

SECTION 6. ROAD CONSTRUCTION STANDARDS

Construction of new roads or reconstruction of existing roads proposed for dedication to the County shall conform to the standards set forth in this section. Roads must be designed to provide safe and adequate passage for vehicular, pedestrian and non-motorized traffic and to ensure proper drainage, including surface crown, culverts, curbs and gutters, drainage swales and storm drains. Where not specifically referenced in this section, all applicable standard drawings for County design requirements are available in Appendix A. In case of conflict between these regulations, MPWSS, AASHTO or Missoula County Subdivision Regulations, the order of precedence is as follows:

1. Subdivision Regulations
2. These Standards
3. AASHTO
4. MPWSS

Private and public non-maintained roads are also subject to the following criteria.

6.1 Road Design Guidelines and Criteria

1. General road design considerations shall be as shown in Table 6.1.

Table 6.1 Road Design Considerations

Design Parameter	Road Classification			
	Local	Minor Collector	Collector or Commercial	Arterial
Design Speed (mph)	25 - 35	25 - 35	25-45	35 - 55
Maximum Vertical Grade (%)	10	8	6	6
Minimum Horizontal Curve Radius (ft)	50	200	525	900
Return Radius Between Intersecting Streets* (ft)	25	35	50	50
Horizontal Clearance (ft)	20	20	20	20
Vertical Clearance (ft)	14	14	14	14

*Based on road with higher classification

2. All new streets or roads that intersect existing or proposed streets or roads shall intersect at a substantially right angle ($\pm 10^\circ$).
3. One way streets require special consideration and will be reviewed on a case by case basis.
4. Where proposed streets cannot intersect directly across from another street, either existing or proposed, the minimum offset distance between the two centerlines shall be one hundred and twenty-five (125) feet.
5. Where public through streets are not feasible, cul-de-sacs are allowed provided that the cul-de-sac meets the following standards (see Standard Drawing MCSD-200 in Appendix A). If a through street is planned or can reasonably be planned for connection at a future

date, a temporary cul-de-sac meeting the same geometric standards will be required. If sufficient conditions warrant, the requirement for paving a temporary cul-de-sac may be waived by the County

- (a) The minimum right-of-way radius is sixty (60) feet;
 - (b) The minimum surfacing width radius is forty-five (45) feet;
 - (c) The minimum right-of-way radius and surfacing radius connecting the cul-de-sac bulb to the tangent road surface is thirty (30) feet; and
 - (d) The maximum cul-de-sac length is one thousand (1,000) feet.
6. Where private through streets are not feasible, the proposed turn around shall be reviewed and approved by the appropriate local rural fire district.
 7. Guardrail or other longitudinal barrier systems shall be required and installed as per regulations in the most recent edition of the “Roadside Design Guide” as published by AASHTO and shall meet requirements of the National Cooperative Highway Research Program (NCHRP) Report 350.
 8. Sight distance shall be provided as required by AASHTO and as shown in Standard Drawing MCSD-408 in Appendix A.
 9. Typical drawings for all roads are shown in Standard Drawings MCSD-200 through MCSD-210 in Appendix A.
 10. Testing, inspection and certification of materials used to construct paved roads shall be conducted in accordance with Section 8 of these standards.
 11. The minimum surface widths for roads or streets are shown in Table 6.2.

Table 6.2 Road Standards

		Urban Standards							Rural Standards	
		ROW (feet)	Pavement Width ^a (feet)						ROW (feet)	Gravel or Pavement Width ^b (feet)
			Small Lot			Large Lot				
Road Classification	Number of Lots / Units		No Parking	Parking 1-side	Parking 2-sides	No Parking	Parking 1-side	Parking 2-sides		No Parking
Local / Private	2 – 5	60	20	22	30	20	22	30	40	18
Local / Public	2 – 5	60 – 80	24	32	40	24	32	40	60	24
Local	6 – 39	60 – 80	n/a	32	40	24	32	40	60	24
Minor Collector	40 – 199	60 – 80	n/a	34	42	26	34	42	60 – 80	26
Collector	200+	60 – 80	n/a	36	44	28	36	44	60 – 80	28
Commercial / Industrial	n/a	60 – 80	26	34	42	26	34	42	n/a	n/a

