

General Comments

There are a significant number of aspects concerning pool and spa design and installation that are common to all. For example, piping materials, suction entrapment avoidance, decks, dimensional tolerances, circulation systems, heater systems and barriers have general characteristics that are the same no matter with what pool or spa they are connected. Placing the regulations for these common items in one location, Chapter 3, makes them easier to find and results in fewer coordination problems as the code is changed in future editions.

Purpose

Chapter 3 contains regulations for electrical, plumbing, energy consumption, barriers, decks, suction entrapment avoidance, circulation systems, heaters and lighting for all types of pools and spas. First and foremost, these regulations provide for the protection of the users of pools and spas. The regulations also provide for a level of quality necessary to ensure that the pools and spas are installed correctly to provide for long-term performance. Also, Section 330 references a standard covering the operation and maintenance of public pools, public spas and aquatic recreation facilities.

SECTION 301—GENERAL

301.1 Scope. General design and construction of public and *residential* pools and spas and related piping, equipment, and materials shall comply with this chapter. Provisions that are unique to a specific type of pool or spa are located in Chapters 4 through 10.

C Many requirements for different types of pools or spas are identical. For example, barriers (such as fences and walls) have the same requirements no matter what pool or spa the barriers protect. Rather than repeat these common requirements for each type of pool or spa, the requirements are stated once in this chapter. Requirements that are specific to each type of pool or spa are indicated in Chapters 4 through 10.

SECTION 302—ELECTRICAL, PLUMBING, MECHANICAL AND FUEL GAS REQUIREMENTS

302.1 Electrical. Electrical requirements for aquatic facilities shall be in accordance with NFPA 70 or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

Exception: Internal wiring for portable *residential* spas and portable *residential* exercise spas *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.

C The *National Electrical Code*® (NEC®), NFPA 70, is to be applied to the electrical installations in connection with pools and spas, except for those pools and spas that are associated with residential structures covered by the *International Residential Code*® (IRC®). The IRC contains chapters on electrical installation that are based on residential-appropriate portions of NFPA 70. Internal wiring requirements for portable residential spas and portable residential exercise spas are covered under UL 1563 or CSA C22.2 No. 218.1. Chapter 10 requires portable residential spas and portable residential exercise spas to be listed and labeled to one of those standards.

This code references specific editions of NFPA 70 and the IRC. Unless the jurisdiction makes an amendment to the code at the time of adoption to change the year of NFPA 70 or the IRC that is referenced, the editions that are referenced in Chapter 11 are to be enforced. Note that a jurisdiction has the authority to adopt local amendments to the code as well as to NFPA 70 and the IRC. Local amendments to the electrical codes might be the result of formal interpretations (FI) or temporary interim amendments (TIA) that were generated by the NFPA for the NEC. Designers and installers should never assume that these FIs or TIAs are part of the electrical codes being enforced in any jurisdiction. Designers and installers should always consult with each jurisdiction to determine what local amendments might apply for that jurisdiction.

This code, the IRC and the NEC do not address who is responsible for performing the design and installation of electrical work covered by the regulations in these codes. Each jurisdiction decides who is qualified to perform such work and typically requires licensure of those individuals at either a state or local level. The licensing laws of the jurisdiction dictate the extent of work that can be performed by licensed individuals.

Section 102.4 covers additions, alterations, renovations or repairs to existing pools and spas. The code official has the responsibility to decide how much of an existing electrical installation must be brought up to the current code. Designers

and installers should always consult with each jurisdiction to determine the extent of electrical rework that is necessary for any remodeling project on a pool or spa.

The electrical requirements in NFPA 70 and the IRC are minimum requirements. These codes do not prohibit designs that exceed the minimum requirements.

302.2 Water service and drainage. Piping and fittings used for water service, makeup and drainage piping for pools and spas shall comply with the *International Plumbing Code*. Fittings shall be *approved* for installation with the piping installed.

C This section addresses piping for the supply of potable water to the pool or spa and drainage (wastewater) from the pool or spa. The *International Plumbing Code*® (IPC®) has provisions for the installation of such piping.

302.3 Pipe, fittings and components. Pipe, fittings and components shall be *listed* and *labeled* in accordance with NSF 50 or NSF 14. Plastic jets, fittings, and outlets used in public spas shall be *listed* and *labeled* in accordance with NSF 50.

