

# Forest Access Roads

**why?** Before harvesting, access roads need to be constructed, unless existing roads are present and adequate to handle the amount of truck traffic. Road layout needs to be conducted with the assistance of a forest engineer. Even temporary roads alter the forest landscape, so you want to minimize the negative impact and be cautious when locating access roads.

**control points:** Control points are landscape features that help you determine areas to avoid when locating access roads, skid trails, and log decks. You can save time and money by drawing these features on your topo map before meeting with a forester or road engineer:

- **County road access points**
- **Waterways (streams, wetlands, springs, sloughs, and ponds)**
- **Seeps**
- **Rock outcrops**
- **Thin soil**
- **Sinkholes:** Divert runoff from haul/access roads, skid trails, and log landings so it does not drain directly into sinkholes, sinking streams, or caves. If runoff does enter a sinkhole, a UIC permit (contact Division of Water 502-564-3410) may be required. Leave a buffer zone between any disturbed area and the open swallet of a sinkhole. Buffer zones should be 30 feet for areas of 5 percent slope, and an additional 10 feet in width should be added to this zone for each 10 percent increase in slope.

## forest access roads checklist:

All access roads need to be built to specific engineering standards in order to prevent any possible safety hazards. Furthermore, road grades should not be 15 percent or greater. Those areas where the road grade is 15 percent are limited in Kentucky to 200 feet in length.

- Select or design the access road entrance to provide adequate traffic safety and to minimize rutting and soil erosion problems (place larger size rock at the access road entrance to remove mud and dirt from truck tires).
- Decide on temporary or permanent roads.
- Layout roads to fit the landscape and access all areas of the tract where access is needed or desirable.
- Follow contour lines as much as possible to avoid steep grades.
- Avoid unstable soil and other sensitive areas (sinkholes, wetlands, waterways).
- To manage surface water on your road, consider using appropriate road prism techniques: crown the road, in-slope or out-slope the road, side ditches, cross drainage, ditch turnouts, broad-based dips, culverts or bridges, and the application of crushed stone on road surface to minimize erosion.

## access roads checklist (cont'd):

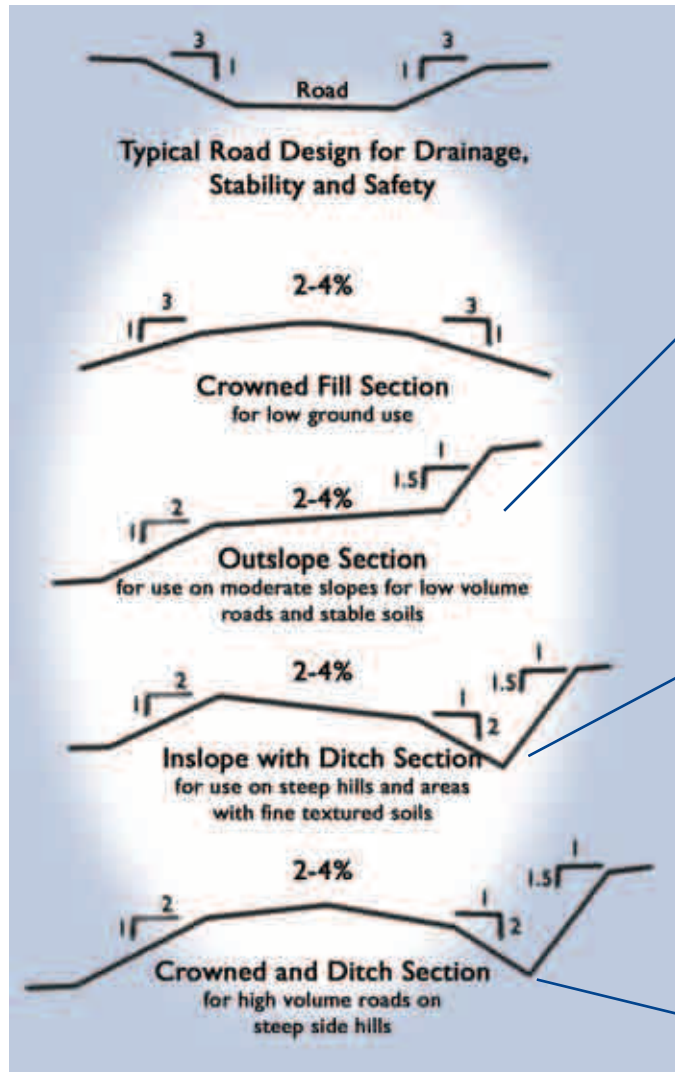
- Keep roads out of the SMZ except to cross streams. Avoid stream crossings if possible.
- Open roads to sunlight so that the road can dry out faster (technical term for this practice is “day lighting”).
- Consider placing a caution sign at the access road entrance.



