

A FORD ACROSS THE WAY - UNKNOWN ARTIST, 19TH CENTURY

A **ford** is a shallow place with good footing where a river or stream may be crossed by wading or in a vehicle. A ford is mostly a natural phenomenon, in contrast to a low water crossing, which is an artificial bridge that allows crossing a river or stream when water is low.

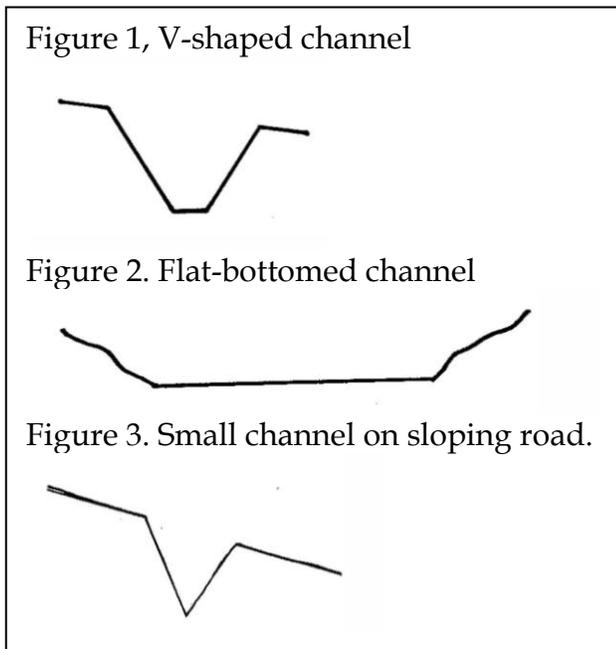
A ford is a much cheaper form of river-crossing than a bridge but it may become impassable after heavy rain or during flood conditions. A ford is therefore normally only suitable for very minor roads. Most modern fords are shallow enough to be crossed by cars and other wheeled or tracked vehicles (a process known, fittingly, as "fording"). The problem about fords is that they overflow in wet weather.

For small stream crossings on forest and farm roads, rocked fords are often preferable to culverts, bridges or

concrete slabs (Figure 1). Well-constructed rocked fords are very dependable, very low in maintenance costs and generally low to medium in construction costs.

Figure 1. Typical small rocked ford construction with roadway excavation, rock fill, end walls and apron.

The principle disadvantages of rocked fords are possible traffic delays during high water, the limitation of the ford low point on vehicle speed and the lack of rock at affordable cost in some locations. Particular advantages of rocked fords are ease of construction, use of local rock where available and ease of repair and reconstruction in case of natural changes in the channel.



Rocked fords can be designed to suit a wide variety of stream and road conditions. Design and costs are affected by differences in stream and channel conditions, expected velocity and depth of flows and planned road use (Table 1).

Commonly encountered road and channel conditions at crossing sites on ephemeral and small intermittent streams include: (1) V-shaped or steep-sided channels, (2) wide flat-bottomed channels with low banks and (3) small channels crossing a sloping road.

For larger fords, a small dozer is likely the most suitable equipment. However, a log skidder or a farm tractor fitted with earth-moving equipment may be suitable for small fords. Where surface rock is available at the site, a small ford can be constructed for little out-of-pocket cost with a farm tractor and hand labor.

On very small channels on rocky or gravelly soil, where local surface rock is available, a satisfactory ford may be constructed by placing a lower end wall with hand labor and a shallow roadway fill of rocky soil or gravel.

Excavation for Roadway Fill

In most cases, the channel should be excavated and filled with rock. On many road fords, the channel bottoms may consist of deep soils that become soft in wet weather. These channels may be excavated and rock or gravel fills provided. Where the bottom is clay soil, excavation and rock or gravel fill are always necessary. Excavation may not be needed where the bottom consists of firm sandy, gravelly or rocky soil with no clay, and a roadway fill of at least one foot of rock is provided. Where excavation is needed, it should normally be about 1½ feet in maximum depth and 4 to 8 feet of roadway length, the length depending on channel size. In cases where the fill is on clay subsoil and heavy truck use is expected, the excavation should be deeper. Excavated soil (other than clay) can be spread on the roadway approaches. The excavation should be extended to include the end wall sites. This will allow water to seep through the rock fill and minimize water standing on the ford roadway and ponding in the channel above the ford.

Roadway Rock Fill

Size of rock needed in the roadway fill depends on the ability of high flows to move the rock. This ability increases as flow velocity and depth increase. Flow depth and velocity increase with channel slope and watershed size and steepness. Size of rock in the roadway fill and depth of the fill needed are also dependent on frequency of road use, likelihood of frequent use during wet conditions and weight of vehicles. Crusher-run rock of 8 inches maximum diameter is recommended as fill for all fords that will receive heavy truck use. At locations that receive heavy truck use and where the fill must be placed on clay subsoil, larger rock should be used. In fords for light vehicle use only, fills of gravel of 1½-inch maximum diameter or larger may be satisfactory.

