Understanding Residential Density: The Relationship between Policy, Measurement, and Perception

by

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B.A. in Molecular and Cell Biology
University of California, Berkeley, 1998

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ABSTRACT

For reasons of smart growth management, upcoming demographics changes, and escalating housing affordability concern, higher-density housing presents one fitting solution to future development challenges. Market conditions also seem favorable given increases in likely consumer population and the readiness of the real estate development industry. However, higher-density residences are still underrepresented housing typologies amidst a plethora of single-family homes. This thesis investigates how aspects of policy, measurement, and perception of density relate to each other in order to uncover predispositions and elucidate reasons for the perpetuation of current development patterns. A case in Fremont California was examined to contextualize and illustrate the findings presented, and recommendations were presented to suggest ways of overcoming current biases and shortcomings.

Thesis Supervisor: John de Monchaux
Title: Professor of Architecture and Planning

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Finally, I want to send my warmest thoughts to the people who have helped me maintain sanity and made life amusing to say the least…Madhu, Carolyn, Metta, Lisa, Jess, Ayan, and to certain kindred spirits across the street. Muchas gracias a tudos.

Contents

Introduction: "A decent home and suitable living environment..."

While the lives of most Americans have improved in today's robust economy, it is puzzling that some of the poorest families have suffered increasing hardships in the face of prosperity. The lack of housing options is one contributing factor, forcing some households into homes that consume over 50% of their monthly income in rent. Families of modest means are not the only ones experiencing difficulties with housing. Demographers have also foretold changes in the new millennium. The baby boomers are today's empty nesters and early retirees. Generation Xers and the echo boomers, children of the baby boomers, are the up and coming young professionals. Both groups seek vibrant, convenient, high-amenity living environments to support their active lifestyles. Coupled with a growing segment of non-traditional households, including single-headed and immigrant households, there is a growing number of households whose needs are poorly met by the single-family detached units. Yet the home construction industry has been producing a plethora of single-family units at an astonishing rate. America's preference for single-family detached dwelling units is based on nostalgia rather than the needs of the current generation. Furthermore, this mismatch of needs and housing typology is leading to unsustainable development patterns and exorbitant housing expenditures. As lifestyle and demographics evolve, there is likely to be an increasing demand for higher-density housing that better suits the needs of growing segments of the population.

The reality of shifting demand has already registered on the radar of many housing developers, who in recent years have been told by market forecasts like Emerging Trends[1], that apartments and condominiums in markets of high and rising house costs are "safe bets." It does not take rocket science to figure this out, given the demographic changes ahead. What has been surprising, however, is the difficulty encountered by housing developers on both coasts who have tried to follow this advice to build higher density housing. Where is the bottleneck faced by higher density housing development? Why has the shift in the demand curve not been followed by a shift in the supply curve as a basic understanding of market dynamics would suggest?

Using a modified version of Michael Porter's 'five forces' diagram[2], an illustration of the market dynamics influencing the production of higher-density, multi-family housing is shown below in Figure X. In the current scenario, the growth in the number of 'likely consumers' and the willingness of 'suppliers' to meet the market demand should yield an increasing production of higher-density units. However, the mass production of single-family homes, a substitute, has hindered the production of higher density housing typologies. In fact, the single-family rental units have a supply that exceeds demand by 250,000 units[3]. Thus this thesis will examine whether the ease of single-family home production, resulting in its predominance in the U. S. housing stock is the most likely response of the supply side given

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[1] Jointly published by PriceWaterhouseCoopers and Lend Lease Real Estate Investments

[2] Michael Porter uses 'five competitive forces' to illustrate the rules and factors influencing competition within any industry structure. These forces are: threat of new entrants, bargaining power of buyers, threat of substitute products or services, bargaining power of suppliers, and rivalry among existing firms. The strength of the forces within a particular industry determines the industry's profitability.

[3] Harvard Joint Center for Housing Studies, "*The State of the Nation's Housing*," 2000.

the non-market based explanations for the regulatory and community resistance to higher density alternatives.

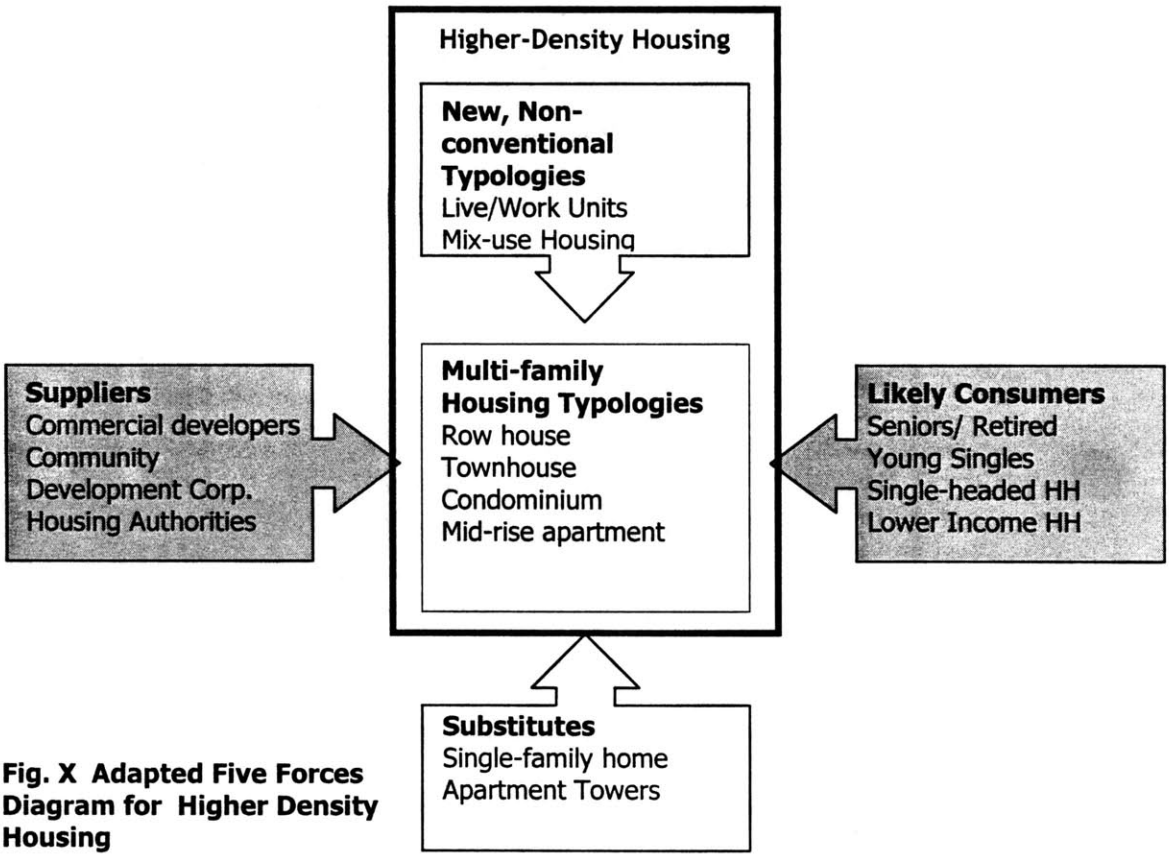
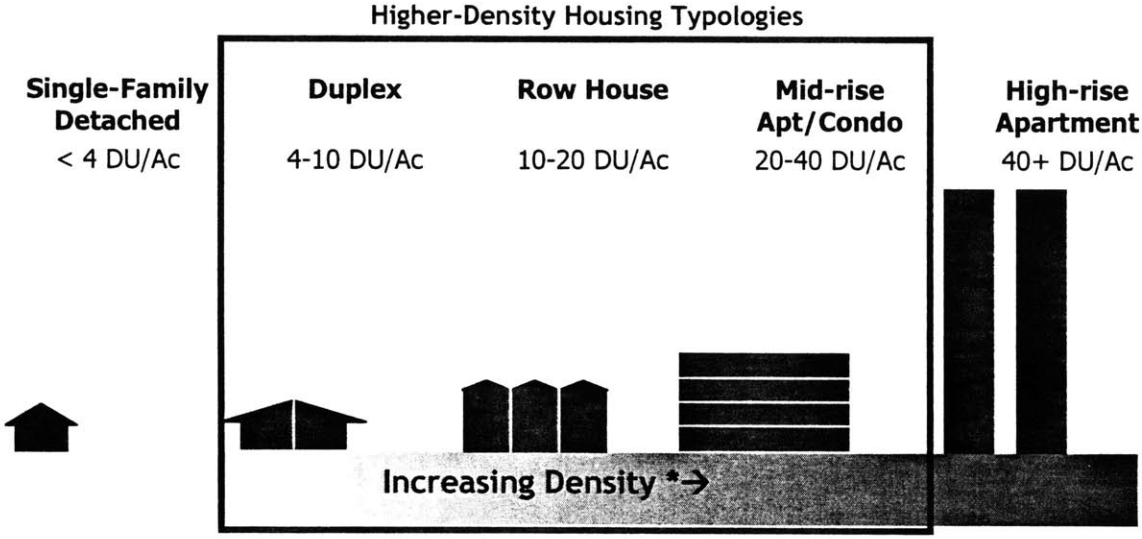


Fig. X Adapted Five Forces Diagram for Higher Density Housing

The relationship between the community, regulatory process, and market forces around the topic of higher-density housing deserves further investigation. There appears to be indication that the interaction is based on a considerable amount of misunderstanding,

making it a casualty of misperceptions, especially in suburban locations where they have been met with considerable opposition. These are the perceptions that have been the focus of my investigation.

Fig. 1 Density of VariousHousing Typologies



*** Defined here as net residential density**

Higher-density housing as used in the context of this thesis refers to housing at a density greater than that achieved by prevailing single-family housing prototypes which is typically less than 4 units per acre. This difference in density from other residential developments in the community has been cited as the reason for community opposition, extending as far reservation for affordable or multi-family attached units. While different densities have different physical implications, the term 'density' has been emblematic of a range of non-physical objections when used by residents of the community. Ultimately this thesis is concerned with understanding how discussion on density is framed through policy and its measurement, and deconstructing the meaning of density as used by resistant residents to get beyond the misconceptions. Only after addressing the root of community concerns and

finding a way to mitigate them can there be hope for augmenting housing diversity through the promotion of the underrepresented higher-density housing typologies. The value in this investigation lies in providing a better understanding of the impact of built density, which have broad-ranging consequences. These impacts are briefly outlined below.

GROWTH MANAGEMENT

The regional implications of the predominance of the single-family housing prototype are profound. First, the consumption of land for the development of single-family homes is depleting the supply of open space in developed areas. This entails open space and parks at the neighborhood as well as regional levels. Because much of the development is at a low density, some communities are drowning in their own vastness without meaningful open space. The result of this development pattern is increasing auto-dependence in every aspect of daily living. Some advocates of low-density development argue that the presence of more open space itself is a signifier of a higher quality of environment, but it cannot be taken for granted as such claims have not been backed by evidence.

Second, the predominance of single-family homes limits diversity within the community. This has two implications: one on the job and housing imbalance, and another on the long-term health and sustainability of the existing population. Suburbanization of the residential population has been followed by the suburbanization of jobs. As employment continues to decentralize, households are able to live and work at greater and greater distances from the urban core. Because the suburbs offer few alternatives to the single-family prototype, lower-wage earners have fewer options and are often forced to pay for housing beyond their means or commute for long distances. Even if rent per square foot in suburbs were lower on

average than in the urban core, the rent per dwelling still might be higher than in urban areas because the size of the units is often bigger. Financial consequences are also coupled with social disruptions. If the multi-family residents choose to move, they would have to leave behind their network of family and friends.

Limited diversity within the community affects the health of the community in the long run. There is disproportional impact on particular community resources. For example, when the community is comprised of mainly young families, attracted to the detached single-family homes for child-rearing, schools would be highly impacted, prompting new school construction. However, as the children grow older, there will be an excess of schools but a lack of facilities that serve the young adults and their middle-age parents. The problems perpetuate as the population evolve from one phase of life to another. This will either result in constant building and demolition or population flux, neither of which is healthy for the community.

Today, we are standing at the threshold of a paradigm shift. The success of smart growth policies that promote a more compact development pattern at the federal, state, regional, or local levels has resulted in greater market acceptance of higher density housing. Between the acceptance of actual policy measures and its implementation lies an uncertain chasm. However, steps are being made to begin bridging the gap. Some states have adopted policies that prevent excessive lot size requirements that perpetuate low-density development. Urban growth boundaries are being adopted in large cities such as Portland, Oregon and small cities like Concord, New Hampshire. More cities are realizing the importance of coordinated land use and transportation planning. All are examples reflecting

conscious and active communities, unwilling to allow past policies and prejudices determine the future. However, communities also need to be mindful of demographic changes that alter market demands and preferences.

CHANGING DEMOGRAPHICS AND LIFESTYLE

Continued population growth coupled with economic prosperity will have implications for future housing market activity. The future demographic profile's divergence from the existing pattern is noteworthy. Nationally, household size has continued to fall, from 2.63 persons per household in 1990 to 2.49 in 1999[4]. Both the higher rate of household formation and greater number of single-headed households contribute towards the rapid growth in the number of households, and in turn bolster the demand for more housing options. For example, female-headed households represent 11.6% of all the households in the United States. The baby boomers are today's empty nesters and early retirees. Thanks to longer life expectancy, there will be growth in the segment of households over 65, healthier and wealthier and than their predecessors. In fact, the proportion of residents in the 35-54 years age group in rental housing alone has increased from 26% in 1975 to 30% in 1987, then to 37% in 1999[5]. Their kids, the echo boomers, are the up and coming young professionals. Both groups are highly educated, and seek vibrant, convenient, high-amenity living environments to support their active lifestyles. Many of these demographic and lifestyle factors contribute towards renewed interest in urban living, resulting in multi-family housing construction in the west, particularly San Francisco, Portland, and Seattle[6].

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[4] U. S. Census, 1999 American Community Survey Summary Tables
[5] *The State of the Nation's Housing,* 2000.
[6] *The State of the Nation's Housing,* 2000.

According to the U.S. Census Bureau, of the 1.5 million housing starts this year, 80% were single-family homes with the remaining 20% in buildings of 2 or more units[7]. With the current multi-family dwelling construction rate double that of the 1993 cyclical low of 162,000 units, multi-family construction is now more reflective of market demand, but perhaps still insufficient[8]. Traditionally, multi-family and single-family housing followed different trends, but vacancy rates for the two types show a dramatic convergence over the past 10 years[9]. The increase of single-person households, echo boomers, and immigrant households have increased the total demand for apartments by over 4% in the years between 1993 and 1997[10], bolstered somewhat by modest production levels. In contrast, the rapid increase in supply and modest growth in demand for single-family housing have increased its rental vacancy rate sharply by approximately 4% over the same period. This may be the time when the preference for single-family detached dwelling units needs to be reevaluated.

One indicator of the changing demographic profile of multi-family housing residents is the increasing size of apartment units. Between 1993 and 1997, the size of the average new multi-family unit increased by 4.4% from 1,015 SF to 1,060 SF, and the segment with two or more bathrooms increased by 10% to 54%. As lifestyle and demographics evolve, there is apparently an increasing demand for higher density housing that better suits the needs of growing segments of the population.

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[7] U. S. Census Bureau, October 2000 press release.
[8] Harvard Joint Center for Housing Studies, 2000.
[9] Harvard Joint Center for Housing Studies, 2000.
[10] Harvard Joint Center for Housing Studies, 2000.

AFFORDABILITY

According to the U. S. Department of Housing and Urban Development (HUD) report, *The State of the Cities 2000,* housing prices nation-wide have risen more than twice the rate of the overall inflation rate, and rents at more than one and a half times that rate between 1989 and 1999. Furthermore, affordability has become a critical issue as more than 46% of all the cities participating in the survey reported a serious shortage of affordable housing for lower-income households. This is not a problem just for the chronically underemployed. In many urban areas households with one and even two working adults must pay significantly more than the 30% of their income recommended for housing expenses. High growth areas like the Silicon Valley, Seattle, and Boston have suffered from the skewed patterns of investment associated with the DOT.com economy, resulting in housing prices and rents beyond the reach of the majority of the area's households[11]. Michael Pyatok, noted architect and polemicist, observes that affordability issues have profound implications for developing housing polices at all levels of government.

Technical solutions have been sought to reduce construction costs: higher density to reduce soft costs and land costs per unit; prefabricated elements to speed the building process while relying more on cheaper production methods; smaller, more efficient dwellings to save materials; and better building insulation and orientation to conserve energy. In a booming economy with severe labor shortages, high inflation in the construction industry, runaway land speculation, even major construction breakthroughs and technical design innovations have limited ability to lower overhead costs. There is no substitute for better planning in the

[11] Pyatok, Michael, "Designing Affordable Housing for the Return of the Homestead," New York: McGraw-Hill, 2000.

first place, and providing housing options that enable residents to reduce their housing expenses. Better planning also results in the reduction of transportation related expenses and time spent commuting, as some development patterns and resulting densities begins to make mass transit options viable alternatives in a car-dominant society.

MISLEADING PERCEPTIONS

Why then is there so much resistance to higher density? There are at least four aspects contributing to the misperceptions evident in the literature that are associated with people's negative reaction: (1) Biases in policy and regulation; (2) Difficulty in measuring density; (3) Emblematic usage of density to imply different concerns; and (4) Lack of research on the impacts of higher-density housing. In fact, some of these aspects have been around for more than three-quarters of a century.

From the inception of zoning in the United States, higher-density housing has been viewed as a nuisance from which single-family residential neighborhoods needed to be protected. The U. S. Supreme Court case such as *Village of Euclid v. Ambler Realty Co.* and Michigan Appellate Court case *Kraus v. City of Royal Oak* demonstrate the court's position in support of separating single- and multi-family homes. Because of these biases in the way density has been framed, communities have developed a mistrust of higher-density housing. Unfortunately, difficulties in measuring and regulating density, through methods using number of dwellings per acre, floor-area-ratio, set back, etc. have further perpetuated this mistrust. Problems in current indices used in regulation include over-aggregation and inability to prescribe good versus bad form.

As a result, people have attributed many negative impacts to the density of the housing development, using it as a scapegoat for other objections such as excessive burden on public schools, and increases in crime or low-income households. Difficulties in measuring density are evidenced in studies showing that most people left to their own inferences underestimate the density of their own neighborhoods. When their perceived density is lower than the actual, it is easy for people to balk at a higher density development if they are only given written information because in their minds, it seems already too dense and entirely out of character with what their neighborhood today. Others couple density with higher crime rates and drug use, but these are more the result of poor urban management rather than density. However, there are a few of the perceptions that are founded in reality as will be discussed later.

There are other arguments against density, such as municipal fiscal burden and construction cost and resident lifestyle preferences. Residential uses consume more municipal services per acre in the form of schools, police, and fire, than commercial and industrial uses that lead local governments to discourage increases in residential uses. Impact fees, if charged to housing developers, usually are not sufficient to cover the expenses incurred by the municipality. Higher housing density also tends to cost more per square-foot to build due to structural and safety requirements, and the need to provide structured or underground parking is often another costly expenditure. However, behind these arguments are a lot of shaky assumptions about the actual level of service necessary and the cost of provision that municipalities must pay for. Consideration is rarely given to who actually bears the costs, whether it will be the public or private sector, or the community at large through negative

externalities. Increased costs in some areas are offset by social benefits and reduced costs elsewhere. The fuzziness of most of these transactions makes them hard to account for fiscally. Further investigation is necessary to substantiate these claims.

All this adds up to the conclusion that perceived density is influenced by a range of confounding factors, producing unexpected reactions because of its divergence from physical density. Since so many factors contribute towards perceived density, changes in density policies and measurements will have broad-ranging consequences. For this reason alone architects, planners, and urban design professionals should be involved with discussions over density. Between theory and reality, they are involved in the forecast of future land use patterns and community as well as outreach and education strategies that influence public opinion about development. Density is an aspect of urban design where profound changes can be made to shape the urban environment. In the words of Jon Lang, academic and theorist, urban design is a "level of urban practice, defined in terms of a certain way of life, where social activities of a group or an individual are revealed for what they are. Here exists typology, a feeling, a concrete rationality, which is more impressive and more complex than abstract rationality." Therefore, density is a subject that must be better understood so that it is part of an active decision communities make about what they aspire to be in the future.

Overview

CHAPTER 1 MACRO POLICIES AND LOCAL POLICE POWER

On one hand this chapter offers a review of federal policies and actions since the turn of the century, and on the other the rationale and court precedents for the regulation of higher-density multi-family housing in the United States.

CHAPTER 2 MEASURING DENSITY

Chapter 2 touches upon the misalignment of physical, measured, and perceived density, and how subtle differences in definition (i.e. area to be included in the land basis or unit vs. neighborhood density) results in density indicators that make comparison difficult. Some commonly used methods to regulate density are covered as well as emerging alternative tactics.

CHAPTER 3 PERCEPTIONS OF RESIDENTIAL DENSITY

Findings based on previous studies are discussed to elucidate factors that contribute to how people perceive residential density. In addition, this chapter summarizes fundamental attitudes of those in support and in opposition of higher density. Together, these observed perceptions and attitudes begin to suggest ways in which regulations can address perceived impacts at the core of community concerns.

