Yavapai County Flood Control District

Newsletter
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WWW.YCFLOOD.COM

Inside this issue:

Websites for other related organizations:

AZ Dept of Water Resources
www.azwater.gov

AZ Dept of Environmental Quality
www.azdeq.gov

AZ Division of Emergency Management
www.dem.azdema.gov

CORPS of Engineers
www.usace.army.mil

Federal Emergency Management Agency
www.fema
www.floodsmart.gov

National Weather Service
www.weather.gov

National Resource Conservation Service
www.nrcs.usda.gov

US Environmental Protection Agency Region IX
www.epa.gov/aboutepa/region9

March is Flash Flood Safety Awareness Month

Floods are the number one weather-related killer in the United States, and Arizona is particularly susceptible to life threatening floods.

A flash flood is a rapid rise in water that occurs in a short period of time after a heavy rainfall or a rain-on-snow event. The flood is a high velocity event that can include mud, rock and other debris. Northern Arizona is particularly susceptible because of our steep terrain, sparse vegetation, and wildfire burn scars. Flash floods occur most often during the summer monsoon months, but can occur any time.

Hikers gravitate toward the beautiful canyons and campers are drawn to set up camp in the flat bottoms of dry washes, yet care should be taken when planning your trip. Always check the weather forecast and be prepared to change your plans if storms threaten. While out, continually check for changing weather. Never camp in a dry wash and be prepared to move to higher ground if waters start to rise. Do not attempt to cross a flowing stream on foot as 6 inches of rapidly flowing water can knock you off your feet. Be sure to check with local land management agencies regarding the flash flood dangers in their area.

Slide Rock under normal conditions, left, and during a flash flood.

Yavapai County is a StormReady Community

Each year, our country sees an average of 10,000 thunderstorms, 5,000 floods, 1,000 tornadoes, and 2 land-falling deadly hurricanes, not to mention winter storms, excessive heat and high winds. Approximately 90% of presidentially-declared disasters are weather-related. In 2009, Yavapai County was declared as a StormReady community by the National Weather Service.

The StormReady program was established to help community leaders and emergency managers strengthen their local hazardous weather operations. The NWS gives communities the skills and education needed to survive severe weather before and during an event.

Tasks involved in qualifying for the program include establishing a 24-hour warning point and emergency operations center, having more than one way to receive severe weather forecasts and warnings and to alert the public, creating a system that monitors local weather conditions, promoting the importance of public readiness through community seminars, and developing a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Storm Ready communities are better prepared to save lives from the onslaught of severe weather through better planning, education and awareness. Communities have fewer fatalities and less property damage if they plan before dangerous weather arrives. It is important to note that StormReady does not mean storm proof. For more information on StormReady communities, go to www.nws.noaa.gov/stormready.

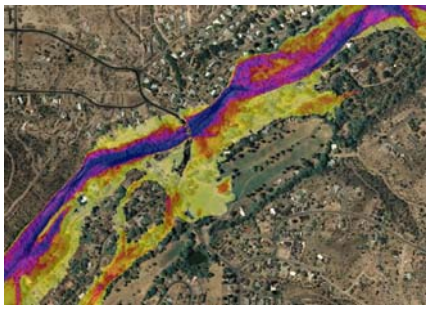
Non-Regulatory Products

The FEMA Flood Insurance Rate Maps (FIRMs) are used to determine that a structure is either in or out of the floodplain. What they don't show is the true level of risk for that structure. A house in an area expected to see water flowing at a depth of 1 foot and a velocity of 2 feet per second during the base flood is shown at the same risk as a house expected to see water flowing at a depth of 8 feet and a velocity of 20 feet per second.

The funny thing is these differences in velocity and depth are already modeled in the creation of the simpler floodplain maps.

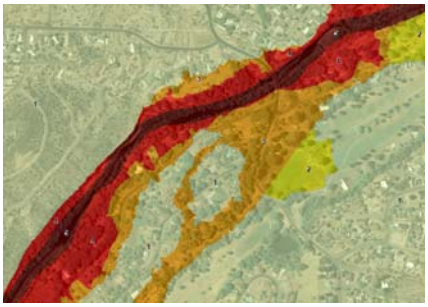
As part of the RiskMAP program, FEMA has developed criteria for a set of non-regulatory products. They are datasets that can be used to better map the risks of a floodplain, including depth and analysis grids and flood risk assessment. Yet they are non-regulatory because they cannot be used in determining the floodplain status of a structure. So why create them? The District is creating datasets that allow us to map the true level of risk to determine requirements for building in the floodplain. This way, the structure expecting flows at 2 feet per second is not required to meet the same standards as a property expecting flows at 20 feet per second.