SAVE THE DATE!

Exciting news! - The Arizona Riparian Council will be having their annual meeting this spring in our watershed. The meeting will be held March 29 through 31. On Thursday, March 29, there will be a workshop on stream restoration projects. Friday morning will feature four invited speakers and a panel discussion on issues pertaining to the Gila River, and the afternoon will contain a technical session. On Saturday, the 31st, we will enjoy a field trip to an actual stream restoration project - the Apache Grove Project, at Larry Barney's farm. For additional information, visit the Arizona Riparian Council web site at : <http://azriparian.org>



Project and Program Status Report

ADEQ E.coli Reduction on the San Francisco River through Alternative Livestock Water on the Kaler Ranch, Phase II – The final report for the project was submitted to Elizabeth Boettcher at the Water Quality Improvement Grant Department at ADEQ. It was approved and we just received the final payment. Thank you to ADEQ for your continuing support. Phil Guertin, professor of the University of Arizona School of Natural Resources and the Environment, has indicated that he has funding to do an analysis of the cumulative effects of all of our grant projects on the Kaler ranch. We are very excited to see the completed analysis.

ADEQ Education Master Watershed Steward Program, Phase II - The next class will be held on Thursday evenings, from 6 to 9 p.m., on January 12th. There are still one or two open spaces, so register today. And remember, if you are over 55, and a resident, registration is free!

AWPF The E.coli Reduction on the San Francisco River Through Alternate Livestock Water on Kaler Ranch - We have submitted the implementation plan. We should be ready to start soon.

The AWPF Gila River Water Conservation Education - We are working with the City of Safford to make some changes in the program to reach the highest water users.

AWPF Eagle Creek Riparian Restoration at Filleman Crossing Project - We have the approval from the landowner to go ahead with the project. Jan Holder is working on final details on the contracts and agreements.

The AWPf Gila River Restoration Project at Apache Grove – The project is proceeding, and should be completed on schedule. Kris Randall, the president of the Arizona Riparian Council, announced that they would like to have their annual meeting in our watershed March 29 to 31. It will include a review of the fluvial geomorphology study, which sparked the Apache Grove project. Also included will be a field trip on the 31st to visit the project. Stephanie Yard and Allen Hayden, from Natural Channel Design, as well as Jeanne Godaire, from the BOR will discuss how the levee removal, bank restoration and re-vegetation will enhance the landowner's agricultural operation, while restoring functionality to the river.



The USFW Syfert Wildlife Watering Facility - this project has just begun. The ADWR is working on the water rights issues. Soon, Kris Randall, with the USFW Partners program, will begin the permitting process soon.

The BOR Graham County Fairgrounds Water Conservation Project - We are hoping to start soon.

Chase Creek Business Support Center and Commercial Kitchen – the project manager wrote a successful grant application to Freeport McMoRan Copper & Gold Foundation for completion funds, allowing Clifton to finish up the last construction tasks and hire staff to open the facility sometime in 2012. GWP has turned the project over fully to the Town of Clifton, which continues to collaborate with EAC Small Business Development Center.

