

## Chapter 1—Housing History and Purpose

Introduction	1-1
Preurban Housing	1-1
Ephemeral Dwellings	1-1
Episodic Dwellings	1-1
Periodic Dwellings	1-1
Seasonal Dwellings	1-2
Semipermanent Dwellings	1-2
Permanent Dwellings	1-2
Urbanization	1-2
Trends in Housing	1-3
References	1-7
Additional Sources of Information	1-7

Figure 1.1.	Conditions in the Tenements	1-3
Figure 1.2.	Levittown, New York	1-6

## Chapter 2—Basic Principles of Healthy Housing

Introduction	2-1
Fundamental Physiologic Needs	2-1
Fundamental Psychologic Needs	2-3
Protection Against Disease	2-3
Protection Against Injury	2-5
Protection Against Fire	2-6
Fire Extinguishers	2-9
Protection Against Toxic Gases	2-9
References	2-9
Additional Sources of Information	2-11

Figure 2.1.	Circa 1890 Icebox	2-5
Figure 2.2.	Smoke Alarm Testing	2-8

## Chapter 3—Housing Regulations

Introduction	3-1
History	3-1
Zoning, Housing Codes, and Building Codes	3-2
Zoning and Zoning Ordinances	3-3
Exceptions to the Zoning Code	3-5
Housing Codes	3-6
Building Codes	3-12
References	3-12
Additional Sources of Information	3-13

Figure 3.1.	Example of a Floor Area	3-5
Figure 3.2.	Example of an Angle of Light Obstruction	3-5

# Chapter 1: Housing History and Purpose

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*“Safe, affordable housing is a basic necessity for every family. Without a decent place to live, people cannot be productive members of society, children cannot learn and families cannot thrive.”*

Tracy Kaufman, Research Associate  
National Low Income Housing Coalition/  
Low Income Housing Information Service  
<http://www.habitat.org/how/poverty.html>; 2003

## Introduction

The term “shelter,” which is often used to define housing, has a strong connection to the ultimate purpose of housing throughout the world. The mental image of a shelter is of a safe, secure place that provides both privacy and protection from the elements and the temperature extremes of the outside world.

This vision of shelter, however, is complex. The earthquake in Bam, Iran, before dawn on December 26, 2003, killed in excess of 30,000 people, most of whom were sleeping in their homes. Although the homes were made of the most simple construction materials, many were well over a thousand years old. Living in a home where generation after generation had been raised should provide an enormous sense of security. Nevertheless, the world press has repeatedly implied that the construction of these homes destined this disaster. The homes in Iran were constructed of sun-dried mud-brick and mud.

We should think of our homes as a legacy to future generations and consider the negative environmental effects of building them to serve only one or two generations before razing or reconstructing them. Homes should be built for sustainability and for ease in future modification. We need to learn the lessons of the earthquake in Iran, as well as the 2003 heat wave in France that killed in excess of 15,000 people because of the lack of climate control systems in their homes. We must use our experience, history, and knowledge of both engineering and human health needs to construct housing that meets the need for privacy, comfort, recreation, and health maintenance.

Health, home construction, and home maintenance are inseparable because of their overlapping goals. Many highly trained individuals must work together to achieve quality, safe, and healthy housing. Contractors, builders,

code inspectors, housing inspectors, environmental health officers, injury control specialists, and epidemiologists all are indispensable to achieving the goal of the best housing in the world for U.S. citizens. This goal is the basis for the collaboration of the U.S. Department of Housing and Urban Development (HUD) and the Centers for Disease and Control and Prevention (CDC).

## Preurban Housing

Early dwelling designs were probably the result of cultural, socioeconomic, and physical forces intrinsic to the environment of their inhabitants. The housing similarities among civilizations separated by vast distances may have been a result of a shared heritage, common influences, or chance.

Caves were accepted as dwellings, perhaps because they were ready made and required little or no construction. However, in areas with no caves, simple shelters were constructed and adapted to the availability of resources and the needs of the population. Classification systems have been developed to demonstrate how dwelling types evolved in preurban indigenous settings [1].

## Ephemeral Dwellings

Ephemeral dwellings, also known as transient dwellings, were typical of nomadic peoples. The African bushmen and Australia’s aborigines are examples of societies whose existence depends on an economy of hunting and food gathering in its simple form. Habitation of an ephemeral dwelling is generally a matter of days.

## Episodic Dwellings

Episodic housing is exemplified by the Inuit igloo, the tents of the Tungus of eastern Siberia, and the very similar tents of the Lapps of northern Europe. These groups are more sophisticated than those living in ephemeral dwellings, tend to be more skilled in hunting or fishing, inhabit a dwelling for a period of weeks, and have a greater effect on the environment. These groups also construct communal housing and often practice slash-and-burn cultivation, which is the least productive use of cropland and has a greater environmental impact than the hunting and gathering of ephemeral dwellers.

## Periodic Dwellings

Periodic dwellings are also defined as regular temporary dwellings used by nomadic tribal societies living in a

pastoral economy. This type of housing is reflected in the yurt used by the Mongolian and Kirgizian groups and the Bedouins of North Africa and western Asia. These groups' dwellings essentially demonstrate the next step in the evolution of housing, which is linked to societal development. Pastoral nomads are distinguished from people living in episodic dwellings by their homogenous cultures and the beginnings of political organization. Their environmental impact increases with their increased dependence on agriculture rather than livestock.

### Seasonal Dwellings

Schoenauer [1] describes seasonal dwellings as reflective of societies that are tribal in nature, seminomadic, and based on agricultural pursuits that are both pastoral and marginal. Housing used by seminomads for several months or for a season can be considered semisedentary and reflective of the advancement of the concept of property, which is lacking in the preceding societies. This concept of property is primarily of communal property, as opposed to individual or personal property. This type of housing is found in diverse environmental conditions and is demonstrated in North America by the hogans and armadas of the Navajo Indians. Similar housing can be found in Tanzania (Barabaig) and in Kenya and Tanzania (Masai).

### Semipermanent Dwellings

According to Schoenauer [1], sedentary folk societies or hoe peasants practicing subsistence agriculture by cultivating staple crops use semipermanent dwellings. These groups tend to live in their dwellings various amounts of time, usually years, as defined by their crop yields. When land needs to lie fallow, they move to more fertile areas. Groups in the Americas that used semipermanent dwellings included the Mayans with their oval houses and the Hopi, Zuni, and Acoma Indians in the southwestern United States with their pueblos.

### Permanent Dwellings

The homes of sedentary agricultural societies, whose political and social organizations are defined as nations and who possess surplus agricultural products, exemplify this type of dwelling. Surplus agricultural products allowed the division of labor and the introduction of other pursuits aside from food production; however, agriculture is still the primary occupation for a significant portion of the population. Although they occurred at different points in time, examples of early sedentary agricultural housing can be found in English cottages, such as the Suffolk, Cornwall, and Kent cottages [1].

## Urbanization

Permanent dwellings went beyond simply providing shelter and protection and moved to the consideration of comfort. These structures began to find their way into what is now known as the urban setting. The earliest available evidence suggests that towns came into existence around 4000 BC. Thus began the social and public health problems that would increase as the population of cities increased in number and in sophistication. In preurban housing, the sparse concentration of people allowed for movement away from human pollution or allowed the dilution of pollution at its location. The movement of populations into urban settings placed individuals in close proximity, without the benefit of previous linkages and without the ability to relocate away from pollution or other people.

Urbanization was relatively slow to begin, but once started, it accelerated rapidly. In the 1800s, only about 3% of the population of the world could be found in urban settings in excess of 5,000 people. This was soon to change. The year 1900 saw the percentage increase to 13.6% and subsequently to 29.8% in 1950. The world's urban population has grown since that time. By 1975, more than one in three of the world's population lived in an urban setting, with almost one out of every two living in urban areas by 1997. Industrialized countries currently find approximately 75% of their population in an urban setting. The United Nations projects that in 2015 the world's urban population will rise to approximately 55% and that in industrialized nations it will rise to just over 80%.

In the Western world, one of the primary forces driving urbanization was the Industrial Revolution. The basic source of energy in the earliest phase of the Industrial Revolution was water provided by flowing rivers. Therefore, towns and cities grew next to the great waterways. Factory buildings were of wood and stone and matched the houses in which the workers lived, both in construction and in location. Workers' homes were little different in the urban setting than the agricultural homes from whence they came. However, living close to the workplace was a definite advantage for the worker of the time. When the power source for factories changed from water to coal, steam became the driver and the construction materials became brick and cast iron, which later evolved into steel. Increasing populations in cities and towns increased social problems in overcrowded slums. The lack of inexpensive, rapid public transportation forced many workers to live close to their work. These factory areas were not the pastoral areas with which many were familiar, but were bleak with smoke and other pollutants. The inhabitants of rural areas migrated to ever-expanding

cities looking for work. Between 1861 and 1911 the population of England grew by 80%. The cities and towns of England were woefully unprepared to cope with the resulting environmental problems, such as the lack of potable water and insufficient sewerage.

In this atmosphere, cholera was rampant; and death rates resembled those of Third World countries today. Children had a one in six chance of dying before the age of 1 year. Because of urban housing problems, social reformers such as Edwin Chadwick began to appear. Chadwick's *Report on an Enquiry into the Sanitary Condition of the Labouring Population of Great Britain and on the Means of its Improvement* [2] sought many reforms, some of which concerned building ventilation and open spaces around the buildings. However, Chadwick's primary contention was that the health of the working classes could be improved by proper street cleaning, drainage, sewage, ventilation, and water supplies. In the United States, Shattuck et al. [3] wrote the *Report of the Sanitary Commission of Massachusetts*, which was printed in 1850. In the report, 50 recommendations were made. Among those related to housing and building issues were recommendations for protecting school children by ventilation and sanitation of school buildings, emphasizing town planning and controlling overcrowded tenements and cellar dwellings. Figure 1.1 demonstrates the conditions common in the tenements.

In 1845, Dr. John H. Griscom, the City Inspector of New York, published *The Sanitary Condition of the Laboring Population of New York* [4]. His document expressed once again the argument for housing reform and sanitation. Griscom is credited with being the first to use the phrase "how the other half lives." During this time, the poor were not only subjected to the physical problems of poor housing, but also were victimized by corrupt landlords and builders.

## Trends in Housing

The term "tenement house" was first used in America and dates from the mid-nineteenth century. It was often intertwined with the term "slum." Wright [5] notes that in English, tenement meant "an abode for a person or for the soul, when someone else owned the property." Slum, on the other hand, initially was used at the beginning of the 19th century as a slang term for a room. By the middle of the century, slum had evolved into a term for a back dwelling occupied by the lowest members of society. Von Hoffman [6] states that this term had, by the end of the century, begun to be used interchangeably with tenement. The author noted that in the larger cities of the United States, the apartment house emerged in the

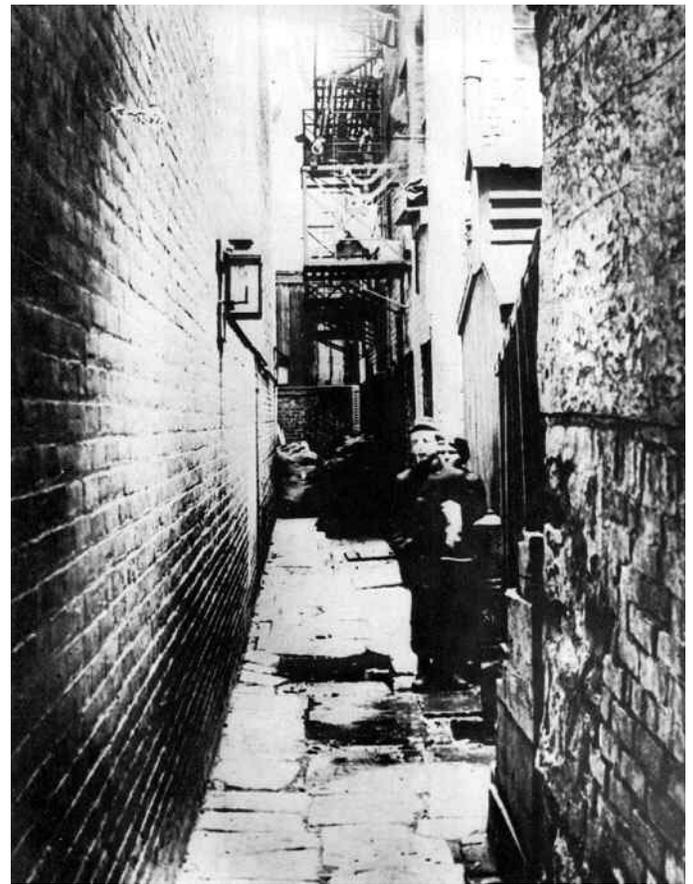


Figure 1.1. Conditions in the Tenements

1830s as a housing unit of two to five stories, with each story containing apartments of two to four rooms. It was originally built for the upper group of the working class. The tenement house emerged in the 1830s when landlords converted warehouses into inexpensive housing designed to accommodate Irish and black workers. Additionally, existing large homes were subdivided and new structures were added, creating rear houses and, in the process, eliminating the traditional gardens and yards behind them. These rear houses, although new, were no healthier than the front house, often housing up to 10 families. When this strategy became inadequate to satisfy demand, the epoch period of the tenements began.

