9:
Grade A infrastructure

Alley Paving:

15,750 s.f. or $\frac{15,750}{168,000} = \frac{.093 \text{ s.f.}}{\text{s.f of lot fronting on alley}}$

Utilities:

2,650 l.f. or $\frac{2,650}{252,000} = \frac{.010 \text{ l.f.}}{\text{s.f. of all new lots}}$

Curb Cuts: (This includes curb cuts off of the alley).

26 or .93/lot

Grade B infrastructure:

Flag Lot Paving:

15,550 s.f. or $\frac{15,550}{84,000} = \frac{.185 \text{ s.f.}}{\text{s.f. of flag lot}}$

Site 3, Drawing 3a.10:

Grade A infrastructure:

Alley Paving

11,100 s.f. of $\frac{11,100}{118,400} = \frac{.094 \text{ s.f.}}{\text{s.f. of new lot area}}$

Utilities:

1,440 l.f. or $\frac{1,440}{118,400} = \frac{.012 \text{ l.f.}}{\text{s.f. of all new lots}}$

Curb Cuts:

2 or .077/lot

Grade B infrastructure:

none

Infrastructure Summary:

In their uses of alley paving, each scheme is of comparable efficiency. Scheme 2a.9 must, however, invest in additional paving for the flag lots. Scheme 2a.9 made more efficient use of utility runs even considering the utility runs for the flag lots. Schemes 2a.9 and 3a.10 made more efficient use of paving than the most efficient flag lot scheme -- 2a.7.

Scheme 2a.7 made more effcient use of utility runs than the alley access schemes. Alley access may not necessarily make more efficient use of utilities if lot widths in an alley access scheme are greater than new house setbacks from the public way in a flag lot scheme. This would be even more true if the houses in an alley access scheme were setback from the alley, requiring additional extensions off the alley.

Site Comparisons and Compromises:

In general, an alley elminates the need for driveway extensions and/or repositioned curb cuts or new curb cuts to accomodate new driveways. As such, physical change to the public way is minimized. Alley access does not interfere with existing yard spaces as do flag lot developments. Alley access makes the greatest degree of sense from the aspect of infrastructure if the new houses are places as close to the alley as possible and if the lot widths are less than the probable setbacks of the new houses from the public way.

With an alley, however, the garage becomes less of an element that can be observed from the public way. The major entrances would tend to be on the alley side given the lack of property relationship to the public way and the inability to extend a sidewalk out to the public way. Although the main orientation of the house may still be to the public way, the lack of the three elements occurring together would tend to weaken whatever public way orientation the house does have.

This brings up the related factor of the degree to which the new houses replicate the relationship of the existing houses to the public way. An alley precludes the need for direct private access to the public way. The relationship to the alley is of a shared, communal type among the new houses and as such decreases the need for interaction among new and existing households. The alley, out of necessity, becomes the communal street, promoting, perhaps, greater interaction among new households than would a flag lot development. A clearly stated relation to the public way and the community at large is sacrificed for a more intense communal relationship around the alley.

Requiring coincidental cooperation among all existing households, an alley development is less likely to be initiated and certainly would not occur as incrementally as flag lot development.

Scheme 2a.9 trades off visual openness through the block perpendicular to the public way for diagonal visual openness. It accomodates as many units as it does by staggering their locations and using views between houses as visual relief. Scheme 3a.10 achieves greater visual openness through the block by locating the garages behind the houses, lessening the "front" identifiability of the houses from the public way, yet unwittingly replicating the existing situation which is characterized by a lack of garages.

The development of neither scheme can be attained as easily as flag lot developments that occur within existing lot lines. Full and equal cooperation from all households would be difficult to achieve to make the development successful whether initiated by a developer, the city, or the block itself. One uncooperative household would stymie such a scheme. With an alley, vis-a-vis flag lots, the middle of the block is treated as a strip of land to be resubdivided. As such, convoluted property boundaries would be absorbed within this strip of land and not have an adverse affect on the new lot sizes. Inequalities within existing lots would be removed through the reapportionment of this strip into equal lots sizes. Because of this, an alley scheme could accomodate house locations that straddle existing lot lines that would require complex agreements among adjacent land owners if they were to be developed within the flag lot method.

An alley development would not require cooperation between new and old households. The new households would never need to interact with the existing households for any reason in the future as may occur with flag lot developments. The alley provides access for services, utilities, deliveries, and emergencies to every lot. The automobile is managed with as little land as possible devoted to vehicular movement and storage. In this sense an alley trades off a certain amount of privacy and removal from vehicles and traffic for the convenience of being located right on the alley, minimizing runs of infrastructure.

Consolidation Scheme Analysis

Consolidation Option Four:

Accessways: Cluster Development

Accessways and Cluster Development[5]

The intent with an accessway is to facilitate efficient use of infrastructure as with an alley, but rely instead on a more incremental development method, more scaled to actual needs, requiring cooperation of fewer households to effect. Accessways are intended to foster a certain amount of socializing among those within the cluster, while providing some interaction potential with existing houses via the accessway (as with flag lot driveways).

An accessway is a private street, built on land separate from the lots it serves. The deed to each lot includes an individual interest in the accessway. No vehicle has to back into traffic. They all have sufficient turnaround space. [At a 20' width], accessways are wider than common driveways to allow for two way travel. They are narrower than standard streets, however, since they are dead end. The traffic volumes are low,[6] there is no through traffic, unlike alleys, and fewer autos use the right of way, unlike alleys.

Discussion:

Site 1, Drawing 1a.10:

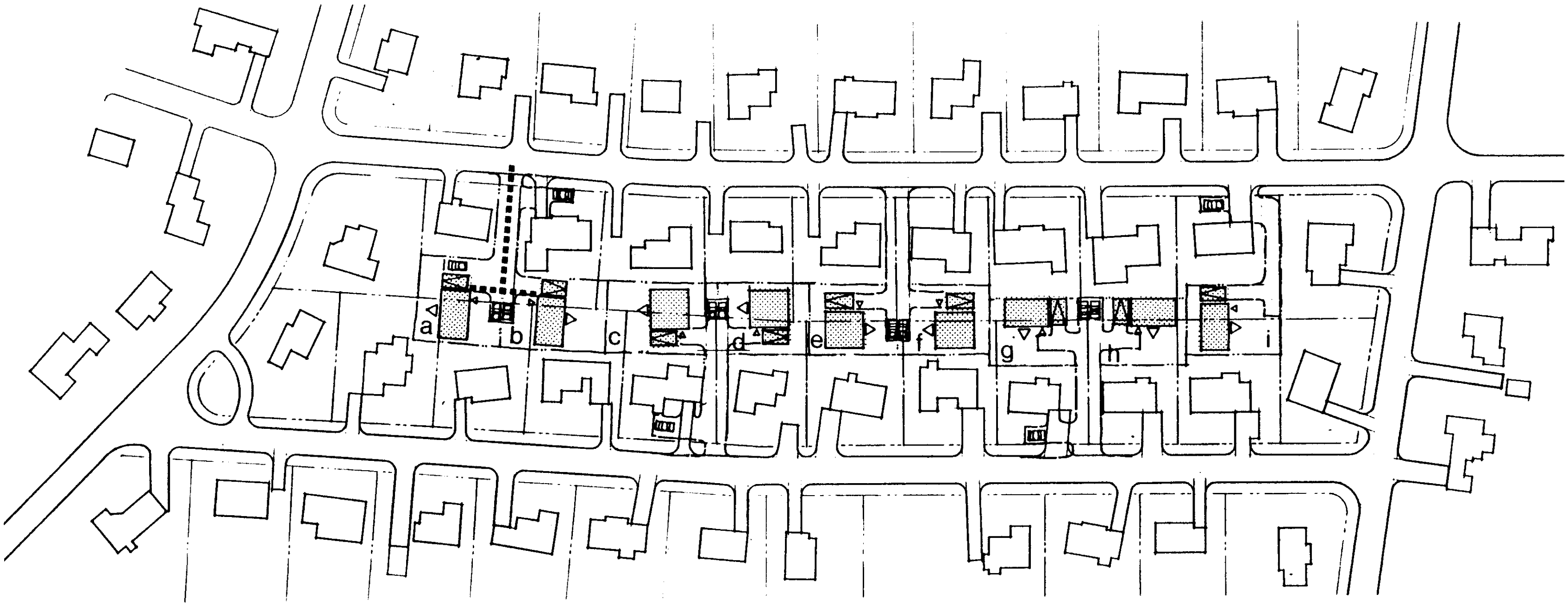
The houses in this scheme are all 1000 s.f. (plus a 250 s.f. garage), and are located to maximize the efficient use of each of the accessways and to equalize lot shapes and sizes. Each accessway is intended to accommodate accessory unit parking and a turn-around area for vehicles. Larger service vehicles are able to turn around by pulling into a driveway apron and backing up. The land devoted to each accessway can be considered as free from the lot line constraints of existing lot lines. The houses within each lot are located to maintain at least a 20' separation from parking areas and to maximize the degree of contiguous yard space.