CHPATER 4 IMPACTS OF HIGHER-DENSITY HOUSING

In contrast, this chapter points to actual ways higher densities make an impact to the physical form, community, infrastructure, and land use and consumption. Where possible, statistics quantifying the impact are presented in support.

CHAPTER 5 VILLAGE AT CIVIC CENTER

A higher-density housing development in suburban Fremont California illustrates the difficulties with higher-density housing raised in earlier chapters. Through an overview of the permitting process, this chapter examines the relationship dynamics between the local regulations, community groups, the developer, and city planning staff to see how each affects the others.

CHAPTER 6 LESSONS AND RECOMMENDATIONS

Starting with a summary of the findings, this chapter highlights the different lessons learned through the process of this investigation. The aim here is to advise municipalities and developers on ways to obviate or overcome hurdles encountered in the development of higher density housing. Recommendations attempt to supplement current professionally based regulations with community established evaluation standards to better integrate community input and concerns into the formal regulatory framework.

1 The Macro Policies and Local Regulations

There has been a history of prejudice that contributes to today's misperceptions about density. This chapter explores the origins of this sentiment by looking at how federal policies and subsidies have shaped development perceptions at the macro level, and the motivations underlying land use regulation at the local level. The goal is to understand how our discussions and views of density are framed, thereby attain better understanding of the difficulties in building higher density housing. In ways, this discussion of power distribution is necessary because of tension that develops between the goals and objectives of different levels of government. Although they are assumed to be consistent and reinforce each other, this may not always be the case. Here is an example of where different regulation goals established by different authorities can undermine the ultimate attainment of public benefits.

The prosperity of the 1920's and the rapid increases in automobile ownership led the first massive migration of middle-income residents from the central city to the suburbs. For the most part, however, low-density suburban development patterns were the indirect result of post-war federal policies working in conjunction with local zoning practices. The federal government's move to encourage home ownership and build highways at the end of World War II was a political decision aimed to stimulate the economy. Federal Housing Administration and the Veteran's Administration implemented programs that guaranteed loans, increasing the attractiveness of these loans to commercial lending institutions. Simultaneously, the construction of freeway, largely paid for by federal money, provided the

path for the urban exodus. Aided by the increasing popularity of the automobile, these developments had significant impacts on the settlement patterns. Today, housing and freeway construction have maintained their position as major contributors of the economy. Housing industry accounts for more than $328 million in 2000[12] and freeway construction accounts for $27 billion in 2000[13].

Furthermore, an abundance of inexpensive land was available on the urban fringe, and public investment in infrastructure, such as sewer, water, and roads contributed to the exodus of urban populations into less dense suburbs. This was where the population could be safeguarded from the unsanitary and overcrowded conditions of the dense, industrial city. The guarantee of a healthy environment and stable property values were the direct benefits of land use regulations. Its simplistic application and predictability helped its wide acceptance to the related professions of real estate development and finance in the early days, however, presents a problem for us today. Because of its underlying assumptions about the 'not inherently benign' nature of multi-family housing and its oversimplified way of regulating use and density prevents a fair assessment of higher density housing as an option appropriate for today's conditions.

Another relationship to note is that while tenure and housing typologies are not inherently related, there is a clear correlation between ownership and single-family detached dwelling units. Fifty years later, this pattern persists as homeownership of single-family detached units has more than four times the ownership rate than other forms housing combined.

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[12] U. S. Central Intelligence Agency, Fact Book Publications, 2000.
[13] Federal Highway Administration, FY 2000 Budget

Renters traditionally have had also a very different demographic profile from the owner population. Since renters constitute more than two-thirds of the multi-family housing stock versus not quite one-eighth of the single-family housing, the multi-family residents were considered the other, a more transient, lower income earning group.

Table 1 Ownership Proportion by Prototype

(Units in structure)	Owner	Rental	Total
SFD (1, detached)	54.9%	7.8%	62.8%
MFD (1+, attached; Condominiums, Cooperatives)	12.0%	25.2%	37.2%
TOTAL	66.9%	33.0%	100.0%

U. S. Census Bureau - American Housing Survey for the United States: 1999

Single-family detached housing comprised three-quarters of new housing stock over the past forty years, a stable figure in the suburbs since the 1960's. The remaining quarter is made of multi-family dwelling (apartments of 5+ units: 12-14%; 10+ units 7-8%) and mobile homes (5-6%)[14]. Because single-family housing predominate the housing stock, and because homeownership is much higher for this segment, inhabitants of higher-density housing have reaped less of the benefits because they are mostly renters who are not entitled to homeownership tax subsidies. Also, it is important to keep in mind that the distinction between lower density, single-family home residents and higher-density, multi-family residents is often the same as the distinction between homeowners and renters.

[14] Moudon, Anne Vernez, Paul Mitchell Hess, "Suburban Clusters," Wharton Real Estate Review, Vol. 3, No. 1, Spring 1999.

Macro Policies

The unique distribution of power among the federal, state, and local governments in the United States has played a complex part in directing and regulating growth. Until the 1980s, most government interventions for housing originated at the federal level through the provision of funds, programs, and rules, which affect market forces and industry structure. These provisions were established to achieve greater public goals. Within its arsenal of tools, the federal government possesses instruments to stimulate housing production via the direct provision of funds, as in the case of public housing, subsidies, as in the provision of affordable housing, and guarantees, as a way to encourage private lending. While the role of the federal government changed dramatically from that of post-war years, the invisible hand of government has always been a strong force in the housing industry, and the underlying attitude towards higher-density dwellings has been consistently negative. Here is a look at how the role has evolved.

The majority of federal housing programs evolved during the Depression under New Deal. The goal of the Housing Act of 1934 was to create a new instrument to guarantee depositor's money and to insure housing mortgages, the result of which would instill confidence and bolster willingness of commercial lenders to finance home purchases. Thus the Federal Housing Administration (FHA) was established. After WWII, the Veterans Administration also established a home loan program, which provided loan guarantees for low-interest, long-term mortgages requiring low down payments. Together, these two programs fueled a period of unparalleled suburban housing development and rapid growth in homeownership.

While the middle-class families enjoyed their move to the low-density, urban fringes, the federal government established the Housing Act of 1937 and began the construction of public housing. Linked to the program of slum clearance, the idea was to demolish overcrowded tenements or 'blighted' neighborhoods to be rehoused in high-density apartment buildings. Thus began the institutionalization of a double standard for suitable density. Low density in the suburbs was for middle-class families who benefited from tremendous homeownership and infrastructure subsidies. However, the poor working class should remain in high-density public housing, occupying building typologies other than the single-family home.

The Housing Act of 1949, the goal to provide "a decent home and suitable living environment for every American family" translated into more mortgage subsidies programs for the middle-class, this time provided by the Veteran's Administration. It also created the Urban Renewal program, which once again demolished low-income neighborhoods to be replaced with largely indefensible, high-density housing projects. Cabrini-Green in Chicago and Pruit-Igoe in St. Louis are among the most notorious examples. 'White flight' of the 1950s and 1960s perpetuated the segregation of socioeconomic groups between high-density cities and low-density suburbs.

The position of the federal government shifted to a much more passive role beginning with the Nixon administration. Categorical grants were consolidated into block grants, making the pot of money appear greater even though there were sever cuts in the funding of federal assistance programs. The President's Commission on Housing made a report in 1982 made official that housing was basically a state and local responsibility. It recommended less

federal intervention in hosing finance, more concentration on land use regulatory reform, primarily at the state and local levels, and elimination of tax policies that subsidized housing through tax deductions.

> "People live in places, and land is intrinsically local, its uses controlled by local regulation. The legal order and legislative atmosphere needed for housing to thrive in this society must be created by states and localities. [15]"

Even though federal involvement in housing was supposed to be relegated to a less active role in general, the main difference was in public housing, the only area where it ever played an active role. The subsidies that assisted middle-class homeownership remained largely intact.

Even in the 1980s changing policies continue the bias against higher-density housing development. Among other impacts of the Tax Reform Act of 1986, the cumulative affect was making rental housing less attractive as an investment (reduced tax rates, reduce the use of tax-exempt revenue bond financing, reduced depreciation allowances, capped capital gains, limited losses from passive investment, etc.). As indicated earlier, there is a strong correlation between rental housing and multi-family housing. If fewer dollars were available for the development of revenue generating rental housing as investments, this translates directly into a reduced construction of multi-family housing.

The Department of Housing and Urban Development's recent attention to New Urbanism can be interpreted as the next step in undermining higher-density housing. The approach of the

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[15] The President's Commission on Housing, *The Report of the President's Commission on Housing* (Washington, DC: U. S. Government Printing Office, 1982) xviii.

HOPE VI program to retrofitting decrepit public housing projects is to decrease its density, and adopt architectural features more reminiscent of single-family homes, such as the frequent use of pitched roofs. One cynical reading of the message being sent out is that higher density housing is bad, but if it can be disguised into looking like the single-family home, people may find it more palatable.

Throughout the federal government's involvement with housing, there has been an undertone of bias against higher-density housing. Whereas the federal government's involvement in housing provision, in the more active earlier periods, perpetuated a racial and economic segregation of low-income families and individuals into higher-density neighborhoods; its restructuring of finance and subsidy programs indirectly discouraged its development. With the public housing stock it has remaining, the attempt is to replace and disguise existing high-density housing to look like lower density housing. When there is a norm, there is also the other. Time and again higher-density housing has been painted as the 'other' against which federal policies and programs have antagonized, either through association or neglect.

Other broader, policy level positions have also encouraged suburbanization and the development of low-density housing. For one, billions of dollars poured into highway construction by Congress after World War II had broad impact on the development patterns. The new interstate highway system, funded 90% with federal money, allowed for commercial and industrial enterprises to move out of their central city locations and relocate in the suburbs where land is cheaper and regulations less stringent. The suburbanization of homes and jobs would not be possible otherwise had it not been for the vast infrastructure

investments. What is more is the building and widening of streets to accommodate the automobile was also seen as part of modernizing, "The City Efficient" efforts. Often forgotten is the tradeoff between expenditures in the suburbs versus in the inner city, where biases in spending practice indicate the government's preference for suburban dwellers.

Another influence on macro forces comes state and regional governments. The role of the state and regional government is widely disparaging because power at this level is either authorize by the local level, or granted down from the federal level. Because the dynamics and political pressures vary from state to state, it is difficult to generalize. Broadly speaking, government at this intermediate level tends to focus on establishing what can be considered as 'fair play' rules because these regulations try to watch over regional natural resources (wetlands protection), growth management (urban growth boundary, job and home balance), and fair share distribution (affordable housing). Growth management implies density management, finding ways to accommodate and sustain growth within current areas and infrastructure capacity. Sometimes these attempts were made at higher levels to allocate growth to where infrastructure, population, or other resources are currently located. This was done explicitly in some areas through the devise of urban growth boundaries.

The benefits of coordinated management and distribution of growth and resources increases efficiencies at the regional level and is highly deserving of our attention. Regional regulations, such as inclusionary zoning and affordable housing development and effort to balance jobs and housing, address needs that yield regional benefits that are beyond the boundary of local jurisdiction. However, this misalignment of burden and benefit produces a friction between local and higher levels of government. Strong communities have the

political will and constituency to make development difficult, if not entirely impossible for undesirable developments to come into the community. Therefore, less desirable developments take place where communities have a weaker local voice, and not necessarily where it makes economic or geographic sense. The lack of authority and compelling incentives for local government to ban together is a challenge. Even so, the work of people like Myron Orfield and their attention to regional collaboration may start to change the dynamics of regional governance.

Local Police Power

On the other end of the spectrum, America's preference for the single-family home has two distinct roots, which provide both the 'push' and 'pull' factors for its preference. One of these roots is the desire to flee from the unsanitary, over-crowded tenement housing of the dense industrial city. The other is rooted in the frontier sprit, the picturesque white picket fence set in a garden green, which has become a cultural symbol for the middle-class, homeownership, and all the liberties and virtues that come with private property, as American as baseball and apple pie. Advocates of the Garden City movement shared both sentiments, although they approach it with a much more ideological overtone. From these reasons stem the twin pillars of rationale for zoning: protection of health and private property.

First, living conditions in the industrial city of the turn of the century warranted serious public concern. While the streets were frequently congested with mud and strewn with garbage, inside the windowless tenements, deplorable conditions of overcrowding and poor sanitation

plagued the factory workers. Both conditions contributed to high infant mortality and frequent epidemics in this high-density environment. In *How the Other Half Lives*, Jacob Riis captured the scene in New York tenement houses, and inspired a social reform movement to tackle what was then perceived as interrelated problems of congestion, crime, underemployment, transit, density, and lack of recreational space. It seemed quite logical that with zoning, use and dimensional requirements could be established to remedy these conditions: residential density can be limited to curb sanitation problems, and setback could be required to prevented the spread of neighborhood fires. Many of the physical regulations for housing, such as bulk, density, setback, and lot coverage were motivated by health considerations. Furthermore, regulation of physical dimension is to protect the privacy of every dwelling free from undue observation and that no loss of light is caused by undue overshadowing from adjoining higher buildings. An individual has a right to expect that these impacts will be regulated in any development. More stringent building regulations that require space between buildings and access to sunlight should be considered to mitigate impacts. However, due to local attitudes that multi-family homes are undesirable, these are not the only constraints imposed on higher-density housing.

Restrictions on the building envelope have been configured so that higher density housing cannot be accommodated without seeking exceptions through variances or special permits. This produces results comparable to exclusionary zoning practices deemed unconstitutional by the landmark New Jersey Supreme Court case *Southern Burlington County NAACP v. Township of Mt. Laurel,* where communities including Mt. Laurel intentionally required large lots for residential dwellings. Similarly, the case *Simon vs. Needham* (1942) the

Massachusetts Court stated that towns cannot discriminate against uses that are more demanding of municipal resources, or would result in a higher tax rate:

> "A zoning by-law cannot be adopted for the purpose of setting up a barrier against the influx of thrifty and respectable citizens who desire to live there and who are able and willing to erect homes upon lots upon which fair and reasonable restrictions have been imposed nor for the purpose of protecting the large estates that area already located in the district."[16]

In this case for multi-family housing, the exclusionary result is a composite of many regulations in addition to density: bulk, height, setback, coverage, etc., resulting in discrimination that is much more subtle and difficult to identify.

The second rationale for zoning was to maintain private property values. The goal of private property owners was to develop their land for the highest and best use, and zoning was a tool to ensure stability and predictability in the neighborhood, and abate the encroachment of nuisances. Seeing that an individual's home is his/her biggest, most precious investment, it made sense that the public, a collective of individuals, was interested in protecting private property values. Some take it a step further in saying that zoning is a means of maximizing the value of property, and that "proper" zoning is actually determined by the dynamics of the market[17].

> "The rank and file of the people are coming to look upon [zoning] as merely a matter of maintaining or increasing property values. Whenever a question of rezoning comes up, the issue is not usually approached from the standpoint of what the city needs, but of what the private owners desire stand what their immediate neighbors feel disinclined to let them have." -1931 William Munroe, Vice President of the National Municipal League

[16] The Court ruled in favor of the town and its large lot requirements, however, but on the grounds that the by-law was valid, but does not say such practices are by default justifiable.
[17] Babcock, 1966.

As mentioned earlier, ownership is much higher among single-family residents, so this protection does not extend to multi-family dwellings.

This preference was made overt in many ways, the most noticeable of which was in the U. S. Supreme Court case *Village of Euclid v. Ambler Realty Co.*, the 1926 landmark case which affirmed the legitimacy of zoning itself. The bench regarded the 'intrusion of industry *and apartments* into single-family zones a cousin to a public nuisance, similar to the intrusion of a tuberculosis sanitarium which should be kept out under orthodox common law principles.'[18] In the name of separating noxious uses from the single-family residential neighborhoods, multi-family housing became an outcast, grouped with industry and commerce as something to be kept distant from the quiet streets where children play. Justice Sutherland of the U. S. Supreme Court stated with respect to Euclid that the separation of multi-family housing from other residential uses is justified because apartment houses are "parasites robbing single-family neighborhoods of value...interfering by their height and bulk with the free circulation of air and monopolizing rays of the sun which otherwise would fall upon the smaller homes...until, finally, the residential character of the neighborhood and its desirability as a place of detached residences are utterly destroyed...[19]"

Justice Sutherland's opinion is based on the assumption that apartments must always be built at high-density and have noxious attributes. Views of this sort were expressed in a number of other instances. Higher-density was said to forced people to "experience the increased confusion and congestion, noise, et cetera that would accompany a development

[18] Babcock, The Zoning Game: Municipal Practices and Policies, Madison: University of Wisconsin Press, 1966.
[19] Village of Euclid vs. Ambler Realty Co.,1926.

other than single-family, a development that would allow a drastic increase in the total number of people...[20]" Indeed, these views suggest the mere existence of higher density in the neighborhood starts a trend towards blight and the development of slums. *Planning and Control of Land Development* by Mendelker, Cunningham, and Payne, documents some of the assumptions behind regulations of the time:

> "Euclid and Brett provide rationale for segregation of residential buildings by building type. List of reasons include a) more restricted areas result in less dense develop that is more peaceful and quiet, more sun, promote public health, safety from fire... b) "Multi-family dwellings are incompatible with the residential character of the area for aesthetic reasons, and also because their occupancy is more transient than that of single-family dwellings; c) because of a. and b. MFD have lower property value, and "start a trend towards blight and the development of slums;" d) segregation of residential structures by building type results in a more "orderly" and "balanced" pattern of development. [Emphasis added] (1979)

Zoning was essentially the "extension of common law nuisance doctrine, to build a comprehensive land-use regulatory scheme under the aegis of police power."[21] It enforced the separation of land uses to provide a healthy, safe environment of promised neighborhood homogeneity. It is evident that from inception land use planning, multi-family housing was targeted for differential treatment based on certain assumptions and prejudices. Many of the problems associated with multi-family housing were problems of design, management, or location. They are factors that can be controlled or mitigated, and are not inherent in the physicality of higher density housing. More problematic is that since the early days, housing standards have improved tremendously, but the way different typologies and densities are treated and regulated was never revisited.

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[20] Kraus v. City of Royal Oak, 1968
[21] Babcock, 1966.

Beyond the way in which it is framed by zoning ordinances, other problems exist at the local level that also create obstacles for higher-density housing. Regulations tend to look at development at a much more aggregate level, expressing recommendations in terms of summary figures that do not reflect the quality of design or site planning. When evaluated on these terms, high quality projects have a difficult time conveying their value or the contribution they can make to the community. Some developers have faced significant resistance even when they approach the city with a project generates positive benefits for the city. Because it may take a longer time to flush out the details and bring the community on board with a better understanding of the project, many developers do not taking the risk associated with higher density developments unless there are extraordinary circumstances.

Furthermore, local regulations can take on a much more political dimension because of local politics and requirements for public hearings. It is much easier to pass policies and make broad sweeping statements at a higher level that do not have explicit physical consequences. When going from policy to the implementation, however, all the peculiarities of the site and generate impact enter the picture to give reason for opposition. Local politicians also answer to their constituents who put them into office, and are less inclined to thinking more broadly for the region in general. Thus, the misalignment of local political burden and regional growth management benefit, policy forces and physical regulations push higher density development in the middle ground. They are recommended at the state and regional level for balance and equity reasons, but prevented at the local level due to financial, resource, and physical impacts.

In cases where use and form are closely associated, it is possible to prevent the use within community by indirectly controlling allowable physical attributes. For example, Chapter 40B of Massachusetts General Law requires a minimum of 10% of a city's housing stock to be available at a predetermined below-market rate. Due to limited project generated revenue and availability of public subsidies, most of these developments must be developed at a higher densities to reduce the cost of land acquisition on a per unit basis. If however, there are large minimum lot size requirements or limited areas with a higher density designation, the community would have successfully precluded the development of affordable housing if the state did not also include the provision to allow such developments to override local zoning in communities that do not meet the 10% requirement.

While the regulations between federal, state, and local levels may appear to complement each other by controlling different attributes, this may not always be the case. Macro policies may push growth in a certain direction, but local controls may prevent it from being developed by making it impossible to implement.

Conclusion

Higher-density housing as seen through the regulatory lens has always been considered a nuisance. Based on outdated assumptions, it is perceived to threaten the primary goals zoning was established to protect: safety and health and property values. For health and sanitation reasons, higher density housing's association with tenement housing is perhaps still embedded in people's perceptions. In terms of protecting property value, its high

correlation with a more transient rental population makes people wonder about its impact to neighborhood stability.

Housing conditions have changed dramatically since the days zoning was first conceived. The progress made so far, coupled with additional changes on the way, should be reason enough to reassess the current situation. Are the original motivations outdated? Have the impacts changed with the advent of technology or other innovation? Can ways of monitoring and regulating be better crafted? These are some of the questions that should be raised at the local level.

