The Woodland Workbook

Logging

Planning Woodland Roads

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Woodland roads are the foundation for long-term development of your property. Roads should be planned in advance; they are not the byproduct of a harvesting operation. Both construction and maintenance of woodland roads are expensive and can involve significant environmental consequences.

Developing woodland roads requires more information than the scope of 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," p. 6).

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

Will the road be capitalized (depreciated annually or amortized over timber volumes removed), or expensed (annual taxable income reduced by expenses occurring within 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? Planning for woodland roads addresses such questions in advance.

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OREGON STATE UNIVERSITY EXTENSION SERVICE

Table 1.—*Decision table for technical assistance.*

Conditions	Woodland owner can handle	Technical assistance needed	Source for 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-inch	Larger streams,* fish in stream or domestic use, culverts larger than 36-inch	State forest practices forester, engineer, forester
Terrain	Stable and/or non-erosive	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 1/2 mile, less than $5,000, low-intensity use	Long roads greater than 1/2 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 State Forestry Department offices with a legal property description in hand.

This publication describes seeking help with roads, timing of 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. Some suggestions are provided 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, 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 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.

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.

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

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, 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 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 and 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 does water get into the cross-drain? How is it dissipated across the road?
8. *Surfacing.* Dirt roads need to have surfaces smooth enough for traffic and effective diversion of rainfall. Build gravel roads by spreading the gravel and then reshaping the road surface for drainage purposes.

Road Planning

Many resources are available to help woodland owners plan their woodland roads. Of primary importance is to obtain legal assurance that the road is 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 or later misunderstandings.

Maps or aerial photos can be especially helpful in road planning. Check for photo availability from adjacent owners, or government agencies such as the Oregon Department of Forestry, Natural Resources Conservation Service, the U.S. Bureau of Land Management, and the U.S. Forest Service. If photos are not available, prepare a detailed drawing of your property indicating road locations.

The Natural Resources Conservation Service (NRCS) can be especially helpful. The NRCS often has soils

Table 2.—*Schedule of roadbuilding.*

Year 1 Spring	Summer	Fall	Winter	Year 2 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.

maps or photos which may include your property. Using this information, it may be possible to 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 describe measures that will be needed to protect soil and water resources. If the road location and construction are difficult, the FPF may visit the property to discuss the road. Following their approval of your plan, you can proceed with road construction.

Some woodland roads may require advice or consultation from a forester, engineer, or road contractor. Quality of service and costs will 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 is typically applied in two layers or 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 will substantially increase their cost. You must decide how much of the road to surface. Will you surface the entire road? or, will you use rock 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 expensive. 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 of major concern when surfacing roads. The cost of rock used for maintenance and for the construction of *temporary* roads may be expensed against your annual income for the year. From a tax standpoint (see discussion below), rock used for the construction of *permanent* roads may be treated differently. Rock encountered as a road is excavated, and spread adjacent to the excavation site, is considered part of your road construction costs.

Construction Contracts

If significant costs will be incurred during construction of your woodland road, 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. Because a road construction contract can be very complex, you may need technical assistance from a forester, an engineer, or an attorney in preparing it.

Because road construction often coincides with timber harvesting, timber contracts (sale or service) may contain road building provisions. While the logging contractor may be capable of building some roads which meet your management objectives, an ordinary timber contract may require modification to meet your objectives for road construction.

Contract specifications are necessary for conveying road design information to the contractor. Specifications include road width, length, and prices, as well as 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 (verbal or written) covers road construction, someone must oversee the road building. Even though you may 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 following:

- 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 for any necessary design and construction changes as the road is being built.

Financial Considerations

Because cost to construct woodland roads may range 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 involves the source of financing required to build woodland roads. If

road construction is linked to timber harvest, you have the options of either lumping together costs for timber harvesting and road building, or separating them and itemizing costs in more detail.

There are several advantages to knowing the actual cost of woodland roads, versus burying their cost in a timber harvest operation. First, you clearly can see the impact of road construction costs on timber harvest returns. Second, when you know the value of the road, the importance of maintenance becomes more obvious for asset protection. Finally, you can document the cost of the road for tax purposes.

Prudent landowners involved with 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 accesses the property for additional harvest units, it may be considered a permanent road.

Advice from a CPA is warranted because you may be asked this question: "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 may expense include maintenance, reconstruction, landing construction, and surfacing rock used for maintenance. Skid roads are not considered permanent roads even though they may 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 may offset annual income.

The number of years road costs can be apportioned against revenues is 15 years for the regular tax, and 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. Address these issues with your CPA at tax time.

Another financial concern is the amount of resources you allocate to initial road construction, versus the amount needed for annual road maintenance. By not allocating enough interest and resources to properly build your road, you may create annual maintenance problems beyond your capability. Once the contractor removes road building machinery from your property, you may not have 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 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," p. 6).

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 may be appropriate for your roads. For example, though government and large industrial roads are often built to standards higher than those required for your property, these roads may have features or points of interest that relate to woodland owner roads.

Using a mental checklist while driving roads on other properties will help you gain valuable insights regarding success and failure of others. A primary point on the checklist is 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, 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?
- 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 they 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

In order to plan woodland roads, woodland owners must give careful thought to their property development and road building objectives. Carefully assess whether you or a contractor should perform road construction. 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

OSU Extension publications

To order copies of the following publications, send the publication's complete title and series number, along with a check or money order for the amount listed, to:

Publication Orders
Extension and Experiment Station Communications
Oregon State University
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If you would like additional copies of this publication, *Planning Woodland Roads*, EC 1118, send $1.00 per copy to the above address.

We offer discounts on orders of 100 or more copies of a single title. Please call (541) 737-2513 for price quotes.

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 1992). $1.25

Adams, Paul W., *Soil Compaction on Woodland Properties*, EC 1109 (Oregon State University, Corvallis, reprinted 1992). $1.00

Garland, John J., *Designing Woodland Roads*, EC 1137 (Oregon State University, Corvallis, reprinted 1993). $3.50

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 97310

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.

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