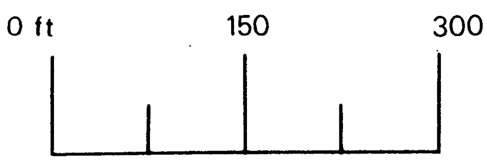
Site 2, Drawing 2a.10:

House locations, shapes, and sizes are those seen in the previous scheme (2a.9), falling within the restrictions of the 60° visual alleys for the site. The diagonal accessway solves the problem of accessing the inner row of new housing without the use of an alley or painfully contorted flag lot driveways. The main view of the new houses is oriented between houses and on to the major yard space of that lot except where the facade of the house facing such a yard area is of minimal dimension (lots n, p) or there is some obstruction (lot bb). Parking for accessory units can be arranged as per lots l, n, p, q, x, aa. It was reasoned that flag lot driveways would provide more convenient access to the north (top) row of new houses than an extension of the accessway.

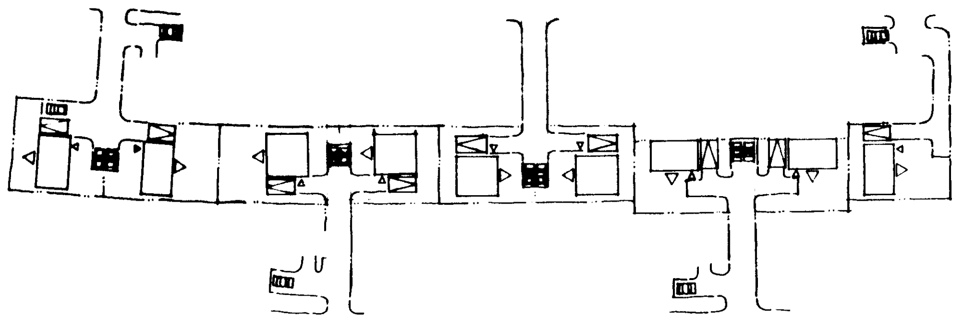
Site 3, Drawing 3a.11:

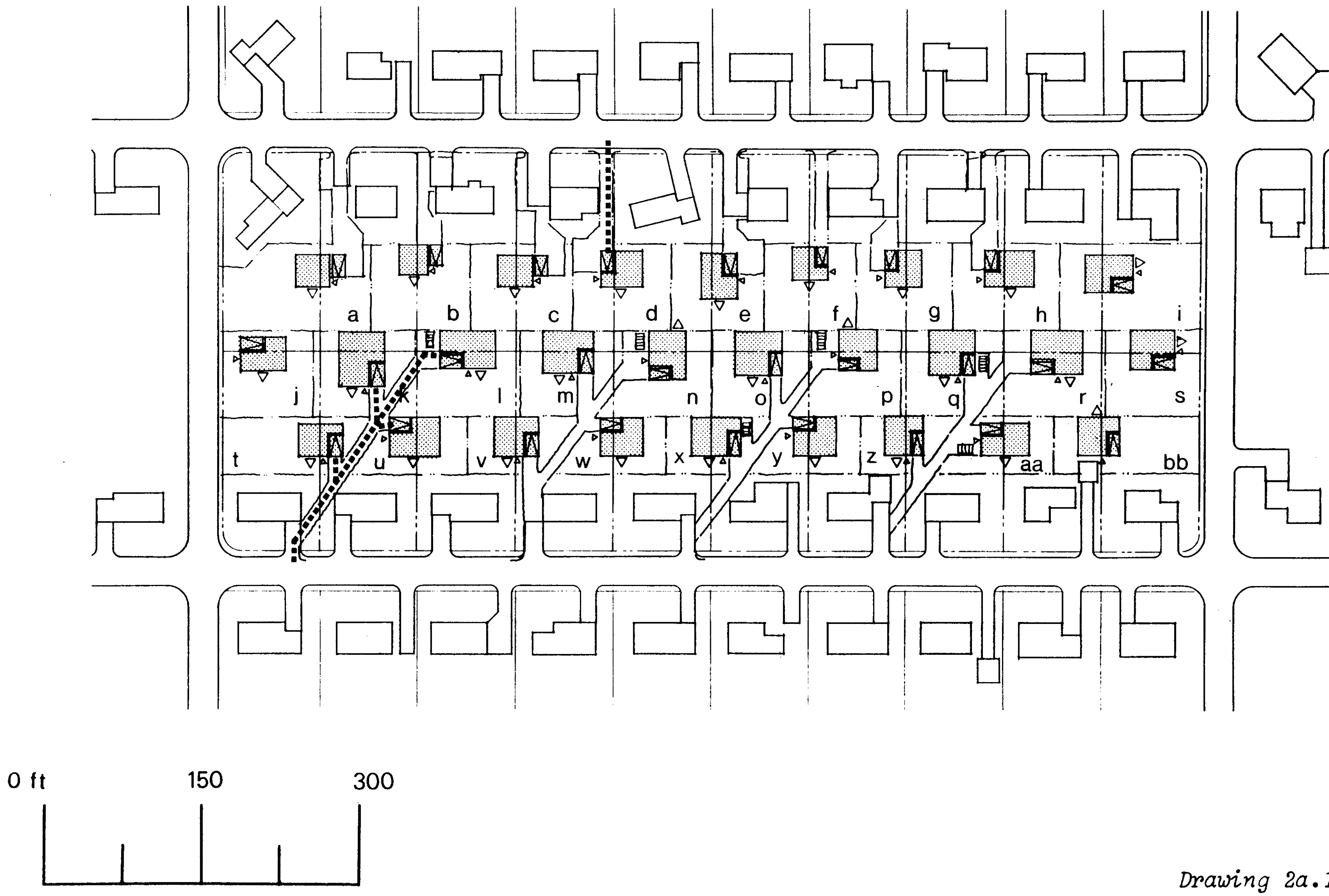
The houses in this scheme are all 1000 s.f. (plus a 250 s.f. garage), and are located to maximize the efficient use of each of the accessways while equalizing lot shapes and sizes. The strip of land for each accessway development is free of the restrictions imposed by existing lot lines. Such restrictions have resulted in some disproportionate yard space size and quality in previous schemes. Parking for accessory units is provided as well as turn-around space for each cluster.