Although unpopular, the tenement house grew in numbers, and, by 1850 in New York and Boston, each tenement housed an average of 65 people. During the 1850s, the railroad house or railroad tenement was introduced. This structure was a solid, rectangular block with a narrow alley in the back. The structure was typically 90 feet long and had 12 to 16 rooms, each about 6 feet by 6 feet and holding around four people. The facility allowed no direct light or air into rooms except those facing the street or alley. Further complicating this structure was the lack of privacy for the tenants. A lack of hallways eliminated any semblance of privacy. Open sewers, a single privy in the back of the building, and uncollected

garbage resulted in an objectionable and unhygienic place to live. Additionally, the wood construction common at the time, coupled with coal and wood heating, made fire an ever-present danger. As a result of a series of tenement fires in 1860 in New York, such terms as death-trap and fire-trap were coined to describe the poorly constructed living facilities [6].

The two last decades of the 19th century saw the introduction and development of dumbbell tenements, a front and rear tenement connected by a long hall. These tenements were typically five stories, with a basement and no elevator (elevators were not required for any building of less than six stories). Dumbbell tenements, like other tenements, resulted in unaesthetic and unhealthy places to live. Garbage was often thrown down the airshafts, natural light was confined to the first floor hallway, and the public hallways only contained one or two toilets and a sink. This apparent lack of sanitary facilities was compounded by the fact that many families took in boarders to help with expenses. In fact, 44,000 families rented space to boarders in New York in 1890, with this increasing to 164,000 families in 1910. In the early 1890s, New York had a population of more than 1 million, of which 70% were residents of multifamily dwellings. Of this group, 80% lived in tenements consisting mostly of dumbbell tenements.

The passage of the New York Tenement House Act of 1901 spelled the end of the dumbbells and acceptance of a new tenement type developed in the 1890s—the park or central court tenement, which was distinguished by a park or open space in the middle of a group of buildings. This design was implemented to reduce the activity on the front street and to enhance the opportunity for fresh air and recreation in the courtyard. The design often included roof playgrounds, kindergartens, communal laundries, and stairways on the courtyard side.

Although the tenements did not go away, reform groups supported ideas such as suburban cottages to be developed for the working class. These cottages were two-story brick and timber, with a porch and a gabled roof. According to Wright [5], a Brooklyn project called Homewood consisted of 53 acres of homes in a planned neighborhood from which multifamily dwellings, saloons, and factories were banned.

Although there were many large homes for the well-to-do, single homes for the not-so-wealthy were not abundant. The first small house designed for the individual of modest means was the bungalow. According to Schoenauer [1], bungalows originated in India. The

bungalow was introduced into the United States in 1880 with the construction of a home in Cape Cod. The bungalow, derived for use in tropical climates, was especially popular in California.

Company towns were another trend in housing in the 19th century. George Pullman, who built railway cars in the 1880s, and John H. Patterson, of the National Cash Register Company, developed notable company towns. Wright [5] notes that in 1917 the U.S. Bureau of Labor Standards estimated that at least 1,000 industrial firms were providing housing for their employees. The provision of housing was not necessarily altruistic. The motivation for providing housing varied from company to company. Such motivations included the use of housing as a recruitment incentive for skilled workers, a method of linking the individual to the company, and a belief that a better home life would make the employees happier and more productive in their jobs. Some companies, such as Firestone and Goodyear, went beyond the company town and allowed their employees to obtain loans for homes from company-established banks. A prime motivator of company town planning was sanitation, because maintaining the worker's health could potentially lead to fewer workdays lost due to illness. Thus, in the development of the town, significant consideration was given to sanitary issues such as window screens, sewage treatment, drainage, and water supplies.

Before World War I there was a shortage of adequate dwellings. Even after World War I, insufficient funding, a shortage of skilled labor, and a dearth of building materials compounded the problem. However, the design of homes after the war was driven in part by health considerations, such as providing good ventilation, sun orientation and exposure, potable pressurized water, and at least one private toilet. Schoenauer [1] notes that, during the postwar years, the improved mobility of the public led to an increase in the growth of suburban areas, exemplified by the detached and sumptuous communities outside New York, such as Oyster Bay. In the meantime, the conditions of working populations consisting of many immigrants began to improve with the improving economy of the 1920s. The garden apartment became popular. These units were well lighted and ventilated and had a courtyard, which was open to all and well maintained.

Immediately after World War I and during the 1920s, city population growth was outpaced by population growth in the suburbs by a factor of two. The focus at the time was on the single-family suburban dwelling. The 1920s were a time of growth, but the decade following the Great

## History of the Department of Housing and Urban Development

1934	Housing Act establishes Federal Housing Administration to insure mortgages and make loans to low-income families; Fannie Mae created.
1937	Housing Act establishes public housing.
1944	Serviceman's Readjustment Act creates Veteran Administration mortgages; trend toward suburbia begins.
Late 1950s	Urban renewal begins; slum clearance developed to promote construction of affordable housing.
1965	Department of Housing and Urban Development created.
1968	Model Cities program launched; fair housing launched through the Civil Rights Act.
1971	Lead-Based Paint Poisoning Prevention Act passed.
1974	Section 8 rental subsidy program begins; Community Development Block Grant program begins.
1977	Urban Development Action Grants begin.
1986	Low-income housing tax credit created.
1987	McKinney Homeless Assistance Act passed; creation of low-income housing tax credit.
1991–1994	Public housing inspection for lead paint.
1992	Residential Lead Hazard Reduction Act passed (Title X of the 1992 Housing and Community Development Act).
1993	Hope VI program begins to redevelop old public housing.
1996	Lead-based paint disclosure becomes law.
1999	HUD and CDC launch the Healthy Homes Initiative.
2000	HUD publishes new lead paint regulations for federally funded assisted housing; President's Task Force releases federal interagency plan to eliminate childhood lead paint poisoning by 2010.
2001	EPA publishes final standards for lead in paint, dust, and soil in housing.

Depression, beginning in 1929, was one of deflation, cessation of building, loss of mortgage financing, and the plunge into unemployment of large numbers of building trade workers. Additionally, 1.5 million home loans were foreclosed during this period. In 1936, the housing market began to make a comeback; however, the 1930s would come to be known as the beginning of public housing, with increased public involvement in housing construction, as demonstrated by the many laws passed during the era [5]. The National Housing Act was passed by Congress in 1934 and set up the Federal Housing Administration. This agency encouraged banks, building

and loan associations, and others to make loans for building homes, small business establishments, and farm buildings. If the Federal Housing Administration approved the plans, it would insure the loan. In 1937, Congress passed another National Housing Act that enabled the Federal Housing Administration to take control of slum clearance. It made 60-year loans at low interest to local governments to help them build apartment blocks. Rents in these homes were fixed and were only available to low-income families. By 1941, the agency had assisted in the construction of more than 120,000 family units.

During World War II, the focus of home building was on housing for workers who were involved in the war effort. Homes were being built through federal agencies such as the newly formed Federal Housing Administration, formed in 1934 and transferred to HUD in 1965. According to the U.S. Census Bureau (USCB) [7], in the years since World War II, the types of homes Americans live in have changed dramatically. In 1940, most homes were considered attached houses (row houses, townhouses, and duplexes). Small apartment houses with two to four apartments had their zenith in the 1950s. In the 1960 census, two-thirds of the housing inventory was made up of one-family detached houses, which declined to less than 60% in the 1990 census.

The postwar years saw the expansion of suburban housing led by William J. Levitt's Levittown, on Long Island, which had a strong influence on postwar building and initiated the subdivisions and tract houses of the following decades (Figure 1.2). The 1950s and 1960s saw continued suburban development, with the growing ease of transportation marked by the expansion of the interstate highway system. As the cost of housing began to increase as a result of increased demand, a grassroots movement to provide adequate housing for the poor began to emerge. According to Wright [5], in the 1970s only about 25% of the population could afford a \$35,000 home. According to Gaillard [8], Koinonia Partners, a religious organization founded in 1942 by Clarence Jordan near Albany, Georgia, was the seed for Habitat for Humanity. Habitat for Humanity, founded in 1976 by Millard Fuller, is known for its international efforts and has constructed more than 150,000 houses in 80 countries; 50,000 of these houses are in the United States. The homes are energy-efficient and environmentally friendly to conserve resources and reduce long-term costs to the homeowners.



Figure 1.2. Levittown, New York

Builders also began promoting one-floor minihomes and no-frills homes of approximately 900 to 1,200 square feet. Manufactured housing began to increase in popularity, with mobile home manufacturers becoming some of the most profitable corporations in the United States in the early 1970s. In the 1940 census, manufactured housing were lumped into the “other” category with boats and tourist cabins: by the 1990 census, manufactured housing made up 7% of the total housing inventory. Many communities ban manufactured housing from residential neighborhoods.

According to Hart et al. [9], nearly 30% of all home sales nationwide are of manufactured housing, and more than 90% of those homes are never moved once they are anchored. According to a 2001 industry report, the demand for prefabricated housing is expected to increase in excess of 3% annually to \$20 billion in 2005, with most units being manufactured homes. The largest market is expected to continue in the southern part of the United States, with the most rapid growth occurring in the western part of the country. As of 2000, five manufactured-home producers, representing 35% of the market, dominated the industry. This industry, over the past 20 to 25 years, has been affected by two pieces of federal legislation. The first, the Mobile Home Construction and Safety Standards Act, adopted by HUD in 1974, was passed to aid consumers through regulation and enforcement of HUD design and construction standards for manufactured homes. The second, the 1980 Housing Act, required the federal government to change the term “mobile home” to “manufactured housing” in all federal laws and literature. One of the prime reasons for this change was that these homes were in reality no longer mobile in the true sense.

The energy crisis in the United States between 1973 and 1974 had a major effect on the way Americans lived, drove, and built their homes. The high cost of both heating and cooling homes required action, and some of the action taken was ill advised or failed to consider healthy housing concerns. Sealing homes and using untried insulation materials and other energy conservation actions often resulted in major and sometimes dangerous buildups of indoor air pollutants. These buildups of toxins occurred both in homes and offices. Sealing buildings for energy efficiency and using off-gassing building materials containing urea-formaldehyde, vinyl, and other new plastic surfaces, new glues, and even wallpapers created toxic environments. These newly sealed environments were not refreshed with makeup air and resulted in the accumulation of both chemical and

biologic pollutants and moisture leading to mold growth, representing new threats to both short-term and long-term health. The results of these actions are still being dealt with today.

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# Chapter 2: Basic Principles of Healthy Housing

*“The connection between health and dwelling is one of the most important that exists.”*

Florence Nightingale

## Introduction

It seems obvious that health is related to where people live. People spend 50% or more of every day inside their homes. Consequently, it makes sense that the housing environment constitutes one of the major influences on health and well-being. Many of the basic principles of the link between housing and health were elucidated more than 60 years ago by the American Public Health Association (APHA) Committee on the Hygiene of Housing. After World War II, political scientists, sociologists, and others became interested in the relation between housing and health, mostly as an outgrowth of a concern over poor housing conditions resulting from the massive influx into American cities of veterans looking for jobs. Now, at the beginning of the 21st century, there is a growing awareness that health is linked not only to the physical structure of a housing unit, but also to the neighborhood and community in which the house is located.

According to Ehlers and Steel [1], in 1938, a Committee on the Hygiene of Housing, appointed by APHA, created the Basic Principles of Healthful Housing, which provided guidance regarding the fundamental needs of humans as they relate to housing. These fundamental needs include physiologic and psychologic needs, protection against disease, protection against injury, protection against fire and electrical shock, and protection against toxic and explosive gases.

