

The Special Maintenance Requirements of Multi-Family Housing

Without a reliable system in place, maintaining an apartment or condominium community can cause a great deal of personal and budgetary stress—for management, owners, and occupants alike. Part One of this book reviews how and why apartments differ from other types of facilities, highlights some building components that warrant special attention, and addresses some important maintenance considerations.

Basic Assumptions

The following assumptions are fundamental to the maintenance of any facility, including apartment and condominium communities.

- *All elements of life, including buildings, are affected by time.* As building materials age, they weaken, deteriorate, and collapse prematurely unless they are supported by proper maintenance. And, of course, the forces of nature take a much quicker toll when human caretakers fail to diligently maintain facilities.
- *Discipline and care in management are essential for long life of the asset.* Too often owners may cry “lack of funding,” when the root cause of a problem is more accurately a lack of maintenance discipline. Maintenance promptly addressed is a fraction of the cost of deferred maintenance.
- *Immediacy is critical in the life of a building.* A management policy of “zero tolerance” for maintenance defects is a must. Some problems, such as mold and other water damage, would never exist if appropriate routine maintenance had been performed throughout the life of the asset.
- *A key role of any owner/manager is to sustain the facility and grounds so that current and future residents can enjoy a healthy, safe, and attractive living environment.* Maintenance personnel also have a responsibility to document, report, and make recommendations when they see issues that merit attention.

- *An organized, comprehensive preventive maintenance (PM) system and effective communication are critical to proper maintenance of multi-family housing.* Communication between management, maintenance personnel, and residents is paramount. Observed problems should be reported and addressed promptly. Residents should be informed routinely of their importance in keeping the facility functioning properly—whether they are condominium owners with a stake in the building as an asset, or renters who want to maintain high standards for their living space.
- *Whenever possible, maintenance personnel should be involved in the planning and design of renovations and new construction projects.* During the design process, the input of the maintenance department can have the greatest effect on future maintenance costs for buildings and grounds. Once construction begins, it is possible to make changes that affect maintainability, but at a higher cost. Once the building is occupied, few, if any, opportunities exist to lessen maintenance requirements and costs.

Apartment maintenance is no different than any other function in the sense that it is time-sensitive and must be approached assertively using the professional and physical tools available.

Apartment & Condominium Facilities

Multi-family housing differs from other buildings because of its unique combination of 24/7 intense usage and potential abuse. Residents occupy the units and access common areas around the clock, making these facilities among the most heavily utilized types of buildings. Apartments and condos also have certain characteristic design and construction features, such as common walls, abutting patios, shared entries, community mail enclosures, central mechanical and electrical systems, public trash chutes, and in some cases, a host of jointly accessible amenities, such as swimming pools, spas, and high-end recreational facilities. As occupants are people of all ages, including children and the elderly, safety is paramount. Extra precautions and rigorous standards must be established and regularly maintained to ensure life safety. (Life safety work items are discussed in more depth in Part Two.)

Public vs. Private Facilities

This book addresses housing's wide range of use and ownership—from single-family dwellings to large multi-family, mixed-use developments in both the private and public sectors. Some housing, such as a single-family dwellings or individual and privately-owned

condo units, tend to be considered private, while city-owned and managed low-income or senior citizen housing communities are thought of as public. Many cities have extensive publicly funded or subsidized housing, which provides for its citizens whose income falls short of being able to meet market rate rents.

In reality, most apartment facilities have both public and private aspects. "Private" residences receive federal and state income tax benefits on interest and property taxes paid by owners, and "public" housing projects are paid for by taxes collected from private citizens and businesses. Often, the biggest difference is that rent collected from public housing is typically much lower than for private housing.

Private Housing One way in which private housing differs from public is in the funding available at a given time for maintenance. Private owners and managers often have more control over maintenance funding mechanisms, and therefore the ability to respond immediately to maintenance issues. Prudent private owners and managers set aside reserve funds, often guided by thorough five- or ten-year plans. Accordingly, such funds are typically available to cover both anticipated needs (brought about by age and use) and unexpected repairs, such as a ruptured pipeline. Also, private owners can risk deferring the planned replacement of a system or systems, or the painting of a building, knowing that funds are at hand in case these items need attention sooner.

