

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
SOUTH DAKOTA SUPPLEMENTS ITALICIZED**

FOREST HARVEST TRAILS AND LANDINGS

(ac.)

CODE 655

DEFINITION

Laying out, constructing, and using forest harvest trails and landings.

PURPOSE

To allow for removal of a forest product while minimizing onsite and offsite damage to resources.

CONDITIONS WHERE PRACTICE APPLIES

On forested areas where harvest operations are scheduled.

CRITERIA

Roads produce 90 percent of all sediment from forest activities. Minimize the number of roads constructed in a watershed through comprehensive road planning with adjacent landowners, and design roads to the minimum standard necessary to accommodate anticipated use and equipment.

Timing and use of equipment will be commensurate with site and soil conditions to maintain site productivity and minimize soil erosion, displacement and compaction.

Refer to Tables 1 and 2 for guidance on soil rating criteria.

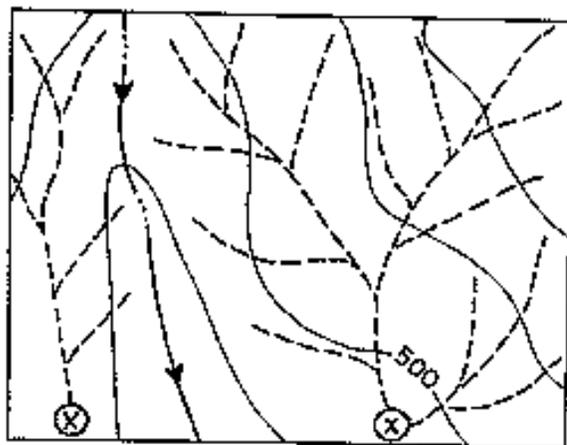
Locate roads to provide access to suitable (relatively flat and well-drained) log landing areas to reduce soil disturbance. Fit the road to the topography by locating roads on natural benches and following natural contours. Avoid long, steep road grades and narrow canyons. Avoid wet areas including moisture-laden or toe slopes, swamps, wet meadows, and natural drainage channels.

Harvest trails and landings will be of a size, gradient, number, and location to accomplish tree removal and transport while minimizing adverse onsite and offsite impacts. *As much as 40 percent of the area may be*

covered with harvest trails during a single entry, if you do not plan and mark them in advance. It is recommended to confine the area covered by harvest trails to less than 15 percent of the area--including landings. Less area in harvest trails results in less compaction/displacement and more area favorable for tree growth. Adverse impacts include, but are not limited to, accelerated erosion, riparian zone degradation, stream channel, and streambank damage, or unacceptable damage to vegetation or habitat.

Two common patterns are the branching and the parallel harvest trail. On gentle slopes, the branching pattern in Figure 1 has one or more main trails from which other trails branch off to provide access to the area.

Figure 1



○ Indicates log-landing areas. Branching pattern
not to scale.

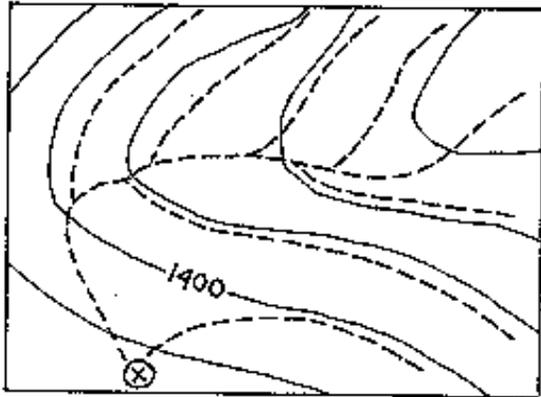
On steeper slopes, the parallel harvest trail pattern reflects the attempt to parallel the contours (Figure 2).

Skidding downhill is preferred for all ground-based systems. Skidding along the contour on slopes of

Conservation practice standards are reviewed periodically and updated if needed. The current version of this standard is posted on our website at www.sd.nrcs.usda.gov or may be obtained at your local Natural Resources Conservation Service.

greater than 20 percent requires excavation of the sideslopes to provide a level running surface. This is necessary because the loaded vehicle tends to slide downslope. Excavated skid trails should be kept narrow and adequately treated to minimize erosion. In steep terrain, skid trails are often oriented up and down the slope so that the vehicle remains perpendicular to the contours to assure vehicle stability. Increased erosion protection measures on these skid trails is essential. Cable harvesting on these slopes may be an effective alternative depending on conditions.

Figure 2



○ Indicates log-landing areas. Parallel patterns not to scale.

Minimize activities when soils appear excessively wet.

Slash, debris, and vegetative material left on the site after harvesting shall be treated so they do not present an unacceptable fire or pest hazard or interfere with the intended purpose.

Provide adequate drainage from the surface of all permanent and temporary roads by using outsloped or crowned roads, drain dips, or insloped roads with ditches and cross drains. Space road drainage features so peak drainage flow on the road surface or in ditches will not exceed the capacity of the individual drainage facilities.

Water bars, rolling dips and other drainage measures for trails shall be of sufficient size, intervals and gradient for adequate drainage and erosion control. Trails and landings shall be sufficiently revegetated to control erosion (See Table 3).

Comply with applicable laws and regulations, including *South Dakota Forestry Best Management Practices (BMPs)*.

CONSIDERATIONS

Assure safe ingress and egress to site.

Use existing roads where practical, unless use of such roads would cause or aggravate an erosion problem.

Locate landings and trails to preserve the aesthetic quality.

