



## Forest Stewardship Education Newsletter September 2023

### Forest Roads

#### Greetings from UC ANR

Permanent, seasonal, or temporary; 'always there' or newly graded; single access or used by many; bumpy, narrow, steep or 'able to swallow a small car'; these are just a few of the ways landowners have described their forest roads. These roads are important in providing you access to enjoy your forests. They can also be a limiting factor in what management activities you can do, how easily you can evacuate your property in times of emergencies, or how quickly emergency services can get to you.

Many of our forest roads are considered 'low volume' roads, and are not built to the standards of more highly trafficked roads which have good drainage. In the majority of watersheds, forest roads contribute more sediment to watercourses, than do timber harvests. Roads are also expensive to maintain and repair. Yet, in most cases, we can't really do without them.

This issue of the Forest Stewardship Newsletter will provide information and resources on road construction, drainage, maintenance, and funding sources for roadwork.

Cheers,  
Kim Ingram, Forest Stewardship Coordinator



*Forest landowner road. Photo by Kim Ingram*

***How you intended to use a road, will determine how it is designed and maintained. All road types should be designed to minimize erosion.***

## **Road Design Principles**

Roads are the primary source of non-point source pollution in rural areas, and are a major source of soil erosion and stream sedimentation. They divide forests into patches which can disrupt wildlife habitat corridors, and act as a conduit for invasive plants and animals. They also provide us access to our forested properties, whether that includes access to our homes or businesses, favorite foraging sites, or as a cross-county ski trail. How you intended to use a road will determine how it is designed and maintained. All road types should be designed to minimize erosion.

According to Rural Roads: A Construction and Maintenance Guide for California Landowners, there are several key road design principles landowners should consider.

### **Construction:**

- Minimize the number and length of roads in a watershed;
- Minimize the width of the road and the area disturbed during construction;
- Minimize road gradient (12% or less);
- Avoid construction on steep slopes over 60% if possible; and
- Minimize cuts, fills, and vegetation clearing.

#### Streams:

- Stay as far away as possible from streams and minimize the number of crossings;
- When designing stream crossings, consider 100-year storm flow, as well as debris and sediment movement through culverts, and avoid the potential for water to backup on road surfaces;
- Ensure crossing outlets are designed with erosion control materials; and
- Facilitate fish passage on fish bearing streams.

#### Drainage:

- Design for adequate road surface drainage;
- Out-slope roads whenever possible;
- Install ditch relief culverts on in-sloped roads; and avoid placing roads in wet or unstable areas.

#### **Some culvert basics**

The placement, spacing and capacity of a culvert should take into consideration peak rainfall and runoff (consider a 100-year storm event); fish passage; soil; road type; frequency of road use; and legal requirements, to name a few considerations.

Culverts should be designed by a registered engineer or erosion control specialist familiar with road building and culvert placement. Recommendations on debris barriers and energy dissipaters, should also be given.

Culvert outlets should extend at least 2 feet beyond the road edge and past the road fill. An energy dissipator, such as a rock rip-rap apron placed on top of a filter fabric, should be installed under the outlet to slow water velocity and minimize erosion.

All stream crossing culverts should be approved by the California Department of Fish and Wildlife before constructed.

For seasonal stream crossings, consider armored fill crossings instead of culverts.



Rock armoring at ditch relief culvert outfall to reduce the potential for downstream erosion.  
Photo by Jared Gerstein.

### **Where to turn for your road questions**

Your county Public Works Department is a good place to start for any road questions you may have. They can give you guidance on permit requirements, ordinances, and emergency vehicle access standards. They may also direct you to other local county offices such as the Planning Department or Air Quality Management District if other factors need to be considered.

The [CA Department of Transportation](#) may be consulted for work done where your private road meets a state-maintained road.

For planning roads within the CA State Coastal Zone, contact the [CA Coastal Commission](#).

For others, consult with your registered engineer, erosion control specialist or Registered Professional Forester.

## **Road Assessment and Key Road Maintenance Practices**

### **Assessment**

To minimize damage, inconvenience and expensive repairs, it is important to make frequent inspections of all parts of your roads (the surface, cut-and-fill slopes, culverts, bridges and water bars) and to plan for and implement repair work before seasonal rain and snow.

To assist you in evaluating the condition of your roads, UCCE has developed a '[Roads Assessment Checklist](#)'. The assessment process includes several steps:

- Identifying access routes to your property and your rights and responsibilities concerning them;
- Mapping existing roads on your property;
- Deciding which roads you need for management;
- Deciding if you need new roads; and
- Evaluating the condition of your existing roads, including both those you will use and those you won't use.

The worksheet asks for 'yes-no' answers, leading to a summary of findings. A 'don't know' answer may imply a need-to-know.