## Fundamental Physiologic Needs

Housing should provide for the following physiologic needs:

1. protection from the elements,
2. a thermal environment that will avoid undue heat loss,
3. a thermal environment that will permit adequate heat loss from the body,
4. an atmosphere of reasonable chemical purity,
5. adequate daylight illumination and avoidance of undue daylight glare,

6. direct sunlight,
7. adequate artificial illumination and avoidance of glare,
8. protection from excessive noise, and
9. adequate space for exercise and for children to play.

The first three physiologic needs reflect the requirement for adequate protection from the elements. The lack of adequate heating and cooling systems in homes can contribute to respiratory illnesses or even lead to death from extreme temperatures. According to the National Weather Service, 98 people died from extreme temperatures in 1996; 62 of these were due to extreme cold. Hypothermia occurs when the body temperature drops below 96°F (46°C). It can occur in any person exposed to severe cold without enough protection. Older people are particularly susceptible because they may not notice the cold as easily and can develop hypothermia even after exposure to mild cold. Susceptibility to the cold can be exacerbated by certain medications, medical conditions, or the consumption of alcohol. Hyperthermia is the name given to a variety of heat-related illnesses. The two most common forms of hyperthermia are heat exhaustion and heat stroke. Of the two, heat stroke is especially dangerous and requires immediate medical attention.

According to the National Institute on Aging (NIA) [2], lifestyle factors can increase the risk for hyperthermia:

**Unbearably hot living quarters.** This would include people who live in homes without fans or air conditioners. To help avert the problem, residents should open windows at night; create cross-ventilation by opening windows on two sides of the building; cover windows when they are exposed to direct sunlight and keep curtains, shades, or blinds drawn during the hottest part of the day.

**Lack of transportation.** People without fans or air conditioners often are unable to go to shopping malls, movie theaters, and libraries to cool off because of illness or the lack of transportation.

**Inadequate or inoperable windows.** Society has become so reliant on climate control systems that when they fail, windows cannot be opened. As was the case in the 2003 heat wave in France, many homes worldwide do not even have fans for cooling.

**Overdressing.** Older people, because they may not feel the heat, may not dress appropriately in hot weather.

**Visiting overcrowded places.** Trips should be scheduled during nonrush-hour times and participation in special events should be carefully planned to avoid disease transmission.

**Not checking weather conditions.** Older people, particularly those at special risk, should stay indoors on especially hot and humid days, particularly when an air pollution alert is in effect.

USCB [3] reported that about 75% of homes in the United States used either utility gas or electricity for heating purposes, with utility gas accounting for about 50%. This, of course, varies with the region of the country, depending on the availability of hydroelectric power. This compares with the 1940 census, which found that three-quarters of all households heated with coal or wood. Electric heat was so rare that it was not even an option on the census form of 1940. Today, coal has virtually disappeared as a household fuel. Wood all but disappeared as a heating fuel in 1970, but made a modest comeback at 4% nationally by 1990. This move over time to more flexible fuels allows a majority of today's homes to maintain healthy temperatures, although many houses still lack adequate insulation.

The fifth through the seventh physiologic concerns address adequate illumination, both natural and artificial. Research has revealed a strong relationship between light and human physiology. The effects of light on both the human eye and human skin are notable. According to Zilber [4], one of the physiologic responses of the skin to sunlight is the production of vitamin D. Light allows us to see. It also affects body rhythms and psychological health. Average individuals are affected daily by both natural and artificial lighting levels in their homes. Adequate lighting is important in allowing people to see unsanitary conditions and to prevent injury, thus contributing to a healthier and safer environment. Improper indoor lighting can also contribute to eyestrain from inadequate illumination, glare, and flicker.

Avoiding excessive noise (eighth physiologic concern) is important in the 21st century. However, the concept of noise pollution is not new. Two thousand years ago, Julius Caesar banned chariots from traveling the streets of Rome late at night. In the 19th century, numerous towns and cities prohibited ringing church bells. In the early 20th century, London prohibited church bells from ringing between 9:00 PM and 9:00 AM. In 1929, New York City

formed a Noise Abatement Commission that was charged with evaluating noise issues and suggesting solutions. At that time, it was concluded that loud noise affected health and productivity. In 1930, this same commission determined that constant exposure to loud noises could affect worker efficiency and long-term hearing levels. In 1974, the U.S. Environmental Protection Agency (EPA) produced a document titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety* [5]. This document identified maximum levels of 55 decibels outdoors and 45 decibels indoors to prevent interference with activities and 70 decibels for all areas to prevent hearing loss. In 1990, the United Kingdom implemented The Household Appliances (Noise Emission) Regulations [6] to help control indoor noise from modern appliances. Noise has physiologic impacts aside from the potential to reduce hearing ability. According to the American Speech-Language-Hearing Association [7], these effects include elevated blood pressure; negative cardiovascular effects; increased breathing rates, digestion, and stomach disturbances; ulcers; negative effects on developing fetuses; difficulty sleeping after the noise stops; plus the intensification of the effects of drugs, alcohol, aging, and carbon monoxide. In addition, noise can reduce attention to tasks and impede speech communication. Finally, noise can hamper performance of daily tasks, increase fatigue, and cause irritability.

Household noise can be controlled in various ways. Approaching the problem during initial construction is the simplest, but has not become popular. For example, in early 2003, only about 30% of homebuilders offered sound-attenuating blankets for interior walls. A sound-attenuating blanket is a lining of noise abatement products (the thickness depends on the material being used). Spray-in-place soft foam insulation can also be used as a sound dampener, as can special walking mats for floors. Actions that can help reduce household noise include installing new, quieter appliances and isolating washing machines to reduce noise and water passing through pipes.

The ninth and final physiologic need is for adequate space for exercise and play. Before industrialization in the United States and England, a preponderance of the population lived and worked in more rural areas with very adequate areas for exercise and play. As industrialization impacted demographics, more people were in cities without ample space for play and exercise. In the 19th century, society responded with the development of playgrounds and public parks. Healthful housing should include the provision of safe play and

exercise areas. Many American neighborhoods are severely deficient, with no area for children to safely play. New residential areas often do not have sidewalks or street lighting, nor are essential services available by foot because of highway and road configurations.

## Fundamental Psychologic Needs

Seven fundamental psychologic needs for healthy housing include the following:

1. adequate privacy for the individual,
2. opportunities for normal family life,
3. opportunities for normal community life,
4. facilities that make possible the performance of household tasks without undue physical and mental fatigue,
5. facilities for maintenance of cleanliness of the dwelling and of the person,
6. possibilities for aesthetic satisfaction in the home and its surroundings, and
7. concordance with prevailing social standards of the local community.

Privacy is a necessity to most people, to some degree and during some periods. The increase in house size and the diminishing family size have, in many instances, increased the availability of privacy. Ideally, everyone would have their own rooms, or, if that were not possible, would share a bedroom with only one person of the same sex, excepting married couples and small children. Psychiatrists consider it important for children older than 2 years to have bedrooms separate from their parents. In addition, bedrooms and bathrooms should be accessible directly from halls or living rooms and not through other bedrooms. In addition to the psychologic value of privacy, repeated studies have shown that lack of space and quiet due to crowding can lead to poor school performance in children.

Coupled with a natural desire for privacy is the social desire for normal family and community life. A wholesome atmosphere requires adequate living room space and adequate space for withdrawal elsewhere during periods of entertainment. This accessibility expands beyond the walls of the home and includes easy communication with centers of culture and business, such as schools, churches, entertainment, shopping, libraries, and medical services.

## Protection Against Disease

Eight ways to protect against contaminants include the following:

1. provide a safe and sanitary water supply;
2. protect the water supply system against pollution;
3. provide toilet facilities that minimize the danger of transmitting disease;
4. protect against sewage contamination of the interior surfaces of the dwelling;
5. avoid unsanitary conditions near the dwelling;
6. exclude vermin from the dwelling, which may play a part in transmitting disease;
7. provide facilities for keeping milk and food fresh; and
8. allow sufficient space in sleeping rooms to minimize the danger of contact infection.

According to the U.S. EPA [8], there are approximately 160,000 public or community drinking water systems in the United States. The current estimate is that 42 million Americans (mostly in rural America) get their water from private wells or other small, unregulated water systems. The presence of adequate water, sewer, and plumbing facilities is central to the prevention, reduction, and possible elimination of water-related diseases. According to the Population Information Program [9], water-related diseases can be organized into four categories:

- waterborne diseases, including those caused by both fecal-oral organisms and those caused by toxic substances;
- water-based diseases;
- water-related vector diseases; and
- water-scarce diseases.

Numerous studies link improvements in sanitation and the provision of potable water with significant reductions in morbidity and mortality from water-related diseases. Clean water and sanitation facilities have proven to reduce infant and child mortality by as much as 55% in Third World countries according to studies from the

1980s. Waterborne diseases are often referred to as “dirty-water” diseases and are the result of contamination from chemical, human, and animal wastes. Specific diseases in this group include cholera, typhoid, shigella, polio, meningitis, and hepatitis A and E. Water-based diseases are caused by aquatic organisms that spend part of their life cycle in the water and another part as parasites of animals. Although rare in the United States, these diseases include dracunculiasis, paragonimiasis, clonorchiasis, and schistosomiasis. The reduction in these diseases in many countries has not only led to decreased rates of illness and death, but has also increased productivity through a reduction in days lost from work.

Water-related diseases are linked to vectors that breed and live in or near polluted and unpolluted water. These vectors are primarily mosquitoes that infect people with the disease agents for malaria, yellow fever, dengue fever, and filariasis. While the control of vectorborne diseases is a complex matter, in the United States, most of the control focus has been on controlling habitat and breeding areas for the vectors and reducing and controlling human cases of the disease that can serve as hosts for the vector. Vectorborne diseases have recently become a more of a concern to the United States with the importation of the West Nile virus. The transmission of West Nile virus occurs when a mosquito vector takes a blood meal from a bird or incidental hosts, such as a dog, cat, horse, or other vertebrate. The human cases of West Nile virus in 2003 numbered 9,862, with 264 deaths. Finally, water-scarce diseases are diseases that flourish where sanitation is poor due to a scarcity of fresh water. Diseases included in this category are diphtheria, leprosy, whooping cough, tetanus, tuberculosis, and trachoma. These diseases are often transmitted when the supply of fresh water is inadequate for hand washing and basic hygiene. These conditions are still rampant in much of the world, but are essentially absent from the United States due to the extensive availability of potable drinking water.

In 2000, USCB [10] reported that 1.4% of U.S. homes lacked plumbing facilities. This differs greatly from the 1940 census, when nearly one-half of U.S. homes lacked complete plumbing. The proportion has continually dropped, falling to about one-third in 1950 and then to one-sixth in 1960. Complete plumbing facilities are defined as hot and cold piped water, a bathtub or shower, and a flush toilet. The containment of household sewage is instrumental in protecting the public from waterborne and vectorborne diseases. The 1940 census revealed that more than a third of U.S. homes had no flush toilet, with 70% of the homes in some states without a flush toilet.

Of the 13 million housing units at the time without flush toilets, 11.8 million (90.7%) had an outside toilet or privy, another 1 million (7.6%) had no toilet or privy, and the remainder had a nonflush toilet in the structure.

In contrast to these figures, the 2000 census data demonstrate the great progress that has been made in providing sanitary sewer facilities. Nationally, 74.8% of homes are served by a public sewer, with 24.1% served by a septic tank or cesspool, and the remaining 1.1% using other means.

Vermin, such as rodents, have long been linked to property destruction and disease. Integrated pest management, along with proper housing construction, has played a significant role in reducing vermin around the modern home. Proper food storage, rat-proofing construction, and ensuring good sanitation outside the home have served to eliminate or reduce rodent problems in the 21st century home.

Facilities to properly store milk and food have not only been instrumental in reducing the incidence of some foodborne diseases, but have also significantly changed the diet in developed countries. Refrigeration can be traced to the ancient Chinese, Hebrews, Greeks, and Romans. In the last 150 years, great strides have been made in using refrigeration to preserve and cool food. Vapor compression using air and, subsequently, ammonia as a coolant was first developed in the 1850s. In the early 1800s, natural ice was extracted for use as a coolant and preserver of food. By the late 1870s, there were 35 commercial ice plants in the United States and, by 1909, there were 2,000. However, as early as the 1890s, sources of natural ice began to be a problem as a result of pollution and sewage dumped into bodies of water. Thus, the use of natural ice as a refrigerant began to present a health problem. Mechanical manufacture of ice provided a temporary solution, which eventually resulted in providing mechanical refrigeration.

