YAVAPAI COUNTY FLOOD CONTROL DISTRICT

1120 COMMERCE DRIVE
PRESCOTT, AZ 86305
928.771.3197 PHONE
928.771.3427 FAX

10 S. 6TH STREET
COTTONWOOD, AZ 86326
928.639.8151 PHONE
928.639.8118 FAX

www.ycflood.com

SUMMARY OF REQUIREMENTS FOR CONSTRUCTION IN FLOOD HAZARD ZONES WHERE BASE FLOOD ELEVATIONS HAVE BEEN ESTABLISHED

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The following summary is provided only as a general guideline for developing in a delineated 100-year flood hazard area. For specific requirements and answers to your questions, contact the District office.

Meeting these requirements does not supersede or eliminate the need for other applicable Local, State and Federal requirements, such as protective covenants, zoning ordinance provisions, Environmental Health Provisions, U.S. Army Corps Of Engineers 404 Permits, or Arizona Department of Environmental Quality (ADEQ) 401 Certification.

FLOODFRINGE

Residential Structure - (Site Built and Manufactured Homes)

When building a residential structure in the floodfringe area of the 100-year floodplain the following is required prior to the issuance of the building permit:

A. The structure must be elevated a minimum of one foot above the 100-year base flood elevation. Therefore, an elevation of floodplain property survey performed by a registered land surveyor licensed in the State of Arizona is required.

This survey must be submitted on forms supplied by the Flood Control District. The survey must contain the following:

1. The date the survey was performed.

2. The assessor's tax parcel number, and lot and subdivision, when available.

3. The owner's name.

4. The base benchmark description and elevation. This benchmark must be on the floodplain elevation circuit with a designated "RM" (Reference Mark). "RM" data is available from the Flood Control District Office, or via the Flood Control District's Property Search Tool located on its website. Elevation information must be provided on the NAVD 1988 datum, unless otherwise advised by the District.

5. Property benchmarks, locations and elevations. A minimum of two local benchmarks needs to be placed on the parcel. One should be placed in an area, possibly at one of the property corners, where it will not be disturbed or destroyed. This benchmark will be needed for completion of under-construction and final Elevation Certificates during construction of the structure. A second local benchmark should be placed at the proposed building site that is easily accessible during construction. Additional benchmarks may be necessary depending upon the site conditions.

6. The survey must be sealed with a valid registration number of a registered land surveyor, licensed in the State of Arizona.

Once all the required information is supplied to the District and approved, a development permit will be issued stating what the required elevation is, to either:

(a) The lowest floor, for a site built structure, as well as any equipment that services the building.

(b) To the bottom of the structural frame or lowest point of any attached appliances for a manufactured home, as well as any equipment that services the building.

Subsequent elevation surveys, on an Elevation Certificate, will be required once the manufactured home is placed on the parcel, or when the lowest finished floor is completed for a site built structure. An under-construction survey certifies that the structure is at or exceeds the required minimum elevation, prior to the remaining portion of a site-built structure or foundation system being built, so there is an opportunity to correct any deficiencies before walls are constructed. A final Elevation Certificate will be required once construction is complete. The Certificate of Occupancy will not be issued until this final Elevation Certificate is submitted.

Note: If a regulatory mapped floodway is either on or adjacent to the parcel, development and/or construction must be a minimum of 20 feet from the edge of the floodway.

B. Foundation Systems shall be designed and constructed so as to offer minimum obstruction to the flow of floodwaters. Structures should be aligned parallel to flow.

1. All new site built construction and substantial improvements shall be designed and constructed to prevent flotation, collapse or lateral movement of the structure. The common methods of elevating residential structures are earthen fill, elevated foundation, shear walls, posts, piles, and piers. These techniques have varying effectiveness under certain flood conditions. Flood hazard conditions at the site must be evaluated carefully before choosing a particular technique.