### **Maintenance**

[Rural Roads: A Construction and Maintenance Guide for California Landowners](#), recommends these key maintenance practices:

- Inspect roads regularly, especially before the winter season and following heavy rains;
- Keep ditches and culverts free from debris;
- Straighten bent culvert ends;
- Install energy dissipaters or armoring around culverts ends, the outside edge of rolling dips or water bars if erosion has occurred;
- Remove slide material from the road or ditches where it blocks normal drainage;
- Regrade and shape the road surface periodically to maintain proper

- surface drainage;
- Keep rolling dips shaped and graded;
- Keep the downhill side of the road free of berms unless they are intentionally placed to control water or traffic;
- Apply surfacing aggregate or pavement to protect the roadbed as needed;
- Avoid disturbing soil and excessive vegetation in ditches, shoulders and on cut-and-fill slopes;
- Maintain an erosion-resistant surface such as grass or rock in ditches;
- Remove logs or branches lodged under bridges;
- Close the road during very wet conditions; and
- Carry a shovel in your vehicle during the rainy season to clean out ditches, and to redirect water off the road surface.



*Rolling dips installed to drain an out-sloped road. Photo by Bill Weaver, Pacific Watershed Associates.*

Rural Roads: A  
Construction and  
Maintenance Guide for  
California Landowners

Central Coast Private  
Road Maintenance  
Guide

Forest Stewardship  
Series 17: Forest Roads





Storm-Proofing Ranch Roads Video with Bill Birmingham, Napa County RCD

### **Q&A with Bill Birmingham, Program Manager with Napa County RCD and Certified Professional in Erosion and Sediment Control (CPESC)**

#### **For new forest landowners, or those who may not have given their roads much attention, what would you recommend they do first?**

Watching the roads storm-proofing video (above link) is a great 1<sup>st</sup> step in understanding your roads system. Storm-proofing a road not only ensures ingress and egress during large storm events, it also will reduce your annual maintenance costs. The goal of the video is to empower the landowner to maintain their roads without having to acquire permits or CEQA review (i.e., streambed alteration permits). In addition to watching the video, check out the Napa RCD 'Characteristics of Storm-proofed Roads Checklist, which is available on our website <https://naparcd.org/resources/conservation-practices/unpaved-roads/storm-proof-roads-checklist/>

#### **What are some common mistakes forest landowners make in terms of their roads?**

The most common mistake is concentrating runoff along long reaches of road length and not frequently dispersing runoff. Another issue I commonly come across in many roads projects, is when multiple landowners have an easement to a common use road (i.e. common driveway in rural communities). More often than not, I've found it almost impossible to get a bunch of disconnected landowners to agree on scope and payment of a project along their common use road. I recommend that the associated landowners create a Roads Maintenance Association (RMA) and pay into that association before trying to implement a project.

**Are there any special considerations needed for forest roads that have been through wildfires?** All landowners should assess their road's culverts. Many newer repairs will have plastic culverts and those will melt during fire events. Areas where culverts have melted will then collapse, potentially injuring drivers or damaging vehicles if those locations are not known. Because CA is such a fire prone state, I never recommend using

plastic culverts.

### **What does typical road maintenance cost?**

There is no typical cost/mile. Costs are relative to equipment rates (including operator), distance equipment must travel to the site, cost of materials (road-rock, culverts, bridges, and so on), permits (Streambed alteration permits, grading permits), NEPA/CEQA review (if public funds are contributing or project is on public lands), and number of treatments/mile that need to be done.

### **Does the RCD provide financial assistance for road maintenance and repair?**

Both the RCD and NRCS are probably the best local resource for funding opportunities.

### **What should a forest landowner look for in a quality contractor for road work?**

Knowledge Skills and Abilities (KSAs). When the RCD puts out a bid request for roads storm-proofing work, we ask the contractors to give at least 3 examples of similar projects they've implemented. The RCD then contacts those landowners to enquire as to the quality of work.



Ruts created by wet weather use of an unsurfaced, poorly drained road.  
Photo by Angela Wilson, Central Valley Regional Water Quality Control Board.

***"Storm-proofing a road not only ensures ingress and egress during large storm events, it also will reduce your annual maintenance costs." Bill Birmingham, Napa RCD***

### **Road Maintenance Associations**

As mentioned, road work can be expensive. When forest landowners share a road with neighbors, it is a good idea to form a Road Maintenance Association (RMA) to clearly outline how

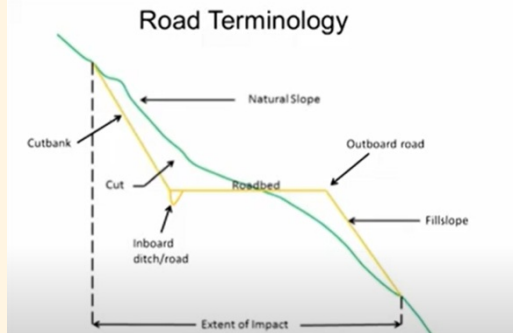


Image from Storm-Proofing Ranch Roads Video with Bill Birmingham, Napa County RCD

### Terms to know...

*Crowned roads:* Disperse water on both sides of the road.