As long as the population continues to increase, growth management will be an important issue. Federal policies up until the 1970s were clearly, but perhaps inadvertently, advocating the development of low-density suburbs. Even as the federal government's role diminish on issues relating to housing development, there remains a need to coordinate at a broader level to achieve more sustainable growth patterns and more rational use of finite resources on a broader, regional level. However, municipalities will continue to pursue their interest in lower density development because of the presumed lower impact on infrastructure and higher real estate tax assessment. The misalignment of burden and benefit will continue to cause friction between different levels of government until their interests and the economics are aligned. This is the challenge that confronts policy makers and municipal planners today.

2 Measuring Density

As an outgrowth of policy and regulations, the way in which density is measured – what is measured, what is not measured, how it is measured – also possesses inherent biases. Density, a calibration tool in the service of zoning, is an application of its principles. The point is that what you see depends on the lens through which you see things. In the last chapter, discussion of the original rationale for zoning illustrates how higher-density housing can be institutionally and systematically discriminated against. In this chapter, further explorations into the mechanics of measurement will demonstrate how biases are perpetuated.

Density levels established to control residential development through either specifying the number of dwellings or the amount of floor area permitted are widely used in conjunction with other physical guides such as maximum height, site coverage, floor area ratio, setback, to control the physical outcome of development. Because of high rates of morbidity and infectious diseases have been traditionally reported from crowded settings, the view that high-density living is deleterious to health may still figure into people's perceptions subconsciously. Physical regulations found in zoning were established to ensure proper light, ventilation, and space to provide for a healthy, sanitary living environment. However, it is necessary to realize that density itself is a neutral indicator and does not determine a healthy or unhealthy environment, good or bad development. While higher-density housing suffers from a negative image, there are a growing number of dense residential developments

receiving accolades for the quality of place created and its sensitivity to the environment, neighborhood fabric, and residents. Therefore, more thought needs to be given to adequacy of aggregate density standards currently used in regulation.

First, residential density can be described as the proximity of dwellings and or people within given areas. For planning purposes, it is most frequently measured in terms of a ratio between the number of dwelling units to the area of land it occupies (Dwelling units per acre). Depending on the case, this may include internal public streets plus half the width of adjoining access roads that provide vehicular access to the dwellings.

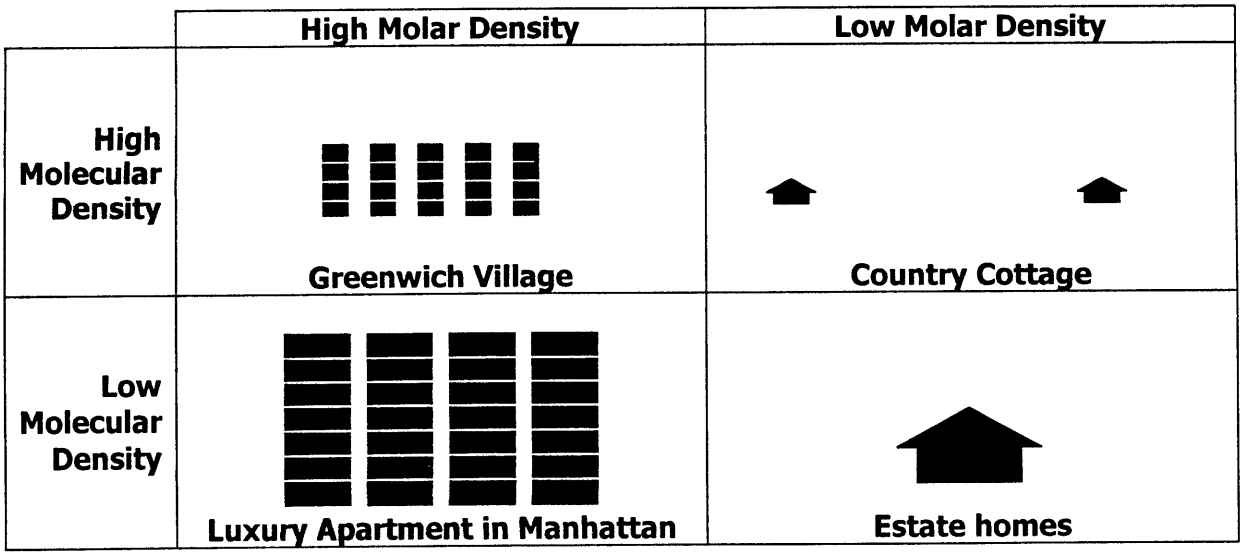
Sociologists use other measures such as persons per acre, persons per room, square foot per person, or persons per dwelling when using density as a measure of crowding. Distinctions are made between these measures by contrasting net and gross, molar and molecular or micro-level and macro-level densities. Net residential density refers to the concentration of housing units on developable residential land whereas gross residential density may include land dedicated as open space areas and community facilities serving those housing units[22]. As defined by Ernest Alexander, Professor Emeritus of Urban Planning at University of Wisconsin at Milwaukee, molecular density measures reflect density within the dwelling unit in terms of persons per square foot whereas molar measures reflect the density of whole neighborhoods in terms of persons per acre. Micro-level and macro-level densities are also terms that describe the difference between molecular and molar densities. This illustrates that there are subtle nuances depending on how density is measured, and using a standard

[22] See Appendix A for list of definitions used for land basis.

dwellings per acre is quite a rough estimate, even for its original intent as a measure of overcrowding.

Because there are no measures that give systematic attention to the different effects of these measures, it is difficult to determine the spatial quality attributable to certain densities. For example, luxury apartments in Manhattan and public housing in the Bronx share the same building typology and therefore both have a low molecular density, but have different molar densities. Cluster housing developments may have high molecular density but has a low molar density. Usage of different density measures may seem to be trivial decisions, but the size and quality of living environment may be dramatically different, resulting in different degrees of desirability and acceptability. Although seemingly subtle in nomenclature, the differences between the selected density measures can result in dramatically different environments.

Fig. 2 Differences between Molar and Molecular Density



Ultimately, density measures are used to regulated, change, or otherwise affect the form of the built environment[23]. Architects, planners, engineers, and urban designers are involved in calibrating appropriate densities. These related professionals use density measures as a surrogate for an outcome they want to achieve in the real-world environment of the city, suburb, or countryside. As pointed out by Alexander, these professionals shape the built environment to have positive "affective" densities, stimulating positive evaluations on the part of their users. The angle from which they approach density stems from their professional ideology, resulting in various measurement methods and recommendations for a professionally defined 'optimal' density. Although people's perceptions and comfort level of density will be the topic of discussion for the next chapter, it is important to recognize the underlying professional biases, such as those discussed last chapter, inherent in measurement methods and qualify the results they produce.

Background and Concept

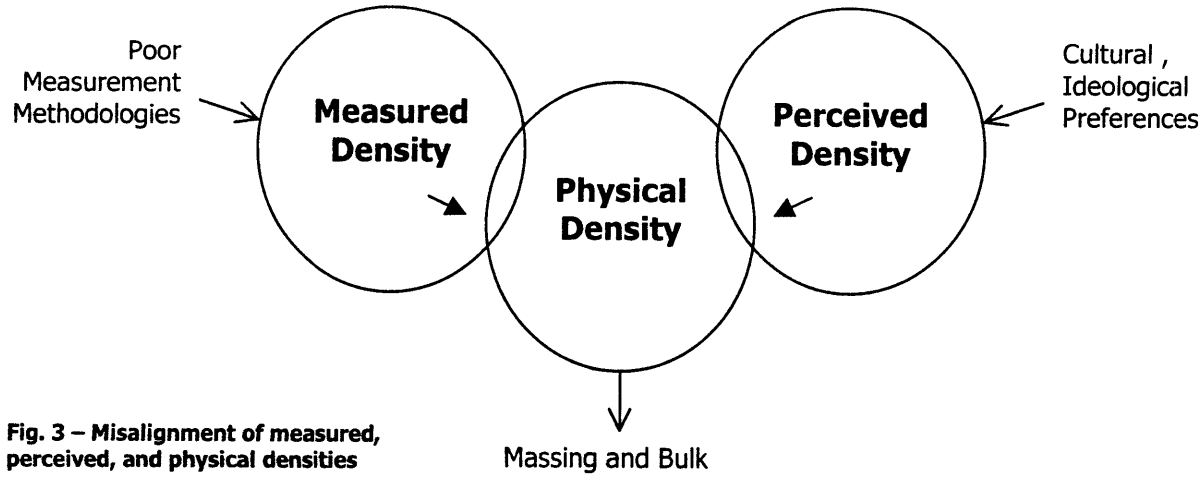


Fig. 3 – Misalignment of measured, perceived, and physical densities

23 Alexander, Ernest, R., K. David Reed, *Density Measures and their Relation to Urban Form*, Wisconsin: University of Wisconsin Press, 1988.

There are actually three types of density: perceived, physical, and measured. While many attempts strive to increase the accuracy and precision to align the three, current measurement methodologies, socio-cultural factors, and physical attributes make it difficult. As will be discussed later in this chapter, poor measurement methodologies that make it difficult for measured density to accurately convey physical density. Different massing, bulk, and other design tactics can also camouflage the development and prevent accurate measurement and perception. Lastly, a wide array of cultural, ideological preferences and factors obfuscate actual residential density. Perceived density appraisals stem from cultural biases and may differ widely from one culture to another, or from one socio-economic group to another[24]. Individual cognitive factors add yet another lens through which physical density is interpreted. Altogether, multiple factors compound the difficulties in precisely and accurately understanding density as a measure of the intensity of land use and sense of place. The association between density expressed through indices and what may be experienced or perceived in the actual built environments is much weaker, as a result, than most users of these measures suspect[25]. Ultimately, the perceived density is not the result of physical density alone, but also a function of social interaction is partially determined by the spatial arrangement of built forms.

Methodology

In zoning and building regulations, a combination of density ratios and measures are used to approximate the permitted maximum intensity of land use. Alternative land use measures exist, such as the Land Use Intensity Rating (LIR), Land Use Intensity Ratio (LUI), and a

[24] Rapoport, Amos, "Towards a Redefinition of Density," *Environment and Behavior*, Vol. 7, No. 2, 1975.

number of other ratios factored into the "densitometer" used by the Federal Housing Authority in the 1970s. LIR is proclaimed to be a more reliable measurement of density because it takes into consideration the size of the unit. However, it is hardly used due to its lack of intuitive transparency and its complexity. Most commonly used measures for the regulation of physical density today include:

- Dwelling Units Per Acre (DU/Ac) – Establishes a limit to the overall density for a given area. A 4 DU/Ac differs from a quarter acre minimum lot size requirement because large areas of open space can be conserved with much smaller parcels retained for housing while maintaining the same density. However, minimum lot requirements usually produce parcels at the minimum lot size. It is possible to have pockets of density higher and lower than the limit as long as the average is below the limit for the entire area. Moreover, the number of dwelling units per acre does not necessarily correspond with population density the size of the unit is not taken into consideration. (See earlier discussion on Molecular vs. Molar density) Therefore, density measured in terms of dwellings per acre is at best an aggregated estimate that is more reflective of physical conditions at a neighborhood level.

- Floor Area Ratio (FAR) – It is the ratio of total built floor area over the area of the site. The total amount of floor space in relation to the site area, when used in conjunction with other standards relating to height, public and private open space, roads and car parking, is believed to be the most accurate and consistent measure of density. However, FAR requirements are most frequently used for commercial developments and not for residential developments.

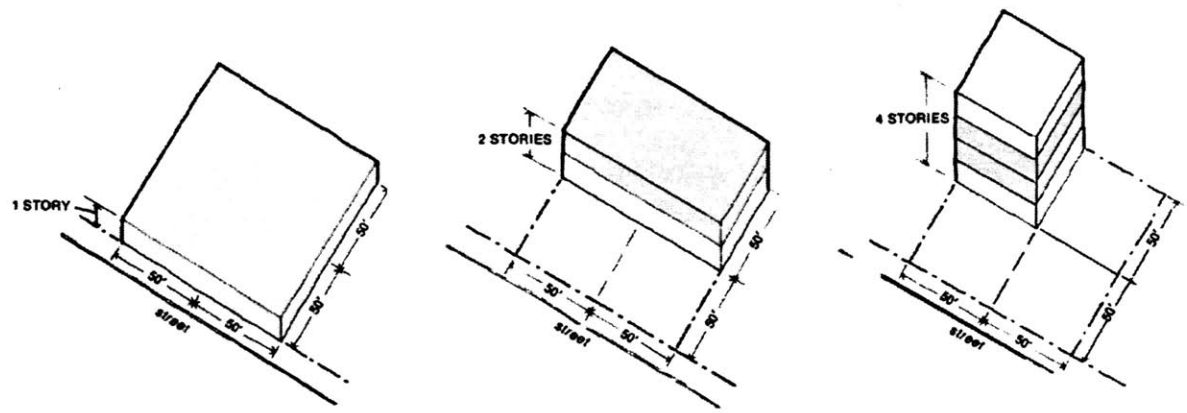


Fig. 4 Variations of 1 FAR

[25] Alexander, et al, 1988.

Source: Alexander and Reed, 1988.

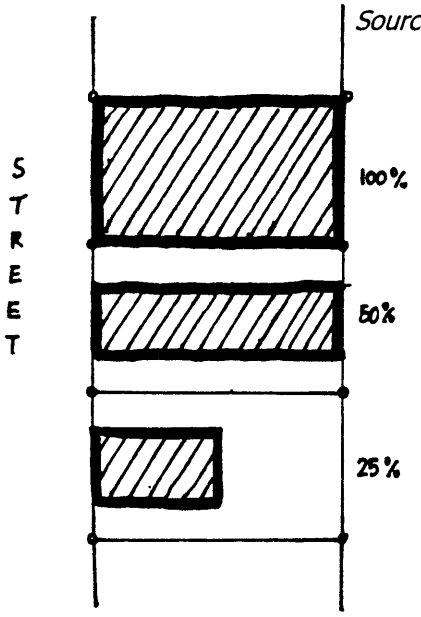


Fig. 5 Site Coverage

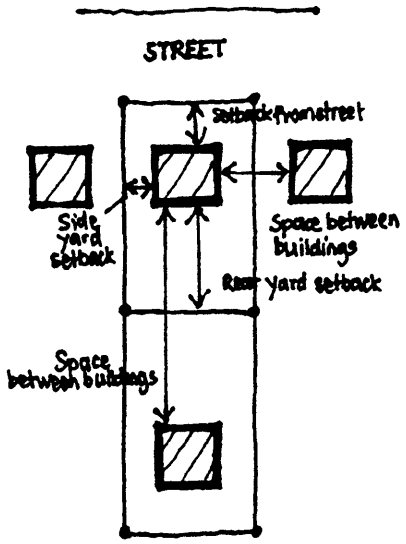


Fig. 6 Site Setback

- Minimum Lot Size – One of the most commonly used tactics, restricting the minimum size of a lot not only dictates the density directly, but also the affordability indirectly. In comparison to DU/Ac requirements set for an area, lot size requirements apply to individual unit. It was used to exclude low-income families, as evidenced in the U. S. Supreme Court case *Southern Burlington County NAACP v. Township of Mt. Laurel*, where a 4-acre minimum lot size was established to discourage the move of "thrifty" persons into town.

- Coverage Ratio – The ratio of the site area covered by building footprint(s). When used in conjunction with FAR, a fairly accurate site density can be predicted. If set low, it indirectly determines the proximity between neighboring units, simply by limiting the land on which the building can occupy.

- Height and Setback – The combination establishes the developable building envelope, fostering building alignment and height consistency in a given area. The main purpose of these requirements is to ensure light penetration and air circulation, prompted by overcrowding in early tenement housing. Rather than mitigating impacts of high density, they have become ways of enforcing low-density development in suburbs.

- Right-of-Way Dedication – Is the space required for a path for access. When publicly owned, there are engineering standards that must be followed to ensure ease of access for fire and police vehicles, but likewise for garbage and delivery vehicles. Right-of-way requirements in some communities are vastly excessive, and when included in gross density measures, noticeably dilute density within the neighborhood. Groups like the New Urbanists as well as real estate developers have challenged excessive right-of-way requirements and in their own developments have reduced the size of streets on private roads.

- Parking Requirement – Determined on a per unit or per square foot basis depending on the use. Parking is a subtle way of controlling how much development can occur on site, particularly for higher density developments because parking is often the limiting factor.

- Permitted Land Use– Zoning designates allowable uses for a set area, often including an allowable intensity. For example, an area between a residential neighborhood and an arterial road may be designated multi-family residential, with a maximum allowable density of 15 DU/ac.

In addition, there are more involved methods and less conventional typologies that require more staff attention. Discretionary reviews, such as design/achitectural review or site planning review, are used when context determines appropriateness. Also, newer typologies such as mixed use or live/work developments are hard to regulate appropriately using standard measurement tools. As a result, many of the development restrictions and conditions are determined on a case by case basis through a lengthy review process involving public hearings. Because they standards differ greatly between municipalities, these two scenarios are difficult to summarize and will not be discussed extensively.

Many shortcomings of existing density controls have already been recognized. In some circumstances, undesirable outcomes results because the design implications have not been adequately understood by the people who wrote the code, and in other cases the design philosophies were outdated. These reasons aside, existing density indicators and controls account for many physicalattributes of density, but lacks rigor in some areas, such as

development impacts. Because density itself is neutural and can take on a good form or a bad form depending on the design, existing regulations are largely insufficient. This does not necessarily mean more stringent regulation is needed. Better accounting and guidance should be used to control for elements that enable good design, and leave sufficient flexibility and adaptability in areas that contribute towards greater variety in architectural design and neighborhood character.

Problems with Current Methods

Many of the analyses expose problems with density measures and their applications. These problems include indeterminacy and ambiguity, oversimplification, over-aggregation, and possibility a weak relationship with perceived density. Furthermore quality measurements are lacking and frequently undervalued in discretionary review.

The emphasis on numerical aspect of development has led to many unexpected, and sometimes undesirable outcomes because significant attributes are not being regulated directly. Qualitative as well as quantitative standards must be considered since the physical and aesthetic characteristic of neighborhoods is the ultimate concern of the residents. Overemphasis on the quantitative aspect often stirs uneasiness in the community and is the reason why developers and designers try to underscore the qualitative aspects through the presentation of illustrative renderings of the development. While these depictions have their shortcomings, tending to look alike, or exaggerating the intensity of use and vibrancy of the proposed development, they are used precisely to overcome the negative perceptions. Lower quantitative standards may be acceptable if accompanied by a parallel increase in

qualitative standards. This should be assessed in the context of the quality of existing or proposed housing in the general area.

Rather than setting down maximum density limits, there is a suggestion that the emphasis be on the design and layout of housing in order to ensure that the highest quality residential environment is provided, which extend to the development's interface with its adjacent environment. The quality of layout and design, public and private open space and landscaping, pedestrian linkages, level of privacy, traffic safety, as well as the provision of a mix of dwelling types are the paramount considerations. For example, cluster subdivisions often result in similar densities as conventional subdivisions. However, because open space areas are consolidated in cluster subdivisions, the expansive natural areas are much better amenities that can hardly be compared to open areas chopped up into individual yards.

Considering the widespread applications of density measures in regulation, planning, and urban design, the relative lack of research into density measures is surprising. Even more surprising is the lack of convergence in this area of study. Several analyses of the relations between density and built form suggest that their interaction is richer and more complex than generally appreciated. Therefore, density measures continue to be used in a very simple way, and some preceding studies imply simple and relatively fixed relations between densities and dwelling types.

Alternative Methods

Progress has been made towards testing out alternative ways of assessing and regulating the urban environment. One approach takes a more graphic approach to measuring acceptability of density among other design prescriptions. As alluded to earlier, people have an inherent reading and feeling about places based on visual cues, personal experience, and collective societal behavior. This is hard to leave behind especially when the reader is called to make his or her own visual references since so much of the information is in text. People's experiences and knowledge of the built environment differ, so it is difficult to control variations of personal interpretations. Anton Nelesson of Rutgers University and Jack Nesar among others have pioneered using visual preference surveys to assess desired density and design, and using images rather than text to illustrate outcomes desired by zoning regulations. Figure X is an example of one such survey conducted by the community. Based on resident's preference for images in a series, recommendations can be made for building setback, site planning, density, and other controls that accurately reflect the sentiments of the community. Although this technique can be manipulated to skew the outcome, such as choosing unattractive images to depict certain conditions versus the preferred alternative, the visualization of design likely outcome has generally been a tremendously valuable technique, educating the public while soliciting their feedback.

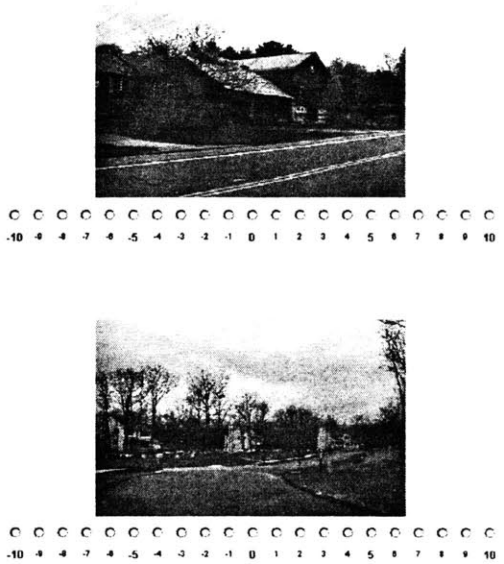


Fig. 7 Typical visual preference survey for desirable developments in a rural community. More explanation....