   A foundation plan must be submitted to the District illustrating how the structure will be elevated. Depending on the flood hazards (depth and velocity) associated with the site, the foundation system may need to be designed by a professional engineer, registered and licensed in the State of Arizona. Typically, a depth of flow greater than 2 feet and/or a floodwater velocity greater than 5 feet per second will require an engineered foundation design. The foundation must be designed to withstand all anticipated forces including the weight of the home (live and dead loads). Hydrodynamic (velocity impact, drag, and scour potential), hydrostatic (lateral and buoyancy), and debris impact flood forces must all be considered, as well as wind forces, which act above the flood levels. All plans that are submitted to Development Services for construction within a Special Flood Hazard Area must include Minimum Finished Floor Elevation and its relationship to the Regulatory Flood Elevation, location and size of openings that meet the National Flood Insurance Program (NFIP) qualifications of flood venting, location and elevation of any

equipment that services the building (HVAC, hot water heater, electrical equipment, etc.), and location of propane tank (if applicable), and method of anchoring. As-built drawings and certification by a registered professional engineer, licensed in the State of Arizona, may be required for any engineered foundation design, prior to the release of the Certificate of Occupancy.

2. All new and replacement manufactured homes and additions to manufactured homes shall be securely anchored to an adequately designed foundation system to resist flotation, collapse, and lateral movement. Typically, the use of normal jack stands as a method of installation will not meet the above requirements (see B.1 above).

3. Fill, if used to elevate structures, must meet all of the following standards:

a. The top of such fill shall be at no point lower than the Regulatory Flood Elevation.
b. Such fill shall extend at least 15 feet beyond the walls or supporting frame of the structure.
c. Fill must be placed and compacted in accordance with the currently adopted building codes within Yavapai County.
d. Fill shall not interfere with local drainage or tributary flow to the channel of any watercourse.

Fill proposed in excess of the volume and extent required herein must be shown to have no detrimental effect. The amount of fill cannot be greater than is necessary to achieve the purpose for which it is intended as demonstrated by a plan submitted by the applicant indicating the uses to which the filled land will be put and the final dimensions and extent of the proposed fill. Fill shall not include junk, trash, wood or other buoyant, deleterious, or hazardous material and shall be protected as needed against scour and erosion by riprap or other protective measures as approved by the Floodplain Administrator.

C. All electrical heating, ventilation, plumbing, air conditioning equipment and other service facilities shall be designed and/or located above the Regulatory Flood Elevation so as to prevent water from entering or accumulating within the components during flood conditions.

D. A septic system placed in the floodfringe area of the 100-year floodplain must be a sealed system. The method to seal a septic tank is available at the Flood Control District Office or from the Environmental Unit within the Development Services Department.

E. If the proposed construction is an addition, attached to an existing structure and the existing structure has a grandfathered status (generally meaning a legal structure completed prior to August 19, 1985), certain requirements apply (see FLOODWAY SECTION D.)

F. Any proposed propane tank within a Special Flood Hazard Area that is not elevated to the Regulatory Flood Elevation must be securely anchored per current FEMA and National Flood Insurance Program (NFIP) standards.

Non-Residential Structure

A. Non-residential construction shall either be elevated in conformance with the District Ordinance, Section 5.1.C.1, 2, and 4, or together with attendant utility and sanitary facilities:

1. Be flood-proofed so that below the regulatory flood level the structure is watertight with walls substantially impermeable to the passage of water;
2. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

3. Be certified by a registered professional engineer or architect that the standards of this subsection and current NFIP standards are satisfied. Such certifications shall be provided to the Floodplain Administrator.

Attached Garage (Barn)

When constructing a non-residential structure in the floodfringe area such as a garage or barn, the following is required:

A. If the main residence (that the garage is being attached to) is grandfathered, the garage can be built if it does not exceed the 50% market value of the existing structure. If it does exceed the 50% the existing structure must then be brought into full compliance with all requirements for development in a floodfringe area.

B. If the existing structure (that the garage is being attached to) is not grandfathered the following is required.

1. If feasible, the structure should be elevated to a minimum height of one foot above the 100-year Base Flood Elevation (Regulatory Flood Elevation).

2. If the structure is built below the base flood elevation it must be constructed in a manner to prevent floatation, collapse, and lateral movement. A structural analysis prepared by a registered professional engineer licensed in the State of Arizona, may be required depending on the flood hazard (depth and velocity) associated with the site. The structure must also be designed with a minimum of two openings on a minimum of two sides of the structure, having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding. Openings shall be no higher than one foot above grade.

3. The garage (barn) must be used solely for storage, parking of vehicles, and/or building access.

4. No machinery or equipment which service a building such as furnaces, air conditioners, heat pumps, hot water heaters, washers, dryers, elevator lift equipment, electrical junction and circuit breaker boxes, and food freezers, are permitted below the regulatory flood elevation.