Exceptions:

1. Portable *residential* spas and portable *residential* exercise spas *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.
2. *Onground storable pools* supplied by the pool manufacturer as a kit that includes all pipe, fittings and components.

C The requirement for the listing and labeling of items to NSF 50 or NSF 14 provides for a certain level of quality for those items so that they will not structurally fail under the intended service conditions, not impart harmful chemicals to the water in the pool or spa and will properly fit with other listed and labeled components. Where pipe, fittings, components, plastic jets and outlets are part of portable residential spas and portable residential exercise spas listed and labeled to UL 1563 or CSA C22.2 No. 218.1, the quality of the items are controlled, as necessary, by those standards.

Because onground storable pools are made for disassembly and storage, replacement of pipe and fittings is more easily accomplished. More frequent replacement of these types of components is generally expected by the owner of this type of pool. The owner will most likely not purchase replacement components listed and labeled to NSF 50 or NSF 14 because similar components that will “do the job” will be less expensive and be readily available at local hardware stores. Thus, from a manufacturer’s point of view, there is no need to initially build these systems with components meeting NSF 50 because replacement of components is relatively easy and inexpensive. See Section 704.5.

302.3.1 Suction outlet fitting assembly sumps. Sumps shall be inspected for dimensional conformance to ANSI/PHTA/ICC-16 as specified by the suction outlet fitting assembly installation instructions.

C Incorrect dimensions of sumps can add danger to bathers. ANSI/PHTA/ICC-16 ensures that the sumps are the correct dimensions for safety.

302.4 Concealed piping inspection. Piping, including process piping, that is installed in trenches, shall be inspected prior to backfilling.

C Piping installed in trenches must be inspected prior to backfilling the trench so that the installation can be checked for leaks, proper piping bedding and the use of appropriate fittings.

302.5 Backflow protection. Water supplies for pools and spas shall be protected against backflow in accordance with the *International Plumbing Code* or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

C Potable water supplies to pools or spas must be kept safe from contamination. The IPC or the IRC, as applicable, provides the necessary requirements for protection against backflow.

302.6 Wastewater discharge. Where wastewater from pools or spas, such as backwash water from filters and water from deck drains discharge to a building drainage system, the connection shall be through an air gap in accordance with the *International Plumbing Code* or the *International Residential Code* as applicable in accordance with Section 102.7.1.

C Wastewater from a pool or spa must be discharged to a building drainage system. The requirements of the IPC or the IRC, as applicable, must be followed.

302.7 Tests. Tests on water piping systems constructed of plastic piping shall not use compressed air for the test.

C Air testing of plastic piping is dangerous because compressed air contains significant potential energy. Should the piping or fittings have imperfections or cracks created during manufacturing, such defects could explode during testing. Dirt, rocks and plastic pipe shrapnel propelled by a failure of the piping could injure nearby personnel. Testing piping systems, including equipment such as filters and pumps connected to the piping, with water, is much safer.

302.8 Maintenance. Pools and spas shall be maintained in a clean and sanitary condition, and in good repair.

C Pools and spas that are not maintained become breeding grounds for mosquitoes. A pool or spa in need of repair can be dangerous to users and possibly to the environment where water leaks out of the pool or spa into the surrounding earth. This section provides the code official with the authority to make the owner of a pool or spa perform the necessary maintenance and repairs.

GENERAL COMPLIANCE

302.8.1 Manuals. An operating and maintenance manual in accordance with industry-accepted standards shall be provided for each piece of equipment requiring maintenance.

C In order to properly maintain equipment associated with pools and spas, instructions in written form must be provided for each piece of equipment. Equipment manuals typically are included within the product or component packaging. Such materials, if not placed in a secure location, can be inadvertently lost, discarded or damaged. The contractor should deliver all product and component manuals, instructions, accompanying signage and other literature to the owner/operator at or before the completion of the project. Because manuals contain important end user safety, operation and maintenance information, it is helpful to include this requirement on inspection checklists.

SECTION 303—ENERGY

303.1 Energy consumption of pools and permanent spas. The energy consumption of pools and permanent spas shall be controlled by the requirements in Sections 303.1.1 through 303.1.3.