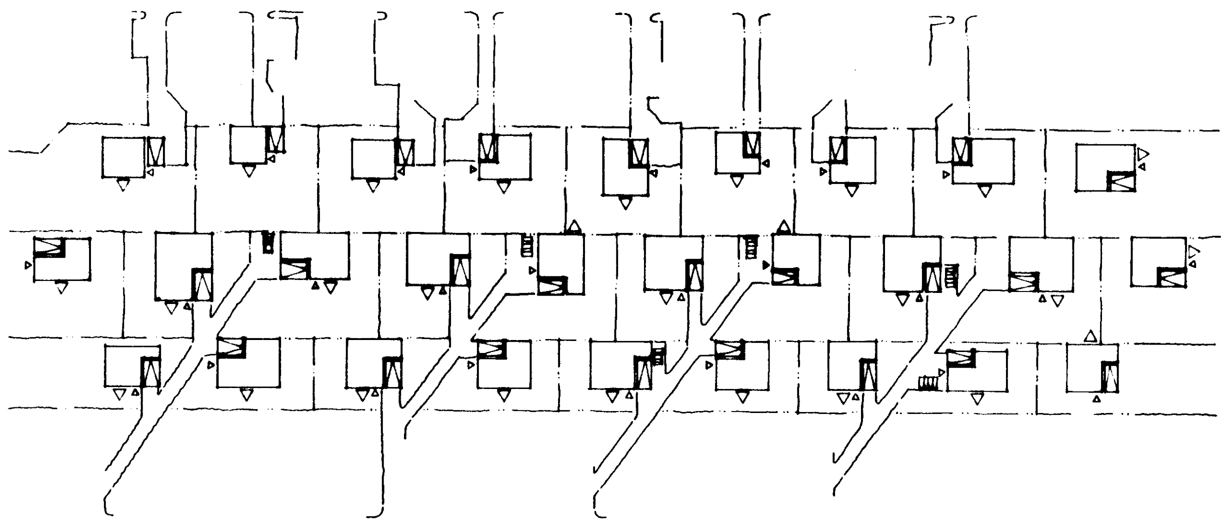


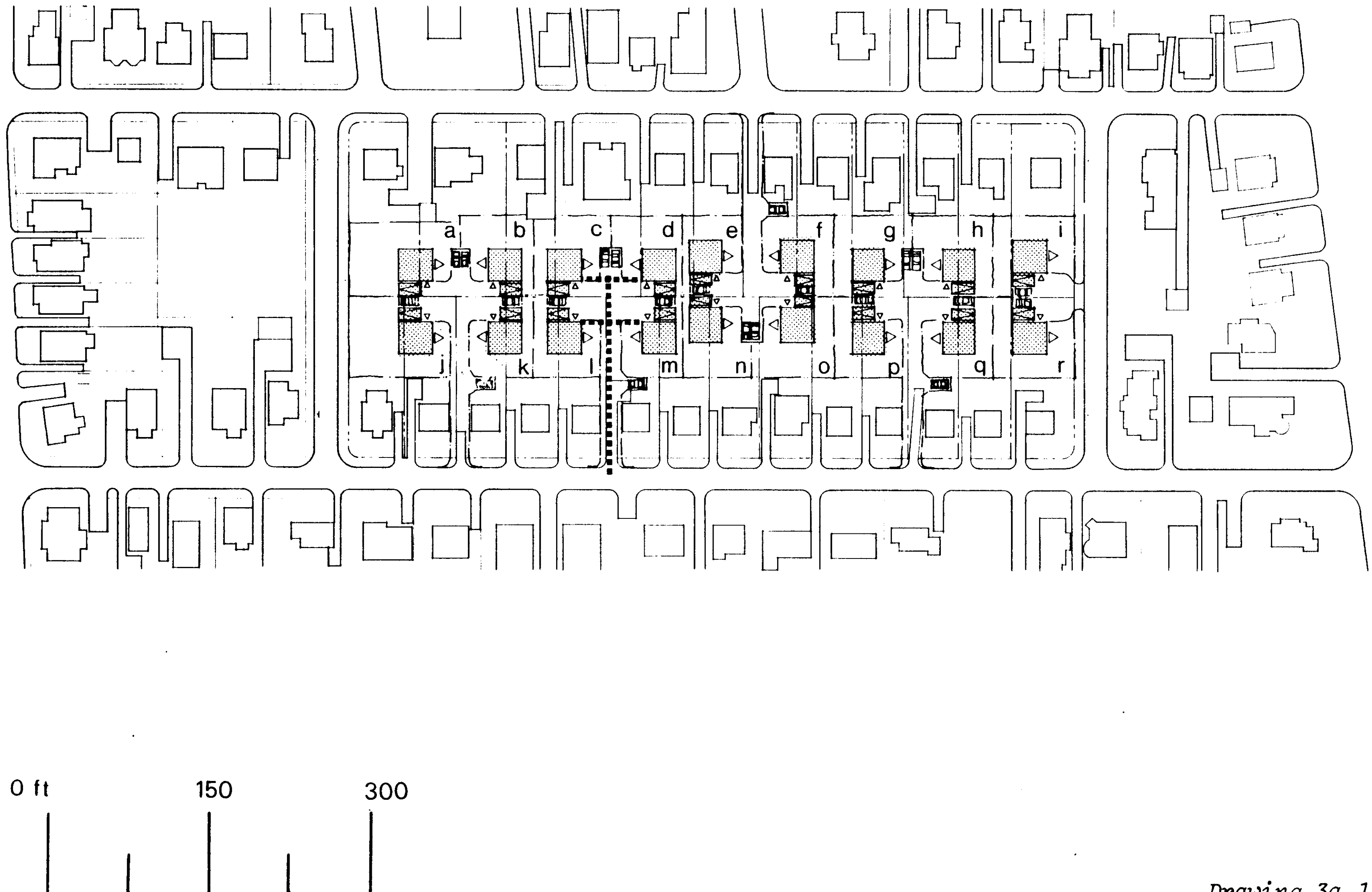
Drawing 1a.10



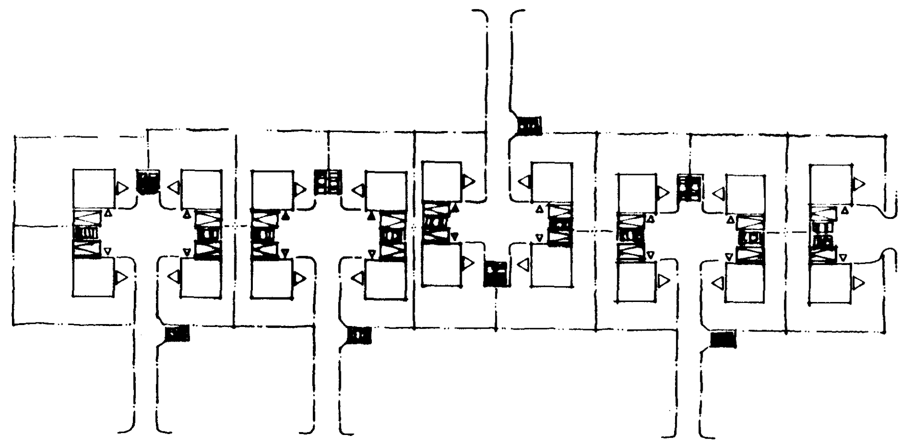


Drawing 2a.10





Drawing 3a.11



* footprint size in s.f.

		coverage			lot size			house size*			front setback			side setbacks			public way width		block dimensions		lot dimensions			
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	pavement only	total	length	width	length	width (frontage)		
site 1 1a.10	existing	17	28	14	10000	11500	7500	1800	2000	1600		40	25	35	60	20	20'	40'	1020'	240'	110'	85'		
site 1	new				5325	6175	4800	1250	1250	1250	26	40	20	8	10	5					85	62		
site 2 2a.10	existing	8	10	7	20000	20000	20000	1600	1950	1350		35	30	40	60	35	28'	48'	1000'	415'	200'	100'		
site 2	new				7266	8000	6800	1954	2640	1150	25	40	15	29	35	23					100	65 70 80		
site 3 3a.11	existing	10	18	8	8250	14450	7200	800	2585	700		30	20		25	18	20'	40'	735'	345'	170' & 160'	50'		
site 3	new				6400	6400	6400	1000	1000	1000	20	20	20	25	20	35					80	80		

Chart 13

		A			B			C			D			E			F		G		H		I	
		average	maximum	minimum	average	maximum	minimum	average	maximum	minimum	total	unit	% change	total	unit	% change	1	2	1	2	1	2	1	2
site 1 1a.10	existing	17	28	14							394	66		245	31		85 99	92	68 84	78	67 89	78	71[a]	71[a]
	new				29	41	19	22	19	23	287	32	-41%	383	48	+ 55%	85 97 100	94	68 74 87	76	75 86 94	85	71 91	81
site 2 2a.10	existing	8	10	7							550	55		414	46		72 89	80	60 85	72	61 88	74	58[a]	58[a]
	new				21	24	12	22	33	9	406	45	- 18%	453	57	+ 24%	85 96 97 97 99	95	59 92 100 100 100	90	65 90 97 98 99	90	52 70 90 99	78
site 3 3a.11	existing	10	18	8							347	29		253	23		74 91	82	74 91	82	69 84	76	62[a]	62[a]
	new				21	35	14	21	24	16	330	30	+ 3%	350	44	+ 91%	74 82 91 92 96	87	74 84 97	85	69 79 98	82	62 78 95	78

Chart 14

Environmental Performance Summary:[7]

The average lot size has dropped from scheme 1a.9 to scheme 1a.10 by 8%. The average coverage of the new lots in scheme 1a.10 has increased by about 4% over scheme 1a.9. Lot sizes in scheme 1a.10 have, however, become much more regular.

The average lot size in scheme 2a.10 has remained the same as in scheme 2a.9. The lot sizes are not equal (although they could have been drawn equally). Drawn as they are in scheme 2a.10, two rows of houses have maximized front lawn areas.

Scheme 3a.11 provides eight fewer houses than scheme 3a.10 (18 vs 26). The average coverage decreases from 25% to 21% - a 16% decrease. Lot size increases from 3900 s.f. to 6400 s.f. - a 64% increase.

In scheme 1a.10 the percentage of the visual field filled by houses remains the same or rises slightly compared to scheme 1a.9 except for the vantage point represented by column F which drops substantially. This may be due to the location of more built area behind the existing homes in scheme 1a.10. In scheme 1a.10 the row of new houses generally contributes less to the visual field than the back row of existing houses does in the existing situation. (Refer to the previous section for comments regarding scheme 2a.10).

In scheme 3a.11 the visual field percentages obviously are going to drop. The average drop is about seven percentage points. The first row of new houses contributes significantly less to the visual field (standing in public way) than the back row of existing houses does in the existing situation. All new percentages are will within the stipulated limit of 50% of the difference between the existing norm and 100%.

