

Planning Woodland Roads

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Woodland roads are the foundation for long-term development of your property. Roads should be planned; they should not be the byproduct of a harvest. Constructing and maintaining woodland roads is expensive and can have significant environmental consequences.

Developing woodland roads requires more information than this publication alone can cover. In addition to this publication, there are several others on developing woodland roads, including road design, construction, and maintenance (see “For further reading,” back page).

Plan woodland roads and coordinate them with other land management activities to provide significant benefits. Identify specific objectives for road development. For example, you might need access for timber harvesting, site preparation and regeneration, stand management, fire protection, hunting, or firewood gathering. The most common need for roads is to support timber harvest, but consider other uses as well.

Planning for woodland roads addresses many questions. Will the road cost be *capitalized* (depreciated annually or amortized over timber volumes removed), or will the cost be *expensed* (annual taxable income reduced by expenses incurred during the year)? Are road costs hidden as part of the



timber contract? Can you tie the harvest of timber to road construction while equipment is available on the property? What contract provisions will you need for roads? How should soil and water resources be protected?

This publication discusses seeking help with roads, timing road development, steps in road building, and information needed for planning. It also addresses rock surfacing, contracting, financial considerations, and planning for soil and water protection. We suggest ways to help you critically review roads on other woodlands and relate your observations to road plans for your own property.

Seeking help

Before beginning a woodland road project, determine whether you need technical assistance. Help is available from a variety of sources. General assistance may

be obtained without charge. However, if you need detailed advice, the cost can be recovered easily by savings in road construction costs or by avoiding environmental problems.

Table 1 identifies some conditions that often call for technical decisions when planning woodland roads. Some of these conditions are related to the property itself, while others are associated with the scale of operation and your own skills. Keep in mind that no decision table absolutely can determine when technical help is needed, because each woodland road is unique for the terrain it crosses.

Some woodland roads are easy to locate and construct, while others could be financial and environmental disasters. Because roads are covered under the Oregon Forest Practices Act, prior approval or technical review may be required. At all times, notification is necessary before road construction may begin.

When reviewing Table 1, consider the conditions that normally require technical

Table 1.—Decision table for technical assistance.

Conditions	Woodland owner can handle	Technical assistance needed	Source of assistance
Slope on hillside where road to be built	Less than 35%	Greater than 35%	Forester, engineer, road contractor
Stream crossings	Small streams,* no fish or domestic use, culverts less than 36 inches	Larger streams,* fish in stream or domestic use, culverts larger than 36 inches	State forest practices forester, engineer, forester
Terrain	Stable and/or nonerosive	Unstable and erodible (slumps, slides, bare soils, silty soils)	State forest practices forester, engineer, forester, road contractor
Soil depth and rock outcrops	Deep soils; no blasting	Shallow soils, rock blasting	Engineer, road contractor
Soil moisture	Well-drained	Wet spots, swamps	State forest practices forester, engineer, forester, road contractor
Scale of operation and finances	Short roads (less than 0.5 mile), less than \$5,000, low-intensity use	Long roads (greater than 0.5 mile), greater than \$5,000, high-intensity use	Forester, engineer, accountant, lawyer
Road crossing other ownerships	Written agreement exists	Agreement to be negotiated	Lawyer, engineer
Owner skills and equipment available	Has equipment or rents it; knows how to operate it	Lacks both	Road contractor

*You can determine stream classes by visiting an Oregon Department of Forestry office; bring your legal property description with you.

assistance on your land. Because road development is an infrequent activity and may involve financial and environmental risks, technical assistance can help reduce these risks.

Some woodland owners tie their road building to timber harvesting. Equipment used for harvesting sometimes can be used for road building. Revenue from harvested timber also can generate income for road construction.

Road development on your property

An important first step for woodland owners is to decide how much road to build. Should roads be built as needed, or should they be developed in their entirety at one time? Several considerations bear on this decision.

Building short stretches of road as needed makes sense to some landowners. Road building can be a do-it-yourself activity requiring much less money than a contracted job. You could build the easy roads and contract more difficult stretches. Also, there may be considerably less maintenance required when roads are developed sequentially.