Public entities, on the other hand, are often controlled by councils and other authorities with strict, inflexible budgetary guidelines that do not allow for the necessary response so often required in multi-family housing environments.

Rent-controlled properties, sometimes characterized in less than favorable terms because of modest funding, do not need to fall into a state of decline. Owners, regardless of fixed rental income, and residents both have a responsible role to play, and indeed can live in a community of pride if they exercise their respective roles with integrity, maturity, and responsibility. The owner has a financial stake in the property, and routine preventive maintenance is a definite protector of that asset. Renters in such facilities can ensure the best possible living conditions by paying attention to the little details that, left unattended, can cause much bigger problems. (A good example is notifying the owner or building manager of leaking pipes or other malfunctioning building systems.)

Rent control in itself is not a predictor of poor maintenance and property decline, provided the affected parties unite to sustain that property with a sense of care on both sides. Attention to detail is key. While it is believed that buildings where the owner has his or her principal residence are the best maintained, this situation is rare in apartment buildings. However, the success of condominiums, cooperatives, and private communities seems to show that private ownership provides well-run, attractive, and desirable housing for those who can afford it.

Public Housing Public housing programs are run by the federal government, states, cities, and towns and are generally provided for low-income citizens who are not able to afford private housing or who have been excluded from it. While there are fair housing laws that prohibit discrimination in a variety of areas, because low-income families are not able to afford moderate or high rents, they are effectively excluded.

Housing is among the more expensive building types to construct, regardless of how much the occupants will ultimately pay for rent. While it is true that large sums can be spent on finishes, fixtures, larger room sizes, and other amenities, there is a baseline cost for even low-income housing. Attempts to lower the cost of such facilities beyond that point usually result in cheaper building materials—and the by-product is significantly increased maintenance and repair costs. Dwelling units have several systems that are particularly costly to build, including bathrooms and kitchens, along with the other systems common to all large buildings such as space for corridors, elevators, and heating and electrical systems.¹

Building Materials, Wear Factors, & Maintenance Requirements

Each of the building materials used in multi-family housing has a certain life span, which is naturally affected by care or lack thereof. (See Figure 1.1.) Proper maintenance, barring accidents such as fire or natural disasters, yields a long life span, while minimal or negligent care results in premature failure. The facility must be understood in terms of projected life span and potential causes of decay.

It is important to note that the construction date of a building does not necessarily determine or influence the potential for asset failure. A building's functional age is generally determined by the length of time since the most recent major renovation, or, if no major repair project has taken place, the original date of construction. However, the facility should never fail—over many decades—if there is a continuous commitment to diligent, professional maintenance.