Visual permeability is attained to less of a degree in scheme 1a.10 than in scheme 1a.9. Complete visual closure occurs from the vantage point represented in column F. The existing houses contribute less to the visual field in scheme 1a.10 than in scheme 1a.9. (Refer to the previous section for comments regarding scheme 2a.10).

Visual permeability is assured to a great extent in scheme 3a.11 compared to scheme 3a.10. Full closure of the visual field through the block is not attained from any vantage point, and the back row of existing houses still contributes between 4% to 27% to the visual field.

All new houses within scheme 1a.10 are visible from the public way, although they are not distinguishable as complete entities from any one vantage point as the houses in scheme 3a.11 may be (due to their location visually between the existing houses). Because the new houses in all schemes do not fall within existing lot lines and are not necessarily evenly spaced (such as in scheme 3a.11), there may be some confusion as to where the property lines fall between new houses and between new houses and existing houses.

The orientation of the houses in schemes 1a.10 and 3a.11 are toward the accessways and away from the public ways. Although the fronts of the houses in each scheme are readily identifiable and relatively coherent, their orientations do not replicate those of existing houses. Only in scheme 2a.10 (the bottom two rows of houses) does the orientation reflect some relationship to the public way, although garage location at times must be removed from the main facade due to the necessity of orientation to the accessway.

The orientation of view from the new houses in schemes 1a.10 and 2a.10 are towards the major yard areas even if the major yard does not happen to coincide with what would be perceived as a front lawn. Only in scheme 3a.11 is the view orientation toward what would be perceived as the front lawn area, right off of the accessway. The households in scheme 2a.10 perhaps enjoy the greatest unconfined view although such views are upon the yards of others.

Due to the full visibility down the accessways in scheme 3a.11, the relationships of the houses to the accessway are more apparent compared to scheme 1a.10 in which the new houses are partially hidden behind the existing. However, due to the diagonal nature of the relationship in scheme 2a.10 the strength of orientation of the houses to the accessways is not as clear as in scheme 3a.11. The accessways themselves in scheme 2a.10 are not entirely visible from all vantage points on the public way as they are in schemes 1a.10 and 3a.11. In any case the greater the indentifiability of the relationship of the house to the accessway, the greater the clarity of front and back relationships among the new houses even if not all of the elements (garage, main entry, main house orientation) are coexistant along the accessway facade. The front and back distinction is perhaps the most explicit in scheme 3a.11.

Only in scheme 2a.10 do the houses replicate the location and spacing of the existing due to their locations within the envelopes circumscribed by the 60° visual alleys. The location and size in the other schemes is based upon attaining equality of lot size as well as maximizing the equality of spacing around the accessways.

The built and open increments of space are well within the guidelines, and do not even approach the limits set by the existing context in scheme 1a.10. Both the new built and open increments are larger than the existing in scheme 3a.11 because there are fewer houses than existing lot lines, and the house themselves are larger than the existing.

Schemes 1a.10 and 2a.10 (except the bottom row of new houses) attain the greatest degree of equality of property ownerships between new lots and existing modified lots. Equality among new property ownerships is attained in all schemes (except the bottom row of new houses in scheme 2a.10). Greater equality of property ownerships is attained in the accessway schemes than in the other sets of consolidation options.

The greatest disparity between the F.A.Rs of existing modified lots and new lots occurs in scheme 1a.10. Here, the F.A.R. for existing modified lots is 32% higher than the F.A.R. for new lots. The F.A.R.s for new and existing properties is much more on par in scheme 3a.11 than in scheme 3a.10. Because the new houses in this scheme are larger than the existing houses, the equality of F.A.R.s requires that the new lots be larger than the existing modified lots. Therefore one cannot place a new house within each lot line.

Independent auto access is assured for all new houses and their accessory units in all schemes. Independent auto access is assured for existing households if additional parking aprons are provided for them to replace parking aprons lost to extended driveways.

Freedom from overlooking and unwanted interaction is assured between new and existing households in scheme 1a.10 and mitigated between new households somewhat in scheme 1a.10 by alternating house orientation and the use of parking aprons between houses. Freedom from overlooking and unwanted interaction in scheme 2a.10 is facilitated by large, private yard areas upon which to overlook (except in the bottom row of new houses and two of the houses in the middle row of new houses - lots n, p) and by views from new houses which are directed between houses rather than at them.

The independence in the use of yard area is less assured in scheme 3a.11 than scheme 2a.10 due to smaller yard areas and the facing of new houses directly at one another. Although the coverages of new houses in schemes 2a.10 and 3a.11 are similar, the smaller house size in scheme 3a.11 results in a small lot size and therefore relatively smaller yard areas compared with scheme 2a.10.

Developmental Concerns Summary:

Accessways provide the benefits of an alley in terms of shared easements for utilities and shared auto access. Furthermore, they provide the benefits of locating houses unrestricted by side yard lot lines (facilitating satisfaction of visual, environmental criteria) to equalize lot sizes and shapes and to reapportion anomolous parcels of land as does an alley development.

Unlike an alley development, however, construction may proceed more incrementally in that cooperation is required only among 4-6 existing households. Alley and accessway developments rely less on interaction between existing and new households (compared to flag lot development) for development to succeed. Because there is no one to one relationship between new and existing households, the new households may feel to be less of a part of the existing neighborhood. The deed to each accessway lot would include an individual interest in the accessway, and therefore encumbers some obligatory sharing of responsibility between new households.

Accessway development results in fewer curb cut modifications and fewer noticeable intrusions into the block interior. The accessway locations in scheme 2a.10 may be less noticeable than direct, perpendicular curb cuts from the public way. The diagonal accessways of scheme 2a.10, however, result in trapezoidal lot shapes although the lot lines are logically located with respect to parking aprons and equal side to side spacing. The lot lines between the three rows of new housing in scheme 2a.10 could have been drawn equidistantly as in scheme 2a.9. The intent, however, was to show the impact that zero lot line zoning would have on yard space integrity. By placing the lot line equidistantly between those two rows of houses, the two yard areas created would have been relatively small and unusable. The flag lots occurring in scheme 2a.10 could be constructed independently of one another and independently of the accessway development. Cooperative action would have to occur, however, between adjacent, existing households.

The Nature and Extent of Shared/Public Space and Private Space

The accessways belong equally to all related households. This private street would be a vehicle for cooperative effort in maintenance, surveillance, and socializing. Defined by the related houses, such a development produces a strength of territoriality unlike that of an alley. Each group of households knows where its property and responsibilities reside. Such a cluster grouping, however, is foreign to the existing context in which cooperative effort or ownership is not a prerequisite for purchasing or maintenance. Visually, such groupings contrast with the existing context, particularly scheme 3a.11.

Scheme 2a.10 is perhaps the most successful in attaining clusters and groupings in principle yet still reiterating the spatial properties of the existing. For this reason, cooperative spirit may lag behind the other schemes in that territoriality is not cooperatively defined. Of course such proximities do not guarantee that cooperation will come about, although there will be pressure to cooperate in order to properly maintain the accessway and to abide by informal, social rules no matter how inauthentic such cooperation may be. In any event, the extent of shared vs. private property is well defined as well as are the qualities of territoriality and privacy from public intrusion which cannot be guaranteed in alley developments.

Compared to alley schemes, accessways encourage, to a greater degree, cooperative efforts among new households. The cooperative territory is well defined and remains removed from through traffic, becoming a semi-private space. Yet accessways maintain some functional connection to existing properties which could become a source for or facilitate socializing with existing households.

Scheme 2a.10 still retains a degree of flag lot quality despite the accessways. The shared space in this case is linear and not focussed to any one area as are the accessways in schemes 1a.10 and 3a.11.

The nature and extent of private space is radically different from one scheme to the next. In scheme 1a.10 the households orient their views down the center of the block generally and away from one another. In scheme 2a.10 there is a certain amount of overlooking from front yards to back yards. However, such overlooking is directed between houses not at them. The main orientations of the houses in scheme 3a.11 are toward one another. Front yard faces front yard. There is no back yard - front yard adjacency conflict. The back yards are free to become more removed from public activity and foster a certain modicum of privacy. The back yards of the existing households face the side yards of the new households. Scheme 3a.11 excels in producing unequivocal, illustrative transitions between semi-public, semi-private, and private space.

Infrastructure:

(All infrastructural quantities are expressed in terms of units/lot or units/s.f. of lot.)

Accessways require a high degree of quality paving as do alleys. Accessways, however need curbs, gutters, and drains. Alleys require only centrally placed storm drains. Per square foot, accessways are more expensive to construct than alleys.