Building roads in their entirety provides full access to the property. You can take advantage of harvesting to meet particular markets, provide fire protection, conduct land management operations, and enjoy recreational opportunities.

Road-building activities

A typical schedule of road-building activity spans 18 months to 2 years (see Table 2). Steps for building most woodland roads include:

1. *Reconnaissance.* Scout the property to assure that road location meets management needs. Find “control points” (locations where the road must be built, such as landing areas, or locations to avoid such as rock outcrops or wet areas).
2. *Design.* Develop specifications for the road. Determine grades, widths, curves, and cut and fill information. If you use a contract, develop plans and details for it.
3. *Layout.* Provide design guidelines to those doing the construction. Ribbons and stakes generally identify the right-of-way, road centerline, and location for cuts and fills.
4. *Right-of-way logging and building a pioneer road.* Remove timber and deck it

Table 2.—Schedule of road building.

Year 1				Year 2			
Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
RECON							
DESIGN							
LAYOUT		EXCAVATION					
				DRAINAGE*			
ORDER CULVERTS							
				MAINTENANCE			
				SURFACING*			
				MAINTENANCE			

*If you can schedule some log hauling after the road is built and before surfacing, the road will benefit from the compaction. The road will benefit especially by overwintering before surfacing.

where it can be hauled away after the road is built. A pioneer road (narrow with little excavation) is needed for logging and should be located to help the later steps.

5. *Clearing and grubbing.* Remove stumps and other organic debris from the roadway. While you can cut some stumps low and leave them, you should remove most of them to avoid holes left after they rot. Also, stumps are obstacles to excavation. Do not add brush or other debris to fill areas.
6. *Excavation to grade.* Cut the earth down to grade; build fills in compacted layers up to grade.
7. *Installing drainage features.* Cross streams with culverts, bridges, or other structures. Consider road cross-drains: how will water get into the cross-drain, and how will it be dissipated across the road?
8. *Surfacing.* Dirt roads need surfaces smooth enough for traffic and effective rain diversion. Build gravel roads by spreading the gravel and then reshaping the road surface for drainage purposes.

Road planning

It's very important to get legal assurance that the road you're planning will in fact be located on your property. If your property has been surveyed, boundary markers may be evident. If you're uncertain of property boundaries, check your property description, consult your county surveyor for survey information, or perhaps consider a property line survey if necessary.

Whenever your roads connect with roads on another ownership, you may need to prepare a right-of-way or road use agreement. In preparing the agreement, legal guidance can prevent problems.

Maps or aerial photos can be especially helpful in road planning. Check for photo availability from adjacent owners or from government agencies such as the Oregon Department of Forestry, the U.S.D.A. Natural Resources Conservation Service (NRCS), the U.S. Bureau of Land Management, and the U.S. Forest Service. If photos

are not available, make a detailed drawing of your property indicating road locations.

The NRCS can be especially helpful. The agency has soil maps or photos that might include your property. Using this information, you could avoid some road-building problems.

Once road planning has advanced far enough to set a tentative location, consult the forest practices forester (FPF) of the Oregon Department of Forestry. The FPF can tell you what is needed to protect soil and water resources. If the road location and construction are difficult, the FPF might visit the property to discuss the road. After ODF approves your plan, you can proceed with road construction.

Some woodland roads might require advice or consultation from a forester, engineer, or road contractor. Costs and quality of service vary. If the variation in costs is significant, seek references and solicit bids for the job.

By learning to use basic measuring tools, you can help with road planning and monitor the progress of road construction. The OSU Extension Service can help you with your educational needs through its county-based forestry agents, who can refer you to a variety of Extension publications related to roads and woodland management.

Surfacing woodland roads

For many woodland owners, well-maintained dirt roads are sufficient. However, rocked roads provide all-weather access to the property and decrease road maintenance costs. Rock typically is applied in two layers, called courses. The *base course* is rock large enough to support a load on the road; depth of the base course is 6 to 18 inches, as needed. The running surface, or *topping course*, is a 2- to 4-inch layer of smaller rock.

Surfacing woodland roads substantially increases cost. You must decide how much of the road to surface. Will you surface the entire road? Or, will you use rock only to maintain and improve deteriorated areas on a dirt road? The cost of surfacing depends on the length of the road, the depth and width of rock needed, and the distance rock must be hauled to your property.

