Appendix Section 20

Rhode Island State Building Code SBC-1
2010, ASCE 24-05 (portion)

STATE of RI BUILDING CODE
SBC-1 2010

SECTION 1612
FLOOD LOADS

1612.1 General. Within *flood hazard areas* as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one *flood hazard area*, the provisions associated with the most restrictive *flood hazard area* shall apply.

1612.2 Definitions. The following words and terms shall, for the purposes of this section, have the meanings shown herein.

BASE FLOOD. The flood having a 1-percent chance of being equaled or exceeded in any given year.

BASE FLOOD ELEVATION. The elevation of the *base flood*, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the Flood Insurance Rate Map (FIRM).

BASEMENT. The portion of a building having its floor subgrade (below ground level) on all sides.

This definition of "Basement" is limited in application to the provisions of Section 1612 (see "Basement" in Section 502.1).

DESIGN FLOOD. The flood associated with the greater of the following two areas:

1. Area with a flood plain subject to a 1-percent or greater chance of flooding in any year; or
2. Area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

DESIGN FLOOD ELEVATION. The elevation of the "*design flood*," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

DRY FLOODPROOFING. A combination of design modifications that results in a building or structure, including the attendant utility and sanitary facilities, being water tight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist loads as identified in ASCE 7.

EXISTING CONSTRUCTION. Any buildings and structures for which the "start of construction" commenced before the effective date of the community's first flood plain management code, ordinance or standard. "Existing construction" is also referred to as "existing structures."

EXISTING STRUCTURE. See "Existing construction."

FLOOD or FLOODING. A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

FLOOD DAMAGE-RESISTANT MATERIALS. Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repair.

FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

FLOOD HAZARD AREA SUBJECT TO HIGH-VELOCITY WAVE ACTION. Area within the *flood hazard area* that is subject to high-velocity wave action, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as Zone V, VO, VE or V1-30.

FLOOD INSURANCE RATE MAP (FIRM). An official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

FLOOD INSURANCE STUDY. The official report provided by the Federal Emergency Management Agency containing the Flood Insurance Rate Map (FIRM), the Flood Boundary and Floodway Map (FBFM), the water surface elevation of the *base flood* and supporting technical data.

FLOODWAY. The channel of the river, creek or other watercourse and the adjacent land areas that must be reserved in order to discharge the *baseflood* without cumulatively increasing the water surface elevation more than a designated height.

LOWEST FLOOR. The floor of the lowest enclosed area, including basement, but excluding any unfinished or flood-resistant enclosure, usable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the structure in violation of this section.

SPECIAL FLOOD HAZARD AREA. The land area subject to flood hazards and shown on a Flood Insurance Rate Map or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE or V1-30.

START OF CONSTRUCTION. The date of issuance for new construction and substantial improvements to existing structures, provided the actual start of construction, repair, reconstruction, rehabilitation, *addition*, placement or other improvement is within 180 days after the date of issuance. The

actual start of construction means the first placement of permanent construction of a building (including a manufactured home) on a site, such as the pouring of a slab or footings, installation of pilings or construction of columns.

Permanent construction does not include land preparation (such as clearing, excavation, grading or filling), the installation of streets or walkways, excavation for a basement, footings, piers or foundations, the erection of temporary forms or the installation of accessory buildings such as garages or sheds not occupied as *dwelling units* or not part of the main building. For a substantial improvement, the actual "start of construction" means the first *alteration* of any wall, ceiling, floor or other structural part of a building, whether or not that *alteration* affects the external dimensions of the building.

SUBSTANTIAL DAMAGE. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT. Any repair, reconstruction, rehabilitation, *addition* or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the *building official* and that are the minimum necessary to assure safe living conditions.
2. Any *alteration* of a historic structure provided that the *alteration* will not preclude the structure's continued designation as a historic structure.