Refrigeration was first used by the brewing and meat-packing industries; but most households had iceboxes (Figure 2.1), which made the ice wagon a popular icon of the late 1800s and early 1900s. In 1915, the first refrigerator, the Guardian, was introduced. This unit was the predecessor of the Frigidaire. The refrigerator became as necessary to the household as a stove or sewing machine. By 1937, nearly 6 million refrigerators were manufactured in the United States. By 1950, in excess of 80% of American farms and more than 90% of urban homes had a refrigerator.

Adequate living and sleeping space are also important in protecting against contagion. It is an issue not only of



**Figure 2.1.** Circa 1890 Icebox  
*Source: Robert R. McCormick Museum, Wheaton, Illinois*

privacy but of adequate room to reduce the potential for the transmission of contagion. Much improvement has been made in the adequacy of living space for the U.S. family over the last 30 years. According to USCB [11], the average size of new single homes has increased from a 1970 average of 1,500 square feet to a 2000 average of 2,266 square feet. USCB [11] says that slightly less than 5% of U.S. homes were considered crowded in 1990; that is, they had more than one person per room. However, this is an increase since the 1980 census, when the figure was 4.5%. This is the only time there has been an increase since the first housing census was initiated in 1940, when one in five homes was crowded. During the 1940 census, most crowded homes were found in southern states, primarily in the rural south. Crowding has become common in a few large urban areas, with more than one-fourth of all crowded units located in four metropolitan areas: Houston, Los Angeles, Miami, and New York. The rate for California has not changed significantly between 1940 (13%) and 1990 (12%). Excessive crowding in homes has the potential to increase not only communicable disease transmission, but also the stress level of occupants because modern urban individuals spend considerably more time indoors than did their 1940s counterparts.

## Protection Against Injury

A major provision for safe housing construction is developing and implementing building codes. According

to the International Code Council one- and two-family dwelling code, the purpose of building codes is to provide minimum standards for the protection of life, limb, property, environment, and for the safety and welfare of the consumer, general public, and the owners and occupants of residential buildings regulated by this code [12].

However, as with all types of codes, the development of innovative processes and products must be allowed to take a place in improving construction technology. Thus, according to the International Code Council one- and two-family dwelling code, building codes are not intended to limit the appropriate use of materials, appliances, equipment, or methods by design or construction that are not specifically prescribed by the code if the building official determines that the proposed alternate materials, appliances, equipment or methods of design or construction are at least equivalent of that prescribed in this code. While the details of what a code should include are beyond the scope of this section, additional information can be found at <http://www.iccsafe.org/>, the Web site of the International Code Council (ICC). ICC is an organization formed by the consolidation of the Building Officials and Code Administrators International, Southern Building Code Congress International, Inc., and the International Conference of Building Officials [12].

According to the Home Safety Council (HSC) [13], the leading causes of home injury deaths in 1998 were falls and poisonings, which accounted for 6,756 and 5,758 deaths, respectively. As expected, the rates and national estimates of the number of fall deaths were highest among those older than 64 years, and stairs or steps were associated with 17% of fall deaths. Overall, falls were the leading cause of nonfatal, unintentional injuries occurring at home and accounted for 5.6 million injuries. Similar to the mortality statistics, consumer products most often associated with emergency department visits included stairs and steps, accounting for 854,631 visits, and floors, accounting for 556,800 visits. A national survey by HSC found that one-third of all households with stairs did not have banisters or handrails on at least one set of stairs. Related to this, homes with older persons were more likely to have banisters or handrails than were those where young children live or visit. The survey also revealed that 48% of households have windows on the second floor or above, but only 25% have window locks or bars to prevent children from falling out. Bathtub mats or nonskid strips to reduce bathtub falls were used in 63% of American households. However, in senior households

(age 70 years and older), 79% used mats or nonskid strips. Nineteen percent of the total number of homes surveyed had grab bars to supplement the mats and strips. Significantly, only 39% of the group most susceptible to falls (people aged 70 years and older) used both nonskid surfaces and grab bars.

## Protection Against Fire

An important component of safe housing is to control conditions that promote the initiation and spread of fire. Between 1992 and 2001, an average of 4,266 Americans died annually in fires and nearly 25,000 were injured. This fact and the following information from the United States Fire Administration (USFA) [14] demonstrate the impact that fire safety and the lack of it have in the United States. The United States has one of the highest fire death rates in the industrialized world, with 13.4 deaths per million people. At least 80% of all fire deaths occur in residences. Residential fires account for 23% of all fires and 76% of structure fires. In one- and two-family dwellings, fires start in the kitchen 25.5% of the time and originate in the bedroom 13.7% of the time. Apartment fires most often start in the kitchen, but at almost twice the rate (48.5%), with bedrooms again being the second most common place at 13.4%.

These USFA statistics also disclose that cooking is the leading cause of home fires, usually a result of unattended cooking and human error rather than mechanical failure of the cooking units. The leading cause of fire deaths in homes is careless smoking, which can be significantly deterred by smoke alarms and smolder-resistant bedding and upholstered furniture. Heating system fires tend to be a larger problem in single-family homes than in apartments because the heating systems in family homes frequently are not professionally maintained.

A number of conditions in the household can contribute to the creation or spread of fire. The USFA data indicate that more than one-third of rural Americans use fireplaces, wood stoves, and other fuel-fired appliances as primary sources of heat. These same systems account for 36% of rural residential fires. Many of these fires are the result of creosote buildup in chimneys and stovepipes. These fires could be avoided by

- inspecting and cleaning by a certified chimney specialist;
- clearing the area around the hearth of debris, decorations, and flammable materials;

- using a metal mesh screen with fireplaces and leaving glass doors open while burning a fire;
- installing stovepipe thermometers to monitor flue temperatures;
- leaving air inlets on wood stoves open and never restricting air supply to the fireplaces, thus helping to reduce creosote buildup;
- using fire-resistant materials on walls around wood stoves;
- never using flammable liquids to start a fire;
- using only seasoned hardwood rather than soft, moist wood, which accelerates creosote buildup;
- building small fires that burn completely and produce less smoke;
- never burning trash, debris, or pasteboard in a fireplace;
- placing logs in the rear of the fireplace on an adequate supporting grate;
- never leaving a fire in the fireplace unattended;
- keeping the roof clear of leaves, pine needles, and other debris;
- covering the chimney with a mesh screen spark arrester; and
- removing branches hanging above the chimney, flues, or vents.

USFA [14] also notes that manufactured homes can be susceptible to fires. More than one-fifth of residential fires in these facilities are related to the use of supplemental room heaters, such as wood- and coal-burning stoves, kerosene heaters, gas space-heaters, and electrical heaters. Most fires related to supplemental heating equipment result from improper installation, maintenance, or use of the appliance. USFA recommendations to reduce the chance of fire with these types of appliances include the following:

- placing wood stoves on noncombustible surfaces or a code-specified or listed floor surface;

- placing noncombustible materials around the opening and hearth of fireplaces;
- placing space heaters on firm, out-of-the-way surfaces to reduce tipping over and subsequent spillage of fuel and providing at least 3 feet of air space between the heating device and walls, chairs, firewood, and curtains;
- placing vents and chimneys to allow 18 inches of air space between single-wall connector pipes and combustibles and 2 inches between insulated chimneys and combustibles; and
- using only the fuel designated by the manufacturer for the appliance.

The ability to escape from a building when fire has been discovered or detected is of extreme importance. In the modern home, three key elements can contribute to a safe exit from a home during the threat of fire. The first of these is a working smoke alarm system. The average homeowner in the 1960s had never heard of a smoke alarm, but by the mid-1980s, laws in 38 states and in thousands of municipalities required smoke alarms in all new and existing residences. By 1995, 93% of all single-family and multifamily homes, apartments, nursing homes, and dormitories were equipped with alarms. The cost decreased from \$1,000 for a professionally installed unit for a three-bedroom home in the 1970s to an owner-installed \$10 unit. According to the EPA [15], ionization chamber and photoelectric are the two most common smoke detectors available commercially. Helmenstein [16] states that a smoke alarm uses one or both methods, and occasionally uses a heat detector, to warn of a fire. These units can be powered by a 9-volt battery, a lithium battery, or 120-volt house wiring. Ionization detectors function using an ionization chamber and a minute source of ionizing radiation. The radiation source is americium-241 (perhaps 1/5,000th of a gram), while the ionization chamber consists of two plates separated by about a centimeter. The power source (battery or house current) applies voltage to the plates, resulting in one plate being charged positively while the other plate is charged negatively. The americium constantly releases alpha particles that knock electrons off the atoms in the air, ionizing the oxygen and nitrogen atoms in the chamber. The negative plate attracts the positively charged oxygen and nitrogen atoms, while the electrons are attracted to the positive plate, generating a small, continuous electric current. If smoke enters the ionization chamber, the smoke particles attach to the ions and neutralize them, so they do not reach the plate. The

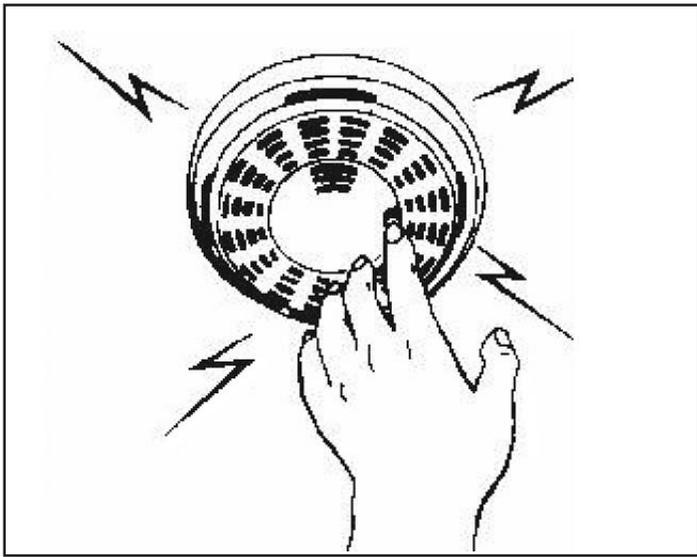
alarm is then triggered by the drop in current between the plates [16].

Photoelectric devices function in one of two ways. First, smoke blocks a light beam, reducing the light reaching the photocell, which sets off the alarm. In the second and more common type of photoelectric unit, smoke particles scatter the light onto a photocell, initiating an alarm. Both detector types are effective smoke sensors and both must pass the same test to be certified as Underwriters Laboratories (UL) smoke detectors. Ionization detectors respond more quickly to flaming fires with smaller combustion particles, while photoelectric detectors respond more quickly to smoldering fires. Detectors can be damaged by steam or high temperatures. Photoelectric detectors are more expensive than ionization detectors and are more sensitive to minute smoke particles. However, ionization detectors have a degree of built-in security not inherent to photoelectric detectors. When the battery starts to fail in an ionization detector, the ion current falls and the alarm sounds, warning that it is time to change the battery before the detector becomes ineffective. Backup batteries may be used for photoelectric detectors that are operated using the home's electrical system.

According to USFA [14], a properly functioning smoke alarm diminishes the risk for dying in a fire by approximately 50% and is considered the single most important means of preventing house and apartment fire fatalities. Proper installation and maintenance, however, are key to their usefulness. Figure 2.2 shows a typical smoke alarm being tested.

Following are key issues regarding installation and maintenance of smoke alarms. (Smoke alarms should be installed on every level of the home including the basement, both inside and outside the sleeping area.)

- Smoke alarms should be installed on the ceiling or 6–8 inches below the ceiling on side walls.
- Battery replacement is imperative to ensuring proper operation. Typically, batteries should be replaced at least once a year, although some units are manufactured with a 10-year battery. A “chirping” noise from the unit indicates the need for battery replacement. A battery-operated smoke alarm has a life expectancy of 8 to 10 years.
- Battery replacement is not necessary in units that are connected to the household electrical system.