photos: Ed Christopher

# forest access roads design for proper drainage, stability and safety.

Follow the guidelines (below) according to traffic use, soil composition and degree of slope.



outsloped road



insloped road



crowned and ditched road

photos: Ed Christopher

Remember, these structures are only as effective as their intended capacity to divert, trap, or slow down water and must be sized appropriately to accomplish water and soil protection.

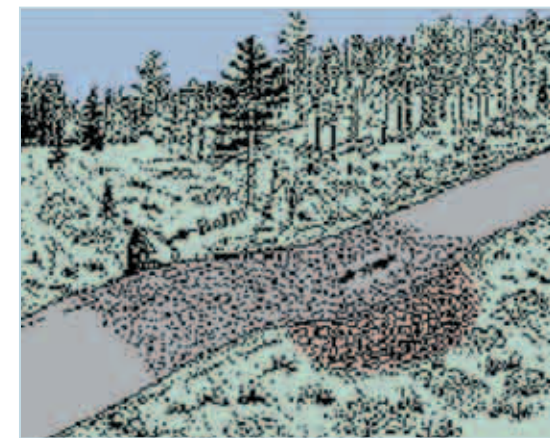
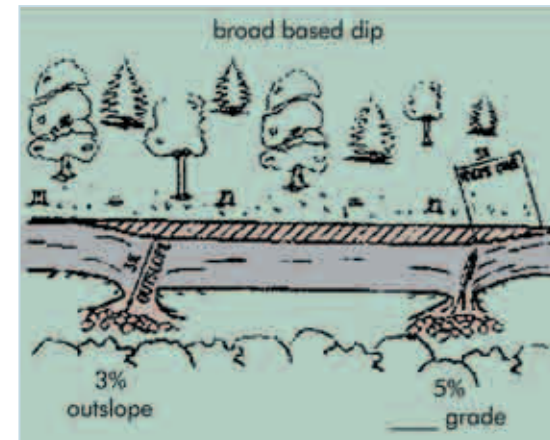
Following are spacing guidelines for broad based dips and culvert installation for cross-draining access roads. It makes more sense to properly implement these measures. By doing it right the first time, you'll save money, time, and the headaches of having to stop your operation to fix problems.

If you're not able to be present during the entire harvest, visit the harvest site frequently. If you see problems with any aspect of the operation, immediately notify the logger to remedy the situation. Often the logger is very busy trying to complete his/her job on your property and may not notice problem areas. It is much more difficult to get a logger to return to a job once he or she considers it completed.

### broad based dips:

Broad based dips are gentle rolls in the center profile of the road. It is meant to be a somewhat permanent structure that most vehicles can travel over. These dips can be difficult to erect on steep grades or rocky roads. Only use on roads with a 10% or less slope.

broad based dip	
road grade (%)	distance between dips (in feet)
2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140

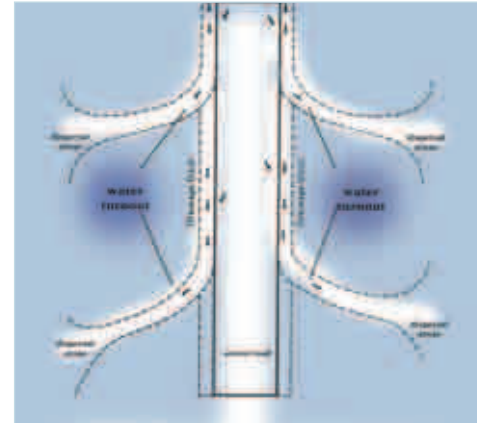


When properly constructed, a broad based dip will channel water off the road and into the ground cover.