1612.3 Establishment of flood hazard areas. To establish *flood hazard areas*, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for [INSERT NAME OF JURISDICTION]," dated [INSERT DATE OF ISSUANCE], as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

1612.3.1 Design flood elevations. Where design flood elevations are not included in the *flood hazard areas* established in Section 1612.3, or where floodways are not designated, the *building official* is authorized to require the applicant to:

1. Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state or other source; or
2. Determine the design flood elevation and/or floodway in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice.

1612.3.2 Determination of impacts. In riverine *flood hazard areas* where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed work will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction of the applicable governing authority.

1612.4 Design and construction. The design and construction of buildings and structures located in *flood hazard areas*, including flood hazard areas subject to high-velocity wave action, shall be in accordance with Chapter 5 of ASCE 7 and with ASCE 24.

1612.5 Flood hazard documentation. The following documentation shall be prepared and sealed by a *registered design professional* and submitted to the *building official*:

1. For construction in *flood hazard areas* not subject to high-velocity wave action:
   - 1.1. The elevation of the lowest floor, including the basement, as required by the lowest floor elevation inspection in Section 110.3.3.
   - 1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.6.2.1 of ASCE 24, *construction documents* shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.6.2.2 of ASCE 24.
   - 1.3. For dry floodproofed nonresidential buildings, *construction documents* shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.
2. For construction in flood hazard areas subject to high-velocity wave action:
   - 2.1. The elevation of the bottom of the lowest horizontal structural member as required by the lowest floor elevation inspection in Section 110.3.3.
   - 2.2. *Construction documents* shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.

The potential for ice or debris capable of inducing or causing loads exceeding design loads shall be identified from a community's flood hazard map or flood hazard study or from hydraulic and other analyses. The results of such analyses shall be documented in an engineering report, which defines the methodology and data used to conclude whether a site is susceptible to ice jams and debris effects.

3.8.1 Protective Works in Ice Jam and Debris Areas

Structures in ice jam and debris areas shall have protective works to provide protection during the design flood event and meet the requirements of Section 1.4.2. The maintenance and operations plan for the protective works shall be provided.

4.0 COASTAL HIGH HAZARD AREAS AND COASTAL A ZONES

4.1 SCOPE

The requirements of Section 4 shall apply to new construction and substantial improvements in Coastal High Hazard Areas and Coastal A Zones

4.1.1 Identification of Coastal High Hazard Areas and Coastal A Zones

For the purposes of this standard, "Coastal High Hazard Areas" shall mean those locations where an area has been designated as subject to high velocity wave action on a community's flood hazard map (V Zones), or

1. Where the stillwater depth of the base flood above the eroded ground elevation is greater than or equal to 3.8 ft, i.e., sufficient to support a wave height equal to or greater than 3 ft and where conditions are conducive to the formation and propagation of such waves; or
2. Where the eroded ground elevation under base flood conditions is 3 ft or more below the maximum wave runup elevation.

For the purposes of this standard, "Coastal A Zones" shall mean those locations where the stillwater depth of the base flood above the eroded ground elevation is greater than or equal to 1.9 ft (sufficient to support a wave height equal to or greater than 1.5 ft), and where conditions are conducive to the formation and propagation of such waves.

4.2 GENERAL

Designs for Coastal High Hazard Areas and Coastal A Zones shall account for the following:

1. Waves breaking against the side or underside of the structure;
2. Drag, inertia, and other wave-induced forces acting on structural members supporting elevated structures;
3. Uplift forces from breaking waves striking the undersides of structures;
4. Wave runup forces including those deflected by the structure; and
5. Erosion and scour.

4.3 SITING

New construction and substantial improvements within Coastal High Hazard Areas and Coastal A Zones shall

1. Be located landward of the reach of mean high tide;
2. Be sited landward of shoreline construction setbacks; and
3. Not remove or otherwise alter sand dunes and mangrove stands, unless the alterations will not reduce the wave and flow dissipation characteristics of the sand dunes or mangrove stands.