Site 1, Drawing 1a.10:

Grade A quality:

Paving: (not including end lot)

$$12{,}160 \text{ s.f. or } \frac{12{,}160}{42{,}600} = \frac{.285 \text{ s.f.}}{\text{s.f.}}$$

Curb and Gutter: (not including end lot)

$$1{,}280 \text{ l.f. or } \frac{1{,}280}{42{,}600} = \frac{.300 \text{ l.f.}}{\text{s.f.}}$$

Utilities: (including end lot)

910 l.f. or $\frac{910}{47,115} = \frac{.019 \text{ l.f.}}{\text{s.f.}}$

Curb Cuts: (including cuts off of accessway)

13 or 1.44/lot.

Grade B quality:

Paving: (end lot only)

1,950 s.f. or $\frac{1,950}{5,325} = \frac{.366 \text{ s.f.}}{\text{s.f.}}$

Site 2, Drawing 2a.10:

Grade A quality:

Paving: (not including flag lots)

24,500 s.f. or $\frac{24,500}{142,000} = \frac{.172 \text{ s.f.}}{\text{s.f.}}$

Curb and Gutter: (not including flag lots)

2,080 l.f. or $\frac{2,080}{142,000} = \frac{.015 \text{ l.f.}}{\text{s.f.}}$

Utilities: (including flag lots)

2,320 l.f. or $\frac{2,320}{203,448} = \frac{.011 \text{ l.f.}}{\text{s.f.}}$

Curb Cuts: (including cuts off of accessway)

24 or .85/lot

Grade B quality:

Paving: (flag lots only)

16,800 s.f. or $\frac{16,800}{88,740} = \frac{.189 \text{ s.f.}}{\text{s.f.}}$

Site 3, Drawing 3a.11:

Grade A quality:

Paving:

25,500 s.f. or $\frac{25,500}{118,400} = \frac{.215}{\text{s.f.}}$

Curb and Gutter:

1,800 l.f. or $\frac{1,800}{118,400} = \frac{.015 \text{ l.f.}}{\text{s.f.}}$

Utilities:

1,100 l.f. or $\frac{1,100}{118,400} = \frac{.009 \text{ l.f.}}{\text{s.f.}}$

Curb cuts:

5 or $\frac{.277}{\text{lot}}$

Infrastructural Summary:

Site 2, in scheme 2a.10, again performs the best among all sites in the effective use of infrastructure except in the category of utilities in which scheme 3a.11 out performs the others. Scheme 1a.10 is the most ineffective user of infrastructure because a similar amount of infrastructure supports a smaller amount of developable land. The alley schemes still out perform the cluster/accessway schemes in terms of effective use of infrastructure. Such is the benefit of all new properties sharing the same easement and access.

Site Comparisons and Compromises:

Accessway developments physically break a block down into definable territories of ownerships. Such ownerships (vis-a-vis alleys or flag lots) give the appearance of cooperative ownership which contrasts with the typical, existing situation of individual, unilateral ownership of properties. Accessway development is scaled more to probable, incremental development procedures and to actual use needs (compared to alleys), while hopefully facilitating (not guaranteeing) some socializing and a feeling of territorial ownership among its respective members (more so than an alley development). The hierarchy of public to semi-public or semi-private and private space is well defined in accessways. The cluster grouping and accessway itself become a buffer to interaction with the community at large, similar to an alley, but to a greater degree. As such, there is little resemblance in the new of the physical relationships of the existing to the public way. The accessway becomes the street upon which the new houses orient their entries, garages, and in many cases, their view.

Schemes 1a.10 and 3a.11 state this relationship the most explicitly due to the visible nature of the accessways from the street and the clear grouping of the new houses around the accessway terminus. A replication of the existing spatial hierarchy and increments of ownerships is sacrificed for an unequivocal statement of territorial hierarchies between new and between new and existing.

Scheme 2a.10 sacrifices this physical statement of cooperative spatial ownership for an obscured accessway that does not attempt to gather houses around it but instead acquiesces to the existing spatial patterns. Scheme 2a.10 becomes a shared, flag lot access scheme in a way that contributes to the autonomous identity of each of the new properties. Such a deferring and skewed access method was required due to the staggered location of the new houses. This diagonal accessway in a way preserves views from the public way into the block and side yard due to the fact that it does not directly and visually divide side yards in two. One views over the accessway rather than up the accessway from both the perspective of the public way and new households.

Chapter 4 Conclusions: Comparisons of Schemes, Sites, and Consolidation Methods

summary

Chapter 4 has brought us through a physical, environmental analysis of each site so that such analysis and the environmental criteria layed out in Chapter 3 can be used to judge the physical, environmental consequences of various consolidation alternatives across various types of sites. The first consolidation alternative was framed within the house locations and sizes circumscribed by the 60° visual alleys. In the subsequent investigations of consolidation alternatives, house size and shape were controlled to register the effect of such criteria on the existing, physical, environmental characteristics for sites 1 and 2. In site 2, the subsequent investigations of consolidation methods were patterned after the optimal number, size, and location of new houses as circumscribed within the 60° visual alleys for the site. Site 2 schemes were not controlled for house size and shape at 1,000 s.f. because this would have resulted in less than optimal size of houses for the site and sizes that would have produced less than challenging physical contraints.

The theoretical intent with flag lot development is to allow individual households to subdivide and develop their lots without the requirements of neighbor cooperation. Each new house is individually and physically connected to the public way, and functionally cooperates with the existing household with regard to auto access. The new house relates to the public way in much the same fashion as the existing house, and is readily identified as related to the parent house and household as long as it is within the existing lot lines. Development of flag lots can occur incrementally, and such development remains within the scale of the intended use.

Flag lot development, however, compromises the quality of the streetscape somewhat due to the visibility of a row of driveway extensions and the new parking aprons, replenishing the parking space for the existing household that has been turned into a driveway extension. The equality of existing property sizes and the equality of the quality of related yard spaces is all a function of the regularity of property increments in the given context. In this sense, new property increments reflect the existing while sacrificing equality among one another. In this sense, site 2, with its existing regularity, caterers to flag lots in that regularity and equality of property increments can occur in a new situation while still fitting within the existing context.

Flag lots also create a repetition in the use of infrastructure and easements. The more densely built the existing situation, the greater the redundancy reduces the effective use of infrastructure and the greater the benefit can be from some sort of shared access and shared easements. Schemes 2a.6 and 2a.7 make much more effective use of infrastructure than scheme 3a.7. In this regard, because scheme 1a.7 already depends on cooperation among four existing households, the flag lot method may not be the most desirable. Access and easements could just as well be shared between two new households. However, the more closely the existing houses are located to the public way, the greater the benefits of flag lot development (compared to alley access) in the effective use of infrastructure and easements, particularly when lot widths are greater than the setback of the new house from the public way. In this sense scheme 2a.7 is superior.

The location of flag lot lines is determined by the tyranny of the location of existing curb cuts. Because flag lot driveways must occur at existing driveways and curb cuts to preserve some of the visual character of the public way, the new house must be located with respect to the driveway extension and existing curb cut, irrespective of the ultimate formation of yard space or location, according to visual, environmental performance criteria.

Alley developments, however, release house locations from the tyranny of existing curb cuts and the inequalities of existing lot widths. Because the center of the block is considered as one developable strip, inequalities and disproportions among existing lots are all subsumed within this strip when it is resubdivided into equal property increments. New houses can be located to optimize any one of the visual criteria and still function effectively in terms of efficient and direct auto and utility access. The facilitation of the effective use of easements and infrastructure becomes more and more certain through the use of alleys as lot widths decrease and set backs from the public way increase (compared with flag lot development).

A successful alley development requires close cooperation among all block residents and/or with a developer. Unless a block is quite regular in terms of existing lot size, and shape and house size and shape, an alley could bring disproportionate benefits to some and disproportionate costs to others. The greater the existing inequalities between properties, the less likely the development is to succeed; that is, the less the likelihood that all existing households will be willing to cooperate. If successful, the alley becomes a linear communal space. The alley becomes the reference point for facilitating neighbor socialization (or contention).

Although the new houses may view toward the public way and existing houses, the functional connection is visibly to the alley, and if nothing else, neighbor interaction will occur out of functional necessities such as parking, garbage collection, and pedestrian activity. Through traffic, however, could discourage such socializing. With regard to the existing houses, functional interaction or obligatory cooperation with the new houses in an alley scheme is non-existant. The new houses arise not out of individual homeowner action as in flag lot development, but as a result of third party (developer) and joint effort among all block residents. the new houses may not even reside within the assumed, pre-existing lot lines of the existing house. To maintain effective use of infrastructure, the new houses are located as closely as possible to the alley, further separating their identities with the existing houses. Alley developments eliminate the curb cut and driveway extension to the public way, obviating disruption to the public way but removing any vestiges of of relationships of the new houses to the public way.