## water turnouts:

Water turnouts should be used wherever you have a safe outlet site for excess water to flow from the road. Adding brush barriers or rip-rap at the dispersal area will help absorb heavy flow and filter sediment from the runoff.

water turnout	
road grade (%)	spacing (in feet)
2-5	500-300
5-10	300-200
10-15	200-100
15-20	100



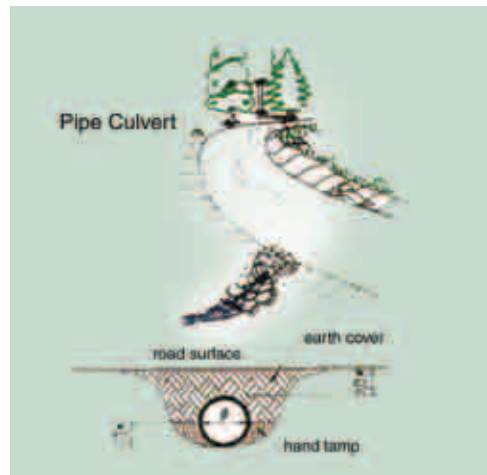
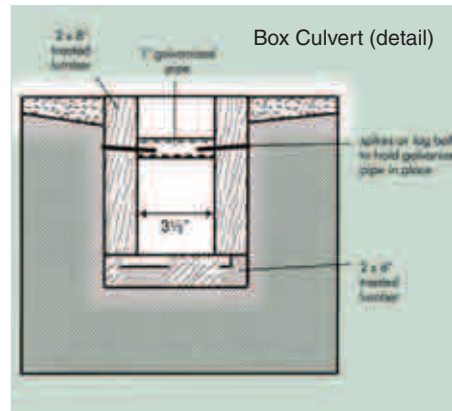
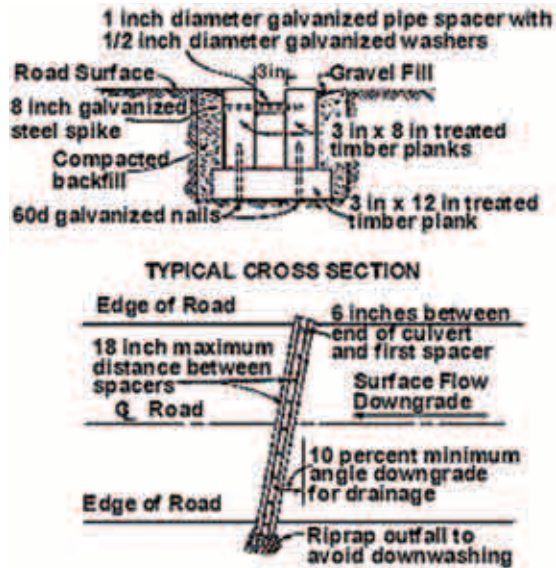
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## culverts:

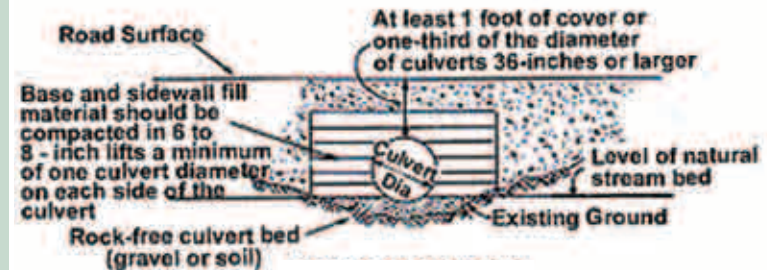
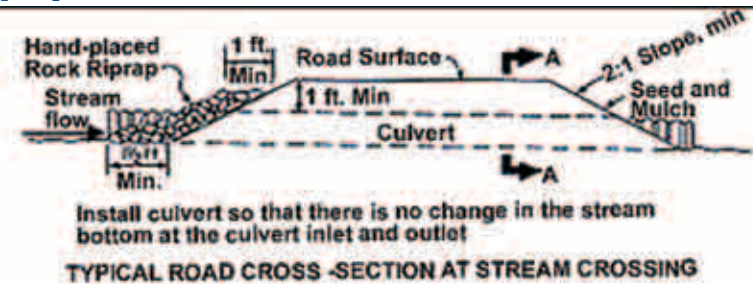
There are two primary types of culverts: box or open culvert, and pipe or relief culvert.