4.4 ELEVATION REQUIREMENTS

The bottom of the lowest horizontal structural member of the lowest floor shall be at or above the Design Flood Elevation (DFE), in conformance with the requirements of Table 4-1. The actual required height above the DFE shall be determined by the structure category and the orientation of the lowest horizontal structural member relative to the direction of wave approach. Piles, pile caps, footings, mat or raft foundations, grade beams, columns, and shear walls designed and constructed in accordance with Section 4.5 shall not be required to meet the elevation requirements of Table 4-1.

4.5 FOUNDATION REQUIREMENTS

4.5.1 General

Foundation systems located in Coastal High Hazard Areas and Coastal A Zones shall be designed to minimize forces acting on that system. Foundation

TABLE 4-1. Minimum Elevation of Bottom of Lowest Supporting Horizontal Structural Member of Lowest Floor Relative to Base Flood Elevation (BFE) or Design Flood Elevation (DFE)—Coastal High Hazard Areas and Coastal A Zones

Structure Category[a]	Member Orientation Relative to the Direction of Wave Approach	
	Parallel[b]	Perpendicular[b]
I	DFE	DFE
II	DFE	BFE + 1 ft or DFE, whichever is higher
III	BFE + 1 ft or DFE, whichever is higher	BFE + 2 ft or DFE, whichever is higher
IV	BFE + 1 ft or DFE, whichever is higher	BFE + 2 ft or DFE, whichever is higher

[a] See Table 1-1 for structure category descriptions.
[b] Orientation of lowest horizontal structural member relative to the general direction of wave approach: parallel shall mean less than or equal to +20 degrees from the direction of approach; perpendicular shall mean greater than +20 degrees from the direction of approach.

systems shall be free of obstructions and attachments that will transfer flood forces to the structural system or that will restrict or eliminate free passage of high velocity flood waters and waves during design flood conditions.

Structures shall be supported on piles, columns, or walls serving as shear walls. Spread footing, mat, or raft foundations shall not be used unless the top of the spread footing, mat, or raft foundation is below the eroded ground elevation. Piles shall extend upward to a point at or above the DFE, as required by Table 4-1. Columns shall be connected to and extend upward from the spread footing, mat, or raft foundation to a point at or above the DFE, as required by Table 4-1. Shear walls shall comply with the requirements of Section 4.5.11.

Where surface or subsurface conditions consist of nonerodible soil that prevents the use of pile or deeply embedded column foundations, spread footing or mat foundations shall be permitted provided they are anchored, if necessary to prevent sliding, uplift, or overturning, to nonerodible soil with sufficient strength to withstand forces from the combination of loads in Section 1.6.2.

4.5.2 Special Geotechnical Considerations

In addition to the requirements of Section 1.5.3, foundation design shall account for instability and decreased structural capacity associated with erosion due to wind, waves, currents, local scour, storm-induced erosion, and shoreline movement.

4.5.3 Foundation Depth

The foundation shall extend to a depth sufficient to provide the support required in Section 1.5.3, taking into account the erosion and scour of the supporting soil during the design flood, and shoreline movement, as predicted by an erosion analysis.

4.5.4 Use of Fill

Fill material used for structural support shall not be permitted in Coastal High Hazard Areas and Coastal A Zones. Placement of nonstructural fill for minimal site grading and landscaping, and to meet local drainage requirements, shall be permitted. Placement of nonstructural fill under and around a structure for dune construction or reconstruction shall be permitted if the fill will not result in wave runup, ramping, or deflection of floodwaters that cause damage to structures.

4.5.5 Pile Foundations

Except as provided for under Section 4.5.1, all foundations constructed in erodible soils shall be founded on piles. Piles that are jetted or installed in an augured excavation shall be seated by driving.

In erodible soils, pile tip penetration shall be to a minimum depth of 10 ft below mean water level (−10 ft MWL), unless the design demonstrates that pile penetration to a shallower depth will provide the support and stability required by Section 4.5.3. In the event that unexpected conditions are encountered during construction and refusal or design friction capacity

is not reached during pile installation, additional geotechnical investigations and a revised pile design shall be completed.

