Woodland roads are the foundation for long term development of your property. Roads are not the byproduct of a harvesting operation; you should plan them in advance. Woodland owners should coordinate with other land management plans to provide access for harvest (including salvage operations), regeneration, site preparation, stand management (thinnings), fire protection, and general access for hunting, firewood gathering, and other uses. Planning for roads can yield large gains.

Because woodland roads involve large sums of money and can have significant environmental consequences, you should develop specific objectives for road development. The most common need for roads occurs immediately before harvest activities, but consider other elements. Will the road be capitalized (depreciated annually or amortized over timber volumes removed) or will it be expensed (annual taxable income reduced by expenses occurring within the year) during timber harvesting?

Are road costs hidden as part of the timber contract? Can you tie the harvest of large timber to road construction while the larger 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.

This publication, one of several on woodland roads, covers planning; others will cover road design, construction, and maintenance. The planning information included here is: seeking help with roads, timing of road development, planning, tanking, planning, construction, financial considerations, and planning for soil and water protection.

Finally, some suggestions are provided to help you critically review other woodland roads and tie your observations to roads planned for your own property.

Seeking help

Before embarking on a woodland road project, determine whether you need technical help. It is available from a variety of sources. Some general help is provided without charge; however, the price for detailed advice can be recovered easily by savings in road construction or by avoiding environmental problems.

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

Some woodland roads appear to locate and construct, while others could be financial and environmental disasters. Some technical review and prior approval may be required before roads are severed under the Oregon Forest Practices Act; permits are required before operations. When reviewing table 1, circle the conditions that normally require technical assistance on your land. If you circle two or more of the conditions, evaluate whether you can acquire sufficient skills to handle the condition.

Because road development is an infrequent activity and roads themselves are financial and environmental risks, you should obtain technical assistance to reduce these risks.

Road development on the property

Woodland owners typically must decide how much road to build. Should you build roads as needed, or should you develop the property at one time? Several considerations bear on the decision.

Building short stretches of road as needed makes sense to some landowners. Roadbuilding can be a do-it-yourself activity requiring much less money. You could build the easy roads and contract more difficult stretches. There is less maintenance required when roads are sequentially developed.
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 road site. While you can cut some stumps and leave them, you should remove most of them (or add holes as they rot out) as they are obstacles to construction. 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 be surfaces smooth enough for traffic and surfaces that will handle rainfall effectively. Build gravel roads by spreading the gravel and then reshaping the road surface for drainage purposes.

Building all your roads at one time provides immediate access to the entire property. You can take advantage of harvesting to sell particular markets, provide protection to the whole property, and carry out land management operations, as well as enjoy recreation on your property.

Some woodland owners can also harvest large timber on their property to aid development. Harvesting the large timber requires equipment of sufficient size to be useful for road building as well, as harvesting large timber to align road construction.

Steps in roadbuilding:
- 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).
- Design. Develop the specifications for the road. Determine grades, widths, curves, cut and fill information. If you use a contract, develop plans and details for it.
- Layout. Provides design guidelines to those doing the construction. Ribbons and stakes generally identify the right-of-way, road centerline, and the location for cuts and fills.
- Technical assistance
- Source for assistance

Table 1. Decision table for technical assistance

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Woodland owner can handle</th>
<th>Technical assistance</th>
<th>Source for assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope on hillside where road to be built</td>
<td>Less than 40%</td>
<td>Greater than 40%</td>
<td>Forester, engineer, road contractor</td>
</tr>
<tr>
<td>Stream crossings</td>
<td>Class II streams,* culverts less than 48&quot;</td>
<td>Class I streams,* greater than 48&quot; culverts, bridges, etc.</td>
<td>State forest practices forester, engineer, forester</td>
</tr>
<tr>
<td>Terrain</td>
<td>Stable and/or nonerosive</td>
<td>Unstable and erosive (slumps, slides, bare soils, silty soils)</td>
<td>State forest practices forester, engineer, forester, road contractor</td>
</tr>
<tr>
<td>Soil depth and rock outcrops</td>
<td>Deep soils—no blasting</td>
<td>Shallow soils, rock blasting</td>
<td>Engineer, road contractor</td>
</tr>
<tr>
<td>Soil moisture</td>
<td>Well-drained</td>
<td>Wet spots, swamps</td>
<td>State forest practices forester, engineer, forester, road contractor</td>
</tr>
<tr>
<td>Scale of operation &amp; finances</td>
<td>Short roads less than ½ mile, less than $5,000, low-intensity use</td>
<td>Long roads greater than ½ mile, greater than $5,000, high-intensity use</td>
<td>Forester, engineer, accountant, lawyer</td>
</tr>
<tr>
<td>Road crossing other ownerships</td>
<td>Written agreement exists</td>
<td>Agreement to be negotiated</td>
<td>Lawyer, engineer</td>
</tr>
<tr>
<td>Owner skills &amp; equipment available</td>
<td>Has equipment or renting it, knows how to operate it</td>
<td>Lacks both</td>
<td>Road contractor</td>
</tr>
</tbody>
</table>