^a Pavement widths do not include bike lanes, curb and gutter, or gravel shoulders

^b Gravel surface widths do not include two (2) foot gravel shoulders

- (a) Roads or streets that do not provide for two opposing twelve (12) foot wide travel lanes will not be maintained by the County.
- (b) Where curb and gutter is not required, two (2) foot gravel shoulders are required. Shoulders shall not be included in the determination of the travel way width.
 1. A shoulder is the portion of the roadway contiguous with the traveled way that accommodates stopped vehicles, emergency use, and lateral support of sub-base, base and surface courses. The shoulder on minor rural roads with low traffic

volume serves essentially as structural lateral support for the surfacing and as an additional width for the traveled way. The slope of the shoulder from road edge to ditch fore-slope must be equal or slightly greater than the road surface cross slope.

- (c) Where bicycle or pedestrian lanes are allowed as an extension of the vehicle travel surface, additional surface width meeting current AASHTO standards shall be provided per bicycle or pedestrian lane and shall be identified appropriately with signage or pavement marking or both.

6.2 Sub-Grade Materials

Sub-grade materials will determine if geotextile materials are required below the sub-base material and what the sub-base material section should be. The classifications of sub-grade materials in Table 6.3 shall be used to describe existing site conditions:

Table 6.3 Sub-grade Classifications

Classification	Description	USCS	AASHTO
Good	Well-graded gravel, Poorly graded gravel, Silty gravel	GW, GP, GM	A-1-a, A-1-b, A-3, A-2-4
Average	Clayey gravel, Well-graded sand, Poorly graded sand, Silty sand	GC, SW, SP, SM	A-2-5, A-2-6, A-2-7, A-4
Poor	Clayey sand, Lean clay, Silt, Organic clay/silt, Fat clay, Elastic silt, Organic clay/silt, Peat	SC, CL, ML, OL, CH, MH, OH, PT	A-5, A-6, A-7-5, A-7-6

1. Where sub-grade materials are classified as “Poor,” an approved geogrid and geotextile fabric combination shall be required unless sub-excavation to a suitable soil horizon is approved by the County.
2. Where sub-grade materials are classified as “Average,” geotextile fabric may be required at the discretion of the County.
3. An engineering report prepared by a licensed geotechnical engineer will be considered when determining subgrade structural stability and the need for geotextile materials.

6.3 Gravel Materials

Gravel material used in constructing all roads within Missoula County shall meet gradations and specifications within these standards.

1. All materials shall be mechanically processed and must meet the following standards:
 - (a) Crushed gravel shall consist of hard, durable particles or fragments of stone, free of excess of flat, elongated, soft or disintegrated pieces, dirt or other deleterious matter.
2. Montana Department of Transportation specifications for “Crushed Base Course” Type ‘A’ Grade 2 (4” minus) and Grade 6 (1 ½” minus) material may be approved for use on a case-by-case basis.
3. Material meeting the County’s ¾” minus specification may be substituted for 2” minus material on a case-by-case basis.

4. Any naturally occurring gravel source that meets the specifications shall be tested prior to use, shall have a quality control plan for material removal approved by the County and will be approved for use in subbase or backfill on a case-by-case basis.
 - (a) Clay percentage must meet the appropriate range.
 - (b) Fractured faces on the #4 sieve must be greater than 50%.
5. The gradation specifications for gravels to be used for public maintained roads are shown in Table 6.4. Surface material for public maintained gravel roads may meet either the Missoula County ¾ inch specification or the Forest Service 1 inch specification.

Table 6.4 Gravel Gradations for Public Maintained Roadways

Sieve Size	Nominal Maximum Size			
	3 inch	2 inch	¾ inch	Forest Service 1 inch ^a
	Percent Passing ^{b,c}			
3"	90 - 100	--	--	
2.5"	85 - 95	--	--	
2"	--	100	--	
1.5"	75 - 95	90 - 100	--	
1"	--	80 - 92	--	100
¾"	65 - 85	75 - 85	90 - 100	97 - 100
⅜"	--	50 - 65	70 - 90	67 - 83
#4	25 - 60	30 - 45	40 - 70	48 - 68
#10	--	--	25 - 55	25 - 42
#40	--	5 - 20	--	17 - 30
#200	3 - 10	3 - 8	2 - 10	8 - 12 ^d
				10 - 18 ^e

