Codes and Building Systems

6

BUILDING CODES AND LIFE SAFETY

Many of Northville's historic buildings were constructed in the mid to late 1800's when building codes were nonexistent. They often fall substantially short of today's standards, particularly standards for public or commercial buildings. Building and life safety codes are intended to protect the health, safety, and welfare of human occupants of all buildings. They set minimum requirements for structural, physical, environmental, and safety characteristics of buildings and they can not be ignored in the historic district. The Building Department reviews all construction for compliance with the BOCA Building Code. This is a national standard adopted by most cities in Michigan.

Evaluation of a building's compliance with building and life safety codes is dependent upon what its ultimate use will be, and whether the ultimate use is a change from the building's previous use. A change of use (such as converting a residential building to commercial use) typically necessitates upgrading the entire building to meet current code requirements. In a non-historic building, such a change of use often means major modifications to the building to comply with current codes. Such modifications include the addition of enclosed fire stairways, widening door openings or corridors, adding fire exits, and increasing the number of public toilets.

Variances to the building code are sometimes allowed for historic buildings. Specific requirements of the building code may be appealed to the Building Board of Appeals for a modification. The goal of the Building Board of Appeals process is to balance the requirements of life safety with the difficulties involved in working with historic buildings. Local officials (the Building Department and the Historic District Commission) will work with owners to find alternative ways of meeting code that preserve the architectural integrity of the building. See Part 7, "Review Processes" for a list of the most common variances and the process by which they are obtained.

At first glance it might appear that the historic character of a building will have to be compromised by the many safety and code requirements that are part of construction. It is possible, however, to meet codes requirements and not harm the traditional harmony of the building in its setting, because most code requirements affect the interior of the building and regulated historic features are on the exterior.

Building Code and Life Safety Guidelines

- If code requires fire prevention equipment such as alarms and sprinklers, it should be installed in a way that does minimal damage to the appearance and fabric of the building. Wiring and supply piping should be concealed; placement should occur as if it had been originally planned for.

- If code requires a new stairway or an elevator, it should be added in a location that does not alter the main historic rooms or character defining features. Try to locate stairs and elevators in service areas or in less important rooms.

- To protect the historic nature of the exterior of a building, the best place to construct fire stairs or elevators is on the rear or side of the building in a way that has the least possible visual impact.

- Building and Life Safety Codes change, and are lengthy and complex. Items included in the *Historic District Design Standards* are for general information only. Check with the Building Department for complete and current requirements.

MICHIGAN BARRIER FREE AND ADA

One of the biggest challenges for the owners of historic buildings that are open to the public is to provide code compliant access to individuals with disabilities. Barrier Free design is regulated at the state level by Michigan Barrier Free Design Law, and at the federal level by the Americans with Disabilities Act (ADA). Michigan Barrier Free is a combination of the State's standard Building Code (BOCA) and portions of ADA. When the building department reviews new and remodeled construction for life safety compliance, it will also review it for compliance with Michigan Barrier Free.

ADA is civil rights legislation enacted at the federal level, which outlaws discrimination against individuals with disabilities. This legislation is not a "code" that is enforced by building officials. Instead, it is enforceable by lawsuit. It gives individuals legal standing to sue building operators and owners for monetary damages if they feel that they have been discriminated against due to their disability. Such discrimination can take the form of denial or restriction of access to, employment in, or use of any facility open to the public. ADA is supported by a set of detailed guidelines with which buildings must comply to meet the requirements of the act. The unique characteristic of ADA is that it applies to all existing buildings, regardless of whether they are being altered or not.

Most structures over twenty years old have few amenities to accommodate disabled persons, and they frequently have structural limitations which make compliance with accessibility requirements difficult and costly. Commonly accepted space use standards of a generation ago were much less generous than today's, leaving a legacy of narrow corridors and doors, tight vestibules, and tiny rest rooms. Finally, commonly used design devices such as level changes and grand staircases which were used for dramatic architectural effect present obstacles to handicapped persons.