With accessways as with alley developments, the inner block becomes a strip of land, existing independently of side lot lines - a strip to be resubdivided into new lots not necessarily resembling the existing in their shape and size but responding to and gathering around the cooperatively owned accessways. These accessways organize this tabla rosa, inner strip of land into several units, each of which can be developed on its own time schedule not as incrementally as flag lots but more incrementally than an alley development. Responding to the functional obligations of auto access, parking and strengthening the cluster implications of an accessway, the new houses turn to orient to the accessway irrespective of the relations of the existing houses to the public way.

Compared to alley developments, the accessways promote a territorial hierarchy and a clear transition from public to semi-public and semi-private space. The autonomy of existing individual properties is not replicated in accessways to as great a degree as in flag lot developments and alleys. Whether cooperative interaction or genuine communality actually exists, the physical statement is one of the importance of shared space perhaps on par with that of the importance of private space.

From the calculations derived from the study sites, accessways sacrifice the effective use of infrastructure when compared to alley developments. Accessways are, however, slightly more effective than flag lots in the use of infrastructure.

Determining the optimum number of houses for a site and an access method is a vexing problem frought with trade-offs of one environmental performance or functional criteria for another. For site 1, scheme 1a.10 produces the maximum number of units (nine new houses containing nine accessory units) in fewer built square feet than scheme 1a.7. Scheme 1a.10 takes advantage of existing household cooperation, which has to occur in any scheme for site one, and develops shared access and easements which makes more effective use of infrastructure. The coverages of new and existing houses is more equalized in scheme 1a.10 and more equalized between new houses. Increments of property ownerships are more equalized among new properties in scheme 1a.10 Fewer curb cuts and driveway extensions are visible in scheme 1a.10 than in the other schemes. Full closure of the visual field occurs from only one vantage point in scheme 1a.10, from three vantage points in 1a.7, and from no vantage points in 1a.9. Among all schemes, the average increases in the visual field percentages is similar. From the vantage point looking between houses (column G), the new houses in scheme 1a.10 add less to the visual field than is typical of the other schemes or than is typical of the existing houses on the far side of the block in the existing context. The orientation of the view between new houses is such that there is little overlooking conflict between new houses and between new and existing houses (except lots g and h).

Scheme 1a.10 sacrifices the replication of autonomous ownerships of existing properties for more shared space. It sacrifices visual permeability as defined by the 60° visual alleys for optimizing the shape and size of house and lot and the location of the house next to the accessway. In the majority of new lots, it sacrifices a replication of the orientation of existing houses to the public way for an orientation directed to the accessway. Tucked closely behind the existing houses each new house is not readily perceived as an entity from any one vantage point. The amount of shared space is greater than in other schemes for site one.

Scheme 1a.9 contains the same number of units as scheme 1a.10 but instead attains closure of the visual field from no vantage points. The new houses more closely replicate the orientation of existing houses to the public way. The image of autonomous property ownerships is strengthened by individual driveway extensions.

Development remains, however, constrained by the vagaries of side yard lot lines, resulting in some contorted lot shapes and segmented yard areas. There is a greater inequality in lot coverage between existing and new properties, and frequent curb cuts and driveway extensions impinge somewhat on the streetscape as well as disrupt existing side yards. The house size, shape, and location is irrespective of the 60° visual alley envelopes, and responds instead to the intent to control for house size in the scheme and provide a functional location with respect to the driveway extension. The tyranny of side yard lot lines prevents shifting house location slightly to obtain a more optimal visual field placement. Although the amount of shared space is small, the scheme sacrifices the cost advantages of sharing access and easements.

Although scheme 1a.7 contains fewer total units (8 houses and 8 accessory apartments), it produces more built square footage (12,400 vs. 11,250) than the other two schemes within the same consolidation alternative. The houses within this scheme all fit within the evelopes circumscribed by the 60° visual alleys for the site, and as a result the new houses replicate the existing in spacing and depth. Because the new houses are visible between the existing, they are readily indentifiable from the public way as distinct entities. This location also allows the new houses a direct view to the public way and maintains some relation to it. This location mitigates some overlooking problems between new and existing properties by directing the view from yards and houses between houses. Individual driveway extensions strengthen the autonomous identity of the new properties while replicating in the new properties some of the spatial inequalities of the existing. The inequality among new and existing properties is perhaps more marked than in the other schemes (compare coverages). Furthermore, although such development requires the cooperation of four households, no advantage is taken of sharing access and easements (although this would result in the increase of shared space). Because the cooperation of more households is necessary in scheme 1a.7 than in scheme 1a.9, development may be more difficult to achieve.

In site two, schemes 2a.9 and 2a.10 produce the optimum number of units (20 houses and 26 accessory apartments) while respecting the building envelopes circumscribed by the 60° visual alleys for the site. The staggered location of the houses, while assuring diagonal visual permeability, effectively closes off views through the block from the vantage points represented in the summary charts. The alley scheme (2a.9) results in the more effective use of infrastructure, but sacrifices ease and incrementality of development. The percentage increase of the buildings visible in the visual field exceeds the recommended limit from all vantage points except column I. Although the new houses are more massive than the existing, the built frontage of the two outer rows of new houses is less than the existing. Diagonal accessways are perhaps less visually obtrusive (considering the block as a whole) than a major alley in that an alley visibly separates the block in two. A staggered scheme with three rows of new houses would be very difficult to develop without some degree of shared access.

For site three, scheme 3a.10 produces the greatest number of units (26 houses and 26 accessory units) while providing more visual permeability between houses and more accessory parking potential than scheme 3a.9. While making more effective use of infrastructure than schemes 3a.7 and 3a.9, scheme 3a.10 preserves the side yards and the parking areas of the existing households while producing more units than the other schemes. Scheme 3a.10 relies, however, on the cooperation among all existing households for execution. Yet such development eliminates the tyranny of existing side yard lot lines experienced in schemes 3a.7 and 3a.9. Although the average increase in the percentages of the visual cones is exceeded only by scheme 2a.9, scheme 2a.10 still produces the greatest number of units. Scheme 2a.10 also provides the most direct access for automobiles. It eliminates the garage as an element exposed to the public way, and it is therefore more in conformance with the existing situation. Scheme 2a.10 also results in a more effective use of infrastructure than does scheme 2a.11. While scheme 3a.7 is developed from the envelopes circumscribed by the 60° visual alleys, closure of the visual field results from two vantage points. Whereas in scheme 3a.10, complete visual enclosure results from only one vantage point.

Scheme 3a.10 also produces new front yard areas which provide sufficient space to ensure some modicum of privacy for new and existing households while setting the new houses back from the existing in a statement of physical autonomy.

Scheme 3a.11 sacrifices numbers of raw units, replication of the existing context, and a lack of a strong statement of physical autonomy for a clarity of organization premised on equal increments of property; territorial definition and hierarchy from public space to private space; a relatively effective use of infrastructure (although not to as great a degree as scheme 3a.10); elimination of overlooking from back yards into front yards and a clear distinction of the public side of property from the private, back side; a generous degree of visual permeability through the block (although irrespective of the 60° visual alleys); a development procedure, which while more incremental than an alley development, smoothes out discontinuities and disproportions in new lot shapes and sizes, and produces few curb cut modifications and driveway extensions to impinge on the streetscape (although the curb cuts and accessways that are there are quite visible).

Clearly, the environmental performance and functional criteria established in the prior chapters do not facilitate the production of black and white, either/or consolidation alternatives. Perhaps perfectly orchestrated and complementary criteria are impossible to develop anyway. One sacrifices incrementality of development for cooperative schemes that allow greater overall leeway in the location of new houses. One desires to establish an equality of new property increments only to realize that the scheme may contrast with the existing context. New houses are visually located between existing houses, straddling lot lines to increase their visibility from and their connection to the public way only to wind up sacrificing the visual permeability of the block. Similarly one orients the main front facade elements to the public way only to realize that the new and existing houses overlook one anothers' back yards and front yards. One may locate and size the new houses such that they are equal in size and shape and maximize their relation to a driveway, alley, or accessway only to discover that full closure of the visual field from all vantage points results.

In sum, long, narrow lots with closely spaced houses benefit the most functionally and visually from shared access methods. A large proportion of their yards are already given over to the automobile. Flag lot development would only begin to remove more yard space for parking and access. The lots are narrow enough to the point where alley access may make the most cost effective use of infrastructure. A shared access scheme would eliminate the problems and constraints of developing within existing lot lines. This problem becomes more acute as the lots become smaller. The larger the lot the more freely one is able to locate a new house to respond to slight variances in environmental performance criteria. Also, the more densely built the existing context, the more likely that a flag lot scheme will impact neighboring lots. Therefore, much could be gained from cooperative development in which inter-lot impacts could be brought to light and distributed among all lots rather than be born by a few.