**Figure 2.2.** Smoke Alarm Testing  
 Source: Federal Emergency Management Agency

- Regardless of the type, it is crucial to test every smoke alarm monthly. Data from HSC [13] revealed that only 83% of individuals with fire alarms test them at least once a year; while only 19% of households with at least one smoke alarm test them quarterly.

A second element impacting escape from a building is a properly installed fire-suppression system. According to USFA [14], sprinkler systems began to be used over 100 years ago in New England textile mills. Currently, few homes are protected by residential sprinkler systems. However, UL-listed home systems are available and are designed to protect homes much faster than standard commercial or industrial sprinklers. Based on approximately 1% of the total building price in new construction, sprinkler systems can be installed for a reasonable price. These systems can be retrofitted to existing construction and are smaller than commercial systems. In addition, homeowner insurance discounts for such systems range between 5% and 15% and are increasing in availability.

The final element in escaping from a residential fire is having a fire plan. A 1999 survey conducted by USFA [14] found that 60% of Americans have an escape plan, with 42% of these individuals having practiced the plan. Surprisingly, 26% of Americans stated they had never thought about practicing an escape plan, and 3% believed escape planning to be unnecessary. In addition, of the people who had a smoke alarm sound an alert over the past year before the study, only 8% believed it to be a fire and thought they should evacuate the building.

Protection from electrical shocks and burns is also a vital element in the overall safety of the home. According to

the National Fire Protection Association (NFPA) [17], electrical distribution equipment was the third-leading cause of home fires and the second-leading cause of fire deaths in the United States between 1994 and 1998. Specifically, NFPA reported that 38,300 home electrical fires occurred in 1998, which resulted in 284 deaths, 1,184 injuries, and approximately \$670 million in direct property damage. The same report indicated that the leading cause of electrical distribution fires was ground fault or short-circuit problems. A third of the home electrical distribution fires were a result of problems with fixed wiring, while cords and plugs were responsible for 17% of these fires and 28% of the deaths.

Additional investigation of these statistics reveals that electrical fires are one of the leading types of home fires in manufactured homes. USFA [14] data demonstrate that many electrical fires in homes are associated with improper installation of electrical devices by do-it-yourselfers. Errors attributed to this amateur electrical work include use of improperly rated devices such as switches or receptacles and loose connections leading to overheating and arcing, resulting in fires. Recommendations to reduce the risk of electrical fires and electrocution include the following:

1. Use only the correct fuse size and do not use pennies behind a fuse.
2. Install ground fault circuit interrupters (GFCI) on all outlets in kitchens, bathrooms, and anywhere else near water. This can also be accomplished by installing a GFCI in the breaker box, thus protecting an entire circuit.
3. Never place combustible materials near light fixtures, especially halogen bulbs that get very hot.
4. Use only the correct bulb size in a light fixture.
5. Use only properly rated extension cords for the job needed.
6. Never use extension cords as a long-term solution to the need for an additional outlet. Size the extension cord to the wattage to be used.
7. Never run extension cords inside walls or under rugs because they generate heat that must be able to dissipate.

## Fire Extinguishers

A fire extinguisher should be listed and labeled by an independent testing laboratory such as FM (Factory Mutual) or UL. Fire extinguishers are labeled according to the type of fire on which they may be used. Fires involving wood or cloth, flammable liquids, electrical, or metal sources react differently to extinguishers. Using the wrong type of extinguisher on a fire could be dangerous and could worsen the fire. Traditionally, the labels A, B, C, and D have been used to indicate the type of fire on which an extinguisher is to be used.

**Type A**—Used for ordinary combustibles such as cloth, wood, rubber, and many plastics. These types of fire usually leave ashes after they burn: Type A extinguishers for ashes. The Type A label is in a triangle on the extinguisher.

**Type B**—Used for flammable liquid fires such as oil, gasoline, paints, lacquers, grease, and solvents. These substances often come in barrels: Type B extinguishers for barrels. The Type B label is in a square on the extinguisher.

**Type C**—Used for electrical fires such as in wiring, fuse boxes, energized electrical equipment, and other electrical sources. Electricity travels in currents; Type C extinguishers for currents. The Type C label is in a circle on the extinguisher.

**Type D**—Used for metal fires such as magnesium, titanium, and sodium. These types of fires are very dangerous and seldom handled by the general public; Type D means don't get involved. The Type D label is in a star on the extinguisher.

The higher the rating number on an A or B fire extinguisher, the more fire it can put out, but high-rated units are often the heavier models. Extinguishers need care and must be recharged after every use—a partially used unit might as well be empty. An extinguisher should be placed in the kitchen and in the garage or workshop. Each extinguisher should be installed in plain view near an escape route and away from potential fire hazards such as heating appliances.

Recently, pictograms have come into use on fire extinguishers. These picture the type of fire on which an extinguisher is to be used. For instance, a Type A extinguisher has a pictogram showing burning wood. A Type C extinguisher has a pictogram showing an electrical cord and outlet. These pictograms are also used to show what not to use. For example, a Type A extinguisher also show a pictogram of

an electrical cord and outlet with a slash through it (do not use it on an electrical fire).

Fire extinguishers also have a number rating. For Type A fires, 1 means 1¼ gallons of water; 2 means 2½ gallons of water, 3 means 3¾ gallons of water, etc. For Type B and Type C fires, the number represents square feet. For example, 2 equals 2 square feet, 5 equals 5 square feet, etc.

Fire extinguishers can also be made to extinguish more than one type of fire. For example, you might have an extinguisher with a label that reads 2A5B. This would mean this extinguisher is good for Type A fires with a 2½-gallon equivalence and it is also good for Type B fires with a 5-square-foot equivalency. A good extinguisher to have in each residential kitchen is a 2A10BC fire extinguisher. You might also get a Type A for the living room and bedrooms and an ABC for the basement and garage.

PASS is a simple acronym to remind you how to operate most fire extinguishers—pull, aim, squeeze, and sweep. Pull the pin at the top of the cylinder. Some units require the releasing of a lock latch or pressing a puncture lever. Aim the nozzle at the base of the fire. Squeeze or press the handle. Sweep the contents from side to side at the base of the fire until it goes out. Shut off the extinguisher and then watch carefully for any rekindling of the fire.

## Protection Against Toxic Gases

Protection against gas poisoning has been a problem since the use of fossil fuels was combined with relatively tight housing construction. NFPA [17] notes that National Safety Council statistics reflect unintentional poisonings by gas or vapors, chiefly carbon monoxide (CO), numbering about 600 in 1998. One-fourth of these involved heating or cooking equipment in the home. The U.S. Consumer Product Safety Commission [18] states that in 2001 an estimated 130 deaths occurred as a result of CO poisoning from residential sources; this decrease in deaths is related to the increased use of CO detectors. In addition, approximately 10,000 cases of CO-related injuries occur each year. NFPA [17] also notes that, similar to fire deaths, unintentional CO deaths are highest for ages 4 years and under and ages 75 years and older. Additional information about home CO monitoring can be found in Chapter 5.

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*“The poorest man may in his cottage bid defiance to all the force of the Crown. It may be frail—its roof may shake—the wind may blow through it—the storm may enter, the rain may enter—but the King of England cannot enter—all his force dares not cross the threshold of the ruined tenement!”*

William Pitt, March 1763

## Introduction

William Pitt, arguing before the British Parliament against excise officers entering private homes to levy the Cyder Tax, eloquently articulated this long-held and cherished notion of the sanctity of private property. However, a person’s right to privacy is not absolute. There has always been a tension between the rights of property owners to do whatever they desire with their property and the ability of the government to regulate uses to protect the safety, health, and welfare of the community. Few, however, would argue with the right and duty of a city government to prohibit the operation of a munitions factory or a chemical plant in the middle of a crowded residential neighborhood.

## History

The first known housing laws are in the Code of Laws of Hammurabi [1], who was the King of Babylonia, circa 1792–1750 BC. These laws addressed the responsibility of the home builder to construct a quality home and outlined the implications to the builder if injury or harm came to the owner as a result of the failure to do so. During the Puritan period (about 1620–1690), housing laws essentially governed the behavior of the members of the society. For example, no one was allowed to live alone, so bachelors, widows, and widowers were placed with other families as servants or boarders. In 1652, Boston prohibited building privies within 12 feet of the street. Around the turn of the 18th century, some New England communities implemented local ordinances that specified the size of houses. During the 17th century, additional public policies on housing were established. Because the English tradition of using wooden chimneys and thatched roofs led to fires in many dwellings, several colonies passed regulations prohibiting them.

After the early 17th century came an era of very rapid metropolitan growth along the East Coast. This growth was due largely to immigration from Europe and was spurred by the Industrial Revolution. The most serious housing problems began in New York about 1840 when

the first tenements were built. In 1867, a report by the New York Metropolitan Board of Health on living conditions in tenements convinced the New York State legislature to pass the Tenement Housing Act of 1867 [2]. The principal requirements of the act included the following:

- Every room occupied for sleeping, if it does not communicate directly with the external air, must have a ventilating or transom window of at least 3 square feet to the neighboring room or hall.
- A proper fire escape is necessary on every tenement or lodging house.
- The roof is to be kept in repair and the stairs are to have banisters.
- At least one toilet is required for every 20 occupants for all such houses, and those toilets must be connected to approved disposal systems.
- Cleansing of every lodging house is to be to the satisfaction of the Board of Health, which is to have access at any time.
- All cases of infectious disease are to be reported to the Board by the owner or his agent; buildings are to be inspected and, if necessary, disinfected or vacated if found to be out of repair.

There were also regulations governing distances between buildings, heights of rooms, and dimensions of windows. Although this act had some beneficial influences on overcrowding, sewage disposal, lighting, and ventilation, perhaps its greatest contribution was in laying a foundation for more stringent future legislation.

Jacob A. Riis, a Danish immigrant and a police reporter on New York’s Lower East Side, published a book titled *How the Other Half Lives—Studies Among the Tenements of New York* [3], which swayed public opinion in the direction of housing reform and resulted in the Tenement House Act of 1901. The basic principles established in the Tenement House Act of 1901 still underlie much of the housing efforts in New York City today [4]. Since 1909, with the establishment of the Philadelphia Housing Association, that city has had almost continual inspection and improvement. Chicago enacted housing legislation as early as 1889 and

health legislation as early as 1881. Regulations on ventilation, light, drainage, and plumbing were put into effect in 1896.

Before 1892, all government involvement in housing was at a local level. In 1892, however, the federal government passed a resolution authorizing investigation of slum conditions in cities with 200,000 or more inhabitants. Congress appropriated only \$20,000 (roughly equal to \$390,000 in 2003) to cover the expenses of this project, which limited the number of investigations.

No significant housing legislation was passed in the 20th century until 1929 [5], when the New York State legislature passed its Multiple Dwelling Law. Other cities and states followed New York's example and permitted less strict requirements in their codes. This decreased what little emphasis there was on enforcement. Conditions declined until, by the 1930s, President Franklin D. Roosevelt's shocking report to the people was "that one-third of the nation is ill-fed, ill-housed, and ill-clothed." In response to the overwhelming loss of homes during the Great Depression, Congress passed the United States Housing Act of 1937, which created the United States Housing Authority (USHA). This act subsidized construction of new public housing units and required the elimination of at least an equivalent number of units from the local housing supply that were determined to be inferior. In 1942, the USHA was renamed the Federal Public Housing Administration and, in 1947, was renamed the Public Housing Administration.

The federal government not only encouraged the construction of public housing, but took on the role of financing private housing. In 1938, the Federal National Mortgage Association was created. (Fannie Mae became a private organization in 1968 [6].) Its purpose was to provide a secondary market for the FHA, created in 1934, and Veterans Administration (VA) mortgage loans. The Servicemen's Readjustment Act of 1944, also known as the GI Bill of Rights, created a VA loan program guaranteeing home mortgage loans for veterans. This legislation, in conjunction with the FHA loan program, was the impetus for initiating the huge program of home construction and subsequent suburban growth following World War II. In 1946, the Farmers Home Administration, housed in the United States Department of Agriculture (USDA), was created to make loans and grants for constructing and repairing farm homes and assisting rural self-help housing groups.

The Housing Act of 1949 allowed "primarily residential" and "blighted" urban areas to be condemned, cleared of buildings, and sold for private development. In addition to assisting in slum clearance, this act also provided for additional public housing and authorized the USDA to provide farmers with loans to construct, improve, repair or replace dwellings to provide decent, safe, and sanitary living conditions for themselves, their tenants, lessees, sharecroppers, and laborers.