The problem is compounded in historic structures originally intended for private occupancy that are now being converted to public use. Such buildings often contain character-defining architectural features and intimate spaces which, if modified, would significantly diminish the historic quality of the structure.

Current regulations and legislation have also expanded the scope of "handicapped." In the early days of barrier-free accessibility laws, making a building "accessible" simply meant providing a way for individuals in wheelchairs to enter a building and go from floor-to-floor. Today's laws recognize a broader range of disabilities, including persons with mobility impairments (e.g. leg braces), severe strength limitations, limited use of hands, various degrees of vision impairment, deafness, paralysis, and loss of sense of touch. Codes recognize not only the space that such individuals require to move through buildings, but how they must position themselves for activities such as opening doors and using toilet facilities.

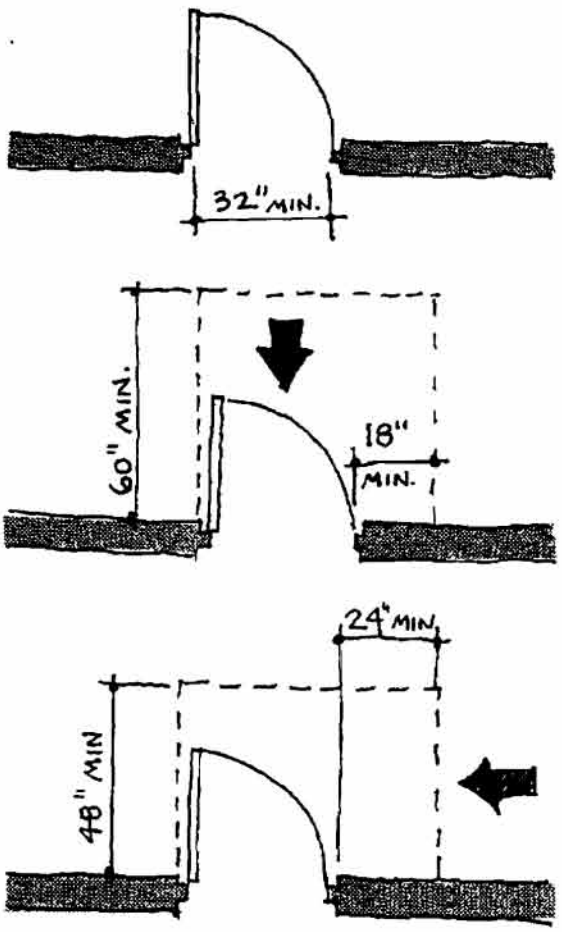
The Michigan Barrier Free code provides some relief from its requirements for historic buildings. In limited cases the State may grant exceptions to the requirements. Although ADA does not provide specific exemptions for historic buildings, it does recognize that accessibility improvements to existing buildings may be made to the extent that they are "readily achievable," and that some changes to buildings may be "structurally infeasible."

ADA also recognizes the concept of "equivalent facilitation." If a disabled person cannot be accommodated in certain areas of a building due to "structural infeasibility," the owner or operator may provide "equivalent facilitation." This could take many forms, including provision of a disabled employee with a place to work or live elsewhere in the building, with similar facilities and opportunities. However, there are no variances from ADA requirements and owners who do not follow ADA guidelines are at risk of being sued.

The following is a partial list of accessibility requirements which often have to be addressed during renovation. This is only a partial list, and by no means a substitute for the code. The following are from the Michigan Barrier Free guidelines current as of this writing. Check with the Building Department for any revisions.

Accessibility Requirements

- Doorways must have 32" clear opening. This is the minimum amount of space that a person in a wheelchair needs to pass through without difficulty.
- Hardware that involves twisting or grabbing may be inoperable by persons with disabilities. Lever hardware can be operated without twisting or grabbing.
- Toilet rooms must have adequate maneuvering space around plumbing fixtures. The height of mirrors, paper towel dispensers, grab bars, hooks, sinks, and toilets is regulated.
- Barrier Free entrances, toilets, and parking must be indicated with accessible signs. Lettering size, type face, braille location, and color contrast are all regulated by the Barrier Free Code.