Minimize the number of stream crossings and choose stable stream-crossing sites. Cross-streams at right angles to the main channel if practical. Install road drainage features above stream crossings to route discharge into filtration zones before entering a stream.

Police landings and trails to remove refuse and garbage.

Complete or stabilize road sections within the same operating season. Stabilize erodible exposed soils by seeding, riprapping, benching, mulching, or other suitable means prior to fall or spring runoff.

Trails may be closed for erosion control, safety and liability, and reduced maintenance costs. *Leave abandoned roads in a condition that provides adequate drainage without further maintenance.*

Landings and trails may be used for wildlife food and cover plantings.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, and narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Watercourses and water quality shall be protected during and after removal and transport of trees. Upon completion of harvest, landings and trails will be left in a stable condition.

Periodic inspections of landings and trails will be conducted with necessary repairs applied.

Table 1
Soil Rating Criteria for Road and Log Landing Suitability (Natural Surface)

FACTOR	WELL SUITED	MODERATELY SUITED	POORLY SUITED	IMPACT
Slope %	< 6 %	6 - 12 %	> 12%	Reduced efficiency; unsafe operation
<i>Rock Fragments</i> 75 mm to <250 mm in size 250 mm to <600 mm in size Greater than 600 mm in size	<i>Percent Surface Cover</i>			<i>Obstruction</i>
	< 15%	15 - 50%	> 50%	
	< 3%	3 - 15%	> 15%	
	<0.1 %	0.1 - 3%	> 3%	
<i>Unified Classification Group</i> > 7 cm thickness in upper 15 cm	---	<i>CL, CH, CL-ML, ML, MH</i>	<i>OL, OH, PT</i>	<i>Reduced efficiency</i>
<i>Ponding and/or Flooding</i> None, Rare Occasional Frequent/Very Frequent	<i>Frequency in months</i>			<i>Reduced efficiency; unsafe operation</i>
	1 - 2	---	---	
	1 - 2	3 - 5	6 - 12	
	0	1 - 2	3 - 12	
<i>Soil Slippage Potential</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>	<i>Landing failures; unsafe operation</i>
<i>Water Table</i> Maximum depth to wet layer for 2 or more consecutive months	> 60 cm	60 cm to 30 cm	< 30 cm	<i>Reduced efficiency</i>

Ratings assume that slopes are less than 20 percent gradient and landings are one-half acre or less in size.

Criteria Notes: If log landing or road suitability is considered "moderately suited" or "poorly suited," refer to the Construction Limitations for Haul Roads and Log Landing interpretation.

Well Suited - Little or no restrictions to road or log landing suitability.

Moderately Suited - One or more restrictions reduce site suitability.

Poorly Suited - One or more restrictions generally make the use of the site for a natural road or landing very difficult or unsafe.

From Part 537.2-National Soil Information System (NA515) Interpretations in the National Forestry Manual.

Table 2
Soil Rating Criteria for Construction Limitations for Haul Roads and Log Landings

FACTOR	SLIGHT	MODERATE	SEVERE	IMPACT
<i>Slope %</i>	< 15 %	15 - 30%	> 30 %	<i>Reduced efficiency</i>
<i>Soil Slippage Potential</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>	<i>Road or landing failure; increased costs</i>
<i>Flooding</i>	<i>Frequency in months</i>			
<i>None, rare</i>	1 - 2	---	---	<i>Road damage; increased costs</i>
<i>Occasional</i>	1 - 2	3 - 5	6 - 12	
<i>Frequent/Very Frequent</i>	0	1 - 2	3 - 12	
<i>Particle Size Separates</i> <i>Percent retained on #200 sieve for layers > 15 cm thick and: within 30 cm on < 15% slopes, within 90 cm on 15 - 30% slopes, or within 150 cm on > 30% slopes</i>	< 85%	> 85%	---	<i>Increased construction costs</i>
<i>Unified Classification Group</i>		<i>CL, CH, CL-ML, ML, MH</i>	<i>OL, OH, PT</i>	<i>Increased construction costs</i>
<i>Rock Fragments</i> <i>Percent surface cover > 250 cm in size</i>	< 3 %	3 - 15 %	> 15 %	<i>Obstruction</i>
<i>Restrictive Layer</i> <i>Depth to bedrock paralithic or any restriction with hardness of indurated</i>				<i>Reduced efficiency; increased construction costs</i>
<i>< 15 % slopes</i>	> 100 cm	50 cm to 100 cm	< 50 cm	
<i>15 - 30 % slopes</i>	> 150 cm	75 cm to 150 cm	< 75 cm	
<i>Water Table</i> <i>Maximum depth to wet layer for 12 months of the year</i>	> 60 cm	60 cm to 30 cm	< 30 cm	<i>Reduced efficiency</i>

Slight - Little or no limitations to construction activities.

Moderate - One or more limitations that cause some difficulty.

Severe - One or more limitations that make road or log landing construction very difficult or more costly.

Table 3**SUGGESTED WATERBAR INTERVALS FOR DIFFERENT SOILS**

	Slope Gradient	Granitic or Sandy	Clay or Loam	Shale or Gravel
Roads and Landings	2 - 5%	400 ft.	500 ft.	600 ft.
	6 - 12%	200 ft.	250 ft.	300 ft.
Skid trails	5 - 10%	250 ft.	300 ft.	400 ft.
	11 - 25%	150 ft.	200 ft.	300 ft.
	over 25%	75 ft	100 ft.	150 ft.