If rock is available on your property, surfacing costs will be less. On some woodland properties, rock simply can be dug out of the hillside and spread on the road. On other properties, you may need to develop a rock pit. Rock is a valuable commodity, and numerous regulations and permits are required to develop rock pits. Most owners need technical assistance for this development.

Taxes and other financial considerations are likely to be major concerns as you plan road surfacing. The cost of rock used to maintain and build *temporary* roads can be expensed against your income for the year. From a tax standpoint (see below), rock used to build *permanent* roads can be treated differently. Rock that is encountered as a road is excavated and that is spread adjacent to the excavation site is considered part of your road construction costs.

Construction contracts

If building your woodland road means a significant expense, consider using a written contract. A contract protects both the woodland owner and the contractor. Details indicating how the road will be built are helpful for the contractor. Performance standards required of the contractor are helpful for the woodland owner.

Logging road construction contracts contain many design specifications. They often provide the contractor with a grade and ground profile of the road centerline. A road construction contract can be very complex, and you might need technical assistance from a forester, an engineer, or an attorney to prepare it.

Because road construction often coincides with timber harvesting, timber contracts (sale or service) can contain road building provisions. While the logging contractor might be able to build some roads that meet your management objectives, an ordinary timber contract could require modification to meet your objectives for road construction.

Contract specifications are necessary to convey road design information to the contractor. Specifications include road width, length, and prices and other important information. Contract specifications control the road builder's performance during the contract period.

If additional road building control is needed, use construction stakes to convey information to road builders. Stakes and ribbons are used to mark the limits between clearing lines (right-of-way). They indicate where the contractor should cut and fill. If the contractor follows the staking information, your road will be built to design specifications.

Under some circumstances, it is well worth the extra engineering expense to develop a detailed road construction contract and then provide construction staking to support the contract.

If a contract (oral or written) covers road construction, someone must oversee the road building. Even if you use a detailed written contract, the contract supervisor has to be at the construction site frequently to assure acceptable performance. Points in the building process that are critical for contract monitoring and supervision include:

- The start of excavation
- The installation of stream crossings (culverts, bridges, etc.)
- Final grading
- The interim before the large excavation equipment is moved from the site

It's important for landowners to be available as the road is being built, in case design or construction changes are needed.

Financial considerations

Building woodland roads can cost from \$8,000 to more than \$100,000 per mile. You'll need to address several financial and tax concerns during planning. The most immediate financial question is financing. If road construction is linked to timber harvest, you have two options: lump together costs for timber harvesting and road building, or separate them and itemize costs in more detail.

The latter approach has several advantages. First, you can see clearly the impact of road construction costs on timber harvest returns. Second, when you know the value of the road, the importance of maintenance (i.e., asset protection) is more obvious. Finally, you can document the cost of the road for tax purposes.

Prudent landowners planning permanent roads should review their circumstances with a certified public accountant (CPA). At issue is whether woodland roads are classed as *temporary* or *permanent*. If, “following the harvest of timber, the cutover land is expected to be reforested, and the road abandoned,” the road may be considered temporary (Revised Rule 88-99, Internal Revenue Service). However, if the road serves the property for longer than 1 year of harvesting, or provides access to the property for additional harvest units, it may be considered a permanent road.

Advice from a CPA is warranted because you might be asked, “Did you build the road to harvest the timber, or did you harvest the timber just to build the road?” The relative amounts of revenues versus expenses help answer this question.

Costs associated with *temporary* roads used for timber harvest within a short period (normally 1 year) are expensed against the year’s income. Other road items you can expense include maintenance, reconstruction, landing construction, and surfacing rock used for maintenance. Skid roads are not considered permanent roads even though they can be used later in woodland management.

Permanent roads access the property for periods longer than current harvests and are classed, for tax purposes, as capital assets. Under the Modified Accelerated Cost Recovery System approach (MACRS), capital assets are placed in certain asset classes. Only a portion of the cost each year can offset annual income.

Road costs can be apportioned against revenues for 15 years for the regular tax and for 20 years for the Alternative Minimum Tax. Surfacing (gravel, pavement, or chipseal), bridges, and culverts are considered depreciable. The roadbed is not depreciable unless it is abandoned (i.e., reforested) at the conclusion of timber harvesting. Discuss these issues with your CPA.