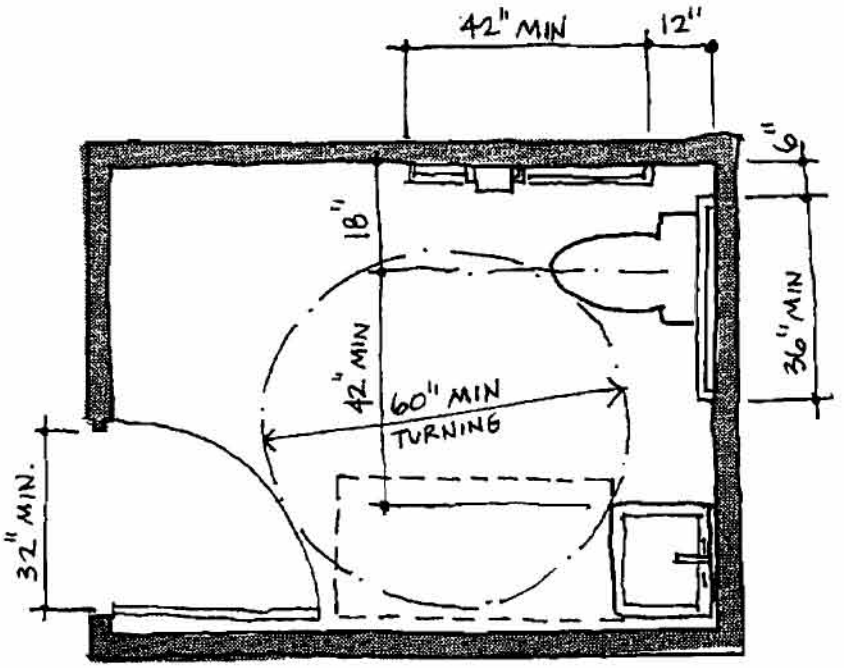


A few of the Barrier Free requirements for clearances around doors based on current (1998) code. Required clearances vary with direction of approach and type of door hardware. Check with the Building Department for current and complete requirements.

- Maneuvering space at doors and space between the door handle and the nearest wall must be provided. The amount of required space varies with the swing of the door and approach to the door. Many times vestibules are too small and do not provide maneuvering space or latch side clearance.

- Steps at doors are not accessible. Grade changes must be made with ramps, sloped no more than 1" rise in a 12" run (1:12) if the rise is more than 6 inches. A steeper slope of 1:10 is allowed for a rise of up to 6 inches. The steepest slope of 1:8 is allowed for grade changes of 3" or less. The biggest "step" allowable at a door is a beveled threshold of 3/4".

- Handrails are required at ramps with slopes of 1:20 or more. The top surface must be grippable, which means that brackets cannot interfere with the railing. Ends of handrails must extend beyond the top and bottom steps and at the top and bottom of landings.



A sample toilet room layout, indicating some of the dimensional requirements based on current (1998) code. The clearances around plumbing fixtures and location of the fixtures and accessories have been designed for easier use by persons with disabilities. Check with the Building Department for complete and current requirements.

BUILDING SYSTEMS

The building structure, mechanical equipment and electrical equipment are referred to as its systems. These systems are not regulated by the Historic District Commission, but they are an integral part of any building. Restoration, rehabilitation and new construction inevitably involve work on the building systems, and the following is a brief introduction to the issues and a list of recommended approaches.

Mechanical and Electrical Systems

Historic structures often have obsolete heating, plumbing, and electrical systems or ones that are nonfunctional. It is possible to update them or return them to functioning condition without compromising historic architectural features. Sometimes the visible parts of the historic systems have historic character that could be preserved. Examples of this are cast iron radiators and historic light switches. Preservation of historic interiors is strongly encouraged but is not regulated by the HDC.