The increased use of visual aids and geographic modeling tools to assess community reaction makes the task of a better-rounded project evaluation less daunting. Some utilize doctored photographs or animated sequences of SimCity-like visualization techniques to illustrate a potential development outcome. Others use sophisticated Geographic Information Systems (GIS) to model impact ranging from traffic generation to damage to natural assets. At the Massachusetts Institute of Technology, the Program in Media Arts and Sciences is collaborating with the Department of Urban Studies and Planning to develop a 'luminous table,' assisting in urban design and public communication efforts. Researchers have used the table to project shadows, reflective glare, and traffic and wind patterns on the table surface based on the arrangement of 3-dimensional models on it. A layperson can easily observe the projected impact of different site planning alternatives or traffic generation patterns by moving around the model structures on the able.

The list illustrates an increasing array of methods allowing community members to respond to calculated impacts of alternative development scenarios. These new methods are more intuitive, utilizing visual and tangible media instead of relying on numerical proxies. Through technology, the public's ability to engage in informed decision-making has been enhanced, aided by sophisticated analysis only available and comprehensible to professionals previously. The implication of this possibility is highly significant.

Table 2 List of Organizations utilizing alternative analysis methods involving visual and geographic aspects

Organization	Technique	Description
Dover, Kohl & Partners	Community Process, Visualization	Using an electronically supported, interactive "charrette" process to promote citizen participation.
Anton Nelessen/ Nelessen Associates	Community Process, Visualization	Using computer-imaging techniques to improve the objectivity of Visual Preference Surveys(TM).
Richard Heapes/ Street-Works	Visualization	Using photographs touched up with painting software to depict street level views of urban revitalization.
Steve Price/ Urban Advantage	Visualization	Using photomontages to envision urban and suburban revitalization.
Ron Morgan/ Urban Ventures	Community Process, Visualization	Altering aerial and street level photographs to present urban designs.
Michael Kwartler/Environmental Simulation Center	Community Process, GIS, Modeling, Impact Analysis, Visualization	Combining 3-D modeling with GIS, so communities can experiment with urban designs and see quantified environmental and fiscal impacts.
Carl Steinitz/ Harvard University	GIS Modeling, Impact Analysis	Using GIS to deepen knowledge of natural landscapes and show preferred development locations.
Criterion Planners/Engineers Inc.	GIS Modeling, Impact Analysis	Using GIS mapping to track indicators of pedestrian amenity and sustainability.
John Landis/University of California Berkeley	GIS Modeling, Impact Analysis	Using GIS modeling to predict regional change.
Wil Orr/Prescott College	GIS Modeling, Impact Analysis	Assessing impacts of different development policies on the city and its "ecological footprint."
Thomas Horan/ Claremont Graduate University	Community Process, GIS Modeling	Using GIS to map citizens' preferences of their neighborhoods.
Joe VanderMeulen/ Land Information Access Association	Community Process, GIS Modeling, Information Resources	Using Community Information Systems to improve citizens' access to information at the local level.
Jim Constantine/ Looney Ricks Kiss	Community Process, Visualization	Using Community Vision Surveys to determine what citizens want and whether they are willing to invest public money to achieve it.
Ginny Graves/Box City	Community Process, Visualization	Developing a community vision using affordable and available tools and materials.
PLACE3S	Community Process	Planning with community resource efficiency as an indicator of community livability.
Museums and Design Centers	Community Process, GIS Modeling, Impact Analysis, Information Resources, Visualization	Providing centrally located places where the community can learn about and engage in urban design.
Duany and Plater-Zyberk/ New Urbanism Lexicon	Urban Design Standards	Developing a professional vocabulary and set of standards for town making.
Claritas/Geodemography	Information Resources	Understanding the diversity of housing markets.
Fregonese Calthorpe	Community Process, GIS Modeling, Impact Analysis, visualization	Distributing regional planning information in ways to engage the broadest audience.
Lane Kendig/Lane Kendig Inc.	Visual Impact Analysis	Providing land use mapping and planning guidance system to rapidly develop and analyze alternatives for neighborhood, traffic zone, or other types of planning area.

There is an increasing use of visualization and illustrative images in public workshops as well to engender community reaction for certain development alternatives. For the most part they have been tremendously valuable as communities learn the developmental implications of their preferred alternatives.

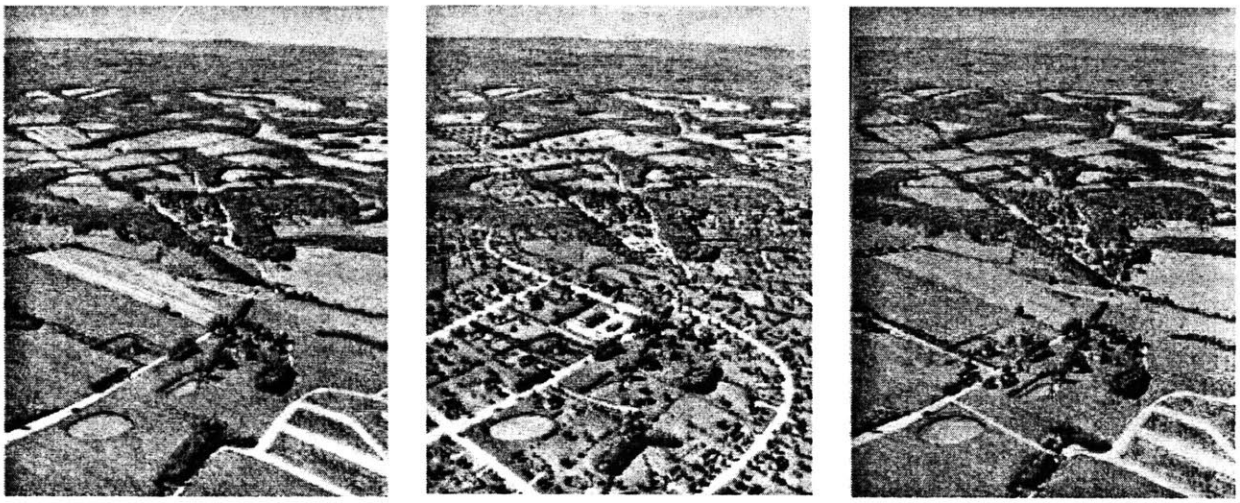


Fig. 8 An agricultural community: before, after conventional development, and with alternative planning. Both scenarios accommodate the same number of people. *Source: Robert Yaro and Tony Hiss. "Region at Risk"*

There needs to be greater recognition that controlling density as a way of ensuring health and safety is outdated. Higher-density Living conditions today are well beyond acceptable standards and not a concern for the most part. The concern today is over noise, traffic, visual impact, and other consequences resulting from the intensity of land use. Conventional density measures exhibit a level of rigidity, aggregation, and lack of precision. Therefore, it is becoming less important, certainly less direct, and as shall be discussed in Chapter 4, less accurate gage for these concerns. Measures of impact are much more relevant and should

be supplemented by guides for design character of the developments and overarching contribution to the vibrancy and diversity to the neighborhood. Indeed, density varies in what is popularly considered attractive neighborhoods, such as Back Bay in Boston, Greenwich Village in New York, which have indices ranging from less than one dwelling per acre to over 40 per acre. The use of density measurements today is misleading because it suggests that it can be used as a proxy for physical quality.

3 Perceptions of Residential Density

> "... density itself is a perceived experience, made up of a physical system which is transformed into a perceived system and, when matched against personal and cultural norms, generates an 'affective density' that communicates evaluative judgments like a sense of isolation, a feeling of comfort, or a perception of crowding."
>
> -Amos Rapoport

Residential density is an objective index of concentration based on physical proximity between housing units. Perception, defined by the *Academic Press Dictionary of Science Technology* as the "conscious mental awareness and interpretation of a sensory stimulus," by its very nature requires the application of a normative, value-based lens to decipher meaning from a sensory phenomenon. Perception is also a byproduct of culture, a property of groups, which distinguishes and identifies between societies.[26] Although cities are very complex and constantly changing, people continuously make judgments based on a very limited scope of what they actually observe. The imposition of personal values based on appearance and physical form alone may be problematic because of the implications drawn from incomplete information, but to base such interpretation on a numerical index compounds the problems exponentially.

Density is cited as one of the most common objections to higher density residential development in the suburbs. Despite having a negative impression of dense places,

[26] Rapoport, Amos, "Toward a Redefinition of Density," *Environment and* Behavior, Vol. 7 No. 2, 1975.

objectors may not be responding to or running from density itself, but from it's perceived correlates[27]. It has become a proxy for a wide range of concerns, which may be based on physical, impact/performance, socio-economic, and environmental attributes. Under the disguise of a seemingly objective, rational concern over density, all sorts of implications and assumptions are made – higher crime rates, visual clutter, less privacy, dull architecture, or lower socioeconomic conditions. Whether the structure will be too big and out of character, generate too much noise, traffic, storm-water run off, or put more pressure on resource strained schools, many neighborhood concerns about the form and the potential residents are attributed to the development density.

Various conceptualizations of the term *built environment* have been proposed. As defined by anthropologist Amos Rapoport, environments comprise relationships between people and people, people and things, things and things. The design of the environment can be conceived as the organization of four variables: space, time, meaning, and communication. Half of the variables do not have a physical dimension, and yet it has profound impacts on it. The essential observation is that the environment is more than the collective hardware that goes in to construction. Rapoport went on to argue that the built environment is both a *system of settings,* within which certain systems of activities take place, and a product of *environmental quality*, comprising the many attributes that characterize the particular system of settings.

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[27] Bergdoll, James R. and Williams, R., "Density Perception on Residential Streets," *Berkeley Planning Journal,* 1990.

The environmental quality of housing can be conceptualized as the product of a process with 4 variables: the components; their ranking; their importance in relation to other qualities such as needs or desires which; and whether they are positive or negative. Furthermore, there is a qualitative component of physical density that is the result of building height, massing, relative spacing, and site layout such as quality of light and sense of enclosure that is not acknowledged by conventional density measures. Some studies have shown that measured density and actual density can be different[28], as discussed in Chapter 2. Often the most influential factors related to physical density are the character of buildings through the intricacy of their elevations and materials, and diversity or homogeneity of color, lighting levels, and landscaping.

Meaning and appearance heighten each other's significance. Research has found that most imageable buildings in a city elicit the strongest evaluations both positive and negative[29]. Other research found that meaning guides individual's selection of imageable elements[30] and that features associated with elevation also relate to building imageability and environmental assessment[31]. Public evaluations of imageable elements will define perceived visual quality of the city.

Discussions last chapter outline some of the problems in measuring density, why the measured density is does not necessarily an accurate portrayal of physical density. This chapter the discussion will expand to illustrate how perception further contributes to the misunderstanding of residential density.

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[28] Martin and March, 1966; Keeble, 1969; Holloway, 1971; Diamond, 1976

Studies

The concern over density has been overwhelming despite ambiguity around people's understanding of density. A survey conducted by the Professional Builder in 1998 found that 52% of the respondents were greatly concerned and 35% where somewhat concerned about density. Similarly, a survey conducted by the National Association of Home Builders reveal that respondents oppose to both apartments (78%) and townhouses (54%) in predominantly single-family neighborhoods. However, as the area under consideration decrease from citywide to community and then to neighborhood level, people's tolerance decreases for a diversity of housing types. This demonstrates people's increasing apprehension as the possibility of having multi-family residences in their neighborhood as opposed to somewhere in the city overall. Other indicators of concern come from opposition by local groups. Residents with an expressed desire to reduce maximum density attack higher density developments in established urban areas. This is especially true when communities go through rezoning or master planning processes.

The NAHB Study further indicated that in practically all of the communities undergoing the process, similar arguments had been brought forward by objectors that such developments will:

- Depreciate adjacent property values
- Give rise to over-shadowing and over-looking because of more massive structures

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[29] Appleyard, 1976.
[30] Harrison & Howard, 1972
[31] Evan, Smith, and Pezdek, 1982

- Make excessive demands on existing infrastructure (roads and services) and municipal resources

But, relatively little writing and research has been done on the subject of perceived density within the interrelated disciplines of environmental psychology, social psychology, city planning, urban design, and architecture. The research and writing that has been done, much has focused on hypothesis and theory. The prevailing ideology is to examine people's subjective experience of the environment rather than rely on "objective" measures such as numbers of people per area[32]. One of the originators of the concept, Amos Rapoport, proposed that the primary determinant of perceived density is "rate of information" or level of perceptual stimulation. In other words, an area with more visual stimulation such as the abundance of cars, signs, lights, and people, will be perceived as more dense. Similarly, high level of social interaction, social and cultural heterogeneity, and lack of territorial boundaries and rules would also be perceived denser.

Empirically, many studies have been done on the effects of crowding, but only two significant ones on the perception of density in the urban environment. One conducted in 1979 by Flachsbart, Professor of Urban and Regional Planning at the University of Hawaii at Manoa, found that block lengths and number of intersections per 100 acres out of six physical form attributes were highly correlated with perceptions of density. His idea is that areas with shorter blocks and more street intersections will seem to contain fewer units per block, and thus will be perceived as having lower density and be more satisfying

[32] Rapoprt, 1975.

environments. The level of intensity is presumably at a lower threshold than that studied by Rapoport's, at a level of stimulation that does not overload the senses.

Street width, slope, block-shape diversity, and street shape were all found by Flachsbart to have no significant correlations with perceived density. He also highlighted the limitations of density as an accurate measurement of acceptable land-use intensity. In relating observers' estimation of densities in several California cities to the measured densities, he found systematic underestimations of physical densities, which is related to the frequency of streets and to block size. However, some researchers question Flachsbart's definition of density and confusion between methods of measuring density, confounding the degree of significance of these findings[33].

[33] Maliza, Emil, Exline, "Consumer Preferences for Residential Development Alternatives," Center for Urban Regional Studies, University of North Carolina, 2000.

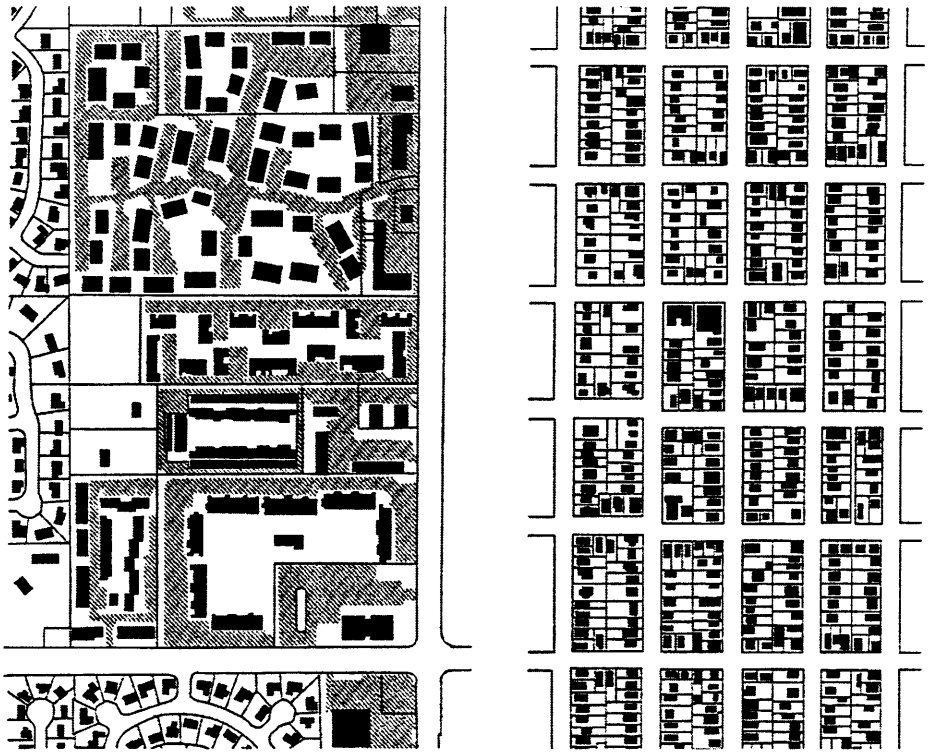


Fig. 9 Comparison of buildings, lots, and parking in multi-family development Crossroads (left), a suburban cluster in Belleview, to an urban neighborhood in Seattle (right). Despite similar density, bigger blocks and bigger buildings in Crossroads give the perception of higher density. *Source: Suburban Clusters*

Interesting findings have also come out of field research conduced at University of California at Berkeley. Graduate students of the College of Environmental Design did the work as a part of the course, "The Urban Environment." A series of study in suburban communities conducted on a number of physical characteristics for their effect on perceived density found that perceived density is partly dependent on the amount of space between houses, the size of the front yard, variety of house styles, and views from the neighborhood. Street width contributes mildly to the perception of higher density, and street trees do not affect perception noticeably. In other words, the less uniform the block, the lower the perceived density.

A more in-depth study conduced by the class in 1990 investigated the physical attributes that affected density perception at three different streets in San Francisco, chosen for having similar measured density (35-47 DU/Ac) but varying amounts of physical articulation in terms of the following attributes:

- Building articulation
- Architectural detail
- Street furniture
- Irregularity of façade silhouette
- Variety of window and door pattern
- Typologies
- Materials and color variation

The results indicate that more single-family dwellings, more space between buildings, and smaller buildings on the street were signifiers of lower density. On the other hand, taller buildings, little space between buildings, large number of apartment buildings, and large number of windows were signifiers of high-density.

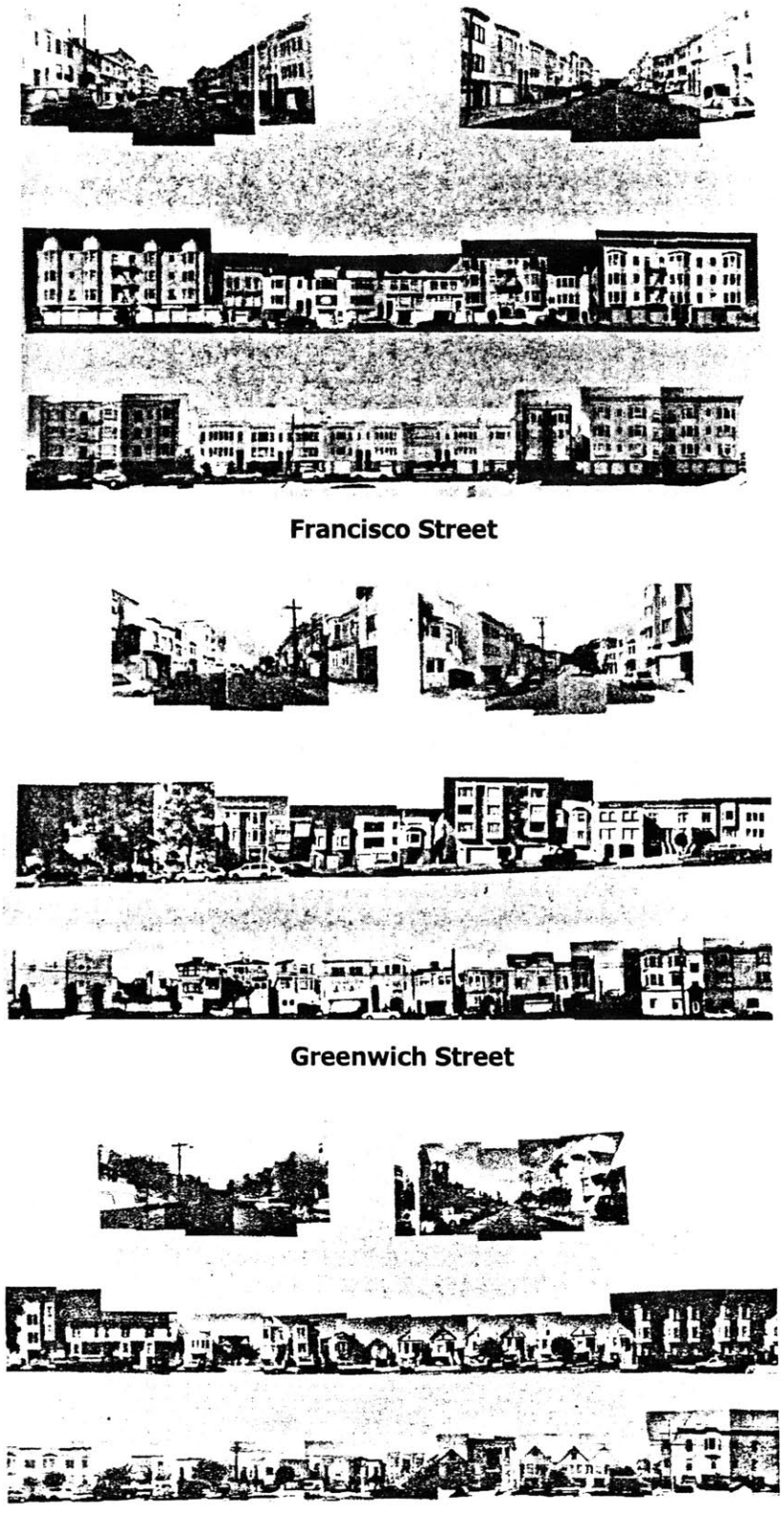
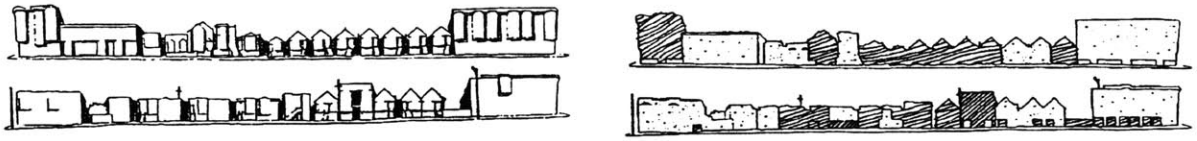


Fig. 10 Photo collage of streets surveyed by Bergdoll and Williams. *Source: Bergdoll and Williams.*

Francisco Street

Greenwich Street



Florida Street

Fig. 11 Facade articulation differences between 3 S. F. residential streets. *Source: Bergdoll and Williams*

Fig.12 Building material variation between 3 S. F. residential streets *Source: Bergdoll and Willams*

Another significant finding of the report is that residents of dense areas were less concerned with the density of other seemingly dense neighborhoods, ranking their own neighborhood as the densest twice as frequently as others who do not live in their neighborhood. This finding is consistent with Rapoport's theory, that when people are cognizant of social network and aware of the neighborhood complexity, this feeds their perception of density in the neighborhood.