The less dense a block becomes the greater the degree to which flag lot development becomes a cost effective use of infrastructure (compare schemes 2a.7, 2a.10, 2a.9). That is, the larger the lot widths become the more cost effective flag lot access and easements become, particularly if the setback of the new houses from the public way is at a minimum. Comparing schemes 2a.9 and 2a.10, an accessway development is even less cost effective than an alley development. However, larger sites that are able to accomodate three rows of houses as in schemes 2a.9 and 2a.10 still require some type of shared access and easements to service the inner row of housing.

CHAPTER 5:
EVALUATION, DIRECTIONS FOR FURTHER STUDY

This thesis can be viewed as a test of a possible method for analyzing lower density, residential environments, and for proposing and evaluating physical change to these environments. Such a method is perhaps useful for only certain types of blocks (for certain densities, degrees of regularity of built and open space, lot shapes, sizes, and house locations). Such a determination cannot be made conclusively from studying only three sites however. Certainly, this type of method is limited to a micro-scale, block by block analysis.

Perhaps this method breaks down in those settings and with those proposed changes where it is no longer possible to work within the existing set of spatial constraints and still allow physical change to come about. Moreover, internal conflicts among environmental performance and functional criteria will occur. There may be, however, some sites and proposals that will test the integrity of these criteria to the limit. Beyond this limit, internal conflicts may occur to such a degree to warrant a rethinking of the criteria.

Such criteria will perhaps never be totally, internally consistent and complementary, necessitating a determination of what combinations of trade offs are acceptable. For example, are individual, lot by lot, flag lot developments acceptable even though a great disparity between the size, shape, and quality of new properties will occur? Is one willing to accept a redundant use of pavement and easements and a view from the public way of curb cuts and driveway extensions rather than combine efforts with neighbors to save on infrastructural costs and mitigate visual impacts? Is one more concerned with optimizing the locations of new houses and lots to conform to functional exigencies rather than minimizing the impingement on the existing visual field? Can one accept a consolidation alternative that does not replicate the autonomy of individual ownerships but does create equal property increments attained through cooperative action and producing some shared spaces?

Evaluating the environmental performance criteria method, this study has shown (for the sites considered) that the visual cone criteria is more useful as an after-the-fact, analytical tool. The 60° visual alley analysis however provides a useful guide of where new houses can be placed while ensuring some replication of the proportional spacing and size of existing houses. This analytical tool describes one's view while in motion down the public way framed by the spacing and depth of existing houses (60° being the limit to this house depth and spacing within the visual field). Once the spacing and depth of existing houses creates an angle of greater than 60° between the front corner of one house and the back corner of the neighboring house, such a tool is inapplicable.

Of course, one could develop a regular, perpendicular tartan grid of visual alleys directly between existing houses. However, such a method does not take into account as one function house spacing, house depth, and proportional house sizes of existing houses.

The stipulation that the norm visual core percentages ought not to be exceeded by 50% of the difference of 100% (closure of the visual field) and the norm (if the norm is greater than 66%) is based on an assumption that new houses will infringe within the visual field and that a certain increase of the visual cone percentage is unavoidable. The 50% limit to change of the norm percentage did not place undue constraints on the proposals for the three study sites. It may therefore be a reasonable limit. More testing with many different types of sites is still required to verify this however.

The visual cone criteria are internally conflicting if treated as autonomous, individual criterion. House size, location, shape, and spacing that may defer to one vantage point may radically conflict with the view from another vantage point. It is misleading to treat each vantage point as an individual criterion. One's visual impression of an object or group of objects is formed from many vantage points The total effect of the visual cones must be determined in the form of an average percentage from all four vantage points. Not all infinitely possible vantage points ought to have to be considered in this analysis, however. One ought to take into account only those vantage points that place the greatest constraints on new development.

One discovery made concerning the visual cone analysis was that the percentages from the public way vantage points never dropped below 60% even in site two with a coverage of 8% and 1/2 acre lots. The visual cone from the vantage point of the rear windows of the houses on the opposite lot never dropped below 55% even in site two. The existing houses are never set back far enough in view and are never small enough or spaced far enough apart to reduce the norm below these percentages. Within the standards of suburban, tract development, the limit may be fairly typical. This, however, needs further testing among many different blocks before any definitive limit or conclusive pattern can be established.

In sum, additional testing and manipulation of the existing environmental performance criteria is needed across a broader range of sites. Three sites are not adequate testing ground. Additional or completely alternative methods of site environmental analysis ought to be developed and compared.

A code analysis of the consequences of consolidation is needed in and of itself and as a way to determine the costs associated with changing the code or applying for variances. The code analysis result ought to be related back to the environmental performance criteria that brought the consolidation schemes about to determine how perhaps such initial assumptions affect the zoning regulations and building codes and any variances to these.

A systematic cost/benefit study is needed to assess the economic and social impact of consolidation alternatives. Perhaps only townhouse developments would be an economic alternative for many sites. Townhouse consolidation options maybe a worthwhile area of study. In such a case new environmental performance criteria would have to be developed to reflect the physical change to a building type unlike the existing. Or at least the limits circumscribed by the existing criteria would need revision.

An assumption upon which the present environmental criteria were based was that all development would occur at one time even if a particular scheme was indicated as developable incrementally. This assumption precluded the need to adjust the environmental criterion in an incremental manner as incremental physical changes were made. One final, but not necessarily last direction for further study, would be to follow several different consolidation methods through in a logical, incremental process, adjusting the environmental performance criteria incrementally to reflect the particular physical changes.

NOTES

Introduction and Abstract

[1]Chester Sprague and Anne Vernez-Moudon, "Consolidation: A Method for Expanding the Use of Single Family Housing in the Suburbs," M.I.T., December, 1981.

[2]Sam Bass Warner, Jr., Streetcar Suburbs: The Process of Growth in Boston (1870-1900), 2nd ed. (Cambridge: Harvard University Press, 1978).

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John Seeley, et al., Crestwood Heights (New York: Basic Books, 1956).

[3]Robert S. and Helen Merrell Lynd, Middletown (New York: Harcourt, Brace, and Co., 1929).

Bennett M. Berger, Working Class Suburb (Berkeley: University of California Press, 1971).

[4]Hattie H. Hartman, "Rehabbing the Suburbs: Freedom to Change," M.I.T. Thesis, M. Arch. and M.C.P., 1982. p. 58.

[5]Sprague and Moudon.

[6]Sprague and Moudon.

[7]Citizens' League of Minneapolis, MN, Making Better Use of Existing Housing: A Rental Strategy for the 1980's, 1982.

[8]cf. Accessory apartment literature: William R. Chandler and Ministry of Housing, Victoria, British Columbia, "Dual Occupancy: Addressing the Mismatch Between Housing Stock and the Needs of Households", Neighborhood Redevelopment Division, 1980.

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[9]Stanford Anderson, ed., On Streets (Cambridge: The M.I.T. Press, 1978).

cf. (for more information regarding the nature and extent of the man-environment relationship. Professor Anderson argues that a built environment has many simultaneous potential uses, eliciting many simultaneous perceptions. That is, a physical environment does not necessarily have to change to accomodate new social relationships, functions, and perceptions. See also:
Claude S. Fischer and Robert Max Jackson, "Suburbs, Networks, and Attitudes", in The Changing Face of the Suburbs, ed. Barry Schwartz (Chicago: University of Chicago Press, 1976).

Ibid., Gans.

Chapter 1

[1]This summary represents my interpretation of the literature on consolidation and accessory apartments.

[2]cf. Phillip L. Clay, The Housing Outlook Report, draft copy, (Cambridge: Joint Center for Urban Studies of M.I.T. and Harvard University, January 1983).

[3]Donald N. Rothblatt, et al., The Suburban Environment and Women (New York: Praeger Publishers, 1979). p. 7.

[4]Ibid., Rothblatt, et al., p. 7.

[5]cf., Richard Sennett, Families Against the City: Middle Class Homes of Industrial Chicago, 1872-1890 (New York: Vintage Books, 1974).

[6]cf., Clay, The Housing Outlook Report.

[7]Sprague and Moudon, p. ii.

[8]cf., Clay, The Housing Outlook Report.

[9]a 75% increase in the last five years - from a report on house sharing from "All Things Considered", N.P.R., April 29, 1983.

[10]cf. Rothblatt, et al.

cf. John E. Ullmann, The Suburban Economic Network: Economic Activity, Resource Use, and the Great Sprawl (New York: Praeger Publishers, 1977).

[11]"Many cities are revising their residential development policies in response to demographic and social changes: Phoenix, AZ, Portland, OR, Dallas, TX, Seattle, WA."

Sprague and Moudon, p. 5.

