

Appendix 6: Conversion Factors and Calculations used in Forestry

Distance Factors

1 mile = 5,280 feet	½ mile = 2,640 feet	¼ mile = 1,320 feet	1/10 mile = 528 feet
1 mile = 1,760 yards	½ mile = 880 yards	¼ mile = 440 yards	1/10 mile = 176 yards
1 mile = 80 chains	½ mile = 40 chains	¼ mile = 20 chains	1/10 mile = 8 chains

NOTE: 1 chain = 66 feet; 1 yard = 3 feet

Area Factors

1 acre = 43,560 square feet

1 square mile = 640 acres

NOTE: A football field is approximately 1.3 acres in area

To Determine Acres of an Area: Step 1: Multiply the LENGTH feet (x) WIDTH feet.

Step 2: Take this answer and divide it by 43,560.

For Example: A log deck is 85 feet wide and 170 feet long. ($85 \times 170 = 14450$)
 $14450 \div 43560 = 0.33$ acre in size

Acres Table for Road, Trail, or Deck Size

Length in Feet	Width in Feet							
	10	12	15	20	35	50	75	100
25	0.006	0.007	0.009	0.011	0.02	0.03	0.04	0.06
50	0.011	0.014	0.02	0.02	0.04	0.06	0.09	0.11
75	0.02	0.02	0.03	0.03	0.06	0.09	0.13	0.17
100	0.02	0.03	0.03	0.05	0.08	0.11	0.17	0.23
125	0.03	0.03	0.04	0.06	0.10	0.14	0.22	0.29
150	0.03	0.04	0.05	0.07	0.12	0.17	0.26	0.34
175	0.04	0.05	0.06	0.08	0.14	0.20	0.30	0.40
200	0.05	0.06	0.07	0.09	0.16	0.23	0.34	0.46
250	0.06	0.07	0.09	0.11	0.20	0.29	0.43	0.57
500	0.11	0.14	0.17	0.23	0.40	0.57	0.86	1.15
750	0.17	0.21	0.26	0.34	0.60	0.86	1.29	1.72
1000	0.23	0.28	0.34	0.46	0.80	1.15	1.72	2.30
1250	0.29	0.34	0.43	0.57	1.00	1.43	2.15	2.87
1500	0.34	0.41	0.52	0.69	1.21	1.72	2.58	3.44
1750	0.40	0.48	0.60	0.80	1.41	2.01	3.01	4.02
2000	0.46	0.55	0.69	0.92	1.61	2.30	3.44	4.59
2500	0.57	0.69	0.86	1.15	2.01	2.87	4.30	5.74
5000	1.15	1.38	1.72	2.30	4.02	5.74	8.61	11.48
5280	1.21	1.45	1.82	2.42	4.24	6.06	9.09	12.12

Calculating Percent (%) Slope of Existing Land Surface

To determine the **percent slope of existing** roads, trails, or the land surface:

Measure the vertical elevation and divide by the horizontal distance. For example:

- A skid trail has an 8-foot change in elevation over a horizontal distance of 55 feet.
- Therefore, $8 \text{ ft} \div 55 \text{ ft} = 0.145$. Multiply your answer $\times 100$. The % slope for this example is 14.5%.

Percent (%) Slope of Existing Surfaces

Vert. Elev.	Horizontal Distance										
	10	15	20	25	33	50	66	75	100	150	200
1	10%	7%	5%	4%	3%	2%	2%	1%	1%	1%	1%
2	20%	13%	10%	8%	6%	4%	3%	3%	2%	1%	1%
3	30%	20%	15%	12%	9%	6%	5%	4%	3%	2%	2%
4	40%	27%	20%	16%	12%	8%	6%	5%	4%	3%	2%
5	50%	33%	25%	20%	15%	10%	8%	7%	5%	3%	3%
6	60%	40%	30%	24%	18%	12%	9%	8%	6%	4%	3%
7	70%	47%	35%	28%	21%	14%	11%	9%	7%	5%	4%
8	80%	53%	40%	32%	24%	16%	12%	11%	8%	5%	4%
9	90%	60%	45%	36%	27%	18%	14%	12%	9%	6%	5%
10	100%	67%	50%	40%	30%	20%	15%	13%	10%	7%	5%
12	-	80%	60%	48%	36%	24%	18%	16%	12%	8%	6%
14	-	93%	70%	56%	42%	28%	21%	19%	14%	9%	7%
16	-	107%	80%	64%	48%	32%	24%	21%	16%	11%	8%
18	-	-	90%	72%	55%	36%	27%	24%	18%	12%	9%
20	-	-	100%	80%	61%	40%	30%	27%	20%	13%	10%

Calculating Slope:Ratio for Grading & Construction

Slope ratio for grading and construction is measured as the horizontal ‘run’ over its vertical ‘rise’.

This is **opposite** of the more common practice to measure the “% slope” as shown in the above table.

- Slope ratio is expressed mathematically in a way so that the second digit (the ‘rise’) is 1.
- In other words, a 2:1 slope ratio has a 2 feet ‘run’ distance-factor for every 1 foot of ‘rise’ height.
- A 2:1 slope [horizontal run is only 2x the rise height] is steeper than a 4:1 slope [run is 4x the rise].
- Therefore, steeper slopes have a smaller first digit in the ratio, than do flatter slopes.

As a forestry example:

A road’s side / cut bank is graded across a horizontal ‘run’ distance of 6 feet, with a vertical ‘rise’ height of 4 feet. This side / cut bank therefore has a slope of 6/4, expressed as a ratio **1.5 : 1** (from $6 \div 4$).