Because the many housing responsibilities administered by various agencies within the federal government proved unwieldy, the Housing and Urban Development Act was passed in 1965. The U.S. Department of Housing and Urban Development (HUD) was created to centralize the responsibilities of the Housing and Home Finance Agency and incorporated the FHA, the Federal National Mortgage Association, the Public Housing Administration, Urban Development Administration, and the Community Facilities Administration.

## Zoning, Housing Codes, and Building Codes

Housing is inextricably linked to the land on which it is located. Changes in the patterns of land use in the United States, shifting demographics, an awareness of the need for environmental stewardship, and competing uses for increasingly scarce (desirable) land have all placed added stress on the traditional relationship between the property owner and the community. This is certainly not a new development.

In the early settlement of this country, following the precedent set by their forefathers from Great Britain, gunpowder mills and storehouses were prohibited from the heavily populated portions of towns, owing to the frequent fires and explosions. Later, zoning took the form of fire districts and, under implied legislative powers, wooden buildings were prohibited from certain sections of a municipality. Massachusetts passed one of the first zoning laws in 1692. This law authorized Boston, Salem, Charlestown, and certain other market towns in the province to restrict the establishment of slaughterhouses and stillhouses for currying leather to certain locations in each town.

Few people objected to such restrictions. Still, the tension remained between the right to use one's land and the community's right to protect its citizens. In 1926, the United States Supreme Court took up the issue in *Village of Euclid, Ohio, v. Ambler Realty* [7]. In this decision, the Court noted,

*“Until recent years, urban life was comparatively simple; but with great increase and concentration of population, problems have developed which require additional restrictions in respect of the use and occupation of private lands in urban communities.”*

In explaining its reasoning, the Court said,

*“the law of nuisances may be consulted not for the purpose of controlling, but for the helpful aid of its analogies in the process of ascertaining the scope of the police power. Thus the question of whether the power exists to forbid the erection of a building of a particular kind or a particular use is to be determined, not by an abstract consideration of the building or other thing considered apart, but by considering it in connection with the circumstances and the locality... A nuisance may be merely the right thing in the wrong place—like a pig in the parlor instead of the barnyard.”*

Zoning, housing, and building codes were adopted to improve the health and safety of people living in communities. And, to some extent, they have performed this function. Certainly, housing and building codes, when enforced, have resulted in better constructed and maintained buildings. Zoning codes have been effective in segregating noxious and dangerous enterprises from residential areas. However, as the U.S. population has grown and changed from a rural to an urban then to a suburban society, land use and building regulations developed for the 19th and early 20th centuries are creating new health and safety problems not envisioned in earlier times.

### Zoning and Zoning Ordinances

Zoning is essentially a means of ensuring that a community’s land uses are compatible with the health, safety, and general welfare of the community. Experience has shown that some types of controls are needed to provide orderly growth in relation to the community plan for development. Just as a capital improvement program governs public improvements such as streets, parks and other recreational facilities, schools, and public buildings, so zoning governs the planning program with respect to the use of public and private property.

It is very important that housing inspectors know the general nature of zoning regulations because properties in violation of both the housing code and the zoning ordinance must be brought into full compliance with the zoning ordinance before the housing code can be enforced. In

many cases, the housing inspector may be able to eliminate violations or properties in violation of housing codes through enforcement of the zoning ordinance.

### Zoning Objectives

As stated earlier, the purpose of a zoning ordinance is to ensure that the land uses within a community are regulated not only for the health, safety, and welfare of the community, but also are in keeping with the comprehensive plan for community development. The provisions in a zoning ordinance that help to achieve development that provides for health, safety, and welfare are designed to do the following:

- **Regulate height, bulk, and area of structure.** To provide established standards for healthful housing within the community, regulations dealing with building heights, lot coverage, and floor areas must be established. These regulations then ensure that adequate natural lighting, ventilation, privacy, and recreational areas for children will be realized. These are all fundamental physiologic needs necessary for a healthful environment. Safety from fires is enhanced by separating buildings to meet yard and open-space requirements. Through requiring a minimum lot area per dwelling unit, population density controls are established.
- **Avoid undue levels of noise, vibration, glare, air pollution, and odor.** By providing land-use category districts, these environmental stresses upon the individual can be reduced.
- **Lessen street congestion by requiring off-street parking and off-street loading.**
- **Facilitate adequate provision of water, sewerage, schools, parks, and playgrounds.**
- **Provide safety from flooding.**
- **Conserve property values.** Through careful enforcement of the zoning ordinance provisions, property values can be stabilized and conserved.

To understand more fully the difference between zoning and subdivision regulations, building codes, and housing ordinances, the housing inspector must know what cannot be accomplished by a zoning ordinance. Items that cannot be accomplished by a zoning ordinance include the following:

- **Overcrowding or substandard housing.** Zoning is not retroactive and cannot correct existing conditions. These are corrected through enforcement of a minimum standards housing code.
- **Materials and methods of construction.** Materials and methods of construction are enforced through building codes rather than through zoning.
- **Cost of construction.** Quality of construction, and hence construction costs, are often regulated through deed restrictions or covenants. Zoning does, however, stabilize property values in an area by prohibiting incompatible development, such as heavy industry in the midst of a well-established subdivision.
- **Subdivision design and layout.** Design and layout of subdivisions, as well as provisions for parks and streets, are controlled through subdivision regulations.

### *Content of the Zoning Ordinance*

Zoning ordinances establish districts of whatever size, shape, and number the municipality deems best for carrying out the purposes of the zoning ordinance. Most cities use three major districts: residential (R), commercial (C), and industrial (I). These three may then be subdivided into many subdistricts, depending on local conditions; e.g., R-1 (single-unit dwellings), R-2 (duplexes), R-3 (low-rise apartment buildings), and so on. These districts specify the principal and accessory uses, exceptions, and prohibitions [8].

In general, permitted land uses are based on the intensity of land use—a less intense land use being permitted in a more intense district, but not vice versa. For example, a single-unit residence is a less intense land use than a multiunit dwelling (defined by HUD as more than four living units) and hence would be permitted in a residential district zoned for more intense land use (e.g., R-3). A multiunit dwelling would not, however, be permitted in an R-1 district. While intended to promote the health, safety, and general welfare of the community, housing trends in the last half of the 20th century have led a number of public health and planning officials to question the blind enforcement of zoning districts. These individuals, citing such problems as urban sprawl, have stated that municipalities need to adopt a more flexible approach to land use regulation—one that encourages creating mixed-use spaces, increasing population densities, and reducing reliance on the automobile.

These initiatives are often called smart growth programs. It is imperative, if this approach is taken, that both governmental officials and citizens be involved in the planning stage. Without this involvement, the community may end up with major problems, such as overloaded infrastructure, structures of inappropriate construction crowded together, and fire and security issues for residents. Increased density could strain the existing water, sewer and waste collection systems, as well as fire and police services, unless proper planning is implemented.

In recent years, some ordinances have been partially based on performance standards rather than solely on land-use intensity. For example, some types of industrial developments may be permitted in a less intense use district provided that the proposed land use creates no noise, glare, smoke, dust, vibration, or other environmental stress exceeding acceptable standards and provided further that adequate off-street parking, screening, landscaping, and similar measures are taken.

**Bulk and Height Requirements.** Most early zoning ordinances stated that, within a particular district, the height and bulk of any structure could not exceed certain dimensions and specified dimensions for front, side, and rear yards. Another approach was to use floor-area ratios for regulation. A floor-area ratio is the relation between the floor space of the structure and the size of the lot on which it is located. For example, a floor-area ratio of 1 would permit either a two-story building covering 50% of the lot, or a one-story building covering 100% of the lot, as demonstrated in Figure 3.1. Other zoning ordinances specify the maximum amount of the lot that can be covered or merely require that a certain amount of open space must be provided for each structure, and leave the builder the flexibility to determine the location of the structure. Still other ordinances, rather than specify a particular height for the structure, specify the angle of light obstruction that will assure adequate air and light to the surrounding structures, as demonstrated in Figure 3.2.

**Yard Requirements.** Zoning ordinances also contain minimum requirements for front, rear, and side yards. These requirements, in addition to stating the lot dimensions, usually designate the amount of setback required. Most ordinances permit the erection of auxiliary buildings in rear yards provided that they are located at stated distances from all lot lines and provided sufficient open space is maintained. If the property is a corner lot, additional requirements are established to allow visibility for motorists.

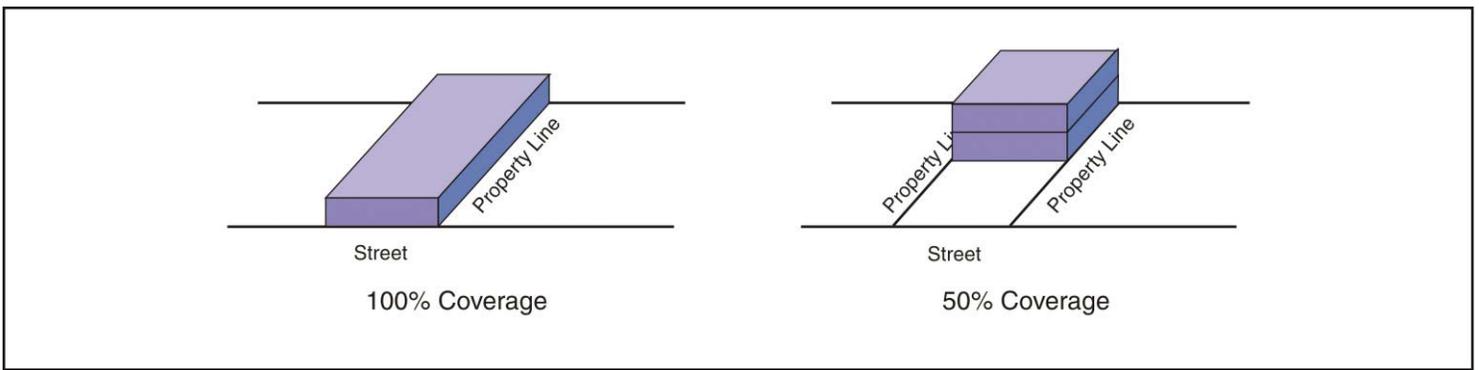


Figure 3.1. Example of a Floor Area

**Off-street Parking.** Space for off-street parking and off-street loading, especially for commercial buildings, is also contained in zoning ordinances. These requirements are based on the relationship of floor space or seating capacity to land use. For example, a furniture store would require fewer off-street parking spaces in relation to the floor area than would a movie theater.

### Exceptions to the Zoning Code

#### *Nonconforming Uses*

Because zoning is not retroactive, all zoning ordinances contain a provision for nonconforming uses. If a use has already been established within a particular district before the adoption of the ordinance, it must be permitted to continue, unless it can be shown to be a public nuisance.

Provisions are, however, put into the ordinance to aid in eliminating nonconforming uses over time. These provisions generally prohibit a) an enlargement or expansion of the nonconforming use, b) reconstruction of the nonconforming use if more than a certain portion of the building should be destroyed, c) resumption of the use after it has been abandoned for a period of specified time, and d) changing the use to a higher classification or to

another nonconforming use. Some zoning ordinances further provide a period of amortization during which nonconforming land use must be phased out.