A sincere thank you to Linda Potter of Atkins North America, Inc. for providing the non-regulatory products.



Depth Map

Velocity Map



Risk Zones based on depth and velocity

Agriculture and Stormwater Pollution

Agriculture along stream banks plays its part in the health of the water system. Lack of vegetation on stream banks can lead to erosion. Overgrazed pastures can also contribute to excessive amounts of sediment to local water bodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

What you can do

- Keep livestock away from stream banks and provide them with a safe water source away from natural water bodies.

- Store and apply manure away from water bodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.
- Construct stream crossings so that they minimize erosion and physical changes to streams.

Gauge of the Month

CYFD @ OUTER LOOP RD.

Gauge ID: 3810

Gauge Type: Precipitation

Primary Watershed: Verde River

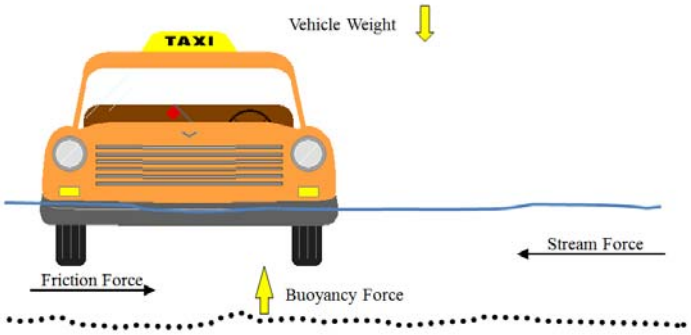
Secondary Watershed: Mint Wash

Installed 5/18/2005

The Power of Water

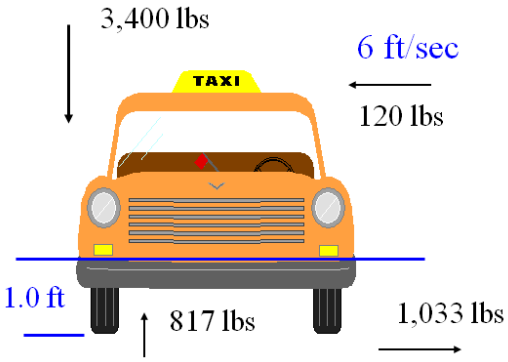
At some point in time, just about everyone who drives in Arizona is faced with the decision to cross an active low water crossing or not. Life is very busy, and we have places to be. But let's take a moment to look at what is really going on in that low water crossing.

First, the math. Archimedes' Principal tells us that the buoyant force on an object is equal to the weight of the fluid that is displaced by that object. Water weighs 62.4 pounds per cubic foot. Add to that the fact that the ground below your car, be it sand, dirt or gravel, provides less friction to hold your car in place when it is under water. Finally, the pressure exerted by moving water increases with the square of its velocity. In other words, a small increase in velocity equals a large increase in pressure. As a result, a car will travel downstream when the stream force is greater than the friction force.

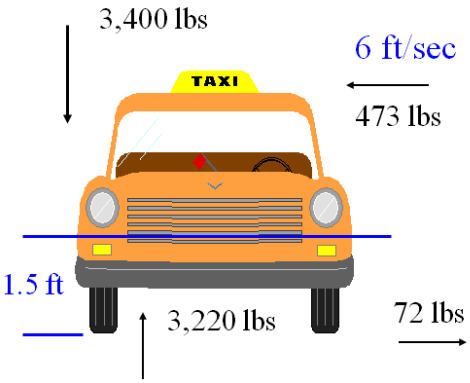


Let's look at a typical SUV. The width is 5.5 feet, the length is 14 feet, and the ground clearance in 10 inches. The vehicle weighs 3,400 pounds. One foot of water displaced by this vehicle weighs 4,805 pounds. It takes less than 22 inches of water on the ground to make this vehicle buoyant.