Suggested Average Useful Life of Building Components

Item	Years	Item	Years
I. Major Construction		b. Fire Pumps	20
A. Reinforced Concrete Frame		a. Hose Housings	
1. Masonry Exterior		1) Wood	15
a. Heavy	45	2) Steel	20
b. Light & Medium	40	3) Masonry	30
B. Steel Frame		5. Sump Pumps	
1. Masonry Exterior		a. Small	10
a. Heavy	45	b. Large	15
b. Medium	35	6. Water Heaters — gas & electric	10
c. Light	30	7. Water Wells	25
2. Metal Exterior		D. Service Systems	
a. Heavy	30	1. Elevators (all types)	20
b. Medium	25	2. Fire Alarm	20
c. Light	20	3. Intercom	15
C. Wood Frame		4. Telephone	15
1. Masonry Exterior		III. Miscellaneous Items	
a. Heavy	35	A. Bulkheads	
b. Medium	25	1. Concrete	30
2. Metal Exterior		2. Steel	25
a. Heavy	30	3. Timber	20
b. Medium	25	B. Chimneys	
c. Light	20	1. Brick or concrete	35
3. Wood Exterior		2. Steel-lined	25
a. Heavy	25	3. Steel-unlined	20
b. Light & Medium	20	C. Culverts	
II. Electrical and Mechanical Equipment		1. Concrete	35
A. Electrical Systems		2. Galv. Steel	20
1. Lighting Systems		D. Curbing	
a. Conduit & Wire	20	1. Concrete	25
b. Fixtures	15	E. Fencing	
c. Flood Lighting	15	1. Brick or stone	30
2. Power Feed Wiring		2. Chain Link	20
a. Bus Duct	25	3. Concrete	30
b. Capacitor	20	4. Wire	10
c. Power Feed Wiring Mains	25	5. Wood	10
d. Switchboards	20	F. Flag Poles	25
e. Switch Units	20	G. Incinerators	
3. Transformers		1. Commercial type, steel fire brick lined	20
a. Wet Type	20	2. Concrete block or brick	20
b. Dry Type	15	3. Steel	15
B. HVAC Systems		H. Paving and Walks	
1. Air Conditioning Systems		1. Asphalt on gravel or stone	15
a. Central, including ducts & piping	15	2. Brick	20
b. Window Type	10	3. Concrete	20
c. Cooling Towers	15	4. Gravel, stone, cinders	10
2. Heating Systems		5. Parking area guard rails	10
a. Furnaces & Boilers	20	I. Platforms	
b. Radiators, Convectors, Piping	25	1. Reinforced concrete	35
c. Unit Heaters, gas & steam piping	20	2. Wood frame on concrete piers	20
d. Unit Heaters — Electrical	15	3. Wood frame on wood posts	15
3. Ventilating Systems including fans & exhausters	15	J. Railroad sidings	25
C. Plumbing Systems		K. Reservoirs, concrete	35
1. Drinking Water System	15	L. Retaining Walls	
2. Fixtures	20	1. Brick	30
3. Piping		2. Concrete	40
a. Cast Iron Waste	35	3. Steel	25
b. Concrete	30	4. Stone	40
c. Copper	30	5. Wood	15
d. Plastic	20	M. Sheds	
e. Steel	20	1. Brick, tile or concrete block with wood frame	25
f. Vitrified Tile	30	2. Brick, tile or concrete block with steel frame	35
4. Sprinkler Systems		3. Metal clad, steel frame	27
a. Wet & Dry Systems	30	4. Metal clad, wood frame	20
		5. Wood siding and frame	20

FIGURE I.1 Excerpted from Means Facilities Maintenance Standards. Copyright R.S. Means Company, Inc.

Management and maintenance personnel should ideally have available the necessary funds at critical life points to sustain the asset with major improvements, such as a new roof. If the maintenance philosophy is to fully correct problems (as opposed to applying “Band-Aid” temporary repairs), the asset should live well beyond its projected life. (*See Part Four for more on budgeting and funding.*)

Certain factors contribute to material failure and the physical deterioration of the facility. In addition to wear and tear of structures and grounds from residents, exposure to the following elements reduces asset integrity:

- Organic solvents
- Oxygen
- Ozone
- Carbon dioxide
- Sulfur dioxide
- Hydrogen sulfide
- Moisture encroachment caused by rain, snow, sleet, hail, or errant irrigation
- Cleaning solutions
- Radiant energy: sunlight, ultraviolet, infrared
- Heat generated by building systems or the weather
- Cold (frost, snow, ice)
- Cycles of heat and cold
- Cycles of relative humidity changes
- Abrasives: dirt particles, airborne dust, smoke
- Water
- Matter in motion: mechanical stress, impact shock, vibration (wind, earthquake)
- Vegetation: algae, bacteria, fungi, lichens, plant roots
- Insects: ants, moths, silverfish, termites, wood beetles
- Rodents
- Birds