"Large numbers of illegal conversions of single family houses into two or more units have forced local authorities to consider consolidation policies: Vancouver, B.C., San Anselmo, Corte Madera, CA, Weston and Westport, CT, Concord and Lincoln, MA, Plainfield and Princeton, NJ, Babylon, NY, Portland, OR."

Sprague and Moudon, p. 6.

Many Communities are revising their policies regarding infill housing construction and the subdivision of existing, residential lots: Portland, OR, Multnomah County, OR, Vancouver, BC, Milwaukee, WI, San Francisco and Los Angeles, CA. (See also: Infill Development Strategies, Real Estate Research Corporation, 1982).

[12]National Association of Home Builders, Planning for Housing: Development Alternatives for Better Environments (Washington, D.C.: National Assoc. of Home Builders, 1980). p. 22.

[13]"Smaller, Smarter, More Affordable Housing", Professional Builder (September 1982).

[14]cf., Professional Builder, December Issues, 1976-1982.

[15]Sprague and Moudon, pp. 5-6.
cf., accessory apartment literature.

[16]Hare, Accesssory Apartments, p. 1.

[17]Hare, p. 2.

[18]Sprague and Moudon.

[19]Clay, "Improving the Utilization of Existing Housing Stock", p. 34.

[20]cf., Louis H. Masotti and Jeffrey K. Hadden, eds., The Urbanization of the Suburbs (Beverly Hills: Sage Publications, 1973).

[21]cf., Barton Myers and George Baird, "The Vacant Lottery," in Design Quarterly 108 Minneapolis, MN: Walker Art Center, 1978.

[22]Wilbur R. Thompson, "A Preface to Suburban Economics," in Masotti and Hadden, Ibid., p. 410.

[23]Ibid., Thompson, p. 429.

[24]Donald W. Walls, "A Theory of Residential Construction in Urban Housing Markets," Harvard University, 1981, p.126. (photocopy).

[25]cf. William C. Wheaton, "Urban Spatial Development with Durable but Replaceable Capital," in Journal of Urban Economics, 12, 1982, pp. 53-67.

[26]Ibid., Wheaton, p. 63.

This statement could be taken as a rejoinder to Mr. Thompson in that the built environment is long-lived only to the extent that it is economically optional.

[27]Ibid., Wheaton, pp. 63-64.

[28]cf., Thompson.

cf., The Costs of Sprawl: Environmental and Economic Costs of Alternative Residential Development Patterns at the Urban Fringe, The Real Estate Research Corporation, 1974.

cf. Duane Windsor, "A Critique of the Costs of Sprawl," in A.P.A. Journal, July 1979, pp. 279-292.

cf. John F. Kain, "Urban Form and the Costs of Urban Services," discussion paper No. 6, Joint Center for Urban Studies, at M.I.T. and Harvard University, May 1967 (Revised).

[29]Thompson, p. 418.

[30]cf., Windsor.

[31]cf., Costs of Sprawl.

The report attempts to show that substantial savings of public and private costs can be achieved by combining neighborhood clustering for higher residential densities with community planning for contiguous development in place of sprawl.

[32]Thompson, p. 420.

[33]c.f., Kain.

[34]Planning for Housing, p. 22.

[35]Metropolitan Area Planning Council, p. 3.

[36]cf., Gans, Berger, Seeley, Lynd.

[37]David Birch, unable to relocate source of reference.

[38]William Severini Kowinski, "Suburbia: End of the Golden Age," New York Times Magazine, 16 March 1980, p. 19.

[39]cf., James Heilbrun, "The Economics of Urban Transportation," in Urban Economics and Public Policy. (New York: St. Martin's Press, 1981), pp. 195-230.

[40]cf. Jon Van Til, Living with Energy Shortfall: A Future for American Towns and Cities (Boulder, CO: Westview Press, 1982), particularly pp. 93-115.

[41]cf., Infill Development Strategies.

[42]Leonard J. Kovac, "Summary of Report on Substandard and Lot Study," City of Portland, OR, December, 1978.

[43]Infill Development Strategies, p. 5.

[44]cf. Literature on accessory apartments.

[45]Infill Development Strategies, p. 1.

[46]"There is little evidence that conversion of farmland is a crisis in the making. In fact, the private market appears to be functioning effectively, a situation that obviates the need for regulation. The imposition of farmland protection regulation may create severe problems for housing at the local level."

Bernard H. Siegan, "The President's Commission on Housing: Zoning Recommendations," Urban Land, November 1982, p. 26.

[47]cf., Robert A. Lemire, Creative Land Development: Bridge to the Future (Boston: Houghton Mifflin Co., 1979).

[48]Anderson, p. 5.

[49]____________. p. 5.

[50]cf., Rothblatt, etal.

[51]____________. p. 170.

[52]____________. p. 1.

[53]____________. p. 7.

[54]cf., Clay, The Housing Outlook Report.

[55]Infill Development Strategies, p. 3.

[56]cf., Clay, "Improving the Utilization of Existing Housing Stock."

[57]cf,__________.

[58]cf,__________.

[59]cf,__________.

[60]Henley, et al., p. 7.

[61]Citizens' League, p. 11.

[62]personal interpretation of the literature on accessory apartments

[63]personal interpretation of the literature on accessory apartments

[64]cf., all consolidation literature.

Chapter 2

[1]D. W. Meinig, ed., The Interpretation of Ordinary Landscapes (New York: Oxford University Press, 1979), p. 228.

[2]Ibid, Meinig, p. 89.

[3]Constance Perin, Everything in its Place (Princeton: Princeton University Press, 1977), p. ____.

[4]Ibid., Perin, p. ______.

[5]Amos Rapoport, review of Everything in Its Place, by Constance Perin, in the Journal of Architecture Research (JAR), March 1979, pp. 34-37.

[6]Jan Cohn, The Palace or the Poorhouse: The American House as a Cultural Symbol (East Lansing: Michigan State University Press, 1979), p. 214.

[7]Ibid., Cohn, p. 214.

[8]N. John Habraken, Transformations of the Site, Draft Copy, M.I.T. Department of Architecture, 1981, p. 293.

[9]Charles Moore, Gerald Allen, Donlyn Lyndon, The Place of Houses (New York: Holt, Rinehart, and Winston, 1974), pp. 199-201. (As used by Hattie H. Hartman, "Rehabbing the Suburbs: Freedom to Change," M.I.T. M. Arch. and M.C.P. thesis, 1982, p. 59.)

[10]Victor Caliandro, "Street Form and Use: A Survey of Principal Street Environments," from On Streets; ed. by Stanford Anderson, (Cambridge, MA: The M.I.T. Press, 1978), p. 154.

[11]Warner, p. 139.

[12]Warner, p. 136.

[13]cf., accessory apartment literature and the typical objections raised by neighborhood residents to accessory apartments (and physical change in general) Refer back to Chapter 1 for specific objections to physical change.

Other components of neighborhood quality that are more of a social and economic concern are important. However, they are not explicitly considered here because of their indirect physical implications (such things as property values, property tax, school crowding, absentee landlords).

[14]It must be kept in mind that such measurement techniques are only tools to be tested out in practice. They are based on informed, personal experience, but are to a certain extent subjective and intuitive. They are not absolute, definitive rules. Such rules may prove to be too restrictive and conflicting. If adherence to these rules results in a very restricted physical change, perhaps these rules need reconsideration.

[15]This is not a fully substantiated concept. It is more of an experiential argument.

[16]Henley, et al., p. 27.

[17]Citizens' League Report, p. 13.

[18] ________, p. 13

[19]Henley, p. 27.

[20]Citizens' League Report, p. 13.

[21]cf., Robert S. Baldwin, "Urban Infill: New Homesites on Vacant Land -- With Accessway Subdivisions," Report prepared for Multnomah County Oregon, October, 1978.

[22]Robert M. Beckley and Lindsay Davidson, "A Study on Optimizing Utilization of Narrow Lots in the City of Milwaukee," Report prepared for the Department of City Development, City of Milwaukee, September, 1975. p. 2/11

[23]"Kitsilano Design Guidelines," Report prepared by the City Planning Department of Vancouver, BC, January, 1977. p. 26.

Chapter 3

[1]Sprague and Moudon, p. 29.

Chapter 4

[1]The regulatory impact of zoning and building codes is one determinant of the ease or difficulty of development and the public and private costs/benefits involved. A regulatory investigation was considered to be beyond the scope of this thesis however.

[2]The consolidation schemes and their analysis are not intended to provide definitive and unequivocal rules. The intent is instead to point up some of the physical/ environmental consequences of consolidation.

[3]Ibid.

[4]Ibid.

[5]Ibid.

[6]Baldwin, p. 29.

[7]See footnote number 2.

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