*Culverts:* metal, concrete or plastic pipes set beneath the road surface to drain ditches, springs or streams crossed by roads. Note that plastic culverts can melt under certain fire conditions.

*Cut-slope or cutbank:* The part of a hillside that is cut away to form a flat, road surface.

*Fill-slope:* The area where cut-slope material is placed and compacted in order to form a flat, road surface.

*In-slope:* Where the road is sloped towards the cut bank and drained by a ditch running at the base of the cut bank. Cross-drain culverts should be placed under the road surface to drain the ditch of excessive flow. Generally require more maintenance than out-sloped roads.

*Out-slope:* Where the road is sloped towards the outside of the road and drained diffusely over the road surface or by depressions in the road called 'rolling dips'. Not advisable on steep terrain or in areas where ice can move vehicles towards the road's outer edge.

*Permanent road:* Able to be used year-round, and has appropriately

necessary road work will be paid for, as well as developing an ongoing maintenance calendar. RMA members will need to reach consensus on the level of maintenance to which the road will be maintained.

The RMA should collect funds from each member, every June 1st for example, or plan on proportionally dividing repair bills once work is completed. Make sure the terms of noncompliance by RMA members are clearly spelled out and signed off on by all members.

According to the Humboldt County Public Works Department, there are several steps to forming a RMA:

1. Hold a neighborhood meeting to gauge interest. Discuss what levels of maintenance are acceptable. Have examples of road work costs and ask how much everyone is comfortable contributing. The RMA should have an 'official' Board of Directors, either appointed or elected, with set terms, and have authority to manage the affairs of the RMA.
2. Consult with your local Public Works Department or a civil engineer to develop a budget that appropriately meets the RMA's maintenance expectations.
3. Once costs are finalized, hold another RMA meeting and come to a consensus on expected work, and how money will be collected and distributed.
4. The RMA may wish to consult with legal counsel.

Note: According to California Civil Code Section 845, road easement owners are obligated to pay for road maintenance. Contact your local Public Works Department for

placed culverts. Rocked surface in riparian areas.

*Rolling dips:* Gradual, undulating depressions in the road surface that allow for drainage to the outside of the road, and are passable by vehicles.

*Seasonal road:* Used for access during dry seasons. May or may not have culverts, or rocked surfaces in riparian areas.

*Temporary road:* Used for a short time period and for a specific purpose. Should not be used in wet seasons. Should have appropriate drainage features in riparian areas.

*Water bar:* A combination of a dip and a hump of soil, much like a speed bump, that allows water to drain towards the outside of the road. Usually not passable by vehicles.

more information.

**Humboldt County Road  
Maintenance Association  
(RMA) Formation  
Information &  
Recommendation  
Handout**



Trash rack installed upstream to protect the culvert from plugging. Photo by Keller and Sherar 2003.

There are cost-share opportunities that can help you with road repair and upgrading. In most cases, you must demonstrate how the work to be done will reduce sediment transportation in near-by waterways, and/or will protect fish and wildlife habitat.

**CA Association of Resource Conservation  
Districts**

**NRCS Environmental Quality Incentives Program (EQIP)**

**Other Stewardship items of note...**

- Have you had your initial site visit with an RPF, Burn Boss or Certified Range Manager? **The deadline for all site visits is May 1, 2024.** No matter which workshop you participated in (even back in 2020!), if you completed the workshop, you are eligible. You DO NOT need to complete your forest management plan before your site visit, just having your management goals thought out is good enough! Need to make up a session in order to qualify for your free site visit, we can arrange that. Contact Kim Ingram at [kcingram@ucanr.edu](mailto:kcingram@ucanr.edu) for more details.



Solano-Sacramento Co-hort participants during the field day. Photo by Kim Ingram



For more information on the workshops, and to share with a friend, please visit:

Stewardship:  
<http://ucanr.edu/forestryworkshopregistration>

Post-fire:  
<http://ucanr.edu/post-fireworkshops>

### Upcoming Forest Stewardship and Post-Fire Forest Resilience Workshops and Field Days:

- **Post-fire Forest Resilience**  
 Northern CA Workshop Series,  
 Online Thursday, Sept. 14th -  
 Oct. 26th (Nov. 2nd, 3rd and  
 4th field days)
- **Forest Stewardship**  
 Workshop Series, Santa Clara-  
 Santa Cruz Co-hort beginning  
 October 24 - December 19  
 (Nov. 18th field day)





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