The Berkeley studies concluded that façade area, building articulation, and building typologies were co-varied factors, most frequently stated as reasons for their ranking by

survey respondents. Indeed, in photos depicting the three streets surveyed, views of units on the street perceived the least dense was obscured by differentiated setback and street trees, had articulated facades typified by bay window protrusions and door recessions, and pitched roofs. Interestingly, architectural details associated with single-family homes contributed towards a lower perceived density. This implies that regulations should focus on the visual impact of a development rather than the aggregated density represented by the concentration of dwellings per acre. The practice of regulating for façade articulation, proportioning and coverage of windows, signage, etc. is commonly used for the regulation of commercial buildings, which can be used as a guide for the regulation of larger residential buildings. As a supplement, or perhaps an alternative, to existing regulations of density, building size and not density should play a more central role in impact mitigation. This is quite a logical solution if visual impact is more differentiable than density.

Emil Malizia of the University of North Carolina at Chapel Hill focused his research on consumer housing preferences and the extent households will accept alternative residential development that is built at higher densities but provide convenient public access to open space. He also examined household attitudes about density, lot size, subdivision configuration, mixed residential and non-residential land uses, quality of design, and access to services and amenities. Malizia mainly contrasted the results of statistical surveys with those derived from visual surveys. The key distinction between visual surveys and statistical surveys is that it ensures the surveyors and respondents have a common understanding of what is being evaluated. However, there are disadvantages to both survey methods, which will be discussed in the following section.

Putting aside the problems in the visual survey method, the results of Malizia's study suggest that a more sizeable group within the community favor higher-density housing when the quality of the environment can be directly conveyed to the respondent. Malizia also found that answering statistical surveys made the respondent more financially conscious and cognizant of property values, whereas visual surveys allow respondent to react to a combination of features, assess their visual impact, and more importantly, reference to the features in questions instead of relying on their personal inferences.

Problems with Surveys

The paradox of density surveys is that statistical surveys are too abstract and visual surveys are too prescriptive. Statistical surveys rarely, if ever, make references to environments with which the individual being surveyed is familiar. Instead, it relies heavily on the respondent's ability to infer from the question and draw from relevant personal examples.

Personal biases and associations lead to a wide variations in interpretation of results, and reduce the reliability of the survey results. Graphic and illustrative surveys engender more particular and situation-specific responses that are difficult to generalize and make policy inferences. Another problem is the biases of the researcher and the highly manipulative nature of the visual representations. Visual surveys are easily engineered to produce the desired results. Thus with the lack of sufficient research confirming the findings of earlier investigations, survey results must be accepted with reservation.

Different Perspectives

Major revival of interest in the study of the relation between culture and built form and in the use of cross-cultural approaches has led to two developments, suggested Rapoport. First, since the 1970's there has been an increasing concern from sociologists and psychologists of users and particularly with differences among groups of users. This can be observed in the implicit acceptance of major differences in the views of designers and users or residents and visitors. Some of the fears may be founded in the higher crime rates associated with some public housing projects during the 1960's. What outsiders perceive contrasts noticeably to how the residents themselves feel. Although many higher-density housing developments have their problems, rooted either in poor management or design, such problems are not inherently attributable to higher-density housing. From Jane Jacob's description of the Greenwich Village and others' recount of Boston's West End, these immensely dense neighborhoods are thriving communities, and when given the chance, have proven to be some of the most beloved parts of the city.

Second, it marks a rival of interest in character and place-based, vernacular design[34]. The broad based interest in place making has both raised public awareness on one hand, but also diluted meaningful discussion of urban design implications on the other. Smart growth and sustainable development are now part of the common household vocabulary, but the lack of in-depth understanding of guiding principles prevents serious action and implementation of policy and regulations that safeguard environmental qualities.

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[34] Rapoport, 1975.

Given the number of ways density can be interpreted, residential density can be considered either as an asset or a detriment. As a proxy of sentiments across the country, a sample survey of residents in three neighborhoods of San Francisco showed the distribution of people's perception of density's desirability breaking down to 57% perceiving it as a negative quality, 31.5% either as positive or negative, and 11.5% as positive[35]. Respondents to the survey for American LIVES in 1995 indicated that 74% of them wanted a variety of people and housing, but 65% are concerned about the impact on their property values if their neighborhoods contained mixed housing types. These results reflect NIMBY[36] attitudes that relate to fundamental concerns about safety and housing values, which may lead to negative perceptions about density and diversity[37]. As mentioned in the first chapter, concerns about property value and community impact often thwart state and regional efforts to encourage a mixture of housing types within a community.

A variety of responses emerged relating to the problems associated with lack of integration with quality public transport, diminished local amenities, poor environmental quality due to low standards, overcrowding, lack of balanced household mix, adverse impact on adjoining neighbors. More specifically, some of the most common perceptions of higher density residential development according to[38]:

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[35] Bergdoll and Williams, 1990.
[36] Acronym for 'Not In My Back Yard'
[37] Malizia, 2000.
[38] MacCabe, O'Rourke, Flemming, "Panning Issues Relating to Residential Density n Urban and Suburban Locations," Study submitted to the Minister for the Environment and Local Government, 1999.

- Land owners / developers are simply trying to maximize development profit.
- Increased densities are as a short-term, low-quality response to the housing crisis.
- Development intensity will overburden existing system, and there is mistrust that proper ancillary infrastructure/services will be provided.
- Increased densities will result in a reduction of neighborhood quality and initiate the downward spiral towards blight.
- More compact living will result in a denial of the right to own and use a car.
- Higher-density will create excessive noise and be a neighborhood nuisance - generally advanced in the case of apartment developments with a potentially younger and less settled population.

The range of concerns reflects the different levels of engagement with social and economic realities inferred from the built environment. Concerns listed above can be grouped into three main personas, which characterize the attitudes that people adopt. Ann Forsyth, Professor of Urban Design and Development at the Harvard Graduate School of Design, summarizes the range of perspectives in *Constructing Suburbs: Competing Voices in a Debate Over Urban Growth*. She categorizes the concerns over growth into three groups: environmentalists, expansionists, and consolidationalists. Below are brief descriptions of the groups. While the major attitudes characterizing each are drawn from Forsyth's writings, they have been supplemented by responses by individuals interviewed for this thesis.

> "An image of popular, inevitable, egalitarian suburban growth set the framework for the project in 1960s. In the 1990s, however, environmental concerns about sustainability and economic concerns about affordability provided alternative perspectives that started to slow and reshape the development. Low-density suburbs that had seemed natural and egalitarian began to seem environmentally and economically wasteful, at least to some."
> - Ann Forsyth

Expansionists

Studies show that far more Americans prefer rural areas and smaller communities than those who actually live there[39], reflecting an anti-urban bias that is often based purely on personal preferences without actual consideration or understanding of city and region wide impacts. In general, expansionists strongly opposes higher density development because they feel low density development is inherently good. There are some who believe this with moral conviction, and others who follow along because they reap the benefits. For example, some developers subscribe to this philosophy because greenfield development often has less resistance from the community because there are no neighbors, is easier to develop due to less site constraints, and cheaper to develop because of lower land prices.

Expansionists have several rationales to support their position. They take for granted that open space is inherently good. This mentality can be traced back to a number of sources. In the face of industrialization and deterioration of many urban environments, the garden city movement advocated for urban population to escape into the country. Returning to more natural environments would thus lead to a healthier lifestyle and living environment. Industrialization spawned another reaction to density because many factory workers lived under the deplorable conditions of tenement housing. The images taken by photojournalist Jacob Riis documented the overcrowding and unsanitary living quarters people endured. Thus the original motivation behind the expansionist philosophy is health.

There are also other reasons that support the expansionist position. High-density, which is overcrowding from this perspective, would overburden existing city resources, amenities, and

infrastructure. Such developments create an excessive strain on existing parks, schools, libraries, roads, and sewage treatment facilities. Increased levels of traffic and congestion would deteriorate the quality of life in the neighborhood. Moreover, communities can simply do without the noise and activity that results from the concentration of people. The concentration of development is unhealthy and would start neighborhood down the spiraling path towards blight.

Listed above are 'pull' factors that make expansionist behavior attractive. However, there are also 'push' factors that make a more compact, infill strategy more difficult. Rehabilitation is costly and often involves environmental complications (removal of lead-based paint, asbestos, etc.). Since greenfield development is cheaper and easier, many developers and communities choose the path of least resistance and adopt the expansionist philosophy. Another 'push' reason is the likelihood of attracting a new population into the community, one that is unlike current residents. It is argued that by including more units, higher-density developments yield higher returns even thought each of the units may come at a lower price. The affordability of the units brings into the community a new population segment or enlarges the population segment containing lower-income individuals. Because these individuals consume more municipal services, this would result in an added burden that can be avoided if the residents were of a different demographic profile.

All these factors contribute towards the mentality that high-density is a low quality solution to housing provision, which should be avoided at all cost. Indeed, if all that has been listed

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[39] Malizia, 2000.

above were true, who would ever allow the development of higher-density housing in their community?

Environmentalists

In contrast to expansionists, environmentalists are more concerned about the health of the natural environment. Three pillars of their concern are: protection of open space, reduction of negative impacts, and promotion of sustainable practices. While there are other consequences and implications stemming from this position, the primary consideration is given to the impact to the environment as a rapidly depleting, non-renewable resource.

Accordingly, highest priority is given to the preservation of the natural environment. There is no substitute for the vast amounts of open space consumed by current development, certainly not the creation of pocket community parks that is meant to serve a large population. There is tremendous value in the preservation of agricultural lands and scenic views that have been a part of the community character and heritage. A higher quality of life provided by an abundance of open space is also an argument advanced by environmentalists, however, they believe communities are best served by open space at a scale that is sufficient to make it truly a community resource.

Impact mitigation is another significant concern for the environmentalists. The expansion of development into greenfield areas disturbs the equilibrium of natural environments and creates significant negative impacts. Provision of water, electricity, and infrastructure is highly inefficient because infrastructure expansion is necessary to make connections to new developments in outlying areas, which on a per unit basis serves a fewer number of people.

Increased energy consumption extends to time and gas consumed in a commute. Not only is it highly frustrating, but it also results in high levels of pollution. Adding to the list of impacts are other indirect impacts to the environment, such as increases in storm water run-off with the increase of impervious surfaces.

Lastly, the concern over sustainability emphasizes the long-term impact of development. Current land consumption rates are simply not sustainable in terms of providing for the housing needs of future generations. If the present development pattern is maintained, the irreversible damage to the natural environment would result, they argue, in a tragedy of catastrophic proportions.

Consolidationalists

In contrast to the environmentalists who advocate for more compact living to protect the environment, consolidationalists believe in consolidation for the synergy and opportunities created. A more compact development pattern provides a strategy to adapt the city to accommodate changing population demographics, revitalize declining suburbs, and other services that makes sense only after achieving critical mass. While motivated by different reasons, on the surface considationalists may appear to share the environmentalists' preference for more contained development. However, consolidationalists are in fact more particular about the form, design, and site planning details. Consuming less land and staying out of greenfield areas are not enough to guarantee the type of environment desired.

Changing demographics and lifestyle preferences signal a need to diverge from current growth patterns. With growing segments of the population out of the child-rearing stage,

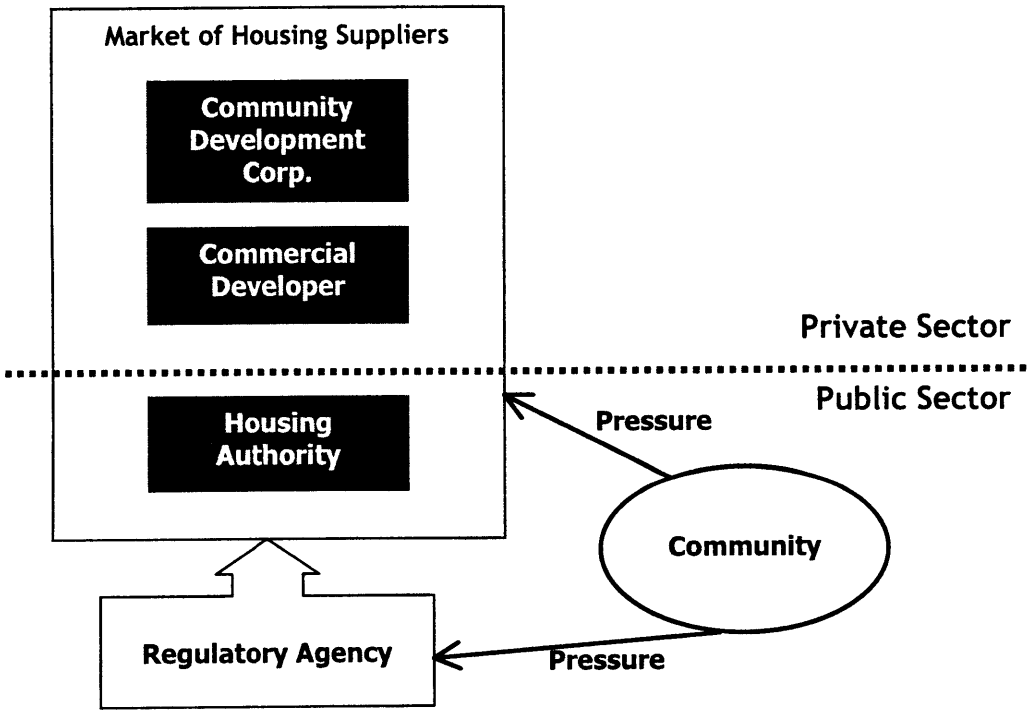
efficient, high-amenity living environments are much better suited to satisfying the needs of this population to prevent migration into more urban areas. Higher-density housing in its current forms (condominiums, townhouses, apartments, duplexes) are often underrepresented in suburbs, limiting the range of housing choices and housing prices. Consolidationalists see higher-density housing and more compact living as an opportunity to satisfy this growing market segment.

Higher-density residential development can catalyze revitalization in suburban areas, particularly in infill sites, produces several desirable results. First, it results in a larger population to support more retail and services in the area. It may even begin to attract neighborhood and cultural amenities into the neighborhood. A larger residential base makes it possible for business to extend hours of operation, facilitating a longer active day, creating some of the urban synergy and vibrancy many of the suburbs lack today. As Anne Vernez Moudon pointed out, dense residential clusters, even if they are away from existing commercial uses, can serve as a hub to attract commercial activity and amenities into the neighborhood to form a village center. Higher-density residences provide benefits in economic development that goes far beyond meeting the market demand for housing.

Lastly, opportunities become available with the achievement of critical mass through the establishment of a more compact development pattern. Public transportation needs a critical mass of people to have a sufficient ridership. Affordable housing begins to be a viable option when there are a sufficient number of market rate units to cross-subsidize. The reason is affordable housing units have maximum rents or purchase prices at 30% of the occupant's income, which is certainly below market rates and often times below

development costs as well. Otherwise steep federal and local subsidies are necessary to provide for the funding gap if revenue from market rate units is not sufficient. This holds true for other community services and programs too. Thus, from the consolidationalist's point of view, higher-density can achieve a range of goals, from economic development, to affordable housing provision, which goes beyond the market need for housing.

Fig. 12 Community Perception and Pressure on market forces and regulatory agent



Conclusion

These perspectives capture the gist of concerns communities have regarding higher density residential development. There are strengths and weaknesses to each argument, supported by different priorities and motivations. While there is a significant amount of subjective reasoning, the key lies in getting the facts and assumptions right. People are entitled to have their own views on what is appropriate for the community, no one more valid than another. The key is to have these perspectives be based on accurate and consistent information. People need to be diligent in distinguishing the difference between perception based on facts and perception based on fallacies. Confusion of one for another can result in the type of misinterpretation that leads to unwarranted antagonism or physical environments that detract from the character of the community. This can be quite difficult because there are perceptions people want to see based on personal values, and then there are perceptions suggested by policies or the way density is measured. It would be quite fortunate if either of these align with the actual impact of higher-density developments.

As indicated by Rapoport, the increased interest in the relation between culture and built form is desirable, especially if it leads to greater community involvement in the planning and regulatory process. However, communities must be careful not to become too zealous without subjecting their decisions to a more rigorous evaluations process or measurement against established performance criteria. The next chapter will briefly discuss some of the actual impacts produced by higher-density housing to begin establishing a basis for informed evaluation of appropriate densities.

4 Impacts of Higher-Density Residences

Because of the number of ways to measure density and the number of speculations on its perceived impact, it is difficult to decipher how much of what is said is real or based on myth. This is an ambiguity that receives little attention because it seems benign enough not to make too much difference. Short of serious research quantifying the wide range of

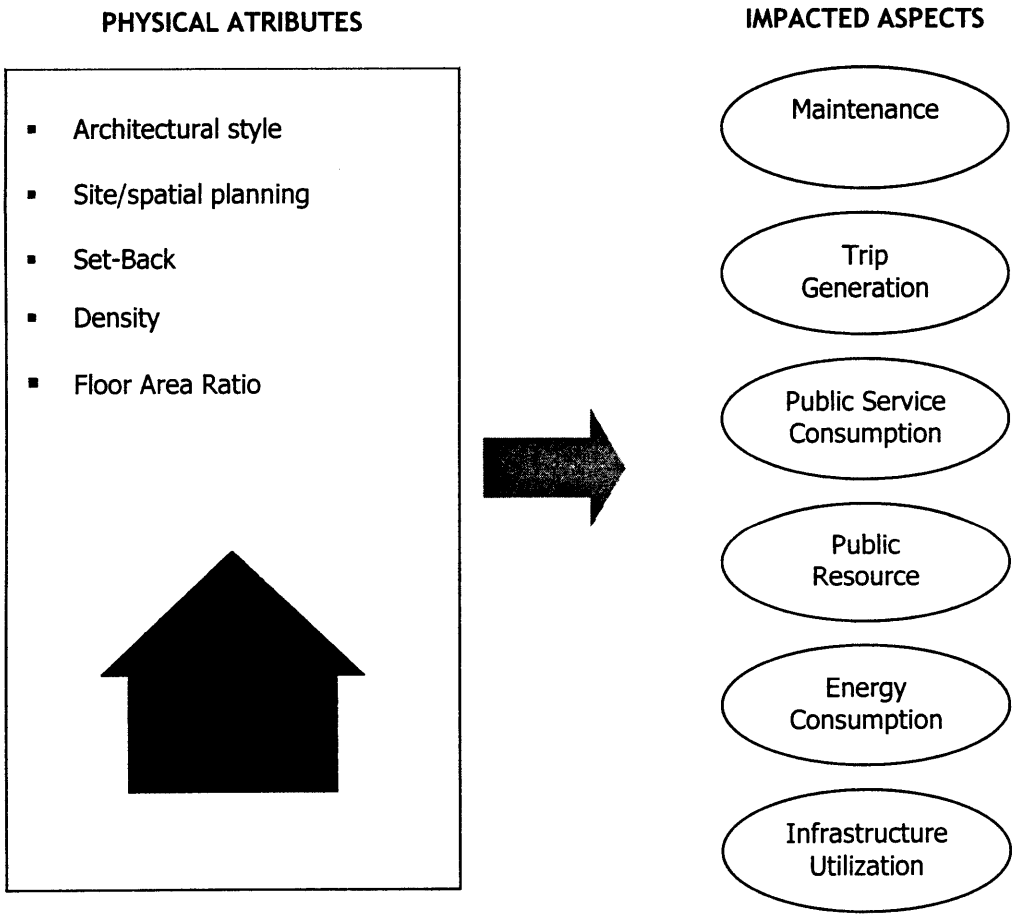


Fig. 13 Physical attributes and Impacted Aspects of Housing

economic, community, and environmental impacts, density measurement and regulations will continue to be marginalized as a narrow concern over aesthetics or an over-zealous attempt to preserve open space. The systematic underestimation and collective dismissal of density, however, has serious implications.