* You can determine stream classes by visiting State Forestry Department offices with a legal property description in hand.
Table 2. Schedule of roadbuilding

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>Summer</td>
</tr>
<tr>
<td>RECON</td>
<td>DESIGN</td>
</tr>
<tr>
<td>LAYOUT</td>
<td>EXCAVATION</td>
</tr>
<tr>
<td>DRAINAGE*</td>
<td>ORDER CULVERTS</td>
</tr>
<tr>
<td>MAINTENANCE</td>
<td>SURFACING*</td>
</tr>
</tbody>
</table>

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

Roads that connect with existing roads off the property, or roads that may cross a neighbor's property, need to have a right-of-way or road use agreement prepared. Legal advice can save problems from later misunderstandings of verbal agreements.

Maps or aerial photos can be especially helpful to road planning. Check with adjacent owners and government agencies, such as the Oregon Department of Forestry, U.S. Soil Conservation Service, U.S. Bureau of Land Management, and U.S. Forest Service for the availability of maps and photos covering the property. At a minimum, retain a detailed drawing of your property showing the roads.

The Soil Conservation Service (SCS) can be especially helpful. The SCS often has maps or photos covering the property that will help inform you of roadbuilding problems that you may encounter.

If the road location and likely construction problems are obvious, the FPF may visit the property to discuss the road and road construction problems. You may need consulting advice and services of the forest engineer, or road construction for the woodland area. The question service, information, and fees involved may be available; seek references and solicit bids for a job if significant values are involved.

By learning how to use some basic measuring tools, you can develop information to help in road planning and check on the progress of roads during construction. The OSU Extension Service through its county-based forestry agents can help you with educational needs and refer you to a variety of Extension publications related to roads and woodland management.

Surfacing woodland roads

For many woodland owners, a well-maintained dirt road is sufficient for their property. However, a rocked road can provide all-weather access to the property and improve hauling and road maintenance. Specific techniques are covered in the Extension publication Rocking Woodland Roads (see "Suggested readings, " below) but several planning related issues are raised here.

If rock is available on the property, you have a great advantage over those who must haul it from a distant source. Some rock on woodland properties can simply be dug out of the hillside and spread on the road. Other rock sources on woodland properties may require development of a rock pit.

While numerous regulations and permits are required for rock pits, the value of the rock may be significant. Most owners need technical assistance for this development. The financial and tax treatment of the surfacing is likely to be a consideration. You may expense the cost of rock used for maintenance and for temporary roads against the year's income.

Surfacing woodland roads may double the cost of the road. Typically, the rock is applied in two layers or courses. The base course is larger rock to support the load on the road; depth of the base course is 6" to 12" needed. The running surface or topping course is a 2" to 4" layer of smaller rock.

You must decide how much of the road to surface, or simply whether you will use rock to maintain or improve spots on an otherwise dirt road. The cost of surfacing depends on the length of road, the depth and width of rock you need, and whether the rock is available nearby or must be hauled to your property.

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While numerous regulations and permits are required for rock pits, the value of the rock may be significant. Most owners need technical assistance for this development. The financial and tax treatment of the surfacing is likely to be a consideration. You may expense the cost of rock used for maintenance and for temporary roads against the year's income.
You may treat rock used for permanent roads differently from a tax standpoint (see discussion below). Rock that you encounter as excavation for the road and that you spread adjacent to the excavation site is considered part of the road construction costs.

Contracting considerations

If the value (or construction cost) of your woodland road is sufficient, consider a written contract for road construction. A contract details for the contractor how the road should be built, and it protects your interests as landowner. Logging road construction contracts contain many design specifications; they often provide the contractor with a grade and ground profile of the road centerline. You may need technical assistance from a forester or engineer, as well as an attorney, to prepare a road construction contract.

Because road construction is often tied directly to timber harvesting, the timber contract (sale or service) may contain the roadbuilding provisions. While the logging contractor may be capable of building some roads that meet logging and woodland management objectives, the ordinary timber contract may not be adequate to meet your objectives for road construction unless you modify it.

The purpose of contract specifications is to translate the road design information to the contractor. Specifications cover road widths, lengths, etc., and price, as well as responsibilities. Contract specifications control the roadbuilder’s performance during and after the contract period.

If you opt for a further contract, you should protect your interests because construction of permanent roads is much more complex and expensive than excavation of temporary roads. Stakes and ribbons mark the limits for the contractor’s activity (between clearing lines on either side of the road) and tell the contractor where to cut and fill. If the contractor follows the construction staking information, the road will be built to your 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, you or someone you designate must oversee the roadbuilding. Even though you may use a detailed written contract, the contract supervisor has to be at the construction site frequently to assure performance. Times and activities especially critical for contract supervision include:

- the start of excavation,
- during installation of stream crossings (culverts, bridges, etc.),
- during final grading, and
- before the large excavation equipment is moved from the site.