Let's look at how quickly a crossing becomes dangerous as the water starts getting deeper. When the water is one foot deep, the weight of the vehicle, 3,400 pounds, minus the weight of the water displaced, 817 pounds, is 2,583 pounds. Multiply that by 0.4 to get a friction force of 1,033 pounds. At 6 feet per second, the stream force is 120 pounds, quite a bit less than the friction force. The vehicle stays put.



When we add six inches to the depth of the water, the new equation is 3,400 pounds—3,220 pounds = 180 pounds, creating a friction force of 72 pounds. The stream force increases to 473 pounds, taking this vehicle downstream.



Here is something else to keep in mind: roads are often damaged, and sometimes completely destroyed, when water is flowing, yet the flowing water conceals the road's condition. Even when the water seems shallow, the road may be washed out. In addition, flash floods rarely last longer than an hour, and oftentimes a road can be cleared in 15 minutes. It is worth the wait to stay put until the water passes.

If you absolutely must cross a flooded stream, enter slowly and immediately back out if the front axle is submerged. If your vehicle stalls in the wash, look upstream. If weather conditions are bad, get out of the vehicle and get to shore immediately. Again, before entering the stream, make sure you cannot wait one hour for the conditions to improve.

When driving around Yavapai County, make sure you are aware of weather conditions in your watershed. When crossing a wash, take a moment to look upstream at the weather. It may not be raining by you, but rain upstream will soon be coming your way. Also, know where to get weather information. Good sources are a NOAA weather radio, radio stations, the National Weather Service, the Weather Channel and the internet. Smart phone users can download applications from NOAA and the Weather Channel that will send notification of weather alerts in the area.

Most importantly, be safe out there.

A sincere thank you to Steve Waters and the Flood Control District of Maricopa County for the use of the graphics and information in this article.

Floods Around the World

Different parts of the world face different challenges in dealing with floods, due to climate and economy. Here in the desert southwest, we tend to have quick floods that come in a hurry and disappear as quickly, leaving little evidence of the force that caused the destruction left behind. Other parts of the world have floods that bring in large volumes of water slowly, and leave pools of stagnant water behind for weeks. This ponding water brings a different set of problems, including an increase in mosquito population and the diseases they carry.

In 2010, parts of Pakistan experienced a slow-moving flood. In fact, the water stayed behind for so long that millions of spiders were able to cocoon the trees where they had taken refuge from the water. The areas with the cocooned trees appeared to have a significantly lower number of malaria-spreading mosquitoes, thus protecting the people where the spiders lived.

Yavapai County Flood Control District

500 S. Marina St. *Phone: 928.771.3197*
Prescott, AZ 86303 *Fax: 928.771.3427*

10 S. Sixth St. *Phone: 928.639.8151*
Cottonwood, AZ 86326 *Fax: 928.639.8118*

www.co.yavapai.az.us

Please visit the County website for more information:

- Applications, Forms and Instructions
- Building Codes
- Community Plans
- Drainage Criteria Manual
- Fees/Impact Fees
- Flood Hazard Status Reports
- Flood Protection Information
- General Plan
- Ordinances
- Regulations
- Storm Water Management Program
- Related Links & More

COUNTY TOLL FREE TELEPHONE NUMBERS

Ash Fork, Bagdad, Seligman, Yarnell	***800.771.2797***
Black Canyon City and Phoenix Area	***602.495.8800***

COUNTY SWITCHBOARD NUMBERS

Prescott 928.771.3100 - Verde Valley 928.639.8100

The Yavapai County Board of Supervisors also serve as The Board of Directors for the District.

The initial floodplain ordinance was adopted December 1981, and has been revised over the years.

The Drainage Criteria Manual, was first adopted November 1998, and revised August 2005. The current Ordinance and Drainage Criteria Manual are available on line at the County website or may be purchased at the Prescott and Cottonwood District offices.

Services Performed

The District is available for assistance or technical advice on the following topics:

- National Flood Insurance Program
- District ALERT System
- Flood Insurance Rate Maps
- Flood Status Information on a Parcel of Land
- Flood Protection & Safety
- Local Flood Hazard
- Development & Permitting within the 100 year floodplain
- Construction in or adjacent to a significant watercourse
- Storm Water Quality and Pollution Control

Flood protection information and links to other agencies are available on the County website. Go to www.ycflood.com for archived issues of this newsletter.