One other rationale for having higher density housing cope with more rigorous requirements is the impacts they are assumed to have on community facilities and resources. Impacts on infrastructure, traffic, schools, demand on open space, and municipal services are assumed to be more intense for higher density developments so developers should bear the burden of the extra costs, according to the city's point of view. As a result, many cities impose impact fees, viewed by developers as 'cash cows' projects deemed less desirable by community opinion.

Single-family homes still constitute the majority of housing starts. Their predominance in the suburban housing stock, however, is beginning to change the quality of life in some communities. For example, in the San Francisco Bay Area, the vast amount of land required for detached single-family housing has pushed development well into former farm lands, and the resulting two hour commute to work has become typical. The frustrating commute and inconvenience of having to drive to every destination has put some communities at the tipping point, causing them to rethink their planning policies. The most commonly cited negative impacts of low-density development are as follows:

- Dependence on automobile
- Increase in energy and resource consumption

- Increase in air pollution
- Higher cost to government and its citizens
- Cost of infrastructure and service delivery per capita increase with decreasing density

It is important to recognize the impacts generated by low-density development so as not to loose sight of the shortcomings of developments at other densities, particularly useful as a basis for comparison. Having done so, let us switch to examine the impacts of higher-density housing, which can be roughly categorized into 4 groups: impacts to the physical form, community, infrastructure, and land use and consumption. Discussions below outline some of the more salient aspect of each impact group.

Physical Form

The physical form and appearance of a development are its most salient attributes, creating a sense of place or the lack of that is immediately apparent. The perspectives of outsiders are established quickly based on visual assessment, and therefore the legibility of the design is much more important than intangible impacts in some respects. People's mental image of multi-family housing is frequently that of public housing projects, many of which were major failures like Cabrini Green in Chicago, Pruitt Igot in Saint Louis, or Columbia Point in Boston. Whether actually relevant or not, these connotations shape people's normative judgment that multi-family housing corrupts the morals and values embraced by their single-family neighbors, and that somehow the latter need to be protected through isolated zoning, or subtly eliminated from the zoning map entirely. Impressions aside, actual aspects of housing

contributing to the visual impact are the building typology, façade treatment, and spatial site planning.

Higher-density housing typically exists in the following typologies: duplex, row house, and mid-rise apartment/condominium. Most common fears involve having excessively large buildings that stand out and block light to nearby lower-density developments. Some recent developments have shown that it is possible to increase densities significantly with modest increases in height by using typologies not typically associated with higher-density housing. The Battle Road Farms residential development in Lincoln Massachusetts was designed with 37 farm structures reminiscent of historical buildings, but within each building are 2-4 units. This strategy can effectively increase the density 2-4 times without appearing to look any different from traditional farmhouses. In the end, the development had a density of 5 DU/Ac while appearing as if it were 1 DU/Ac[40].

Fig. 14 Battle Road Farm Farm House

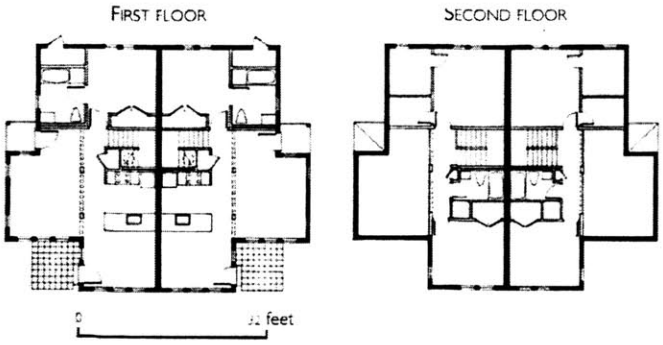


Fig. 16 Unit Plan of Duplex at Battle Road Farms

Furthermore, façade and height articulations and setback modulation can be used to break

[40] Urban Land Institute Project Reference File.

expansive surfaces, or simulate the appearance of multiple buildings. Higher-density residential buildings can also adopt architectural styles typical of lower density housing if the results would help reduce perceived density, an observations from density perception research at U. C. Berkeley[41]. Difficulties arise when designers have preferences unlike those of the community residents. However, careful selection of a project architect with context sensitivity and established reputation can easily obviate such problems.

Lastly, good site planning can make a world of difference, often times hiding density or making it contextual to the surroundings. For example, Anne Vernez Moudon, Professor of Urban Studies and Planning at University of Washington at Seattle found that many multi-family developments exist without community residents being aware of their presence. Sound site planning can camouflage density and help create a buffer between different land uses.

Community Impacts

The comparison between the impacts of low-density developments with multi-family dwelling units begins to highlight the tradeoff between the two housing typologies. The following figures provided in the Census Bureau, makes the differences apparent.

[41] Bergdoll and Williams, 1990.

	SFD	MFD
School-age children/100 units	55.6	36.1
School-age children/100 NEW units	63.0	38.9
Proximity to public transportation as purchasing factor	2%	6%
Convenience to jobs as purchasing factor	17%	25%
Use transit to commute to work	4%	19%

U. S. Census Bureau, 1990

In education and work status, the 26 million residents of multi-family housing in the U. S. are similar to other households, but have fewer children to send to public schools and make smaller demands on roads and water infrastructure systems[42]. This suggests that multi-family housing dwellers are young professionals or retirees who are not starting families. Also, when population growth is within developed areas, schools can be enlarged on existing sites rather than buying land for new ones; existing parks can be upgraded instead of purchasing new acreage in outlying areas; and police and fire crews have shorter distances to travel to emergencies. Also resulting from the demographic change, fewer school-age children residing in the units means less of an impact to local schools than previous figures may suggest.

Locationwise, multi-family housing has less traffic impact per dwelling and consumes less energy than its single-family counterparts. Interestingly, multi-family developments generate less traffic than single-family developments because transit is a more important deciding factor when residents make their housing choice. Residents of MFD own fewer vehicles, have fewer problems with traffic, generate fewer motor vehicle trips and use public

transportation more frequently. In the 1993 American Housing Survey, 25% of multi-family residents chose their home in part because of its convenience to transportation and proximity to jobs vs. 17% for single-family residents. This is especially significant when we compare the proportion American families spend on transportation (20%) vs. European families (7%)[43] despite heavy subsidies for gas and the auto industry. Compounded by heavy housing expenditures, with some families paying up to 50% of their income on housing, the amount of expenditure on transportation is especially significant. Furthermore, multi-family units are more energy efficient because non-essential energy consumption (i.e. exterior lighting, swimming pools) is shared among many households.

However, one of the most common perceived impacts of higher density is its association with a higher crime rate. However, this is more reflective of poor management rather than something inherent to higher density developments. For example, luxury apartments on Fifth Avenue in New York exist at a much higher density than suburban developments, but because of the tight security precautions, there is not the association with crime. Furthermore, since there is an expected shift in the demographic profile of multi-family unit residents towards more young working professionals and empty-nesters resulting from changing lifestyle preferences, it is likely that crime rates[44] may actually diminish even in less tightly patrolled developments.

Being a more intensive use, multi-family housing can buffer quieter single-family housing neighborhoods from the nuisance of commerce and traffic. The "bounding" of an area, as

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[42] Multi-Family Home building Association, 2000.
[43] Calthorp, Fulton, *The Regional City*, 2000.

defined by whether adjacent alternative locations are available for nonresidential uses or not, and the presence or absence of nonresidential land uses, and their mixture may also be important contributors to the sense of scale[45].

In more urban settings, higher residential density can revitalize areas that suffer from lack of nighttime activities, and open the possibility of viable transit alternatives. Research done by Anne Vernez Moudon suggests many existing multi-family dwellings are already located at crossroads of the community. As suburban communities look for ways to revitalize and densify to accommodate projected growth, they are prime candidates to serve as the nucleus of a new neighborhood center.

Infrastructure Impacts

	SFD	MFD
Average Water Demand/yr	407	213
Peak Water Demand	1,290	403
Proximity to public transportation as purchasing factor	2%	6%
Convenience to jobs as purchasing factor	17%	25%
Use transit to commute to work	4%	19%
Trip Generation	9.57	6.59 for 1-2 stories 4.2 for 3+ stories

U. S. Census Bureau, 1990

Multi-family housing developments represent a more intense usage of land, necessarily creating more demand on municipal services and infrastructure than single-family housing occupying the same area. However, because additional services can be provided in a more efficient manner in a compact development, the costs are less than if the same number of

[44] According to NAHB, crime rate is related to the number of non-family households, which multi-family housing has a larger proportion of than in single-family housing neighborhoods.

units was provided in the form of single-family units[46]. This was one of the key concerns expressed by the environmentalists in the previous chapter. The increased burden warrants additional municipal investment, but building on existing resources, the net cost is much less than providing brand new facilities. If located within the existing urban fabric, an even greater cost savings can be realized by avoiding the cost of new roads, and water and sewer lines. In fact, infrastructure cost associated with multi-family housing is less than cost by 6-8% on a per unit basis.

By contrast, when we disproportionately invest most of our tax dollars to subsidize new development around the edges of the city, our taxes and costs tend to rise, as we carry the dual expense of providing new infrastructure while maintaining older systems nearer the center. As proof of this, witness the recent push for impact fees on new residential development to help offset increasing demands on the public purse from overbuilding these same low-density subdivisions. These fees provide more public money, but at the cost of raising new house prices, rendering them less affordable for individuals and families with limited earning power. Thus our society becomes increasingly stratified and segregated geographically.

Land Use and Consumption

Professor Anne Vernez Moudon, who had been studying the Puget Sound area in Washington, argues that multi-family housing constitutes a significant portion of the housing stock in suburban areas. Most postwar multi-family development has taken place not in

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[45] Rapoport, 1975.

central cities but in suburban areas – 52% in the 1960s and 70% in the 1970s. While occupying only 8% of the suburban land, these multi-family developments accommodate nearly 20% of the suburban population. Based on figures provided by the 1990 U. S. Census, multi-family housing constitute 37% of Miami's urban fringe, 45% of L. A. and Seattle's urban fringes, and 51% of San Francisco's. Surprisingly, multi-family housing now constitutes a substantial portion of the housing stock in suburbs of most metropolitan areas[47].

These "discrete clusters," Moudon argues can serve as the nucleus of more compact, walkable, mix-use neighborhood centers. This is a significant observation because higher-density housing presents one solution to curb the sprawling affects of traditional suburban development. In fact, some of the clusters observed by Moudon have started transforming into primary town centers, some becoming so successful that there is fear that gentrification will change the neighborhood. However, the fragmented approach to planning and development employed by the private sector considerably reduces the ability of most clusters to become viable neighborhoods. The ultimate success of the discrete clusters will rely on changes in the regulatory process to accommodate their sustained presence them in urban fabric. This involves recognizing and encouraging a neighborhood paradigm that already flourishes within established areas.

Some conventional beliefs, such as higher density developments reduces land consumption and development cost cannot always be taken for granted in today's development market.

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[46] Harvard Joint Center for Housing Studies, *The State of the Nation's Housing*, 2000.
[47] Moudon, 1999.

Many times "higher-density" developments take the form of cluster developments, which does contain higher net density, but because of the large portion of the land dedicated to open space, still results in low gross density. Likewise, because of the more stringent structural requirements for taller buildings and perhaps the necessity of structured or underground parking, the cost of construction actually increases for higher-density housing. More compact units dilute land costs to the developer. Presently, land acquisition constitutes 8 to 12 % of total development costs. The ability to distribute this among a larger number of units contributes towards the affordability of all the units.

A number of advantages arise from adopting a more sustainable form of development. Savings in municipal spending and services from developing a more economically can then be plowed back to renew other decaying older areas, stimulating redevelopment to compete with development in fringe areas. Less land is consumed, more of our natural resources are conserved, our quality of life stays high, and fewer taxes are required to pay for new infrastructure. Developing more multi-family housing is a win-win scenario for the community from many vantage points.

Conclusion

As stressed in previous sections, density figures alone mean very little, especially because they do not account for all the impacts of development. Many people follow the blind assumption that low residential density is good and high-density is bad. In reality, some high-density developments are well-designed, vibrant places; others are dreadful beyond words. Conversely, many low-density developments are drab, featureless and a community

eye sore; other examples are paragons of charm and beauty. Beyond perceptions and appearances, this chapter was an attempt to highlight the fact that higher density developments have demonstrated advantages with respect to impact on infrastructure, community facilities, and land consumption than single-family dwellings.

Furthermore, many factors that contribute to the quality of the environment are not included on the balance sheet. As Jerold Kayden at the Harvard Graduate School of Design attests, costs that can be quantified tend to receive much more attention than attributes that are not quantifiable. Benefits that do not have a dollar figure are frequently ignored since economic language dominates policy discussions and characteristics that cannot be expressed are often excluded. In the end society as a whole pays the price. Thus one must be weary of attaching an index or price to something, because it creates the illusion of objectivity covering unchecked subjectivity. Also defying quantification, higher density developments provide critical mass for urban amenities and vitality as consolidationalists pointed out. Especially with the attention to sustainable development, smart growth, and place making among communities across the nation, higher density is even more essential as the means to an end.

One weakness though is the lack of results and figures for impact comparison on a broader community scale, particularly in nascent neo-traditional communities that boast to have lower environmental and community impact due to their transit orientation and meticulous site planning. Hopefully, as these communities mature, efforts will be made to determine whether the benefits of these communities extend beyond their aesthetic value. The

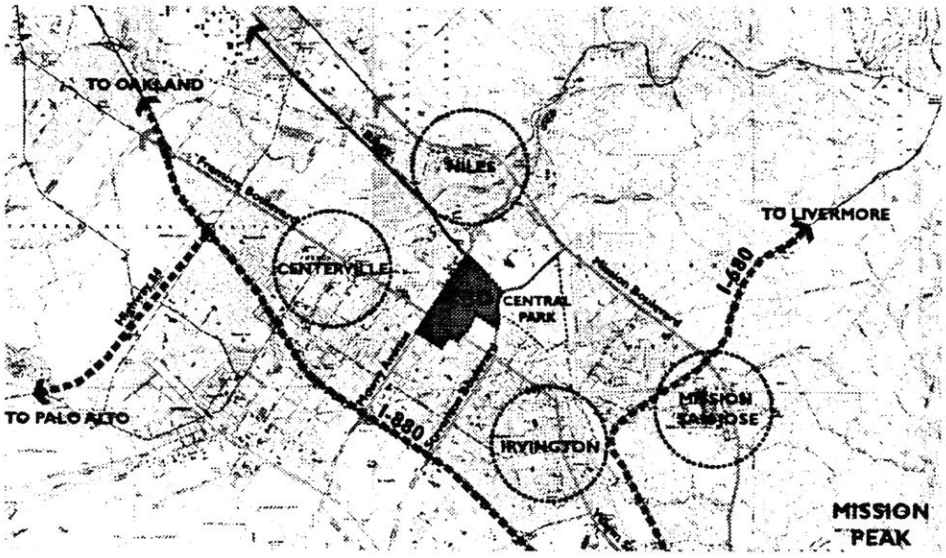
bottom line for providing accurate impact information is to help communities understand the implications of their decisions and the tradeoffs to which they are committing.

5 Village at Civic Center

Fig. 16 San Francisco Context

An interesting example of higher-density housing development in Fremont, CA serves to illustrate how the different components contributing to the general misunderstanding of density influenced each other. This case was discovered over conversation with a former colleague. The topic of discussion was the subject of my thesis research, at which she recommended a project on which she had recently worked. After learning more about it, many parallels were discovered between the particulars of the case and the nuances of my research. Thus it was fortunate to find a suitable case that demonstrated the points made in earlier chapters regarding density without the rigors of a more scientific selection process.

Fig. 17 Fremont Context Map



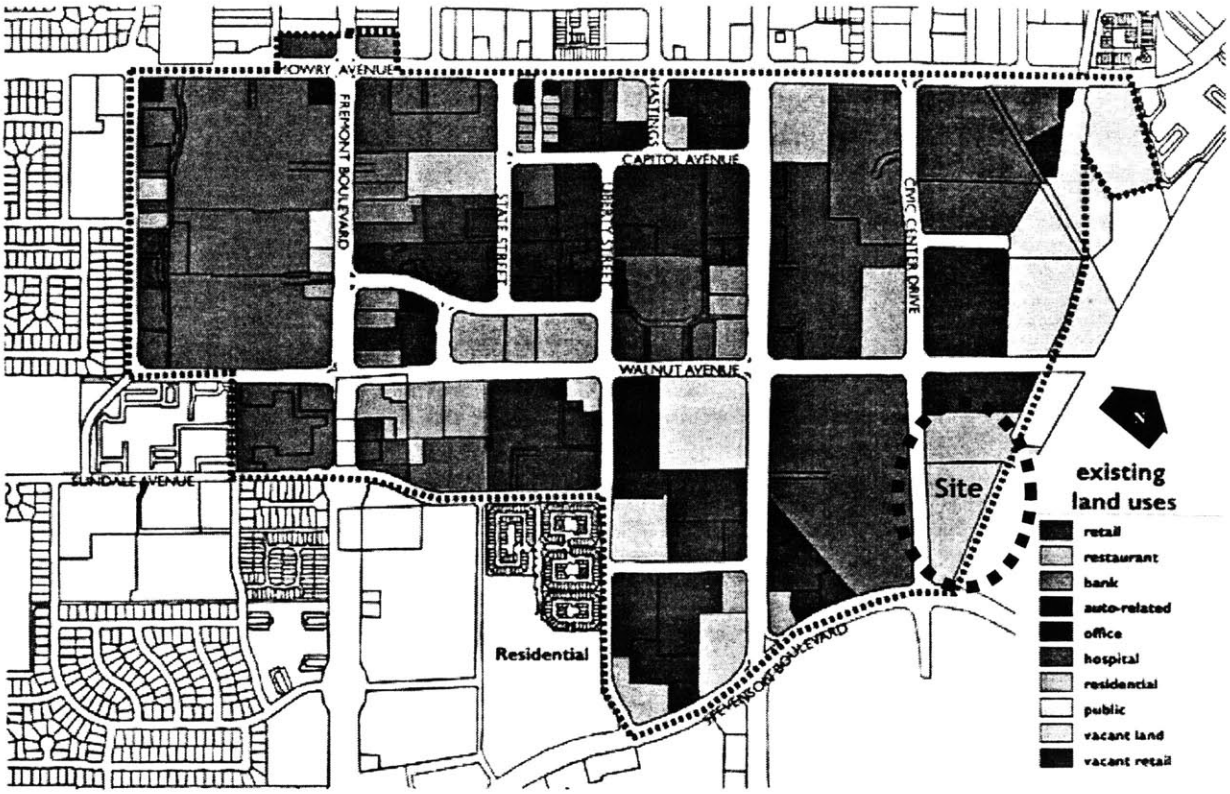


Fig. 18 CBD Land Use

The Village at Civic Center was a mix-use development proposed by Huntington Partners in the Central Business District (CBD) of Fremont, California. Fremont is located in the northeastern corner of Silicon Valley, and was experiencing steady growth in the late 1990's as light industrial and office developments associated with the high-tech industry made its way north along Interstate 880. Fremont had a strong housing market, with much of the development occurring in the period roughly five to ten earlier before the spurt in commercial and industrial development. Since the mid-1990s, 1,300 units have been added in the downtown area, although zoning prevented its development in the CBD itself. A large percentage of the residential development continued to contribute to the single-family housing stock, but a few developers have begun developing other prototypes. Higher

density housing in the form of apartments, condominiums, and townhouses has become increasingly viable housing prototypes as land value escalates in the coveted Silicon Valley.