C The energy consumption of pools and permanent spas can be significant because filter pumps often operate continuously. This section covers methods and equipment to limit energy consumption. Note that Section 303.3 has additional requirements for residential pools and permanent residential spas.

303.1.1 Heaters. The electric power to heaters shall be controlled by an on-off switch with ready access that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously burning ignition pilots.

C The provision of an easily accessed on-off switch for a heater goes a long way toward offering the user of the pool or spa a method to limit energy use. Where adjustment of a thermostat is required for turning off a heater, most users will elect not to make the adjustment because they have it set to their preferred temperature. The switch for the heater needs to be within close proximity to the heater (or mounted externally on the heater) so that a person knows to what piece of equipment the switch belongs. This is especially useful (and safe) for servicing a heater where there are multiple heaters in one location. Although NFPA 70 (and the electrical chapters of the IRC) do not require a separate switch where the circuit breaker is within sight of the equipment, having such a switch further enables users to turn off the heater when not in use. Some users might have safety concerns (generally unwarranted) about “flipping” a circuit breaker in a circuit breaker panel (having multiple circuit breakers). Also, some circuit breaker panel doors are difficult to open, especially those suitable for outdoor service. Older circuit breakers in existing circuit breaker panels might not have circuit breakers that are rated for “switch duty.” Frequent use of those older circuit breakers might result in damage to the circuit breaker. Gas heaters with “standing pilots” (continuously burning pilots) waste energy. There are other technologies available to provide ignition for gas-fired heaters. Additional primary pool heating provisions for public swimming pools and spas are provided within the *International Energy Conservation Code®* (IECC®).

303.1.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches shall be in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate on-site renewable energy or waste-heat recovery pool heating systems.

C The area where the pools or spas are located might not be open to users during certain hours of the day or on certain days. A time switch is a simple way to automatically shut off heaters and pumps during these times. The first exception allows for not providing the time switch where the public health standards require that the pool be heated or circulated (or both) 24 hours per day. The second exception is for pools that are provided with a waste-heat recovery pool heating system or on-site renewable energy heating system. Pumps for these systems need to run when the heat source is available to maximize the energy savings that those systems offer.

303.1.3 Covers. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor-retardant cover or other approved vapor-retardant means in accordance with Section 104.9.1.

Exception: Where more than 75 percent of the energy for heating, computed over an operating season of not fewer than 3 calendar months, is from a heat pump or an on-site renewable energy system, covers or other vapor-retardant means shall not be required.

C The majority of energy loss from a heated pool or spa is from the open surface of the water, primarily because of the cooling effect that evaporation of water from the surface causes. Covering pools and spas with a vapor-retardant cover when the pool or spa is not in use is highly beneficial. As an encouragement for pool and spa owners to actually install a cover on the pool or spa, this section requires that a cover be present (but not necessarily installed) at final inspection. Although

the code official cannot make the owner install the cover, it is hoped that if the owner incurred the expense for having the cover present, the owner will use it to their benefit for saving money on energy use.