Other times and activities depend on circumstances; however, it is important for landowners to have available for any necessary legal and construction changes when the road is being built.

Financial considerations

Because woodland roads can cost from $8,000 to $100,000 per mile, you need to address several financial and tax concerns during planning. The most immediate question may be where the money is coming from to build the road. The ACRS and the Accelerated Cost Recovery System (ACRS) are tax incentives that encourage the construction of permanent roads even though they may be considered temporary under the IRS rules.

Like other investments, capital assets like permanent roads provide an opportunity to allocate funds to asset protection. Permanent roads provide the opportunity to defer or deduct expenses from taxable income. In order to justify the costs of permanent roads, you need to carefully consider how your woodland roads will be accounted for on your tax returns.

Costs associated with temporary roads used for timber harvest within a short period (usually 1 year) are deductible against the year’s income. However, if the road serves the property for longer than 1 year, you may consider it a permanent road.

Contracting

If the road is to be used for more than 1 year, you may choose to include maintenance, reconstruction, and surface treatment in the cost of the road. Skids must be considered permanent because even though they may be considered temporary in woodland management, your C.P.A. may want to document the cost of the road for tax purposes.

As of this writing, the Internal Revenue Service (IRS) treatment of woodland roads is unclear. Resolving the tax treatment may require tax court decisions and IRS revisions.

Prudent landowners who are involved with permanent roads should review their circumstances with a certified public accountant (C.P.A.). At issue is whether woodland roads are classed as temporary or permanent. The uncertainty is caused by a tax shift to the Accelerated Cost Recovery System (ACRS) and away from a tax accounting system based on an asset’s useful life.

You may treat rock used for temporary roads differently from a tax standpoint. Resolving the tax treatment may require tax court decisions and IRS revisions. Prudent landowners who are involved with permanent roads should review their circumstances with a certified public accountant (C.P.A.).
face annual maintenance problems beyond your capability. Once the contractor removes the roadbuilding 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 source of most problems with soil and water protection—both on your woodland property itself and on downstream adjacent properties. Adequate road planning assures that road drainage, stream crossings, and placement and performance of road maintenance will create problems during and after road construction. Publications and other sources of information are available to help landowners in planning for environmental protection (see "Suggested readings").

Critically reviewing roads on other properties

Woodland owners typically have time to study and deliberate their decisions on woodland roads. Therefore, you can critically review roads built on other properties to collect information and experience to help with your roads. Study by driving roads on other properties and using a mental checklist, you can gain valuable insights from successes and failures of others. A primary point on the checklist is to relate roads to the owner’s use requirements. Government and large industry roads may not be to high standards than you would require on Woodland Roads. If there are useful points on the roads that do not on Woodland Roads, the checklist is not a complete list of criteria, but it should be able to assist you to 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 fillslopes look? Are they holding up?

Check the road intersections at the highway and with other roads. Any safety or traffic problems?

Check the culverts, bridges, and stream crossings, as well as the road drainage features. Are they adequate for storm conditions?

Review the maintenance on the older roads. Are ditches and culverts plugged?

Look for evidence of erosion or gully, such as road failures or culvert erosion. Are they halting erosion?

Look for road failures and pieces in other information on what might have caused the failure. Look for evidence that these warm season are draining poorly.

Conclusion

Planning for woodland roads means that woodland owners must give careful thought to their property development and roadbuilding objectives. You need to carefully plan whether you can handle the roadbuilding yourself or must contract for it. A variety of planning information is available to you, especially in planning for soil and water protection. Major planning decisions involve financial concerns and rock surfacing. Finally, you can develop your roadbuilding knowledge by critically reviewing roads on other properties.

Suggested readings

(Order OSU Extension Service and PNW publications from the Bulletin Mailing Office, OSU, Corvallis 97331; enclose the amounts indicated.)


Field Guide to the Oregon Forest Practice Rules, Oregon State Department of Forestry (Salem, issued annually). Order from Oregon Department of Forestry, Salem 97310.


The Woodland Workbook comprises more than 50 publications prepared by the Oregon State University Extension Service specifically for owners and managers of private, nonindustrial woodlands. The Workbook is organized into 10 sections containing information of long-range and day-to-day value for anyone interested in wise management, conservation, and use of woodland properties. The sections are Management Planning, Forest Measurements, Reforestation, Stand Management, Logging, Marketing Forest Products, Multiple Use, Forestry Issues, Business Management, and Woodland Assistance.

Although each publication is intended to be complete in itself, you may wish to purchase the entire set in a three-ring Woodland Workbook binder, with tabbed dividers for each section. If you wish to purchase only the binder for filing copies of our woodland publications, you may obtain the binder and dividers as a package. Or you may purchase individual Woodland Workbook publications as you need them.

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This publication was prepared by John J. Garland, Extension timber harvesting specialist, Oregon State University.

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