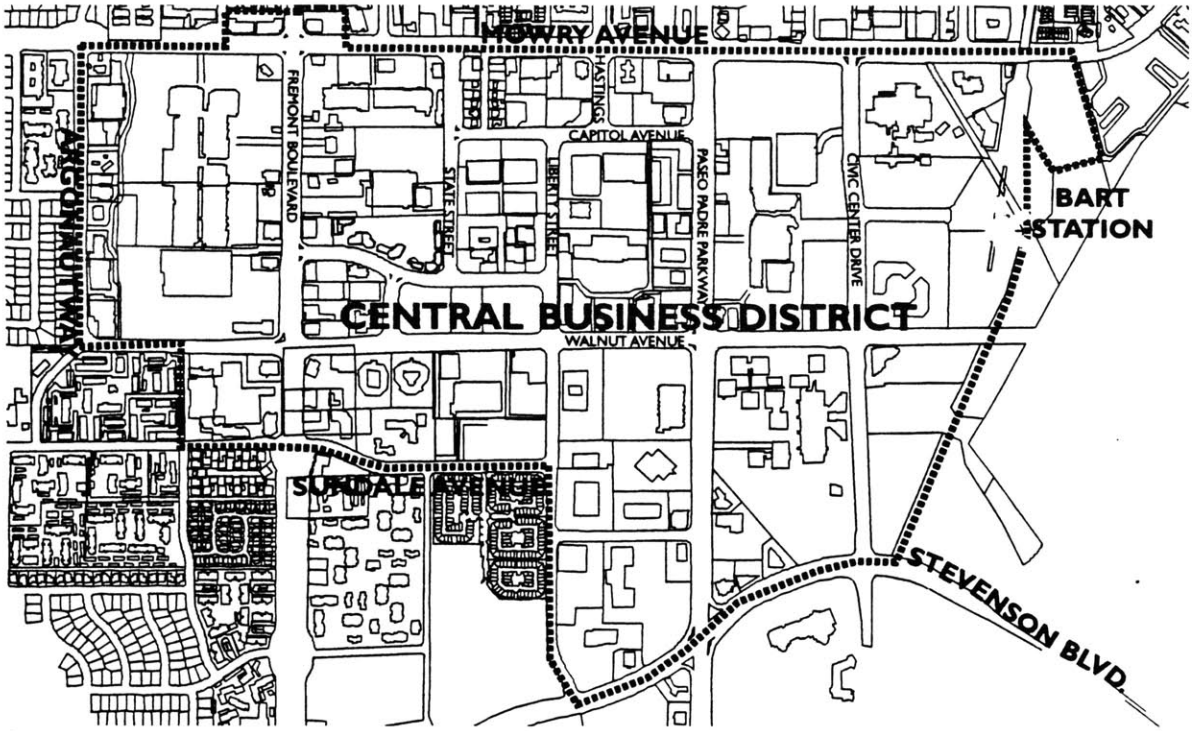


Fig. 19 Fremont CBD Context Map

Fremont's 1990 General Plan described this 430-acre CBD as a "vibrant, well-defined center that unites all parts of the city[48]." Furthermore, policies were outlined in the General Plan to ensure transit- and pedestrian-orientation, development continuity, public open space, plaza, and arts provision. The Zoning Ordinance sets forth building and site design standards to ensure the quality of the CBD described in the General Plan, and called for uses oriented towards regional or sub-regional office and retail markets, services, entertainment, and mixed-use developments. However, existing land uses reveal a different reality.

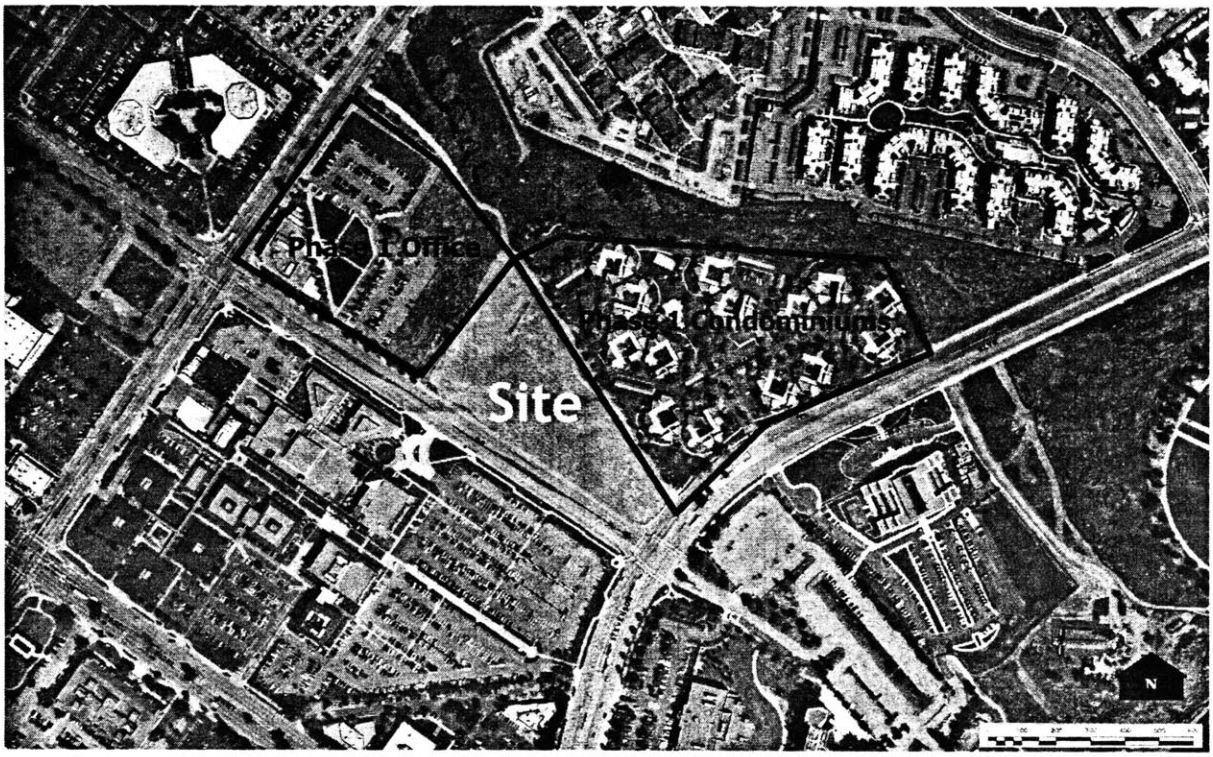


Fig. 20 Previous partial developments

Two previous mix-use developments on parcels adjacent to the site had partial success, with the completion of only phase one construction in both cases, resulting in single-use developments. One resulted in the development of residential condominiums to the east

[48] Fremont CBD Concept Plan, 2000.

across an earthquake fault line outside of the CBD, and the other a four-story office building to the north. Also near the site were a regional medical facility to the west, and City library and police headquarters to the south. While these major commercial and civic uses put the site in the proximity to major city destinations, the site in actuality is bordered by surface parking on three sides.

Jim Magstadt, Vice President of Huntington Partners, a Los Angeles based development firm, became interested in the site. He consolidated the remaining portions of the two partial developments with a major parcel owned by Leighton Pacific Development to form a 12.67-acre site.

The site was a city-initiated planned district, located within the General Plan designated *Activity Corridor* where "variations in siting, a mixture of land uses, and for a variety of or increased density of housing units" were encouraged for sites, much in line with *Consolidationalist* philosophy. Since it was within a half mile of the Bay Area Rapid Transit (BART) station, development was allowed to have an increased FAR of 0.8 to encourage transit-oriented development in contrast to the 0.5 FAR allowed for the rest of the CBD. However, neither the Zoning Ordinance nor the General Plan addressed methods of calculating FAR and density ranges. Therefore, the high-density residential range of 35-50 DU/Ac was recommended by planning staff with regards to this particular development. This is one of few occasions when local zoning actually called for high-density development. However, as shall be discussed, neighbors were not willing to accept that as a given.

Huntington Partners initially approached the city with a proposal consisting of 399 apartment units, 25,771 SF of commercial space, and a request to waive the affordable housing requirement. The development would result in a FAR of 0.92 and a net density of 38 DU/Ac. Because neighbors tend to be more concerned in infill situations, Anu Natarajan, project planner from the city side, impressed upon Mr. Magstadt the need to contact the neighbors and to initiate a dialogue directly instead of relying solely on city notices or newspaper announcements[49]. As a result, Mr. Magstadt and the members of the development team met with the homeowners associations groups three or four times, and explained the details of their proposal.

Fig. 21 Typical Residential

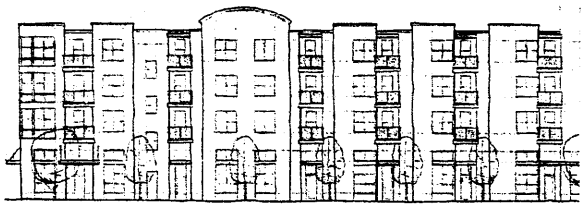


Fig. 22 Typical Mix-Use Facads

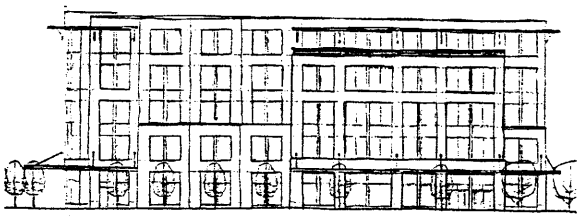


Fig. 23 Typical Office Facads

Residents initially expressed only minor concerns over the concept, and in fact, preferred having some residential uses versus 100% commercial uses typical of other CBD developments neighboring their property. Depending on ownership status, different segments of community had different concerns. While owners of neighboring property had strong reactions to development that affects the value of their property, residential tenants

were understandably more concerned about quality of life impacts, such as noise and traffic. Attendees of the informational meetings were shown preliminary design drawings, to which the primary reactions were to the shortage of parking provided, the parking's location close to the residential condominiums, and height of the buildings looming over them. It was a typical list of complaints because the development was in compliance with height, bulk, and impacts allowed for the CBD area. Developers assured them that with vegetative buffering, a minimum of 200 feet setback, and proximity to transit, the impacts would not be excessive. Furthermore, they were willing to work with the city to mitigate the impacts.

However, when the neighbors were told the density of the proposed development, a red flag of alarm was raised, changing people's attitudes entirely. It did not matter that they were agreeable to everything up until this point, that the height was comparable to other buildings in the area[50], that being a transit-oriented mixed use development it would generate less traffic than an all-commercial development, nor that the 430-acre CBD can be well served with more intensity (especially since over 50% of the development parcels within it were dedicated to surface parking lots). Rather, the development density completely changed the community's perception of the development.

At the first official public hearing, City Council and members of the public expressed concern in four general areas: mix of uses, height, parking and infrastructure impact, and incorporation of affordable housing. Each of the concerns raised were answered by city staff, city-hired consultants, or surveys that demonstrated minimal harm. For example, City

[49] It is interesting to note that in some cities, the planning department prefers for the applicant not to seek out the neighbors without their facilitation. Whichever the case, community contact is often the most tenacious

Council originally required a primary commercial use (more than 50%) in mix-use areas, and the development only proposed 6%. However, a survey of typical mix-use developments showed that a market feasible mix contained only 3-15% commercial uses. The height of the buildings were comparable to other buildings in the area, 45 feet maximum for residential and 70 for the all-commercial building. Mr. Magstadt guaranteed a minimum setback of 200 feet and other landscaping treatments to mitigate the visual impact of his development. The impact on parking and infrastructure was also questioned. City staff explained that the 1.5 parking spot per unit provided was more than some of the developments in the CBD, and that according to studies conduced in nearby apartments operating at a 5% vacancy rate, maximum parking even at peak hours reached the level of 1.1 spaces per unit. Typical transit-oriented development had parking ratios no more than 1.5 spaces per dwelling unit. Concerns over the effect on schools were eventually quelled when statistics were presented indicating that households in apartments generally do not have as many children. Even so, nearby residents expressed great concern for affect on their quality of life and lamented the loss of open space.

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aspect of the permit seeking process, so applicant was advised to proceed with caution.

[50] Commercial uses in the CBD did not have height restrictions.

Table 3 Trip Generation by Use

Use	Daily Trips	A. M. Peak	P. M. Peak
Mixed use project as proposed (322 DU, 85,000 SF commercial)	2135	335	448
Percentage of 100% Commercial	44%	39%	42%
Mixed use under existing Zoning (51% Commercial, 49% Residential)	3802	550	676
100% Commercial to 0.8 FAR	4855	869	1062

Report to Planning Commission Meeting June 24, 1999

By the end of the hearing, City Council stated that it was too early to tell, and that more information was needed before they can render a final decision. It did express that the project would be viewed favorably if it were truly a mix-use development, meaning a bigger commercial component. City Council would not waive the affordable housing requirement, instead recommending the developer to work with the Office of Neighborhoods to come up with a reasonable solution. However, there still was no indication of the degree of density that the City Council would find acceptable. It was quite clear that in this instance, community perceptions prevailed and actual impact figures were ignored because they did not support the community's desires.

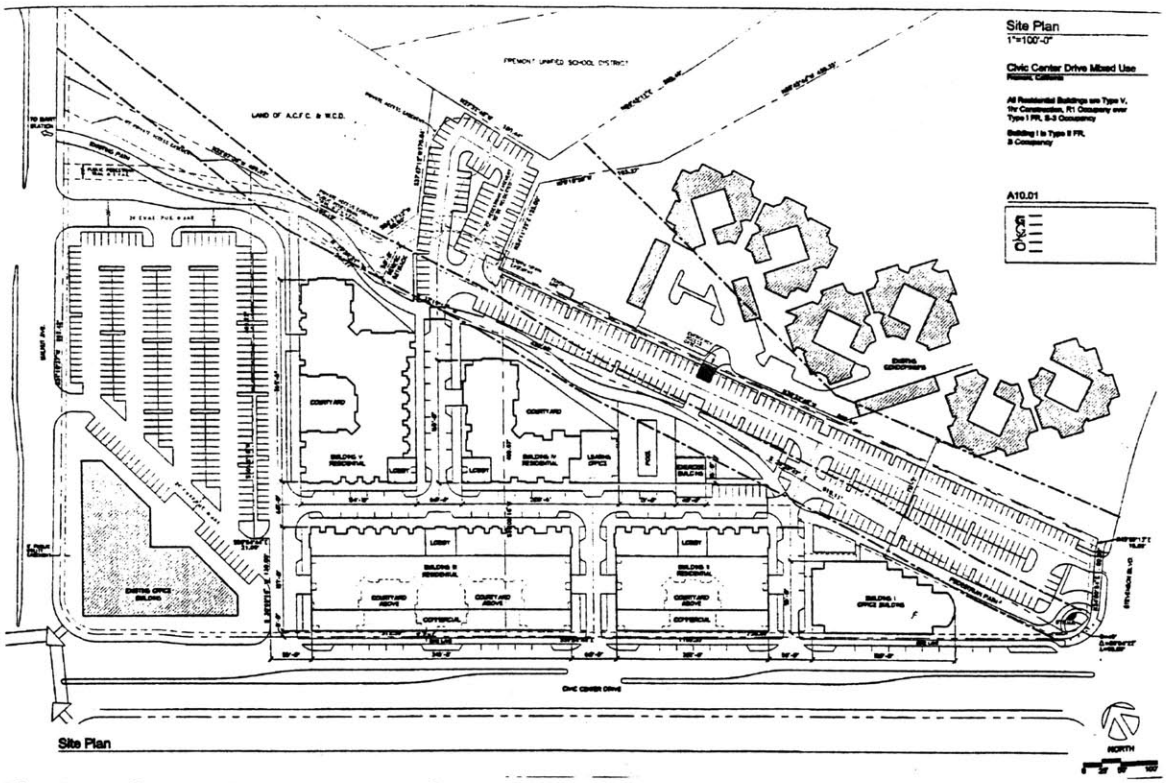

Fig. 24 Village at Civic Center Development Site Plan

Mr. Magstadt concurred, although he was much more aware of the amount of work required to arrive at that point. Density concerns were clearly a source of contention even though the original proposal was dismissed primarily on the ground of the absence of affordable housing. From planning and development perspectives, the site was ideal for dense housing development because of its location at the intersection of two major collectors, adjacency to offices and a major medical facility. Locating high-density housing at the proposed site provided a buffer to residential neighborhoods just outside of the CBD, and facilitated the transit/pedestrian orientation. Its central location also allowed for cheaper provision of municipal services and infrastructure than had the project been located further out from the developed area. Therefore, contextually with regards to adjacent uses and geographically

with regards to its location in the city, the development proposed by Mr. Magstadt fit in access with sound planning practice.

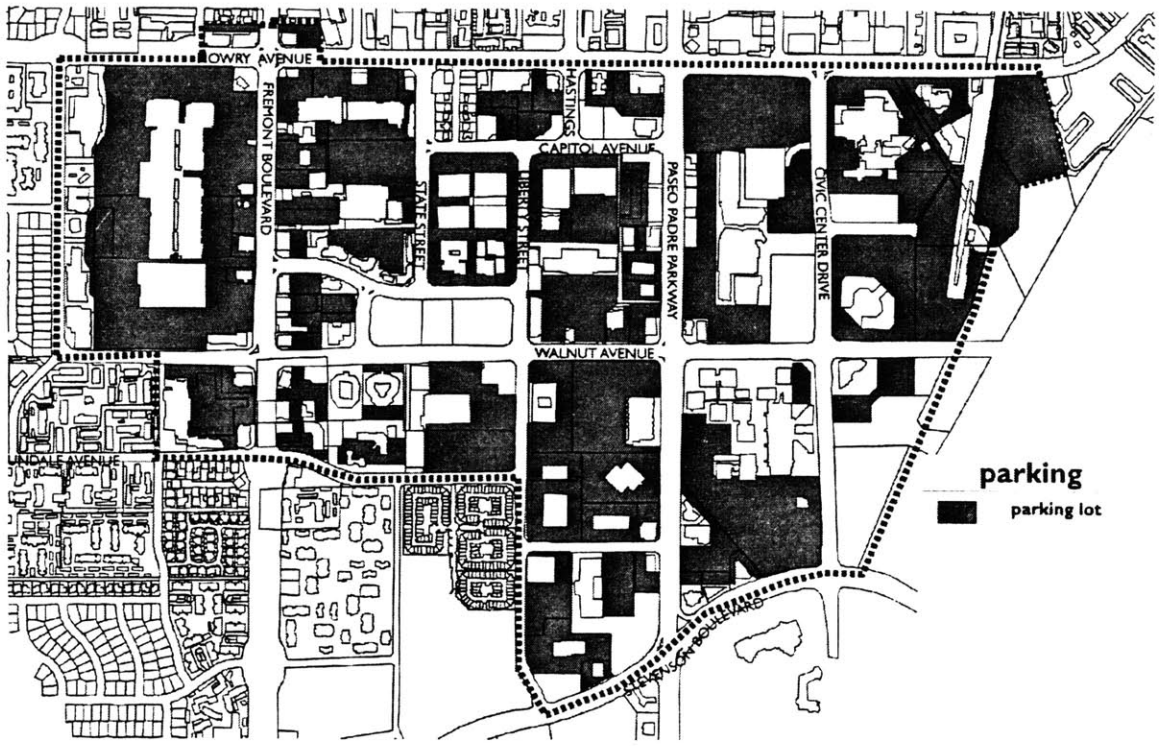

Fig. 25 Surface parking lots in Fremont CBD

In truth, the resulting impacts of the proposed development are milder than those that would otherwise result in as-of-right developments, but this fact seems to have escaped people's notice. For example, the development was only four stories for the most part with the exception of an office building 75 feet in height at the intersection. Commercial buildings in the CBD did not have a height limit, and the proposed height is in character of other commercial buildings currently in the CBD. The resulting bulk and shadow impacts are much lower than what would have occurred for an exclusively commercial development. Because residential uses also generate less traffic than commercial uses, the total trips generated is much less than a purely commercial development. According to the study conducted by the

City's traffic engineers, the level-of-service will be maintained a mid-D, below he City's General Plan target, and daily trip generation well below 50% of what would result had the site been developed at 100% commercial with 0.8 FAR. Therefore, the community's alarm might have been unwarranted given the actual impact of the development.

At the urging of the city, the developer sought and received $58 million in bond capitalization, allowing the project to exceed the recommended 10% affordable units at 60% AMI recommended to arrive at 20% affordable units at 50% Area Median Income. This was fortuitous because the economic consultants determined that City Council's recommendation was economically infeasible given the revenues generated by the project without additional subsidies.

Nevertheless, the community's response clearly had an effect on City Council's position. For a controversial development such as this, the Council postponed ruling until the project was further developed in order to provide feedback that responded to the design and site planning details. In extreme cases, such as the one in Fremont, political lobbyists were hired to scope the sentiments of the City Council members and advise the developer on the best strategy for getting the necessary votes for approval. Endorsement of a third-party advocate group, Urban Ecology was sought to lend legitimacy to the development and pressure on the municipal government. The San Francisco Bay Area based environmental advocacy group stepped to support the transit-oriented development. As a result, the decision was based at least in part on the political leverage of the advocacy group. This highlights the politically charged atmosphere of the regulatory process, shifting attention away from the physical and visual impact of the resulting development.

Interactions with nearby residents also required significant amount of time and effort. Neighboring residents changed their tactic as the project progressed. As mentioned, some community residents attended initial information meetings and expressed some general concerns. Some changed strategies and began boycotting the meetings to save 'ammunition' for the official public hearings. They argued off handedly that their property values would decrease, and the traffic would erode their quality of life. There was complaint of the height being more than twice the height of existing housing adjacent to the site and therefore the development would look down on them. Some simply said the number of units was too many. In fact, all the classic arguments against high-density residential development were referred to during the public hearing:

- Mr. Mammarella – overwhelming mass and height; lack of open space
- Mr. Papini – not enough parking on site, worried about overflow into his parking lot.
- Ms. Minola – car and people noise, safety at night, undesirable associated commercial uses
- Mr. Miller – too close to existing development; not enough public input
- Ms. Uy – sacrifice of open space
- Mr. Gulbranson – intense impact to city infrastructure
- Mr. Bayol – excessive traffic running over pedestrians

As mentioned earlier, the project was consistent with the vision established by the General Plan, and the actual impact of the project was lower than that allowed under current zoning. This serves to illustrate that any time a different type of development is proposed, different concerns are raised about the impact to the community without basing the arguments on findings, sometimes used explicitly to exact public benefits from the developer.