It is important to note that water is particularly damaging, as it can dissolve building materials over time, and fosters mold, rot, Sick Building Syndrome, and other adverse conditions such as adsorption, absorption, hydration, hydrolysis, pore adsorption, internal and

interstitial condensation, moisture mass and content decay, freeze-thaw, frost progression, crack initiation and propagation, pressure release and air entrainment, rising damp and salt decay, and efflorescence, as well as creating chemical reactions with a number of host chemicals. Water further acts as a venue for insect intrusion. As a universal solvent, water is a catalyst for chemical reactions. It can also consume wood, erode masonry, corrode metal, peel paint, expand when frozen, and permeate everywhere when it evaporates. It warps, swells, discolors, rusts, loosens, mildews, and causes odor. Since buildings today are airtight and well-insulated, they can generate high levels of destructive internal moisture, which corrodes as it penetrates.

Architectural Materials

Most apartments are composed of traditional architectural fabrics consisting of two broad types: *monolithic mass masonry* and *skeletal or composite* structures. The primary materials used in apartment construction are:

- Wood
- Metals: cast iron, wrought iron, modern steels, copper, sheet metal
- Masonry: stone, brick, ceramics, concrete, terra cotta, stucco
- Plastics: countertop laminates, piping, vinyl siding, skylights, fencing, railing, drain covers, gutters

For decorative or protective purposes, many apartment facilities contain the following materials:

- Floors: wood, tile, brick, stone, vinyl or linoleum, carpet
- Walls and ceilings: plaster or gypsum board (painted, papered), wood, glass, masonry, tile, acoustic tile, painted concrete block
- Roofs: shingles (asphalt, wood, tile, slate, metal); sheet metal, steel, or built-up membranes; felt; asphalt; thermoset; thermoplastic; PVC

Each of these materials has its own physical and chemical characteristics, as well as repair and maintenance requirements. Restorative or preservation tactics are often required. Deterioration is not always visible without in-depth inspection, even to the trained eye. Generally, maintenance personnel encounter the following conditions.

Wood Wood is used for both structural and aesthetic purposes. Maintenance personnel will deal with a wide variety of wood structures in various states of physical deterioration. Major causes of wood deterioration include decay-causing fungi, marine borers,

insects, and fire damage. Maintenance personnel often come across signs of splitting or excessive deflection in wood. Exactly how to repair and preserve wood—e.g., the extent of intervention—depends on two considerations: aesthetic and structural. Focusing on only one can actually cause confusion about the other. For example, painting a wood beam for cosmetic reasons might conceal structural weaknesses caused by fungi or insect attack, whereas an ill-appearing wood-paneled wall may in fact be structurally sound, needing only a coat of paint.

When failure of a wood element is structural, intervention is mandatory; the member must be either repaired or replaced. If the member is concealed and therefore difficult to regularly access for inspection and repair (for example, behind a floor, paneled wall, or plaster ceiling), it might be preferable to replace it with a new one while it is exposed, rather than make repairs, which may require later follow-up. Wood members may be replaced or reinforced with steel. As with all repairs, the structural and design integrity of the asset is critical. Therefore, prior to replacement or reinforcement, refer to the building's "as-built" drawings and current code requirements, and evaluate new materials within the market that may offer more advantages for the work to be accomplished.²

Concrete and Masonry Masonry materials consist of tilt-up concrete, brick, stone, terra cotta, and stucco, and are most often used for structural and decorative walls, walkways, and miscellaneous reinforcement areas. Masonry/concrete is the dominant fabric of many facilities. Conservation of these materials depends on the maintenance staff's ability to recognize and address potential problems.

Terra cotta/concrete roofing materials are used extensively for their aesthetic, fireproofing, and historical qualities. They are, however, susceptible to the effects of heat, cold, wind, rain, earthquakes, and other environmental factors. A keen eye in the preventive maintenance process and attention to detail in remedial maintenance should sustain these materials and allow them to achieve a normal 45-50 year life span.

Water, as previously mentioned, is one of the greatest causes of masonry damage and demise. Cracks, eroded surfaces, efflorescence, and subterranean encroachment can all violate the integrity of masonry fabric. Weather conditions and environmental pollutants can lead to failure.