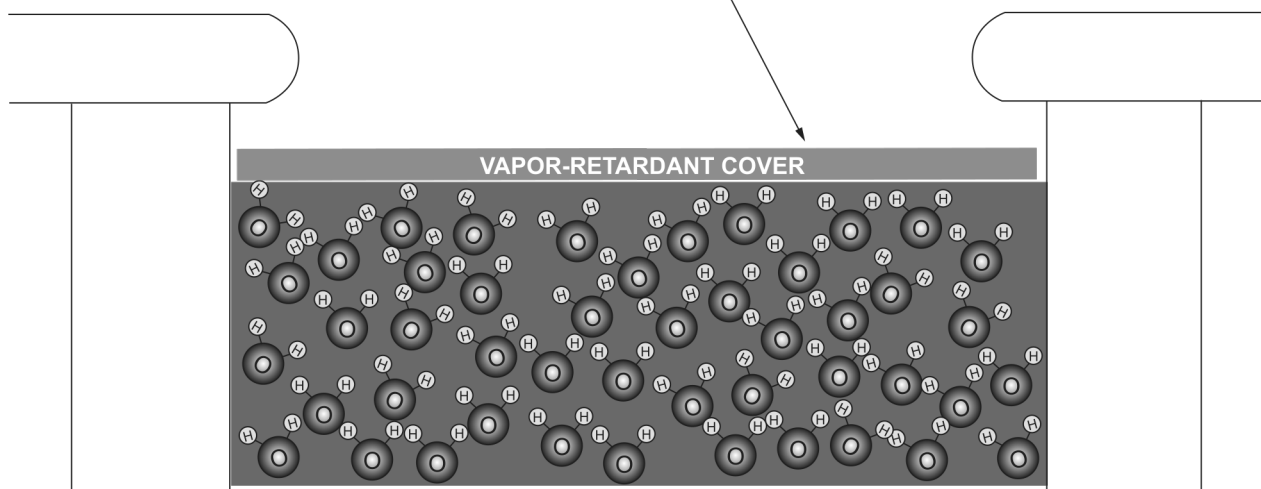
A vapor-retardant cover is a solid layer of material (not mesh or netting) that rests on or at the water's surface to retard or curtail evaporation. In a swimming pool, the solid, vapor-retardant cover must touch most of the water's surface to impede the majority of water molecules from escaping [see Commentary Figures 303.1.3(1) and 303.1.3(2)].

On a spa, the vapor-retardant cover can be above the water's surface as long as all sides of the spa rim or coping are sealed by the cover to confine the water molecules that have escaped the water's surface to the airspace between the water and the cover, keeping them from escaping into the atmosphere [see Commentary Figure 303.1.3(3)].

The exception recognizes that heat pump and solar heating types of pool and spa heaters are very efficient. A calculation of the amount of energy for heating the pool or spa water over an operating season is necessary. There could be a number of factors involved in making this calculation, such as the geographic area, the operating season length, the operating period within the year, the heat losses through pool walls and surface evaporation heat losses. Note that the code does not specify the temperature at which the pool or spa water is to be maintained for making this calculation. The total amount of required energy for the year is compared to the amount of energy that will be provided by a heat pump or solar heating system. Where the heat pump or solar heating system provides more than 75 percent of the required energy, then a vapor retarder or other vapor-retardant means need not be provided.

Commentary Figure 303.1.3(1)—Floating-Type Solid Vapor-Retardant Cover

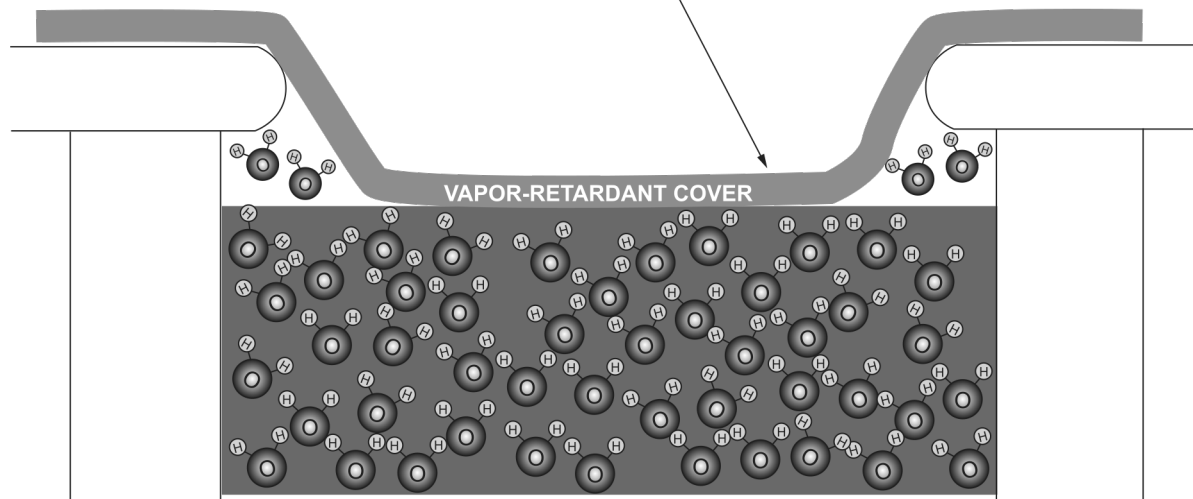
A SOLID VAPOR-RETARDANT COVER ON OR AT THE WATER'S SURFACE IN A SWIMMING POOL ONLY NEEDS TO BE APPROXIMATELY 0.010 INCH (2.5 mm) IN THICKNESS OR MORE TO REDUCE EVAPORATION AND CONSERVE ENERGY.