#### *Variations*

Zoning ordinances contain provisions for permitting variations and providing a method for granting these variations, subject to certain specified provisions. A variance may be granted when, owing to the specific conditions or use of a particular lot, an undue hardship would be imposed on the owner if the exact content of the ordinance is enforced. A variance may be granted due to the shape, topography, or other characteristic of the lot. For example, suppose an irregularly shaped lot is located in a district having a side yard requirement of 20 feet on a side and a total lot size requirement of 10,000 square feet. Further suppose that this lot contains 10,200 square feet (and thus meets the total size requirement); however, due to the irregular shape of the lot, there would be sufficient space for only a 15-foot side yard. Because a hardship would be imposed on the owner if the exact letter of the law is applied, the owner of the property could apply to the zoning adjustment board for a variance. Because the total area of the lot is sufficient and a lessening of the

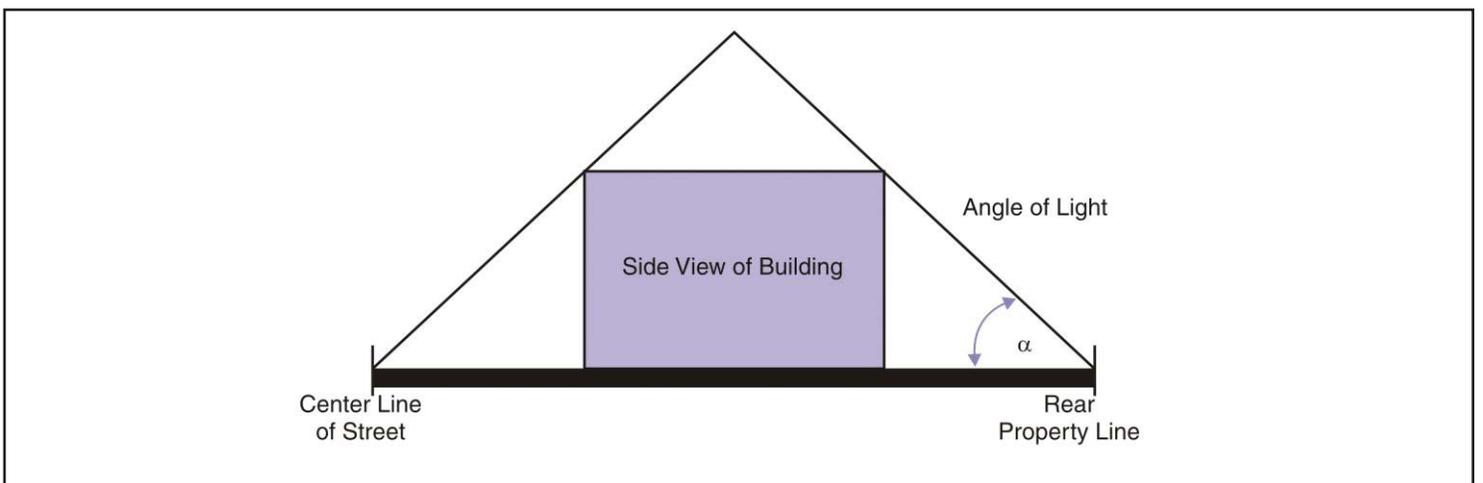


Figure 3.2. Example of an Angle of Light Obstruction

ordinance requirements would not be detrimental to the surrounding property, nor would it interfere with neighboring properties, a variance would probably be granted. Note that a variance is granted to the owner under specific conditions. Should use of the property change, the variance would be voided.

### *Exceptions*

An exception is often confused with a variance. In every city there are some necessary uses that do not correspond to the permitted land uses within the district. The zoning code recognizes, however, that if proper safeguards are provided, these uses would not have a detrimental effect on the district. An example would be a fire station that could be permitted in a residential area, provided the station house is designed and the property is properly landscaped to resemble or fit in with the characteristics of the neighborhood in which it is located.

### *Administration*

Zoning inspectors are essential to the zoning process because they have firsthand knowledge of a case. Often, the zoning inspector may also be the building inspector or housing inspector. Because the building inspector or housing inspector is already in the field making inspections, it is relatively easy for that individual to check compliance with the zoning ordinances. Compliance is determined by comparing the actual land use with that allowed for the area and shown on the zoning map.

Each zoning ordinance has a map detailing the permitted usage for each block. Using a copy of this map, the inspector can make a preliminary check of the land use in the field. If the use does not conform, the inspector must then contact the Zoning Board to see whether the property in question was a nonconforming use at the time of the passage of the ordinance and whether an exception or variance has been granted. In cities where up-to-date records are maintained, the inspector can check the use in the field.

When a violation is observed, and the property owners are duly notified of the violation, they have the right to request a hearing before the Zoning Board of Adjustment (also called the Zoning Board of Appeals in some cities). The board may uphold the zoning enforcement officer or may rule in favor of the property owner. If the action of the zoning officer is upheld, the property owner may, if desired, seek relief by appealing the decision to the courts; otherwise, the violation must be corrected to conform to the zoning code.

It is critical for the housing or building inspector and the zoning inspector to work closely in municipalities where these positions and responsibilities are separate. Experience has shown that illegally converted properties are often among the most substandard encountered in the municipality and often contain especially dangerous housing code violations.

In communities where the zoning code is enforced effectively, the resulting zoning compliance helps to advance, as well as sustain, many of the minimum standards of the housing code such as occupancy, ventilation, light, and unimpeded egress. By the same token, building or housing inspectors can often aid the zoning inspector by helping eliminate some nonconforming uses through code enforcement.

### **Housing Codes**

A housing code, regardless of who promulgates it, is basically an environmental health protection code. Housing codes are distinguished from building codes in that they cover houses, not buildings in general. For example, the housing code requires that walls support the weight of the roof, any floors above, and the furnishings, occupants, etc., within a building.

Early housing codes primarily protected only physical health; hence, they were enforced only in slum areas. In the 1970s, it was realized that, if urban blight and its associated human suffering were to be controlled, housing codes must consider both physical and mental health and must be administered uniformly throughout the community.

In preparing or revising housing codes, local officials must maintain a level of standards that will not merely be minimal. Standards should maintain a living environment that contributes positively to healthful individual and family living. The fact that a small portion of housing fails to meet a desirable standard is not a legitimate reason for retrogressive modification or abolition of a standard. The adoption of a housing ordinance that establishes low standards for existing housing serves only to legalize and perpetuate an unhealthy living environment. Wherever local conditions are such that immediate enforcement of some standards within the code would cause undue hardship for some individuals, it is better to allow some time for compliance than to eliminate an otherwise satisfactory standard. When immediate health or safety hazards are not involved, it is often wise to attempt to create a reasonable timetable for accomplishing necessary code modifications.

## History

To assist municipalities with developing legislation necessary to regulate the quality of housing, the American Public Health Association (APHA) Committee on the Hygiene of Housing prepared and published in 1952 a proposed housing ordinance. This provided a prototype on which such legislation might be based and has served as the basis for countless housing codes enacted in the United States since that time. Some municipalities enacted it without change. Others made revisions by omitting some portions, modifying others, and sometimes adding new provisions [9].

The APHA ordinance was revised in 1969 and 1971. In 1975, APHA and the CDC jointly undertook the job of rewriting and updating this model ordinance. The new ordinance was entitled the *APHA-CDC Recommended Housing Maintenance and Occupancy Ordinance* [10]. The most recent model ordinance was published by APHA in 1986 as *Housing and Health: APHA-CDC Recommended Minimum Housing Standards* [11]. This new ordinance is one of several model ordinances available to communities when they are interested in adopting a housing code.

A community should read and consider each element within the model code to determine its applicability to their community. A housing code is merely a means to an end. The end is the eventual elimination of all substandard conditions within the home and the neighborhood. This end cannot be achieved if the community adopts an inadequate housing code.

## Objectives

The Housing Act of 1949 [12] gave new impetus to existing local, state, and federal housing programs directed toward eliminating poor housing. In passing this legislation, Congress defined a new national objective by declaring that “the general welfare and security of the nation and the health and living standards of its people...require a decent home and a suitable living environment for every American family.” This mandate generated an awareness that the quality of housing and residential environment has an enormous influence upon the physical and mental health and the social well-being of each individual and, in turn, on the economic, political, and social conditions in every community. Consequently, public agencies, units of government, professional organizations and others sought ways to ensure that the quality of housing and the residential environment did not deteriorate.

It soon became apparent that ordinances regulating the supplied utilities and the maintenance and occupancy of

dwellings were needed. Commonly called housing codes, these ordinances establish minimum standards to make dwellings safe, sanitary, and fit for human habitation by governing their condition and maintenance, their supplied utilities and facilities, and their occupancy. The 2003 International Code Council (ICC) [13,14] International Residential Code-One- and Two-Family Dwellings (R101.3) states

*“the purpose of this code is to provide minimum requirements to safeguard the public safety, health and general welfare, through affordability, structural strength, means of egress, facilities, stability, sanitation, light and ventilation, energy conservation, safety to fire and property from fire and other hazards attributed to the built environment.”*

## Critical Requirements of an Effective Housing Program

A housing code is limited in its effectiveness by several factors. First, if the housing code does not contain standards that adequately protect the health and well-being of the individuals, it cannot be effective. The best-trained housing inspector, if not armed with an adequate housing code, can accomplish little good in the battle against urban blight.

A second issue in establishing an effective housing code is the need to establish a baseline of current housing conditions. A systems approach requires that you establish where you are, where you are going, and how you plan to achieve your goals. In using a systems approach, it is essential to know where the program started so that the success or failure of various initiatives can be established. Without this information, success cannot be replicated, because you cannot identify the obstacles navigated nor the elements of success. Many initiatives fail because program administrators are without the necessary proof of success when facing funding shortfalls and budget cuts.

A third factor affecting the quality of housing codes is budget. Without adequate funds and personnel, the community can expect to lose the battle against urban blight. It is only through a systematic enforcement effort by an adequately sized staff of properly trained inspectors that the battle can be won.

A fourth factor is the attitude of the political bodies within the area. A properly administered housing program will require upgrading substandard housing throughout the community. Frequently, this results in political pressures being exerted to prevent the enforcement of the code in certain areas of the city. If the housing effort is backed

properly by all political elements, blight can be controlled and eventually eliminated within the community. If, however, the housing program is not permitted to choke out the spreading influence of substandard conditions, urban blight will spread like a cancer, engulfing greater and greater portions of the city. Similarly, an effort directed at only the most seriously blighted blocks in the city will upgrade merely those blocks, while the blight spreads elsewhere. If urban blight is to be controlled, it must be cut out in its entirety.

A fifth element that limits housing programs is whether they are supported fully by the other departments within the city. Regardless of which city agency administers the housing program, other city agencies must support the activities of the housing program. In addition, great effort should be expended to obtain the support and cooperation of the community. This can be accomplished through public awareness and public information programs, which can result in considerable support or considerable resistance to the efforts of the program.

A sixth limitation is an inadequately or improperly trained inspection staff. Inspectors should be capable of evaluating whether a serious or a minor problem exists in matters ranging from the structural stability of a building to the health and sanitary aspects of the structure. If they do not have the authority or expertise, they should develop that expertise or establish effective and efficient agreements with overlapping agencies to ensure timely and appropriate response.

A seventh item that frequently restricts the effectiveness of a housing program is the fact that many housing groups fail to do a complete job of evaluating housing problems. The deterioration of an area may be due to factors such as housing affordability, tax rates, or issues related to investment cost and return. In many cases, the inspection effort is restricted to merely evaluating the conditions that exist, with little or no thought given to why these conditions exist. If a housing effort is to be successful, as part of a systems approach, the question of why the homes deteriorated must be considered. Was it because of environmental stresses within the neighborhood that need to be eliminated or was it because of apathy on the part of the occupants? In either case, if the causative agent is not removed, then the inspector faces an annual problem of maintaining the quality of that residence. It is only by eliminating the causes of deterioration that the quality of the neighborhood can be maintained. Often the regulatory authority does not have adequate authority within the

enabling legislation of the code needed to resolve the problem or there are gaps in jurisdiction.

### *Content of a Housing Code*

Although all comprehensive housing codes or ordinances contain a number of common elements, the provisions of communities will usually vary. These variations stem from differences in local policies, preferences, and, to a lesser extent, needs. They are also influenced by the standards set by the related provisions of the diverse building, electrical, and plumbing codes in use in the municipality.

Within any housing code there are generally five features:

1. **Definitions** of terms used in the code.
2. **Administrative provisions** showing who is authorized to administer the code and the basic methods and procedures that must be followed in implementing and enforcing the sections of the code. Administrative provisions deal with items such as reasonable hours of inspections, whether serving violation notices is required, how to notify absentee owners or resident-owners or tenants, how to process and conduct hearings, what rules to follow in processing dwellings alleged to be unfit for human habitation, and how to occupy or use dwellings finally declared fit.
3. **Substantive provisions** specifying the various types of health, building, electrical, heating, plumbing, maintenance, occupancy, and use conditions that constitute violations of the housing code. These provisions can be and often are grouped into three categories: minimum facilities and equipment for dwelling units; adequate maintenance of dwellings and dwelling units, as well as their facilities and equipment; and occupancy conditions of dwellings and dwelling units.
4. **Court and penalty sections** outlining the basis for court action and the penalty or penalties to which the alleged violator will be subjected if proved guilty of violating one or more provisions of the code.
5. **Enabling, conflict, and unconstitutionality clauses** providing the date a new or amended code will take effect, prevalence of more stringent provision when there is a conflict of two codes, severability of any part of the ordinance that might be found unconstitutional, and retention of all other parts in full course and effect. In any city

following the format of the *APHA-CDC Recommended Housing Maintenance and Occupancy Ordinance* [10] the housing officer or other supervisor in charge of housing inspections will also adopt appropriate housing rules and regulations from time to time to clarify or further refine the provisions of the ordinance. When rules and regulations are used, care should be taken that the department is not overburdened with a number of minor rules and regulations. Similarly, a housing ordinance that encompasses all rules and regulations might have difficulty because any amendments to it will require action by the political element of the community. Some housing groups, in attempting to obtain amendments to an ordinance, have had the entire ordinance thrown out by the political bodies.