The attrition of masonry is so widespread that the syndrome has been dubbed “stone disease,” and scientists in several countries are attempting to isolate the specific causes and develop the appropriate prevention and therapies. Because many American brick and stone masonry buildings are relatively new, preservation often requires nothing more than cleaning, sealing, and sometimes repainting for aesthetic rather than structural reasons. Where structural issues arise, an appropriate engineer should be consulted.

The extent and frequency of preventive maintenance of masonry components will depend on the location, exposure, existing deterioration, and desired appearance of the materials. Cleaning methods such as wet or dry grit blasting, water washing, steam cleaning, and chemical cleaning with acid, alkaline, or organic cleaners all have their advantages, disadvantages, and relative effectiveness and expense. Historic brickwork requires specialized, non-abrasive techniques such as high-pressure water treatment with mild detergents, or hand scrubbing and sealing to prevent further deterioration. The choice of restoration methods for historic buildings may be limited, depending on the funding source available to the apartment facility.

To aid in masonry maintenance, staff should take the following actions.

- Keep abreast of the technology for cleaning and waterproofing.
- Actively seek out and repair areas of suspected water intrusion.
- Pay close attention to signs of earth movement and subsequent cracks or displacement.³

Metal Metal in buildings is used for both structural and aesthetic components, including fences, roofs, posts, railings, stairs (both fire escapes and interior fire stairs), as well as metal ductwork. Common exterior metal materials include aluminum, galvanized iron and steel, copper (e.g., for roof and window flashing and piping), and prefabricated sheet metal. Metal, like wood and masonry, is subject to deterioration, particularly by oxidation, water, and atmospheric/ environmental factors.

Exposed metal needs to be maintained by cleaning, painting, and polishing. Unexposed metal must be protected from contact with water. Metal fences must be appropriately coated to prevent rust and other damage. Generally, maintenance of fences involves painting to

prevent rust; ensuring stability of posts, braces, and anchors; keeping the area free of vegetation and trash; and patching holes and gaps when necessary.⁴

Maintenance & Repair Strategies for Housing

Following is a description of the items that most commonly require attention in multi-family housing facilities. The preventive maintenance techniques outlined in this book can help identify and proactively address deficiencies in these areas before they become costly problems. (See Part Two, "Preventive Maintenance," for specific guidance on implementing a preventive maintenance system.)

Exterior Maintenance

Roofs In housing, roofs generally last the full extent of their predicted useful life unless damage is caused by hail, hurricanes, or tornados, or results from other work done on the roof. Most roof work addresses unpredicted leaks. In cold climates, *sloped shingled roofs* often experience ice dams resulting from improper gutters and flashing. Repair of the chimney or flashing at roof penetrations and transitions is often required; this can be a signal to examine the roof for its overall condition and for possible replacement.

Flat roofs are common in multi-family residences, where there is often mechanical equipment on the roof. The vibration or regular maintenance of the HVAC equipment can lead to more frequent roof repairs. Condensate lines that drip on the roof, poor location or clogging of roof drains, and flashing at parapet walls are common causes of frequent roof repairs. When replacing flat roofs, consideration should be given to an insulated roof. Poor ventilation can cause serious problems of roof rot. Water moisture trapped under roof decks can cause rotting, resulting in structural damage and the need for a total roof replacement. This problem is made worse by the use of fire-treated plywood, which, while good for minimizing fire damage at roofs, actually is less stable than preservative pressure-treated wood and delaminates in poorly vented environments.

Enclosure Walls Wood façades require periodic painting, and must be maintained so that the wood is 6" above the ground over time, as plants grow and water causes soil to migrate near foundation walls. Periodic maintenance is necessary to avoid wood rot at the sills, as well as to keep trees, shrubbery, and irrigation system water flow away from walls and roofs.