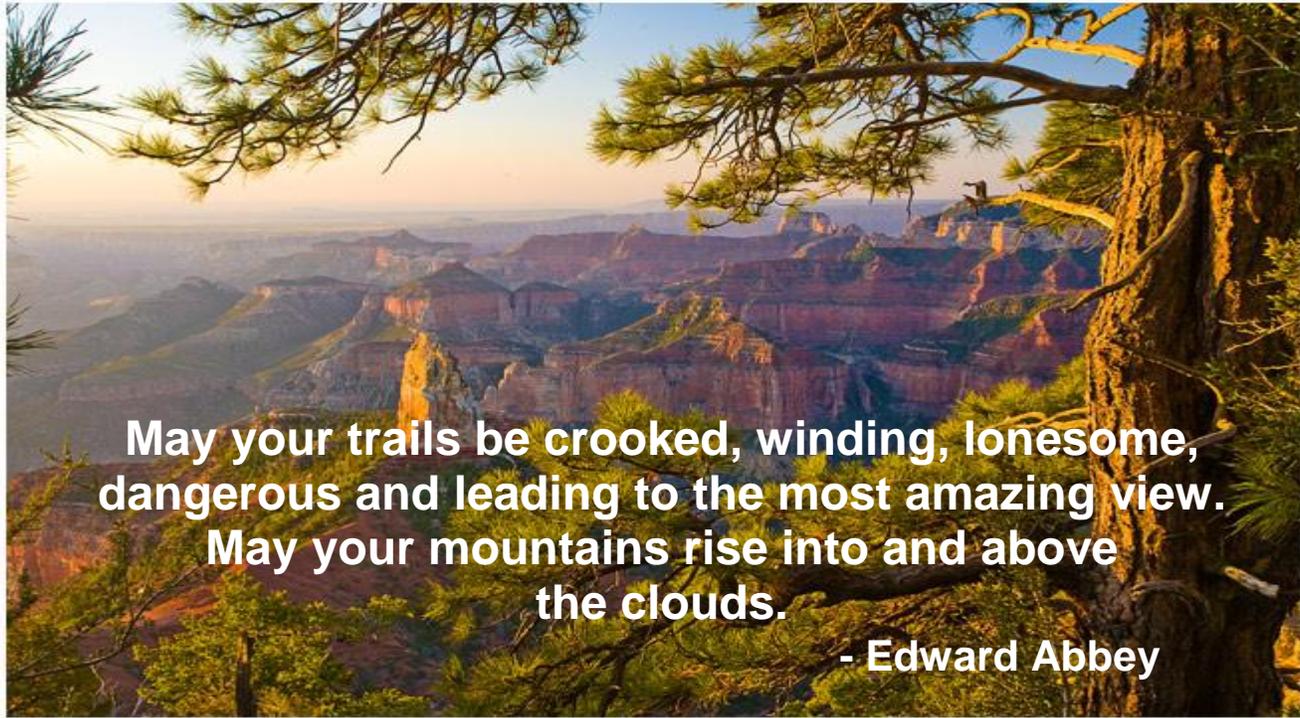
AWPF Eagle Creek Riparian Corridor Protection Project - Darcy Ely located the missing agreement with the San Carlos Apache Tribe. Jan Holder is still working on the contracts and agreements.

Business District Façade Improvements in Clifton and Duncan – storefronts up and down Chase Creek in Clifton and on Highway 70 and Main Street in Duncan are getting everything from new coats of paint to full restorations. A total of about 30 projects are in progress, with several already completed. Cost-share contributions of labor and materials by the building owners look like they will far exceed the goal set with funder Freeport McMoRan Copper & Gold Foundation.



E. coli Reduction on the San Francisco and Blue Rivers – the team is about to sit down with advisors Dr. Phil Guertin and Dr. Channah Rock to determine how to solve the last remaining puzzles regarding E. coli exceedances on the two rivers. One outcome of that meeting will be new public presentations in Greenlee County in the coming weeks so that everyone interested in this research will up to speed on findings and on directions for the last phases of research. The Master Watershed Steward course for the San Francisco-Blue watershed will begin on Monday, March 5th in Clifton; publicity will start circulating this week.

USFW Partners Eagle Creek Riparian Restoration at Filleman Crossing Project - The Partners program, administered by Kris Randall, has granted us additional funding for the project, which will be used for permits and the re-vegetation.



Calendar of Events

Wednesday, January 11, 2012,

7 p.m. Our meeting will be held at the Graham County General Services Building, 921 Thatcher Blvd., Safford, AZ, and will feature a talk by Robert Porter about the mysteries involved in the hydrology of the Filleman Crossing project.

Wednesday, February 8, 2012,

7 p.m. Our meeting will be held at the Graham County General Services Building, 921 Thatcher Blvd., Safford, AZ, and will feature a talk by Alec Smith and Jeff Riley with the U.S. Bureau of Reclamation on the new Fish Barrier on the Blue River.

March 29-31, 2012,

The Arizona Riparian Council's annual meeting will be held in Thatcher, at the Eastern Arizona College. A field trip to the Apache Grove project will be held Saturday, the 31st.

Our partners include:

Arizona Department of Agriculture	Gila Valley NRC
Arizona Department of Environmental Quality	Discovery Park
Arizona Department of Transportation	Farm Bureau
Arizona Department of Water Resources	Freeport McMoRan Copper and Gold Inc.
Arizona Game and Fish Department	Graham County
Arizona Geological Survey	Greenlee County
Arizona State Land Department	Gila Valley Irrigation District
Bureau of Land Management	Natural Resource Conservation Service
City of Safford	University of Arizona Cooperative Extension
Town of Thatcher	University of Arizona NEMO Project
Town of Pima	U.S. Fish and Wildlife Service
Town of Clifton	U.S. Forest Service – Apache
Town of Duncan	Sitgreaves and Coronado Forests
Greenlee County Cattlegrowers	U.S. Bureau of Reclamation
	And many community members

Get involved in your watershed

For more information, contact Jan Holder at the Gila Watershed Partnership, 711 S. 14th Avenue, 85546, 520-419-0374, email-watershedholder@gmail.com