Mechanical and Electrical Systems Guidelines

- Install systems in areas and spaces that will require the least possible alteration to the structural integrity and physical appearance of the building.
- Install the vertical runs of ducts, pipes, and cables in closets, service rooms, and wall cavities.
- Do not install dropped ceilings or furr out walls to install mechanical and electrical systems.
- If you have chosen to retain a historic interior, you will want to use period or wiring plumbing and lighting fixtures, where possible, even when installing new piping systems. (See Part 8, "References.")

Energy Conservation

Improvements that increase the energy efficiency of a historic building should be incorporated into rehabilitation projects when possible. They will increase the value of the property and make the spaces more comfortable. Improvements can be made in ways that increase efficiency with fewer modifications to the historic materials.

Winter Conditions

Heat loss during winter should be dealt with in the following priority: The greatest loss is through the roof as heated air rises. The second greatest loss is from air infiltration through leaky windows, doors, utility entrances, and other wall penetrations. The third cause is the loss of heat through the walls of the building.

Winter Conditions Guidelines

- Insulate the upper story ceiling to reduce heat loss through the attic.
- Install storm windows on the interior of window openings.
- Match the style of the windows in sash, color, proportion, and material if replacement windows are approved by the HDC.
- Install double-glazed ("insulating glass") in display windows to reduce heat loss through the walls.
- Do not lower ceilings in order to save energy. Instead, eliminate the causes of heat loss in order of priority: roof insulation, storm windows, and double glazing.
- See "Windows" in Part Five for appropriate ways to use insulating glazing in historic windows.

Summer Conditions

Many historic buildings have two features that help to reduce heat in the summer: double hung windows and storefront awnings. The principle of double hung windows is very energy efficient. One lowers the top sash to let out hot air and raise the bottom sash to let in cooler air. A natural convection loop is set up.

Summer Conditions Guidelines

- Maintain double hung windows so that they operate properly.
- Maintain or install a retractable awning to shade the storefront and prevent heat build up on hot days.
- Install an operable skylight not visible from the street to allow natural ventilation.
- A ceiling fan can help conserve energy in both summer and winter.
- Plant shade trees.

STRUCTURAL SYSTEMS

There are special problems inherent in the structural systems of historic buildings because many of the original construction techniques are no longer used. Restoration would require that weakened structural members be stabilized, reinforced, and repaired with techniques similar to the original construction. If the structural features are exposed, such as cast iron columns, exposed trusses, or stone foundation walls, they may contribute to the historic character and should be preserved. This is not to say that structural systems that were not ever intended to be exposed should be stripped of historic finishes to give a building a more "rustic" or industrial appearance.

Rehabilitation requires that the structure be stabilized and repaired for safe reuse. Floor structures must be able to carry a minimum amount of weight per square foot depending on the building use. Buildings for public use must have greater capacities than those for residential use. These capacities are listed in BOCA and regulated by the Building Department. Often historic structures are stable, but were not designed to carry the greater loads required by the building codes, or the greater loads due to a change from private to public use. In these cases structural reinforcing may be needed. Care must be taken when making changes, to avoid disturbing existing foundations in order to protect the structural stability of the building.

Structural Systems Guidelines

- Have structural systems inspected by a licensed professional, such as an architect or structural engineer, prior to making any modifications.

- If reinforcing is required, try to do it in "invisible" ways, such as by doubling floor joists, and adding columns or beams in existing walls or ceiling drops.

- Do not strip away historic finishes to expose structural systems, unless there is evidence that they were originally exposed. With the exception of industrial buildings, very few historic buildings had exposed floor structures or exposed interior brick walls.

- Do not cut holes in the structure to run pipes or ducts, without the approval of a structural engineer.

- A house converted to commercial use is likely to need some structural reinforcing. Plan for this early in the design process.