Masonry Masonry generally requires little annual maintenance until the mortar needs repointing. However, repointing is a significant cost to consider. Masonry cracks are usually not extensive, but should be repaired to avoid accelerated damage, particularly where freeze-thaw cycles are common. Personnel performing preventive maintenance on brick buildings should be on the lookout for cracked or broken brick sometimes caused by use of improper brick for the purpose, such as paving brick used for chimneys. Additionally, the growth of ornamental vines should be monitored and controlled, as it can be a serious cause of damage to wood and masonry surfaces.

Windows Window repair is usually done in conjunction with exterior painting. Repair of broken windows, rotted or rusted sashes and frames, window washing, and weatherstripping should be done annually. When windows are painted, it is a good idea to replace the following items.

- Deteriorated caulking and putty work
- Cracked glass
- Sash cords and hardware
- Deteriorated wood trim

Window replacement is usually expensive and not done unless tied to other issues such as extreme leakage, severe rot, or the need to reconfigure the windows for air conditioners or other changes in the building.

Doors Hardware for doors in residential buildings often requires re-keying when there is a change in tenants. Door hardware may also need occasional, usually minor repairs. Routine PM for the door as a whole would include checking for cleanliness, dents, splinters or rough surfaces, operational integrity, hinge adherence and lubrication, dry rot, casing alignment, condition of weatherstripping, threshold integrity, appearance of locks, handles, peep holes, lubrication of lock mechanism, positioning and security of latch receptacle, and overall quietness and functional movement of the door. (Note: choice of doors pursuant to climatic conditions and proper installation and finishing according to manufacturer recommendations are important elements in avoiding the adverse effects of humidity, rain, and snow.)

Waterproofing Below-grade leaks often occur in basement areas. Sump pumps or foundation drains and dehumidifiers can be added to control moisture. Often, the source of moisture is an inadequate storm water system or poor exterior grading that does not properly conduct rainwater away from the building.

Exterior Painting Exterior painting of trim and wood siding is to be expected at regular intervals. Proper priming, wood repair, and stucco or masonry repair, coupled with touch-ups between major paint jobs, can minimize painting costs and extend the life of the building exterior.

Exterior Ramps, Walks, Paths, and Signage These items require annual review and patching for wear and tear, frost heaves, salt damage, and weathering. Some items accessible by the public may require improvement to meet the Americans with Disabilities Act (ADA) requirements.

Landscaping/Hardscape The PM venue for landscape and hardscape is a combination of weekly (and in some cases daily), monthly, seasonal, and annual tasks to ensure that property conditions remain safe and marketable. Landscaping, for example, requires monthly checks on irrigation systems and shrub, tree, and vine encroachment. So too with hardscape—monthly checks would include walkways for cracks and trip-and-fall conditions, annual checks with an eye toward re-striping and re-surfacing driving areas.

Utilities Generally, residential buildings do not experience significant costs resulting from maintenance of utilities. However, trash removal, sewer fees, new or improved cable or satellite installation, and advances in technology that impact the property may very well have a residual impact on the cost of residency.

Historic Materials Although there are many new apartment communities being constructed to meet expanding populations, there are still many older facilities (from as early as the early 1900s) in operation. Specialty contractors, qualified architects, engineers, and craftspeople may need to be consulted for technical expertise on the long-term performance of building products and the timed maintenance and repair they may require. Some standard preventive maintenance procedures may harm historic materials such as masonry components, door and window hardware, or other functional or aesthetic details. Cleaning solvents in particular may further deteriorate archaic materials, calling for maintenance personnel to use non-abrasive cleaning techniques and mild detergents.

Interior Maintenance

Life Safety Residential buildings generally do not require unusual items or expenses for code upgrades involving life safety. There are, however, expected annual expenses to maintain fire alarm, elevator, HVAC, and fire protection systems.

Upgrades for the Disabled Modifications for disabled residents in existing housing for private residences may be necessary only if residents require them, since most private housing is exempt from ADA requirements. Entrances, doors, thresholds, hardware, toilets, elevators, and signage in common areas used by the public may require some upgrade as annual repairs and improvements are made. Typically, a percentage of the units in a new facility must be handicapped-compatible.