The design shall consider that local scour and liquefaction of the erodible soil during design flood conditions will render as nonsupportive, the soil at least to a depth of two times the pile diameter (round pile) or two times the diagonal (rectangular pile) below the ground elevation at the point of pile penetration after flood- or storm-induced erosion has been considered. This nonsupportive soil shall not be considered in the design. Calculation of local scour effects during design flood conditions shall include the interactive effects of pilings or other foundation elements in close proximity to one another.

4.5.5.1 Attachments to Piles

Pile design shall account for the additional loads resulting from any attachments to the piles and shall account for increased scour around the base of the pile.

Bracing used for lateral support of pile foundation systems shall be in accordance with Section 4.5.10.

4.5.5.2 Piles Terminating in Caps at or Below Grade

Foundations composed of a number of single piles or pile clusters terminating in reinforced concrete pile caps at or below grade shall be designed for the combination of loads in Section 1.6.2. Embedment of the pile into the pile cap shall be sufficient to resist separation of the two. Embedment shall not be less than that specified by Section 4.5.6.

The pile cap shall be designed and constructed to be structurally stable, without relying on supporting soil around or under the cap. Pile-to-pile cap and pile cap-to-column connections shall be designed to withstand expected hydrodynamic forces including wave and debris impact.

4.5.5.3 Piles Extending to Superstructure (Structure Framing)

The portion of a pile that extends above the eroded ground elevation to elevate a structure shall be designed as a column. Pile spacing shall take into account the design bearing capacity, uplift, and overturning resistance.

Bracing shall be provided in accordance with Section 4.5.10.

4.5.5.4 Wood Piles

Wood piles shall be preservative treated in accordance with Section 5. Consideration shall be given to the use of pile fittings at the butt, tip, and at designated intervals along the pile length for the protection of piles during installation. Round timber piles shall conform to ASTM D 25 *Standard Specification for Round Timber Piles,* Ref. [7].

Round piles shall have a minimum diameter of 8 in. at the tip. The minimum size for square piles shall be 8 in. on a side where the exposed pile length (after accounting for scour and erosion) is equal to or less than 12 ft and shall be 10 in. on a side where the exposed pile length (after accounting for scour and erosion) is greater than 12 ft.

Wood piles that are directly connected to beams supporting an elevated lowest floor shall be individually secured thereto by means of at least two hot-dipped galvanized or stainless steel bolts, nuts, and washers, of sufficient size and number to resist the forces resulting from the combinations of loads in Section 1.6.2.

4.5.5.5 Steel H Piles

Steel piles of rolled HP sections or built-up sections shall consist of a corrosion resistant material or be protected from corrosion by a corrosion resistant coating or by cathodic protection, in accordance with Section 5. Built-up sections shall have a web thickness equal to the flange thickness; the web and flange shall be continuously welded together.

The metal thickness shall be based on the loss of section due to corrosion, unless corrosion protection is provided in the form of concrete, bituminous, or plastic (epoxy) coatings or cathodic protection. The minimum allowable thickness of the metal shall be 0.4 in. Damage to coatings during installation shall be avoided, and, if damage occurs, repairs shall be made in accordance with manufacturers' recommendations and applicable codes, standards, and regulations.

Pile tip reinforcing, splicing, fittings, and cap plates shall be provided, as required.

4.5.5.6 Concrete-Filled Steel Pipe Piles and Shells

Steel components of concrete-filled steel pipe piles and shells shall be protected with a corrosion resistant coating, in accordance with Section 5.

Pipe for concrete-filled steel pipe piles shall conform to ASTM A 252 *Standard Specification for Welded and Seamless Steel Pipe Piles,* Ref. [8]. Pile tip reinforcing, splicing, fittings, and cap plates shall be specified as required. Flat steel plates closing the tip of pipe piles shall be of a diameter not greater than 3/4 in. more than the outside diameter of the pipe.

The slump of concrete and maximum size of coarse aggregate used in concrete to be placed in piles

shall be specified with consideration given to the difficulty of placement conditions.