City Council was essentially looking for technical support for how they wanted to decide. Fortunately, the developers had the planning staff behind them and helped them push

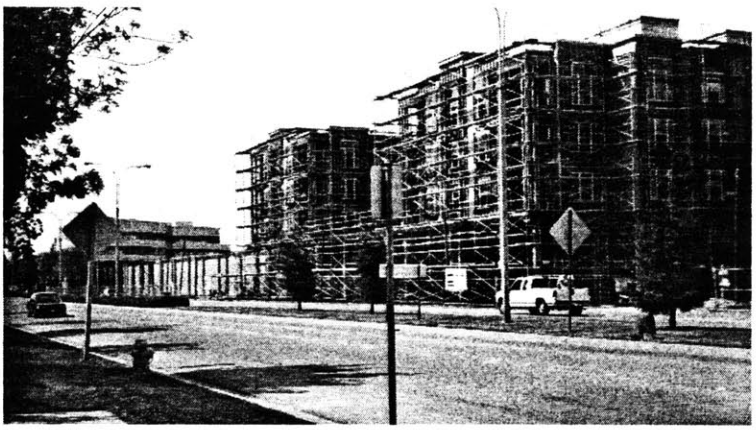

Fig. 26 View of development from Civic

Fig. 27 Image of condominiums north of the

Fig. 28 Image of existing adjacent office

their way through the project as well as getting a better design. Urban Ecology's support of the transit-oriented development was also an advantage. After explaining the reduced impact overall and further elaboration about the distinction between affordable and low income, the council as well as the community were more willing to go along with the project. It has been the case, where, generally with increased information foster the alignment of the community and the developer's interests, minimizing the ambiguities that seem to set them apart.

After working with planning staff, Office of neighborhoods staff, economic consultants hired by the city, and concerned residents, the project was approved at a second City Council hearing with conditions that primarily required design, landscaping, and site planning review for alternations that addressed neighbor concerns about safety and lighting. This was a more discretionary process that paid attention to context issues, rather than objective indices. However, density was still used as a trigger for community reaction, trigger to increase the complexity and duration of the public process. The terms of the agreement included a modest reduction to 322 units (31 DU/Ac), increase to 85,000 SF of commercial (19%), significant increase to 64 units (20%) of affordable housing to households earning 50% of Area Median Income (AMI) and modifications to the site planning to allow for a greater distance between the bulk of the apartments and the nearby condominiums. Overall the approved project was much better from the city as well as the community's perspective.

Having received City Council approval, the next step was to obtain building permits, which took six months to obtain. Six to eight months was typical for more complex projects, indicating that permitting was less of a problem since it mainly dealt with compliance to

standard codes and regulation. All together, the project took 18 months from start to finish versus a typical 4 months for an average suburban single-family detached development. Eight to 12 months is the typical timeframe for higher density housing development.

Reflection

At the end of a very long and contentious process, it was agreed between the developer and city that the project improved in quality of design and site planning, and increased level of public benefits. However, it took considerable amounts of outreach, education, and research to reach agreement. In the end despite the amount of community uproar, density was only reduced from 36 DU/Ac to 31 DU/Ac. This insubstantial change indicates that density was not the community's primary concern. The commercial component of the development did contribute to the project complexity, but actually made the project more palatable to the city and neighboring community. It is also ironic that although proposed project was much less intense of in land use than allowed by zoning and produced much lower impacts, it took nearly four times as long to get through the regulatory process. The overall delay and complication in the process increased the developer's exposure to risk, requiring greater sunk costs without the guarantee of approval.

If we look strictly at the subject areas discussed in earlier chapters, several interesting observations can be made. First, this was an example where zoning favored higher density development. However, because of unrealistic expectations regarding the amount of supportable commercial in a mix-use development, it took time for staff and consultants to conduct research to determine a reasonable solution. The proximity to transit and

designation within the activity corridor was supposed to encourage higher density, but the community remained skeptical of impact mitigation measures. For example, many felt the 1.5 parking spots provided was insufficient despite time-share parking arrangements, proximity to transit, and other developments with lower parking ratios.

In the case of measuring density, there was ambiguity in the lack of guidance on measuring density in the Zoning Ordinance and General Plan. City staff came up with a recommendation for this project, which was uncontested for the most part. In one sense it was good that the community did not pay too much attention to density indicators FAR and dwellings per acre. However, the inattention was due to their reliance on a personal sense of compatibility and appropriate height and bulk rather than more objective measures. Indeed, the project was primarily driven by community perceptions.

Through outreach and educational efforts, the city and developer were able to explain to many members of the community the actual impact of the development. Unfortunately, this was mainly useful for individuals who did not have a position in the beginning. For those who chose to oppose the project, findings from the reports, studies, and surveys were mainly ignored. Many of the concerns raised at the second City Council hearing were already addressed in earlier reports or informational sessions, indicating the people's unwillingness to accept factual findings. Perhaps this resistance is aimed at change in general and not density per se. This is certainly a possibility because given many community's desire to preserve the status quo, their solution to growth management is no growth, however unrealistic the proposition.

In comparison, the most convincing arguments stemmed from people's perceptions. Strong convictions persuaded people to dismiss findings that indicated otherwise. The Village at Civic Center in Fremont was a mix-use development that clearly made a lot of sense according to good planning practice and seemed to be consistent with the City's vision established in the General Plan and Zoning ordinance. However, due to the obstacles created by community perceptions, the project went through an extended process, met with many challenges along the way. In the end, the endurance of the planning staff and developer prevailed. However, it makes one pause and wonder if the energy spent to prevent an otherwise desirable development is in the community's own best interest?

6 Lessons and Recommendations

> "The basic goal of urban design is to ensure a concern for the public interest in the ongoing process of building and rebuilding cities and other human settlements." -Jon Lang

Starting out as an inquiry into the difficulties facing higher-density, multi-family housing development, this thesis has led to a path of discoveries of new findings and rediscoveries of familiar concepts. A better understanding of how aspects of policy, measurement, and perception of density relate to each other helps to explain the big picture, and elucidate reasons for the perpetuation of current development patterns. It is clear that there is not one answer to explain the resistance against higher-density development in suburban areas, nor is there one solution to overcome them.

In tracing the roots of zoning regulation and policies that shaped urban development, it was discovered that many federal, state, and regional goals were in response to outdated concerns. Because regional benefits may not necessarily benefit individual municipalities, the misalignment of benefits at the regional level and the cost of provision at the local level create obstacles for development, particularly higher-density residential developments. Lesson one: Policies are vague, and usually outdated. People can interpret as they like, especially when it's convenient to do so in a certain way to produce desired results.

Communities are different so that each must discover for itself the best way to measure and regulate the aspects that residents are seriously concerned about. Density is used as a proxy for other concerns that residents do not articulate clearly or are even aware. For example, as discovered by researchers at U. C. Berkeley, visual impact was the most significant attribute in contributing towards people's perception of density on three San Francisco streets. Therefore, façade articulation, set-back, and height restrictions were successful methods to address the concerns of residents in that situation. Furthermore, if visual impact were the main concern and not the density of dwelling units, perhaps a better way of managing the impact would be to emphasize regulations that address the mass of the building as opposed to its use. Lesson two: Understand the actual attributes that contribute to neighborhood concern, and devise a method to measure and regulate that aspect instead of regulating density as a proxy.

Mostly inaccurate personal perception still permeates people's attitude towards multi-family housing. There is no consistent way of measuring and reporting impact, so decisions are made based on ad hoc findings, which may be skewed or manipulated. Without analysis through rigorous standards, it's hard to tell what the tradeoffs and what the opportunity costs are. Lesson three: After understanding attributes contributing towards neighborhood concern, develop evaluation criteria based on these concerns so development proposals are judged according to the attributes that matter.

To understand the concerns of community residents, there needs to be advanced planning efforts, and the means to engage communities to articulate their vision for the neighborhood. Discussion should include the benefits and drawbacks of higher density, and

explanations of existing density in within the municipality to provide a context for reference. Furthermore, services and amenities that require the attainment of critical density for viability should be identified so the community understands the tradeoffs at stake. Building up consensus on the desires of the community, residents give the city planning staff a clear direction on the appropriate types of regulation strategies they should pursue. If a community is at odds with itself, people will take sides and form factions antagonizing each other, engaging in debates that merely pay lip service to the issues, in the meanwhile allowing time, the silent killer, to stop the project. For example, residents of Lincoln came to consensus on the desire to develop affordable housing on the site of Battle Road Farms. Despite the financial risk of having 60% affordable units, the developer felt it was worth it because he had the backing of the community and town. Furthermore, this should be well documented in the General Plan and Zoning Ordinance to impress the vision upon any developer wishing to do business in town[51]. Lesson four: Establishing community consensus and broad-base support should be the first priority to nurture desired community growth.

In addition to making the goals clear, city planning departments should make regulations easier for the types of development they desire in the community. Many developers expressed their preference to use planned unit development district designations because it enables them to custom tailor specifications such as density, height, , etc. instead of requesting individual zoning change separately. Lesson five: Make desired uses easy for developers to develop.

[51] The location of the site, isolated at the town's periphery also made the development more palatable.

Before community concerns can be elucidated and consensus built, there needs to be a tremendous amount of information exchange and education between the city planning staff and the community residents must occur. It is not difficult for anyone to read and interpret the built environment, however, such interpretations are based on personal knowledge as discussed earlier and may not have the benefit of a clear understanding of factors that contribute towards crowding, safety, or good urban design in general, much less ways to mitigate them. In Fremont, Huntington Partners held extra information sessions for concerned neighbors and special study sessions for the City Council and Planning Commission. Both the project planner and the developer spent a tremendous amount of time explaining the project and the likely impact. Although there were significant amount of politics involved, both the leadership and most of the nearby residents accepted the development because there was less ambiguity about the likely outcome. Lesson six: Give both the leadership and community residents the tools and information to make an informed decision.

Lastly, city planning staff plays a tremendous role in facilitating information sharing, consensus building, and urban development. Having a knowledgeable staff with a good understanding of the community can help communities grapple with their concerns and developers jump through hoops at the local level. The staff and consultants at the City of Fremont played such a role, and because of their vision and persistence, the city will benefit from a high-quality multi-family development that provides needed affordable housing at reduced cost and negative impact to the city. Lesson seven: Recruit talented people and populate city staff with both practitioners and visionaries.

Recommendations

Throughout this investigation, it was found time and again that certain associations have colored perceptions of density. These are associations based on unproven assumptions that were established in the public mind under very different circumstances, more than three quarters of a century ago. Over the years, through either inadvertence or inertia, they have remained unchallenged and continued to influence the way we think and shape our environment. Demographic and lifestyle changes, critical housing affordability concerns, coupled with deleterious land and energy consumption levels, many conditions today prompt an urgent need for change if we are to maintain the current quality of life. Earlier chapters identified sources of bias in policy and measurement technique that skew our perception of density, which is further confounded by personal interpretations and normative ideologies. Unfortunately, not as much attention has been paid to context appropriateness or impact analysis, which is in many ways a more telling indicator of acceptable density than measured density.

Paradoxically, the goal and challenge of zoning is to protect the health, safety and property values within the community via proxies that ensure a standard of environmental quality. While the intent of this thesis was to highlight the inadequacies, and perhaps the impossibility of such an endeavor, nevertheless, density measures, FAR, set-back, and height restrictions offer a way through which we can begin to regulate the intensity of land use. The challenge now is with what do in addition to existing regulations to rectify the biases and over-aggregation or does it need to be completely supplanted? How do you regulate development impact more directly? How is it possible to avoid making density the scapegoat

or trigger of reactionary responses from the community? What is a viable template for intervention?

Since zoning was established in New York City in 1916 as a tool land use regulation, the planner's tool kit has expanded in many areas. Some alternative measures and assessments of acceptable land use intensity and development configuration were briefly mentioned in Chapter 2. The increased use of visual aids and geographic modeling tools to assess community reaction makes the task of a better-rounded project evaluation less daunting. Some utilize doctored photographs or animated sequences of SimCity-like visualization techniques to illustrate a potential development outcome. Others use sophisticated Geographic Information Systems (GIS) to model impact ranging from traffic generation to damage to natural assets. At the Massachusetts Institute of Technology, the Program in Media Arts and Sciences is collaborating with the Department of Urban Studies and Planning to develop a 'luminous table,' assisting in urban design and public communication efforts. Researchers have used the table to project shadows, reflective glare, and traffic and wind patterns on the table surface based on the arrangement of 3-dimensional models on it. A layperson can easily observe the projected impact of different site planning alternatives or traffic generation patterns by moving around the model structures on the able.

The list illustrates an increasing array of methods allowing community members to respond to calculated impacts of alternative development scenarios. These new methods are more intuitive, utilizing visual and tangible media instead of relying on numerical proxies. Through technology, the public's ability to engage in informed decision-making has been enhanced, aided by sophisticated analysis only available and comprehensible to professionals

previously. The implication of this possibility is highly significant, and will be expanded upon a little later.

Traditionally, there has been an emphasis on the regulation of physical attributes of development based on professionally determined standards, such as appropriate density, right-of-way dedication, building set-back, etc. With the discretionary reviews overseen by either appointed or elected bodies, public involvement had been relegated to the establishment of underlying guidelines, such as general plans, or public hearings at the end of the development process. It is understandable, then, that the community feels 'out of the loop' in the regulatory process because they engaged very late in the process. Furthermore, their concerns are mainly relegated into the discretionary category, where there are no predetermined standards or thresholds for performance, unlike physical requirements. This limited involvement may be one source of apprehension, leading to the public's use of density as an entrée into discussion. The use of density as a surrogate rationale lends legitimacy to the complaint under the disguise of concern over health and community impacts. Even if these concerns surfaced over change in the community in general as opposed to density specifically, the likeliness of this possibility speaks to the inadequacy of the current regulatory process in productively engaging the community.

Instead, more emphasis should be placed on a participatory, performance-based regulatory process as a strategy to alleviate community anxieties by directly addressing the development impacts. There are numerous ways to constructively engage the community other than through time-consuming public hearings. As a starting point, public participation could be stressed in community visioning and master planning efforts. Next, with the aid of

more intuitive visualization and modeling techniques, residents can be involved in developing and providing feedback on acceptable levels of development. This feedback can in turn be used as standards in a performance based evaluation process[52]. While not advocating a total substitution of conventional Euclidian zoning for performance zoning, a modified version can be overlaid on top of conventional zoning regulations to directly address the impacts that most concern members of the community.

Developed through a consensus building process, community determined standards can serve as the next level of quality assurance, ensuring the evaluation of development projects according to community concerns, such as visual and traffic impact. The layering of community established, performance-based standards to supplement professionally determined, technical standards serve an important function. This is a further incorporation of community input into the formal regulatory process, a surrogate for full-blown public hearings, but still taking into account the community's preferences. Thus, the proposed alternative engages the community, both directly and indirectly, throughout the decision making process.

[52] Performance zoning is an alternative to traditional land use zoning. Whereas traditional land use zoning specifies what uses land can be put to within specified districts, performance zoning specifies the intensity of land use that is acceptable. In other words, it deals not with the use of a parcel, but the performance of a parcel and how it impacts surrounding areas.

Table 4 Tools and Methods in the Approval and Permitting Process

	Traditional Tools	Supplemental Tools
Underlying Guidelines	General Plans, Specific Plans, Neighborhood Plans, Vision Plans	
Administrative Review	Basic physical and use regulations. (First level of review)	Community determined levels of performance zoning to evaluate complex or interdisciplinary issues
Minor Discretionary Review	Site planning, signage, environmental reviews	
Discretionary Review	More extensive review involving some form of regulatory body, may include public input. (i.e. overlay districts for additional review on urban design, historical preservation, or economic development aspects.	
Public Hearing	At the end of the process	

Public, participatory portion of the process

Although some municipalities already use these supplemental evaluations, they have not been given as much prominence in the regulatory process. Or, it may be more accurate to say that impact reports can become marginalized if they do not concur with the popular sentiment, as was the case in Fremont. Being more upfront about the impacts generated by developments and using it as standard evaluation criteria promotes a less biased discussion of not only higher-density developments, but any development proposed. Furthermore, by centering discussion on more substantive issues relegates the importance of simplified indices in development regulation.

Using supplemental review tools also decreases the number of project unknowns. Chapter 4 touched upon four types of impact through which higher-density development can affect the community: physical form, demand on community resources and services, demand on

infrastructure, and consumption of land. Of these types, current regulatory process only addresses a limited spectrum of impacts rigorously. If performance-based evaluations are adopted, the number of unknown attributes or aspects of the project can be significantly reduced. By increasing transparency on the impacts and putting all of the information on the table for discussion, community anxiety over perceived impacts can be alleviated. The reduction of uncertainty is also beneficial for the developer because community reaction should be more predictable, which in turn, help to reduce development risk.

Table 5 Breakdown of Knows and Unknowns in the Approval and Permitting Process

	Current System	Recommended
Known Attributes/Aspects	▪ Use ▪ Physical impact – height, set-back, density, site planning ▪ Environmental impact ▪ (Traffic impact)	▪ Use ▪ Physical impact – height, set-back, density, site planning ▪ Environmental Impact ▪ Traffic impact, ▪ Tax revenue/loss generated, ▪ Infrastructure impact ▪ Municipal services impact
Unknown Attributes/Aspects	▪ Traffic impact ▪ Fiscal impact – tax revenue generated ▪ Infrastructure impact ▪ Municipal services impact ▪ City Council/Zoning Board response ▪ Community reaction	▪ City Council/Zoning Board response ▪ Community reaction

Conclusions

For higher-density housing to have currency, the three major participants involved in the development process must be satisfied: the occupants must be satisfied with the quality of

environment; the developers should be able to earn satisfactory risk-adjusted returns; and the local government should be able to realize the social benefits and efficiencies of more compact development. This thesis dealt with the two latter participants, although the needs, concerns, and perception of residents living higher-density are of paramount significance.

The key to successful incentives is to both recognize the nature of the marketplace for land and buildings and to have clearly specified design features and impact controls. Developers also need to use more sophisticated methods to understand consumer preferences. Development opportunities are harder to find during tighter times, but this is the best reason to pay closer attention to local concerns. The real estate market operates in cycles and developers most perceptive of the underlying demographic and lifestyle changes will find themselves in an advantage. Also noteworthy is that the impacts of low-density development have begun making suburban living inconvenient: the long commute, escalating prices at the pump, stifling mortgage payments, and perhaps the lawn mowing. There is a desire to reevaluate, a motivation that was not there when the economy was good.

Emphasis should be placed on creating a diversity of housing options, or at least give higher-density housing a chance to compete. If there is no demand, the market will be the first to take its toll. If the demand is there, what is the rationale for hindering the development of higher-density housing? The goal of zoning and land use control is to protect public welfare. The original concerns for dilapidated, overcrowded, and unsanitary tenement housing that happened to be higher-density housing are no longer pressing issues. Furthermore, many of those problems are the result of poor management and not inherent to density. The current

concerns for impacts on traffic, noise, infrastructure, and quality of life have supplanted the earlier rationale, but higher-density, multi-family housing has outperformed lower-density, single-family homes on most of these fronts.

The whole concept of managed growth means making the best use of our existing resources, and maximizing our investment in existing infrastructure. Part of this strategy inevitably involves building and rebuilding at higher densities, and actively linking such land use to more focused patterns of fast and efficient transportation. Ignoring density issue will only cause more problems, since it leads to reactionary measures and ad hoc decision making. Because growth to some degree is inevitable, acknowledging it enables communities to channel it to places where it can make a positive difference and foster a sense of community by building on an existing foundation.

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Appendix A: Land Basis Definition

Boundary of Land Base	Definitions
Net Residential Site Area	▪ The total land area devoted to residential dwellings, including private driveways, yards, parking areas, and gardens.
Gross Residential Site Area	▪ Net Residential site Area plus half the area of the perimeter of roads plus one-quarter the area of the intersections ▪ Net Residential Site Area plus one-half rights of way which abut residential parcels ▪ Net Residential Site Area plus 20' of peripheral roads ▪ Net Residential Site Are plus unspecified pro-rated area of local and collector roads
Neighborhood Area	▪ The total land area devoted to neighborhood uses, including residential land, streets, neighborhood community uses such as schools, recreation, religion, culture, and retail.
Suburban Area	▪ The total land area devoted to neighborhood uses, inclusive of land used for local and collector roads, all non-residential uses (e.g. local open spaces, drainage reserves, community facilities, schools), and regional uses (regional open space, environmental protection areas, large scale commercial, community and educational uses.

Source: Chan, Claire S., *Measuring Physical Density: Implications on the Use of Diffeent Measures on Land Use in Singapore," 1999.*

Appendix B: Interview List

CAROL FOSS
Community Resident, Concord, NH

LANGLY KEYEYS
Professor, MIT

BOB KUEHN
President, Keen Development

JIM MAGSTADT
Vice President, Huntington Partners

ED MARCHANT
Adjunct Professor, Harvard University

ANU NATARAJAN
Associate Planner, City of Fremont

BRENDA PERKINS
Community Resident, Concord, NH

JOEY SCANGA
Architect - Calthorp Associates

AMY SCHECTMAN
Economic Development Officer, Town of Brookline