



## Design Parameters

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent<sup>1</sup>. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use <b>MOTORCYCLE</b>		<b>Trail Class 1</b>	<b>Trail Class 2</b>	<b>Trail Class 3</b>	<b>Trail Class 4</b>	<b>Trail Class 5</b>
<b>Design Tread Width</b>	<b>Single Lane</b>	Typically not designed or actively managed for motorcycles, although use may be accepted	8" – 24"	18" – 36"	24" – 48"	Typically not designed or actively managed for motorcycles, although use may be accepted
	<b>Double Lane</b>		48"	48" – 60"	60" – 72"	
	<b>Structures</b> (Minimum Width)		36"	48"	48"	
<b>Design Surface<sup>2</sup></b>	<b>Type</b>		Native, limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native with some onsite borrow or imported material where needed for stabilization, occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present	Native with imported materials for tread stabilization common, routine grading Minor roughness Sections of soft tread not common	
	<b>Protrusions</b>		≤ 6" May be common and continuous	≤ 3" May be common, not continuous	≤ 3" Uncommon, not continuous	
	<b>Obstacles</b> (Maximum Height)		18" May be common or placed for increased challenge	12" Common, left for increased challenge	3" Uncommon	
<b>Design Grade<sup>2</sup></b>	<b>Target Grade</b>		10% – 25%	5% – 20%	3% – 10%	
	<b>Short Pitch Maximum</b>		40%	25%	15%	
	<b>Maximum Pitch Density</b>		20% – 40% of trail	15% – 30% of trail	10% – 20% of trail	

Designed Use <b>MOTORCYCLE</b>		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Cross Slope</b>	<b>Target Cross Slope</b>		5% – 10%	5% – 8%	3% – 5%	
	<b>Maximum Cross Slope</b>		15%	10%	10%	
<b>Design Clearing</b>	<b>Height</b>		6' – 7'	6' - 8'	8' - 10'	
	<b>Width</b> (On steep side-hills, increase clearing on uphill side by 6" – 12")		36" – 48" Some light vegetation may encroach into clearing area	48" – 60"	60" - 72"	
	<b>Shoulder Clearance</b>		6" – 12"	12" – 18"	12" – 24"	
<b>Design Turn</b>	<b>Radius</b>		3' – 4'	4' – 6'	5' – 8'	

<sup>1</sup> For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum) see FSH 2309.18, section 05.

<sup>2</sup> The determination of trail-specific grades, surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential, and other factors contributing to surface stability and overall trail sustainability.



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Designed Use <b>ALL-TERRAIN VEHICLE</b>		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Tread Width</b>	<b>Single Lane</b>	Typically not designed or actively managed for ATVs, although use may be accepted	48" – 60"	60"	60" – 72"	Typically not designed or actively managed for ATVs, although use may be accepted
	<b>Double Lane</b>		96"	96" – 108"	96" – 120"	
	<b>Structures</b> (Minimum Width)		60"	60"	60"	
<b>Design Surface<sup>2</sup></b>	<b>Type</b>		Native, limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native with some onsite borrow or imported material where needed for stabilization, occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present	Native with imported materials for tread stabilization common, routine grading Minor roughness Sections of soft tread not common	
	<b>Protrusions</b>		≤ 6" May be common and continuous	≤ 3" May be common, not continuous	≤ 3" Uncommon, not continuous	
	<b>Obstacles</b> (Maximum Height)		12" May be common or placed for increased challenge	6" May be common, left for increased challenge	3" Uncommon	
<b>Design Grade<sup>2</sup></b>	<b>Target Grade</b>		10% – 25%	5% – 15%	3% – 10%	
	<b>Short Pitch Maximum</b>		35%	25%	15%	
	<b>Maximum Pitch Density</b>		20% – 40% of trail	15% – 30% of trail	10% – 20% of trail	

Designed Use ALL-TERRAIN VEHICLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Cross Slope</b>	Target Cross Slope		5% – 10%	3% – 8%	3% – 5%	
	Maximum Cross Slope		15%	10%	8%	
<b>Design Clearing</b>	Height		6' – 7'	6' – 8'	8' – 10'	
	Width (On steep side hills, increase clearing on uphill side by 6" – 12")		60" Some light vegetation may encroach into clearing area	60" – 72"	72" - 96"	
	Shoulder Clearance		0" – 6"	6" – 12"	12" – 18"	
<b>Design Turn</b>	Radius		6' – 8'	8' – 10'	8' – 12'	