4.5.5.7 Prestressed Concrete Piles and Precast Concrete Piles

Prestressed concrete piles and precast concrete piles shall be designed, manufactured, and installed in accordance with Section 5.

Pile dimensions shall be 10 in. minimum for piles of uniform section and 8 in. minimum for tapered piles.

For piles subject to exposure from brackish water, seawater, or spray from these sources, cover for reinforcement shall be not less than 3 in. for precast concrete piles and not less than 2-1/2 in. for prestressed concrete piles.

4.5.5.8 Cast-in-Place Concrete Piles

Concrete and steel reinforcement used in cast-in-place concrete piles shall conform to the requirements of ACI 318 *Building Code Requirements for Structural Concrete,* Ref. [4].

4.5.6 Pile Design

4.5.6.1 Pile Capacity

Piles shall be designed to carry the loads imposed by the combinations of loads in Section 1.6.2 and to withstand installation forces.

Unless exceeded by moments indicated by analysis of applied loads, the piles shall be designed for a minimum moment produced by an eccentricity of 0.10 times the equivalent diameter of the pile times the axial load on the pile.

The minimum required lateral resistance of an individual pile shall be at least 5% of the axial load on the pile.

4.5.6.2 Capacity of the Supporting Soils

Soil values pertaining to friction, end bearing resistance, and settlement of single piles and pile groups shall be based on the geotechnical characteristics of the soil as required by Section 1.5.3.1.

For piles spaced more than three pile diameters apart, measured center to center, the diameter of the soil that shall be assumed reacting laterally on each pile shall have a maximum equivalent diameter equal to three times the diameter of the pile.

4.5.6.3 Minimum Penetration

Pile penetration into acceptable bearing strata shall be a minimum depth sufficient to allow distribution of the pile load to the supporting soils, including a consideration for reduction in soils due to the effects of scour and erosion, in accordance with Section 1.5.3.2 and/or Section 4.5.3.

4.5.6.4 Foundation Pile Spacing

Pile spacing shall be not less than 8 ft as measured center to center, unless otherwise justified by a geotechnical analysis and the foundation design.

4.5.6.5 Pile Caps

Pile caps shall be constructed with their tops at or below grade. The design shall provide for the effects of scour and erosion. Piles shall be designed to carry the total superimposed vertical load from the structure above with no allowance made for the supporting value of the soil under the pile caps. Pile caps and piles shall be designed to resist lateral flood loads acting on pile caps and pile sections exposed by erosion and scour.

4.5.6.6 Timber Pile Connections

For timber piles, bolts for cap-to-pile or beam-to-pile connections shall be 5/8 in. in diameter minimum. Bolt holes shall be staggered with a maximum diameter of 1/16 in. greater than the bolt diameter. The dimension from the edge of the holes to the pile or beam edge shall be 2 in. minimum. Notching of pile tops shall not exceed 50% of the pile cross section. Other pile-to-beam connections are acceptable provided they are demonstrably equal to or superior than the applications and do not depend upon nailing for attachment of individual members.

For timber piles not in tension, and connected to timber caps, the tops of the piles shall be secured to the caps with spiral-drive drift bolts, metal plates, or bolted timber scabs.

For timber piles not in tension, and connected to concrete caps, the tops of the piles shall have a minimum 4 in. embedment into the concrete pile caps.

For timber piles in tension, piles shall be embedded into pile caps a minimum of 6 in., with a connection designed for tension made to pile caps. Connections to timber caps shall be made with timber scabs or metal straps, and headed bolts.

Connections of timber piles in tension to concrete pile caps shall have the tops of the piles embedded to satisfy requirements of shear stress in the timber (parallel to grain) and shear stress in the concrete. Connections shall be made with metal straps, headed bolts, or other forms of positive tension resisting devices that develop the necessary shear in the concrete without causing failure of the wood.

area shall be installed using methods and practices which minimize flood damage. Manufactured homes shall be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement. Methods of anchoring are authorized to include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

SECTION G601
RECREATIONAL VEHICLES

G601.1 Placement prohibited. The placement of recreational vehicles shall not be authorized in *flood hazard areas* subject to high velocity wave action and in *floodways*.