[Illustration courtesy of the Association of Pool and Spa Professionals (APSP)]

Commentary Figure 303.1.3(2)—Powered or Pin-Down Type Solid Vapor-Retardant Cover

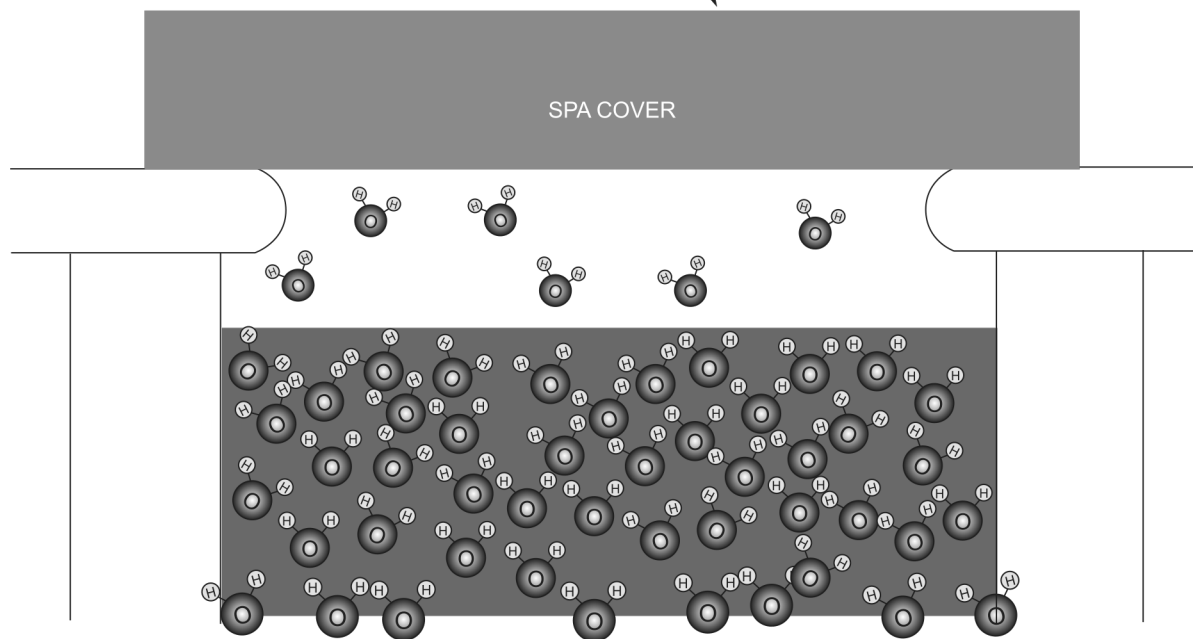
A SOLID VAPOR-RETARDANT COVER ON OR AT THE WATER'S SURFACE IN A SWIMMING POOL ONLY NEEDS TO BE APPROXIMATELY 0.010 INCH (2.5 mm) IN THICKNESS OR MORE TO REDUCE EVAPORATION AND CONSERVE ENERGY.



[[Illustration courtesy of the Association of Pool and Spa Professionals (APSP)]]

Commentary Figure 303.1.3(3)—Solid Vapor-Retardant Spa Cover

A VAPOR-RETARDANT SPA COVER CAN BE ABOVE THE WATER'S SURFACE AS LONG AS ALL SIDES OF THE SPA RIM OR COPING ARE SEALED BY AN APPROVED SPA COVER.



[[Illustration courtesy of the Association of Pool and Spa Professionals (APSP)]]

303.2 Portable spas. The energy consumption of electric-powered portable spas shall be controlled by the requirements of ANSI/ PHTA/ICC-14.

- C** Electric-powered portable spas are products manufactured to numerous standards, one of which is ANSI/PHTA/ICC-14, which specifically addresses energy efficiency for these types of products.