**Box culverts** are usually **temporary** for intercepting heavy runoff or for smaller operations. They should be installed at an angle so only a single tire hits at a time. By contrast, **pipe culverts can be permanent**, but only if you periodically check to make sure the pipe is free of debris. Also make sure each end of the pipe extends at least 1 foot beyond the road width.

### box culvert



### pipe culvert



# Stream Crossings

**what are they?** Stream crossings are the locations where road or skid trails intersect streams. **Stream crossings are the most frequent site of water sedimentation or pollution from forestry activities.** There are several stream crossing options to reduce the potential for water quality degradation, and each site requires specific crossing consideration. The following information describes pipe culverts, bridges and fords, and offers guidelines for suitable application. Take your specific site into consideration, then weigh the costs and protection offered by each option.

Use good common sense. Perhaps the best way for you to minimize cost and disturbance is to avoid crossing the stream altogether.



**pipe culverts:** Pipe Culverts are typically expensive to construct, but can be permanent. Following use on temporary roads and skid trails, they can be carefully removed to minimize soil disturbance. Size is the key consideration when installing culverts. Insufficient sized culverts have the potential to clog, create pools of water and create road stream diversion, which puts the stream on the road instead of through the culvert. The culvert should be installed with a 2 to 4 percent downstream angle to flush out debris. Where culverts are installed for cross-draining roads, place rock on the outflow of the pipe to reduce the water's scouring capacity on the downhill side as well as reduce the velocity.

Backfill material should be free of debris and the culvert should be covered with fill to a depth of one-half the diameter of the culvert.



**bridges:** There are numerous styles of bridges, both temporary and permanent, used to cross streams. They are often used where culverts aren't able to handle the stream flow. Bridges must support very heavy loads, and therefore construction has many technical aspects. Unless you plan on implementing a log bridge as a temporary crossing, use the assistance of a civil engineer.



Stream channel and stream banks should be protected from erosion during construction by continual mulching or vegetative ground cover. Abutments and headwalls may be needed to handle flood conditions and stabilize the approaches to the crossing area. Use vegetation or ground cover to stabilize road approaches and road banks.

photos: Ed Christopher

**fords:** Fords are used for temporary or minimum-use crossings. There are some instances where fords would be less intrusive on a stream than installing a culvert(s). However, fords should only be utilized if there is a sufficient firm base to withstand the heavy loads that will cross it (i.e., bedrock or geotextiles filled with crushed rock). Riprap stone, brush, poles or other materials stabilize the road or skid trail approach to a ford, and the streambed to protect the stream channel (Hamilton, 1999). Remove brush, poles, and any other materials after use of the ford.



photos: Ed Christopher

## stream crossing checklist:

- Avoid crossings if possible.
- Determine if you need temporary or permanent crossings.
- If crossing is temporary, plan to remove immediately after use and fully rehabilitate the area to prevent sedimentation.
- If crossing is permanent, select the type of crossing that will adequately handle the task and will protect stream banks, stream water quality, aquatic habitat, and ensure safe fish passage through the culvert.
- Plan for emergency spillways during flood conditions.
- Mark your stream crossing locations as you layout your roads and skid trails with the help of a forester or engineer.
- Identify stream crossings on a topographic map that you have verified “in the field” for accuracy.
- Road and skid trail approaches to stream crossings should be at right angles.** A right angle approach accompanied with water turnouts and hay bales will reduce the amount of sediment-laden runoff that might enter the stream.



# Skid Trails

**what are they?** Skid trails are exactly as they sound. They are pathways used to drag the felled timber to a log deck. Skid trails, like access roads, can cause sedimentation in waterbodies. Skid trails are used by conventional logging systems—a skidder is a piece of heavy equipment that extracts the timber to the log deck. Tractors and rubber-tired skidders are commonplace in the southeast. They are really hard on soil and plants. The tires compact the soil and cause rutting and puddling.