G601.2 Temporary placement. Recreational vehicles in *flood hazard areas* shall be fully licensed and ready for highway use, and shall be placed on a site for less than 180 consecutive days.

G601.3 Permanent placement. Recreational vehicles that are not fully licensed and ready for highway use, or that are to be placed on a site for more than 180 consecutive days, shall meet the requirements of Section G501 for manufactured homes.

SECTION G701
TANKS

G701.1 Underground tanks. Underground tanks in *flood hazard areas* shall be anchored to prevent flotation, collapse or lateral movement resulting from hydrostatic loads, including the effects of buoyancy, during conditions of the design *flood*.

G701.2 Above-ground tanks. Above-ground tanks in flood hazard areas shall be elevated to or above the design *flood* elevation or shall be anchored or otherwise designed and constructed to prevent flotation, collapse or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, during conditions of the design *flood*.

G701.3 Tank inlets and vents. In *flood hazard areas*, tank inlets, fill openings, outlets and vents shall be:

1. At or above the design flood elevation or fitted with covers designed to prevent the inflow of floodwater or outflow of the contents of the tanks during conditions of the design *flood*.
2. Anchored to prevent lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, during conditions of the design *flood*.

SECTION G801
OTHER BUILDING WORK

G801.1 Detached accessory structures. Detached accessory structures shall be anchored to prevent flotation, collapse or lateral movement resulting from hydrostatic loads, including the effects of bouyancy, during conditions of the design *flood*. Fully enclosed accessory structures shall have flood openings to allow for the automatic entry and exit of *flood* waters.

G801.2 Fences. Fences in floodways that may block the passage of floodwaters, such as stockade fences and wire mesh fences, shall meet the requirement of Section G103.5.

G801.3 Oil derricks. Oil derricks located in *flood hazard areas* shall be designed in conformance with the flood loads in Sections 1603.1.7 and 1612.

G801.4 Retaining walls, sidewalks and driveways. Retaining walls, sidewalks and driveways shall meet the requirements of Section 1803.4.

G801.5 Prefabricated swimming pools. Prefabricated swimming pools in *floodways* shall meet the requirements of Section G103.5.

SECTION G901
TEMPORARY STRUCTURES AND TEMPORARY STORAGE

G901.1 Temporary structures. Temporary structures shall be erected for a period of less than 180 days. Temporary structures shall be anchored to prevent flotation, collapse or lateral movement resulting from hydrostatic loads, including the effects of buoyancy, during conditions of the design *flood*. Fully enclosed temporary structures shall have flood openings to allow for the automatic entry and exit of floodwaters.

G901.2 Temporary storage. Temporary storage includes storage of goods and materials for a period of less than 180 days. Stored materials shall not include hazardous materials.

G901.3 Floodway encroachment. Temporary structures and temporary storage in floodways shall meet the requirements of G103.5.

SECTION G1001
UTILITY AND MISCELLANEOUS GROUP U

G1001.1 Utility and miscellaneous Group U. Utility and miscellaneous Group U includes buildings that are accessory in character and miscellaneous structures not classified in any specific occupancy in the *International Building Code*, including, but not limited to, agricultural buildings, aircraft hangars (accessory to a one- or two-family residence), barns, carports, fences more than 6 feet (1829 mm) high, grain silos (accessory to a residential occupancy), greenhouses, livestock shelters, private garages, retaining walls, sheds, stables and towers.

G1001.2 Flood loads. Utility and miscellaneous Group U buildings and structures, including substantial improvement of such buildings and structures, shall be anchored to prevent flotation, collapse or lateral movement resulting from flood loads, including the effects of buoyancy, during conditions of the design *flood*.

G1001.3 Elevation. Utility and miscellaneous Group U buildings and structures, including substantial improvement of such buildings and structures, shall be elevated such that the lowest floor, including basement, is elevated to or above the design