Another financial concern is the amount of resources you allocate to initial road construction versus the amount needed for annual road maintenance. If you don’t allocate enough interest and resources to properly build your road, you could create annual maintenance problems beyond your ability to manage. Once the contractor

removes road building machinery from your property, you might not have the skills or equipment to handle severe maintenance problems such as road failures or culvert problems.

Planning for environmental protection

Roads are the cause of most problems affecting soil and water protection, both on your woodland property and on adjacent downstream properties. Adequate road planning assures that road drainage, stream crossings, and placement of excess excavation will not create problems during and after road construction. Special measures are required when roads cross fish-bearing streams, and technical assistance from the ODF forest practices forester likely will be necessary. Publications and other sources of information are available to help landowners plan for environmental protection (see “For further reading,” back page).

Reviewing roads on other properties

Woodland owners usually have the opportunity to study their options before beginning construction of woodland roads. Review roads built on other properties and collect information that could be useful in planning your roads. For example, though government and large industrial roads often are built to standards higher than those required for your property, these roads may have features or points of interest that relate to the kind of road you’re planning.

Using a mental checklist while driving roads on other properties will help you gain valuable insights regarding the success and failure of others. Be sure to relate a road to the owner’s use requirements. The checklist below is not comprehensive, but it should help you critically review other owners’ roads.

- Check the width and road surface. Is it a crowned road or an inslope or outslope

road? Would water quickly drain off the surface? Is the road rocked? How much rock?

- If you were a log truck driver, how would you evaluate the grades? Too steep or all right?
- Check the horizontal curves. Could a load of poles get around the curves?
- How do the cut slopes and fill slopes look? Are they holding up?
- Check the road intersections. Any safety or traffic problems?
- Check culverts, bridges, and stream crossings as well as road drainage features. Are the culverts and bridges adequate for storm conditions and fish passage?
- Review maintenance on older roads. Are ditches and culverts plugged?
- Look for erosion-control measures such as grass seeding, culvert outfalls, etc. Are they effective in preventing erosion?
- Look at road failures. Consider what might have caused the failure. Look for evidence that water wasn't drained properly.

Conclusion

To plan woodland roads, give careful thought to your property development and road building objectives. Carefully assess whether you or a contractor should build the road. A variety of information is available to you, especially in planning for soil and water protection. Major planning decisions involve financial concerns. Finally, develop your road building knowledge by critically reviewing roads on other properties.

For further reading

To order copies of OSU Extension publications, send the publication's complete title and series number, along with a check or money order (payable to Oregon State University) for the amount listed, to:

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Our Publications & Videos catalog and many of our publications are available on the Web at <http://eesc.oregonstate.edu>

Adams, Paul W. *Oregon's Forest Practices Rules*, EC 1194 (Oregon State University, Corvallis, revised 1996). \$1.00

Adams, Paul W. *Maintenance of Woodland Roads*, EC 1139 (Oregon State University, Corvallis, reprinted 1997). \$1.50

Adams, Paul W. *Soil Compaction on Woodland Properties*, EC 1109 (Oregon State University, Corvallis, reprinted 1998). \$1.50

Garland, John J. *Designing Woodland Roads*, EC 1137 (Oregon State University, Corvallis, reprinted 2000). \$3.00

Garland, John J. *Road Construction on Woodland Properties*, EC 1135 (Oregon State University, Corvallis, reprinted 1993). \$2.00

Other publications

Oregon Forest Practices Rules and Statutes (Oregon Department of Forestry, Salem, issued annually). Order from: Oregon Department of Forestry, Salem, OR 97301.

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The Woodland Workbook is a collection of publications prepared by the Oregon State University Extension Service specifically for owners and managers of private, nonindustrial woodlands. The Workbook is organized into separate sections, containing information of long-range and day-to-day value for anyone interested in wise management, conservation, and use of woodland properties. It's available in a 3-ring binder with tabbed dividers for each section.

For information about how to order, and for a current list of titles and prices, inquire at the office of the OSU Extension Service that serves your county.

This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties.

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Revised August 1996. Reprinted May 2002.