Upgrades to Improve Building Performance Each year some allowance should be made for building upgrade. Typical improvements include:

- HVAC and energy management systems
- Lighting upgrades for improved efficiency, such as replacing incandescent lighting fixtures with fluorescent ones in public and common areas
- Installation of improved security, CATV, or intercom systems
- Kitchen and bathroom upgrades
- Flooring upgrades
- New carpeting

Laundry Rooms Laundry facilities are often provided in residential buildings. When the laundry equipment is located within the individual apartment unit, equipment maintenance is sometimes the tenant's responsibility. When laundry rooms are located in common areas, maintenance is the responsibility of the building manager. Operation of laundries, including maintenance of washers and dryers, can be provided by service vendors who retain a percentage of the coin receipts.

Water Leaks from Equipment In buildings where individual water heaters or laundries are installed, it is possible for the water heaters to corrode or washing machines to flood, causing water damage to units or areas below. Careful maintenance of such equipment is necessary to minimize damage. When possible, floor drains and/or pans installed throughout the building can provide some measure of protection, although such systems are expensive to retrofit in existing buildings.

Trash Rooms Weekly trash collection, inspection of trash chutes (to be sure they're not blocked), and trash room wash-down and cleanup are a regular part of apartment maintenance. Common costs

associated with trash rooms include pest control, protection of sprinkler systems from freezing in cold weather, maintenance to avoid fire hazards, and maintenance of special equipment such as compactor systems.

Tenant Changeover At the conclusion of rental leases, it is customary for the landlord to provide some improvements to the apartment—typically apartment cleanup and painting. In some cases, floor sanding and refinishing, new tile/vinyl, or new carpet are provided.

Maintaining Compliance with Codes & Standards

It is essential that management and staff routinely monitor compliance with building codes and standards, such as the requirements of the National Fire Protection Association (NFPA), the Americans with Disabilities Act (ADA), the Environmental Protection Agency (EPA), and the Occupational Safety and Health Administration (OSHA), where applicable.

According to the NFPA, buildings must have a properly maintained egress system that includes panic hardware for releasing door latches, rescue and ventilation windows, emergency lighting, and other features. The NFPA's *Life Safety Code*[®] is also helpful for important information relating to fire protection of buildings. According to Title III of the ADA, a federal anti-discrimination civil rights act, public facilities must make accommodations for accessibility. Spaces such as entrances, hallways, restrooms, and other public areas must provide accessibility for disabled users. Drinking fountains and sinks must not exceed certain height requirements, and must allow clearance for wheelchairs, for example.

Public multi-family housing must feature special ramps, chair lifts or elevators, railings, seating, and emergency warning systems, as well as signage identified with the International Symbol of Accessibility, among other elements. Outside accommodations must include accessible parking areas, passenger loading zones, curb ramps, signage, walkways, and playground equipment. Indoor and outdoor surfaces must be accessible, firm, stable, and slip-resistant.⁵

Summary

Apartment buildings and condominiums are actively maintained properties, since tenants who reside there naturally care about where they live. Part One explored some key considerations that differentiate apartment complex maintenance from the care of other types of facilities. Clearly, the safety of residents and the extended life of the asset are priorities of preventive maintenance for apartments. This section also highlighted the major categories of building materials and types of deterioration to which they are susceptible.

Part Two outlines the basic requirements and components of a complete PM system, and Part Three offers guidance on procedures for estimating PM, including information on material, equipment, and labor costs. Part Four provides guidelines on budgeting for PM within multi-family housing. Part Five contains reproducible PM checklists, followed by an Appendix of repair considerations, more on PM costs, and helpful resources for more information on a number of specific topics.

1. *Cost Planning and Estimating for Facilities Maintenance*, R.S. Means Company, Inc., 1996.
2. Fitch, James Marston. *Historic Preservation: Curatorial Management of the Built World*. University Press of Virginia, 1990.
3. Ibid.
4. Ibid.
5. *Cost Planning and Estimating for Facilities Maintenance*, R.S. Means Company, Inc., 1996.