303.3 Residential pools and permanent residential spas. The energy consumption of *residential* swimming pools and permanent *residential* spas shall be controlled in accordance with the requirements of ANSI/PHTA/ICC-15.

- C** ANSI/PHTA/ICC-15 covers residential swimming pool filtration systems, including the filtration pump, controller, filter, backwash valve, filtration piping and valves. Note that only systems used for filtration are regulated by the standard; other systems, such as for cleaning, spa boosting and various water features, are not regulated. However, where a system is used for multiple purposes, one of which is filtration, the system is regulated by ANSI/PHTA/ICC-15.

SECTION 304—FLOOD HAZARD AREAS

304.1 General. The provisions of Section 304 shall control the design and construction of pools and spas installed in flood hazard areas, including special flood hazard areas and 500-year floodplains.

- C** Pools and spas installed in flood hazard areas must be specifically designed for the application.

[BS] 304.2 Determination of compliance based on location. Pools and spas located in flood hazard areas, including special flood hazard areas and 500-year floodplains, indicated within the *International Building Code* or the *International Residential Code* shall comply with Section 304.2.1, 304.2.2 or 304.2.3.

Exceptions:

1. Pools and spas located in riverine flood hazard areas that are outside of designated floodways.
2. Pools and spas located inland of coastal high hazard areas or inland of Coastal A Zones where the source of flooding is tides, storm surges, or coastal storms.

- C** The flood hazard areas are defined by and designated in the *International Building Code*® (IBC®) or the IRC. Pools and spas in designated floodways must comply with Section 304.2.1. Pools and spas, especially those that extend above ground and those that involve fill, can block floodwater and cause waters to rise higher if the vessels are placed in areas with effective flow (effective flow areas are those that pass the greatest volumes of water, typically with higher velocities). The requirement in Section 304.2.2 to consider the impacts of development on flood heights in riverine flood hazard areas where floodways have not been designated is consistent with the National Flood Insurance Program (NFIP), IRC Section R307.1.4.2, and IBC Section 1612.3. No specific requirements apply if pools and spas are located outside of floodways (i.e., in areas sometimes referred to as the “floodway fringe”). Section 304.2.3 contains requirements for pools and spas in areas subject to coastal flooding that are designated coastal high hazard areas and Coastal A Zone.

[BS] 304.2.1 Pools and spas located in designated floodways. Where pools and spas are located in designated floodways, documentation shall be submitted to the *code official* that demonstrates that the construction of the pools and spas will not increase the base flood elevation at any point within the jurisdiction.

- C** Floodways are portions of riverine floodplains where encroachments may block the flow of floodwaters and increase flood heights and flood risks on adjacent properties. The Federal Emergency Management Agency (FEMA) provides floodway delineations along many rivers and streams shown on Flood Insurance Rate Maps (FIRMs). Placement of pools and spas that encroach into floodways, especially those pools and spas that are on ground, partially in the ground and those that involve fill, are required to be evaluated by a qualified professional in accordance with accepted engineering practices. To be acceptable, the encroachment analysis must demonstrate that there will be no increase in the base flood elevation. Several states have more restrictive requirements, which can be determined by contacting the NFIP state coordinator (each state has an agency designated to coordinate the NFIP with communities).

[BS] 304.2.2 Pools and spas located in riverine flood hazard areas where floodways have not been designated. Where pools and spas are located where base flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed pool or spa and any associated grading and filling, will not increase the base flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

- C** Although FEMA designates floodways along many rivers and streams shown on FIRMs, other riverine flood hazard areas have base flood elevations but do not have designated floodways. In these areas, the potential effects that floodplain activities may have on flood elevations have not been evaluated. If FEMA has not designated a regulatory floodway, the community is responsible for regulating development that encroaches into these areas so as not to increase flood elevations by more than 1 foot (305 mm) at any point in the community. In effect, this means a community must either prepare a hydraulic analysis for proposed activities or require permit applicants to do so (some communities have approved setbacks to guide development out of conveyance areas). Encroachment analyses should be prepared by a qualified professional in accordance with accepted engineering practices. Commercial software for these analyses is readily available and FEMA provides technical guidance at <https://www.fema.gov/software/>. Several states have more restrictive requirements, which can be determined by contacting the NFIP state coordinator.