The term “yarding” is also used when describing the act of moving the logs from the stump to the landing. Yarding is often associated with aerial logging systems which employ cable yarding machines, helicopters, or balloons in steep and/or inaccessible areas. Aerial logging systems usually fully suspend the log above the ground when transporting them from the stump to the landing area. For more information about aerial logging methods see the special section on Alternative Harvesting Options.

Poorly laid out skid trails will cost you money by taking longer to move logs to the log deck and can damage water quality and soil productivity. Therefore, take the necessary precautions by laying out the skid trail pattern with a professional before harvest.

## skid trail checklist:

- Select the proper skidding system** that fits the site and task and provides full environmental protection.
- Limit the number of stream crossings.** This saves time and money.
- Avoid entering the SMZ.**
- Begin felling and skidding at the most distant point and progress toward the log deck.** This pattern will allow logging debris to be placed on bare-ground areas to control soil erosion.
- Plan to install water diversion structures** and/or techniques to manage surface water and control soil erosion.
- Follow the contour of the slope** to minimize damage.



photo: Ed Christopher

This photo shows what not to do. This poorly constructed skid trail shows a skidder being pulled up the trail by a bulldozer. This is not only dangerous, but creates twice the erosion.

## Log Decks/Log Landings

Your log deck, or landing, is the staging area where the cut timber is hauled to and then placed upon trucks for transport to the mill. This area receives the heaviest amount of traffic during the harvest operation. It should be situated in an optimal location that can withstand heavy impact and allows the skidder or tractor adequate area for easy turns.

### log deck checklist:

- Keep the **number of log decks to a minimum**.
- Plan, where possible, for skidding up the hill.** Skidding downward on a hill can compound erosion.
- Consider **access to decks by highway vehicles** and by skidding equipment.
- Select sites that have firm ground and gentle slopes** (for drainage) as much as possible. Do not use SMZs, buffers or other sensitive areas for loading trucks.
- Plan for immediate containment, removal, and disposal** of accidental petroleum, gasoline or oil spills.
- Place a garbage can near the log deck** so that trash is not thrown on the ground.
- Place **hay bales, silt fences, or slash on the low side of the slope** to capture any runoff during rain.
- Place **crushed rock throughout the log deck** to strengthen the area against the potential rutting and puddling of forest soils. This practice will also reduce erosion potential and lessen the opportunities for trucks to get bogged down.

## forest access roads and stream crossings log landings and skid trails—required by law

The following BMPs are required by law. To obtain a complete copy of these requirements, contact the Division of Forestry or visit <http://www.ca.uky.edu/agc/pubs/for/for67/for67.htm>

### the Forest Conservation Act (FCA) /Agriculture Water Quality Act (AWQA) minimum requirements

These are the **minimum standards for forest access roads, stream crossings and skid trails required by law** :

- Do not operate skidders or other logging equipment off hard-surfaced roads under conditions that may cause the development of excessive rutting. Excess rutting is defined as a point where ruts cannot be resurfaced with available equipment.
- Construct roads and skid trails so that grades are kept to a minimum. When possible, access roads should not exceed a grade of 15 percent except for short stretches of 200 feet or less where grades should not exceed 18 percent.
- Install water bars, culverts, or other drainage structures at intervals appropriate to remove water from the road or skid trail to prevent damage and erosion to the surface of the road, trail, or the forest floor from channelized flow.
- Use or install bridges or culverts to cross streams (perennial or intermittent) or ephemeral channels where feasible.
- Cross streams or ephemeral channels at right angles where bridges or culverts are not used.
- Do not leave disturbed soil or concentrated logging slash in ephemeral channels. Locate yards and landings outside of streamside management zones (SMZs) and ensure they have adequate drainage.

### other regulatory requirements:

- Construction in floodplains: (KRS 151.250)
- Filling or draining of wetlands: (U.S. Clean Water Act, Section 404)
- All silvicultural operations: (410 KAR 5:026, 5:029, 5:030, and 5:031)
- Activities near high quality waters and outstanding national resource waters: (401 KAR 5:029, 5:030, and 5:031)
- Activities near wild rivers: (KRS 146.200 et seq. and 401 KAR 4:100-140)