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Designed Use FOUR-WHEEL DRIVE VEHICLE > 50"		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Tread Width</b>	<b>Single Lane</b>	Typically not designed or actively managed for 4WD Vehicles > 50", although use may be accepted	72" – 84"	72" – 96"	96" – 120"	Typically not designed or actively managed for 4WD Vehicles > 50", although use may be accepted
	<b>Double Lane</b>		16'	16'	16'	
	<b>Structures</b> (Minimum Width)		96"	96"	96"	
<b>Design Surface<sup>2</sup></b>	<b>Type</b>		Native, limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native with some onsite borrow or imported material where needed for stabilization, occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present	Native with imported materials for tread stabilization common, routine grading Minor roughness Sections of soft tread not common	
	<b>Protrusions</b>		≤ 12" May be common and continuous	≤ 8" May be common and continuous	≤ 4" May be common and continuous	
	<b>Obstacles</b> (Maximum Height)		36" May be common or placed for increased challenge	24" Common, left for increased challenge	12" Uncommon	
<b>Design Grade<sup>2</sup></b>	<b>Target Grade</b>	10% – 21%	5% – 18%	5% – 12%		
	<b>Short Pitch Maximum</b>	25%	20%	15%		
	<b>Maximum Pitch Density</b>	20% – 30% of trail	10% – 20% of trail	5% – 10% of trail		

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Designed Use FOUR WHEEL DRIVE VEHICLE > 50"		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Cross Slope</b>	Target Cross Slope		8% – 15%	5% – 12%	5% – 8%	
	Maximum Cross Slope		15%	12%	8%	
<b>Design Clearing</b>	Height		6' – 8'	6' – 8'	8' – 10'	
	Width		72" – 84" Some light vegetation may encroach into clearing area	72" – 96"	96" - 144"	
	Shoulder Clearance		0" – 6"	6" – 12"	12" – 18"	
<b>Design Turn</b>	Radius		10' – 15'	15' – 20'	20' – 30'	

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Designed Use <b>SNOWMOBILE</b>		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Tread Width</b>	<b>Single Lane</b>	Typically not designed or actively managed for snowmobiles.	4' – 6' Typically not groomed	6' – 8' (or width of grooming equipment) On tight-radius turns, increase groomed width to ≥ 10'	8' – 10' (or minimum width of grooming equipment) On tight-radius turns, increase groomed width to ≥ 12'	Typically not designed or actively managed for snowmobiles.
	<b>Double Lane</b>		10' Typically not groomed	10' – 12'	12' – 20'	
	<b>Structures</b> (Minimum Width)		6'	12'	18'	
<b>Design Surface</b> <sup>1</sup>	<b>Type</b>		Generally no machine grooming Commonly rough and bumpy	May receive occasional machine grooming for snow compaction and conditioning Frequently rough and bumpy	Regular machine grooming for snow compaction and conditioning Commonly smooth	
	<b>Protrusions</b>		No protrusions	No protrusions	No protrusions	
	<b>Obstacles</b> (Maximum Height)		12" Uncommon	6" Uncommon (no obstacles if machine groomed)	No obstacles	
<b>Design Grade</b> <sup>2</sup>	<b>Target Grade</b>		0% – 12%	0% – 10%	0% – 8%	
	<b>Short Pitch Maximum</b>		35%	25%	20%	
	<b>Maximum Pitch Density</b>		15% – 30% of trail	10% – 20% of trail	5% – 10% of trail	

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Designed Use <b>SNOWMOBILE</b>		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
<b>Design Cross Slope</b>	<b>Target Cross Slope</b>		0% – 10%	0% – 5%	0%	
	<b>Maximum Cross Slope</b>		15%	10%	5%	
<b>Design Clearing</b>	<b>Height</b> (Above normal maximum snow level)		6'	6' – 8' (provide sufficient clearance for grooming equipment)	8' – 12' (provide sufficient clearance for grooming equipment)	
	<b>Width</b>		6' – 12' Some light vegetation may encroach into clearing area	8' – 14' Light vegetation may encroach into clearing area	10' – 22' Widen clearing at turns or if increased sight distance needed	
	<b>Shoulder Clearance</b>		6" – 12"	12" – 18"	12" – 24"	
<b>Design Turn</b>	<b>Radius</b>		8' – 10'	15' – 20' (or sufficient radius for grooming equipment)	25' – 50'	

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