### *Administrative Provisions of a Housing Code*

The administrative procedures and powers of the housing inspection agency, its supervisors, and its staff are similar to other provisions in that all are based on the police power of the state to legislate for public health and safety. In addition, the administrative provisions, and to a lesser extent, the court and penalty provisions, outline how the police power is to be exercised in administering and enforcing the code.

Generally, the administrative elements deal with procedures for ensuring that the constitutional doctrines of reasonableness, equal protection under the law and due process of law are observed. They also must guard against violation of prohibitions against unlawful search and seizure, impairment of obligations of contract, and unlawful delegation of authority. These factors encompass items of great importance to housing inspection supervisors such as the inspector's right of entry, reasonable hours of inspection, proper service, and the validity of the provisions of the housing codes they administer.

**Owner of Record.** It is essential to file legal actions against the true owners of properties in violation of housing codes. With the advent of the computer, this is often much easier than in the past. Databases that provide this information are readily available from many offices of local government such as the tax assessment office. The method of obtaining the name and address of the legal owner of a property in violation varies from place to place. Ordinarily, a check of the city tax records will suffice unless there is reason to believe these are not up to date. In this case, a further check of county or parish records will turn up the legal owner if state law requires

deed registration there. If it does not, the advice of the municipal law department should be sought about the next steps to follow.

**Due Process Requirements.** Every notice, complaint, summons, or other type of legal paper concerning alleged housing code violations in a given dwelling or dwelling unit must be legally served on the proper party to be valid and to prevent harassment of innocent parties. This might be the owner, agent, or tenant, as required by the code. It is customary to require that the notice to correct existing violations and any subsequent notices or letters be served by certified or registered mail with return receipt requested. The receipt serves as proof of service if the case has to be taken to court.

Due process requirements also call for clarity and specificity with respect to the alleged violations, both in the violation notices and the court complaint-summons. For this reason, special care must be taken to be complete and accurate in listing the violations and charges. To illustrate, rather than direct the violator to repair all windows where needed, the violator should be told exactly which windows and what repairs are involved.

The chief limitation on the due process requirement, with respect to service of notices, lies in cases involving immediate threats to health and safety. In these instances, the inspection agency or its representative may, without notice or hearing, issue an order citing the existence of the emergency and requiring that action deemed necessary to meet the emergency be taken.

In some areas housing courts on the municipal level have advocates that assist both plaintiffs and defendants prepare for the court process or to resolve the issue to avoid court.

**Hearings and Condemnation Power.** The purpose of a hearing is to give the alleged violator an opportunity to be heard before further action is taken by the housing inspection agency. These hearings may be very informal, involving meetings between a representative of the agency and the person ordered to take corrective action. They also may be formal hearings at which the agency head presides and at which the city and the defendant both are entitled to be represented by counsel and expert witnesses.

**Informal Hearings.** A violator may have questions about a violation notice or the notice may be served at a time when personal hardship or other factors prevent a violator from meeting the terms of the notice. Therefore, many

housing codes provide the opportunity for a hearing at which the violator may discuss questions or problems and seek additional time or some modification of the order. Administered in a firm but understanding manner, these hearings can serve as invaluable aids in relieving needless fears of those involved, in showing how the inspection program is designed to help them and in winning their voluntary compliance.

**Formal Hearings.** Formal hearings are often quasijudicial hearings (even though the prevailing court rules of evidence do not always apply) from which an appeal may be taken to court. All witnesses must therefore be sworn in, and a record of the proceedings must be made. The formal hearing is used chiefly as the basis for determining whether a dwelling is fit for human habitation, occupancy, or use. In the event it is proved unfit, the building is condemned and the owner is given a designated amount of time either to rehabilitate it completely or to demolish it. Where local funds are available, a municipality may demolish the building and place a lien against the property to cover demolition costs if the owner fails to obey the order within the time specified. This type of condemnation hearing is a very effective means of stimulating prompt and appropriate corrective action when it is administered fairly and firmly.

**Procedures for Coping With Common Problems.** Several states and local communities have developed innovative ways to resolve code violation issues.

**Limitation of Occupancy Notification.** This technique was pioneered in Wilmington, Delaware. It makes it mandatory for property owners in the community to obtain a legal notice from the housing inspection agency specifying the maximum number of persons that may occupy each of their properties. It also requires these owners to have a residence, place of business, or an agent for their properties within the community. The agent should be empowered to take remedial action on any of the properties found in violation. In addition, if the property is sold, the new owner must obtain a new Limitation of Occupancy Notification.

**Request for Inspections.** Several states permit their municipalities to offer a request for inspection service. For a fee, the housing inspector will inspect a property for violations of the housing code before its sale so that the buyer can learn its condition in advance. Many states and localities now require owners to notify prospective purchasers of any outstanding notice of health risk or violations they have against their property before the sale.

If they fail to do so, some codes will hold the owner liable to the purchaser and the inspection agency for violations.

**Tickets for Minor Offenses.** Denver, Colorado, has used minimal financial fines to prod minor violators and first offenders into correcting violations without the city resorting to court action. There are mixed views about this technique because it is akin to formal police action. Nevertheless, the action may stimulate compliance and reduce the amount of court action needed to achieve it.

**Forms and Form Letters.** A fairly typical set of forms and form letters are described below. It should be stressed that inspection forms to be used for legal notices must satisfy legal standards of the code, be meaningful to the owner and sufficiently explicit about the extent and location of particular defects, be adaptable to statistical compilation for the governing body reports, and be written in a manner that will facilitate clerical and other administrative usage.

**The Daily Report Form.** This form gives the inspection agency an accurate basis for reporting, evaluating, and, if necessary, improving the productivity and performance of its inspectors.

**Complaint Form.** This form helps obtain full information from the complainant and thus makes the relative seriousness of the problem clear and reduces the number of crank complaints.

**No-entry Notice.** This notice advises occupants or owners that an inspector was there and that they must return a call to the inspector.

**Inspection Report Form.** This is the most important form in an agency. It comes in countless varieties, but if designed properly, it will ensure more productivity and more thoroughness by the inspectors, reduce the time spent in writing reports, locate all violations correctly, and reduce the time required for typing violation notices. Forms may vary widely in sophistication from a very simple form to one whose components are identified by number for use in processing the case by automation. Some forms are a combined inspection report and notice form in triplicate so that the first page can be used as the notice of violation, the second as the office record, and the third as the guide for reinspection. A covering form letter notifies the violator of the time allowed to correct the conditions listed in the report form.

**Violation Notice.** This is the legal notice that housing code violations exist and must be corrected within the

indicated amount of time. The notice may be in the form of a letter that includes the alleged violations or has a copy of these attached. It may be a standard notice form, or it may be a combined report-notice. Regardless of the type of notice used, it should make the location and nature of all violations clear and specify the exact section of the code that covers each one. The notice must advise violators of their right to a hearing. It should also indicate that the violator has a right to be represented by counsel and that failure to obtain counsel will not be accepted as grounds for postponing a hearing or court case.

**Hearing Forms.** These should include a form letter notifying the violator of the date and time set for the hearing, a standard summary sheet on which the supervisor can record the facts presented at an informal hearing, and a hearing-decision letter for notifying all concerned of the hearing results. The latter should include the names of the violator, inspector, law department, and any other city official or agency that may be involved in the case.

**Reinspection Form Letters or Notices.** These have the same characteristics as violation notices except that they cover the follow-up orders given to the violator who has failed to comply with the original notice within the time specified. Some agencies may use two or three types of these form letters to accommodate different degrees of response by the violator. Whether one or several are used, standardization of these letters or notices will expedite the processing of cases.

**Court Complaint and Summons Forms.** These forms advise alleged violators of the charges against them and summon them to appear in court at the specified time and place. It is essential that the housing inspection agency work closely with the municipal law department in preparing these forms so that each is done in exact accord with the rules of court procedure in the relevant state and community.

**Court Action Record Form.** This form provides an accurate running record of the inspection agency's court actions and their results.

### ***Substantive Provisions of a Housing Code***

A housing code is the primary tool of the housing inspector. The code spells out what the inspector may or may not do. An effort to improve housing conditions can be no better than the code allows. The substantive provisions of the code specify the minimal housing conditions acceptable to the community that developed them.

Dwelling units should have provisions for preparing at least one regularly cooked meal per day. Minimum equipment should include a kitchen sink in good working condition and properly connected to the water supply system approved by the appropriate authority. It should provide, at all times, an adequate amount of heated and unheated running water under pressure and should be connected to a sewer system approved by the appropriate authority. Cabinets or shelves, or both, for storing eating, drinking, and cooking utensils and food should be provided. These surfaces should be of sound construction and made of material that is easy to clean and that will not have a toxic or deleterious effect on food.

In addition, a stove and refrigerator should be provided. Within every dwelling there should be a room that affords privacy and is equipped with a flush toilet in good working condition.

Within the vicinity of the flush toilet, a sink should be provided. In no case should a kitchen sink substitute as a lavatory sink. In addition, within each dwelling unit there should be, within a room that affords privacy, either a bathtub or shower or both, in good working condition. Both the lavatory sink and the bathtub or shower or both should be equipped with an adequate amount of heated and unheated water under pressure. Each should be connected to an approved sewer system.

Within each dwelling unit two or more means of egress should be provided to safe and open space at ground level. Provisions should be incorporated within the housing code to meet the safety requirements of the state and community involved. The housing code should spell out minimum standards for lighting and ventilation within each room in the structure. In addition, minimum thermal standards should be provided. Although most codes merely provide the requirement of a given temperature at a given height above floor level, the community should give consideration to the use of effective temperatures. The effective temperature is a means of incorporating not only absolute temperature in degrees, but also humidity and air movement, giving a better indication of the comfort index of a room.

The code should provide that no person shall occupy or let for occupancy any dwelling or dwelling units that do not comply with stated requirements. Generally, these requirements specify that the foundation, roof, exterior walls, doors, window space and windows of the structure be sound and in good repair; that it be moisture-free, watertight and reasonably weather tight and that all structural surfaces be sound and in good repair.

HUD defines a multifamily dwelling unit as one that contains four or more dwelling units in a single structure. A dwelling unit is further defined as a single unit of residence for a family of one or more persons in which sleeping accommodations are provided but toileting or cooking facilities are shared by the occupants.

### Building Codes

Building codes define what materials and methods are to be used in the construction of various buildings. Model building codes have been published by various trade organizations such as the Southern Building Code Congress International (SBCCI), Building Officials and Code Administrators (BOCA), and the International Conference of Building Officials (ICBO). Each of these groups published a model building code that was widely used or adapted regionally in the United States. BOCA national codes were used mostly in eastern and Great Lakes states, ICBO uniform codes in western and Midwest states, and SBCCI standard codes in southern states. As a result, the construction industry often faced the challenge, and cost, of building to different codes in different areas of the country.

In 1994, BOCA, ICBO, and SBCCI created the International Code Council (ICC) to develop a single set of comprehensive, coordinated model construction codes that could be used throughout the United States and around the world. The first I-Code published was the International Plumbing Code in 1995. By 2000, a complete family of I-Codes was available, including the International Building Code. The ICC Performance Code for Buildings and Facilities joined the I-Code family in 2001.

On February 1, 2003, the three organizations (BOCA, SBCCI, and ICBO) were consolidated into the ICC [13,14]. According to ICC Board president, Paul E. Myers,

*“The ICC International Codes (I Codes) combine the strengths of the regional codes without regional limitations. The ICC is a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national codes to make compliance easier and more cost-effective. I Codes respond to the needs of the construction industry and public safety. A single set of codes has strong support from government, code enforcement officials, fire officials, architects, engineers, builders, developers, and building owners and managers.”*

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