5. All interior walls, floor and ceiling materials located below the regulatory flood elevation must be unfinished and resistant to flood damage.

NOTE: If laundry equipment or a workshop is placed in an attached garage, it would no longer be used solely for parking, building access, or storage, and the floor of the garage would have to be considered the lowest floor of the structure according to the National Flood Insurance Program (NFIP) criteria.

Detached Garage (Barn)

A proposed detached garage (barn) would not be subject to the regulations under grandfathered status.

If the proposed structure constituted a minimal investment, and is used only for parking of vehicles or limited storage, all requirements from B.1 through B.5, as listed above would apply.

If the garage (barn) constituted a larger investment it would then normally fall under the residential requirements. Special cases will be handled on an individual basis.

FLOODWAY

Encroachments in floodways are prohibited, including fill, new construction, substantial improvements, and other development unless:

A. Certification by a registered professional engineer, registered and licensed in the State of Arizona, is provided demonstrating that:

1. The encroachment(s) shall not result in any increase in flood levels or loss of floodway conveyance. A "Certificate of No-Rise" shall accompany all certification calculations and documentation. The formula used to determine conveyance (K) is as follows:

$$K=1.49/nAR^{2/3}$$

Where:

n	=	Manning's roughness coefficient
A	=	Flow Area (ft^2)
R	=	Hydraulic radius (ft)

The conveyance should be computed using the proper "n" values and hydraulic radius at the site of the encroachment. In the event that there is a loss in conveyance as a result of the proposed encroachment, the engineer may adequately compensate for this loss. This compensation is accomplished by including some ***permanent*** means or measures with the proposed floodway development for providing an increase in effective conveyance, at some point on the cross section, equal to or greater than that lost. Equal area exchanges are only valid if the "n" value and hydraulic radius remain unchanged between the encroachment site and the compensation site. It is also important that the flow area provided is truly effective; that is, open to inflow and outflow and not just an isolated low spot or depression. The means and measures used to provide this effective conveyance (e.g. excavation, roughness coefficient reduction) would be at the discretion of the engineer but must be approved by the District.

2. That the structural integrity of the development is not susceptible to the base flood velocities, bed scour and other physical mechanisms during the occurrence of a 100-year flood event.

NOTE: Refer to **"YAVAPAI COUNTY DRAINAGE DESIGN MANUAL"** located on the Yavapai County Flood Control District website for Manning's roughness coefficient values

B. If a structure is allowed to be constructed in the floodway the lowest finished floor must be elevated a minimum of one foot above the 100-year base flood elevation (regulatory flood elevation) and be designed on an open to flow foundation.

C. In order to place a sealed septic system on a parcel located in the floodway of a mapped 100-year floodplain a variance must be granted. In some cases a scour analysis must be performed and supplied to the Flood Control District to support the variance request, particularly if the site is subject to high floodwater depth and/or velocity. Requirements for sewage disposal systems in a floodway are available at the Flood Control District Office and the Environmental Unit of the Development Services Department.

D. If the proposed construction is an addition attached to an existing structure, that has legal use and was built prior to August 19, 1985, the existing structure would have a grandfathered status. The addition could be built onto the existing structure as long as the new construction did not exceed 50% of the market value of the existing structure. However, the District does not recommend construction below the base flood elevation. If the proposed new construction does exceed the 50% market value of the existing structure, it would be considered a substantial improvement and would then have to comply with the requirements as stated above. Improvements to an existing structure are cumulative and t racked by the Flood Control District. Multiple smaller projects can add up cumulatively to the 50% figure, eventually requiring the entire structure be brought into compliance with current regulations.

E. If the proposed encroachment in the floodway is a manufactured home, the same requirements as stated above apply together with the following:

1. The home must be on a permanent open to flow foundation (see FLOODFRINGE, SECTION B. Foundation Systems).

2. The home must be securely anchored to the ground/foundation system to resist flotation, collapse and lateral movement.

3. The manufactured home must be elevated so the bottom of the structural frame or the lowest point of any attached appliances, whichever is lower, is at least one (1) foot above the 100-year base flood elevation (regulatory flood elevation).

F. An elevation of floodplain property survey and subsequent Elevation Certificates are also required as previously outlined. (FLOODFRINGE, SECTION A.)

NOTE: Because floodway development is contradictory to the tenets of sound floodplain management, the Federal Emergency Management Agency discourages such development.