^a Allowed for gravel surfaced roads only

^b Percentages by weight passing square mesh sieves

Fractured Faces > 35%

30% to 60% of material passing #200 sieve must be clay (i.e. smaller than 0.002 mm) as determined by ASTM D-422

^c Forest Service fractured faces > 75%

^d If PI is 4 - 12

^e If PI < 4

6. The gradation specifications for gravels to be used for private and public non-maintained roads are shown in Table 6.5 and Table 6.6.
 - (a) Surface material for private and public non-maintained gravel roads may meet any ¾ inch or 1 inch standard listed in Table 6.4 or Table 6.6.
 - (b) Base course material for paved private and public non-maintained roads shall meet the ¾ inch standard in Table 6.4 or Table 6.6.

**Table 6.5 Private or Public Non-maintained Road
Sub-base Gradation Specification**

Sieve Size	Nominal Maximum Size			
	Percent Passing*			
	3"	2"	1 1/2"	1"
3"	100	--	--	--
2 1/2"	--	--	--	--
2"	--	100	--	--
1 1/2"	--	--	100	--
1"	--	--	--	100
3/4"	--	--	--	--
3/8"	--	--	--	--
#4	25 - 60	25 - 60	25 - 60	25 - 70
#40	--	--	--	--
#200	2 - 12	2 - 12	2 - 12	2 - 12

* Percentages by weight passing square mesh sieves

Table 6.6 Private or Public Non-maintained Road Base Gradation Specifications

Sieve Size	Nominal Maximum Size		
	Percent Passing*		
	1 1/2"	1"	3/4"
1 1/2"	100	--	--
1"	--	100	--
3/4"	--	--	100
3/8"	--	--	--
#4	25 - 60	40 - 70	40 - 70
#10	--	25 - 55	25 - 55
#200	0 - 8	2 - 10	2 - 10

* Percentages by weight passing square mesh sieves

7. The County will allow the use of recycled asphalt or concrete materials in crushed sub-base materials, subject to the following conditions:
 - (a) If segregated stockpile management is employed, the County will accept recycled material in crushed sub-base courses at a rate of fifty percent (50%), with a maximum of twenty-five percent (25%) recycled asphalt.
 - (b) If clean integrated stockpile management is employed (i.e. no stumps, topsoil, tires, grass or other deleterious materials), the County will accept recycled material at a rate of thirty percent (30%) mixed with seventy percent (70%) virgin aggregate.
 - (c) When recycled materials are used, the gradation specifications shown in Table 6.4 shall be met.
 - (d) The County shall be notified when recycled material will be processed and shall be allowed to annually inspect and approve recycled material, the crushing process and the stockpiled material.

6.4 Asphalt Surfacing

Asphalt surfacing, including overlays over existing pavements, shall be constructed under the observation of the County and shall consist of hot mix asphaltic concrete consisting of mineral aggregate and asphalt material mixed at a hot plant. The materials used and the placement methods employed shall meet the requirements of the appropriate sections of the latest edition of MPWSS.

1. Prior to placing any asphalt material, the County shall have the opportunity to observe and approve the top course. The placement of the asphalt material must be observed and approved by the County. The notification for the paving work must be received at least twenty-four (24) hours prior to the start date and must be requested for observation during the County's normal working hours.
2. Recycled asphalt material is allowed as aggregate in new hot mix asphalt, provided that its use is pre-approved by the County, the recycled material is no more than twenty percent (20%) of the total aggregate by weight and the entire aggregate blend meets the batch mix specifications approved by the County. The recycled asphalt crushing, handling and stockpiling process shall be reviewed and approved annually by the County
3. Hot mix asphalt shall be placed when the air temperature is at least forty degrees (40°) and rising.
4. Hot mix asphalt shall not be placed during the following conditions:
 - (a) When the roadbed is frozen;
 - (b) During heavy rainfall, subject to the inspector's judgment;
 - (c) Upon standing water; or
 - (d) Where the roadbed is pumping.
4. If deficiencies in the asphalt surfacing are observed by the County prior to certification and acceptance, the contractor shall submit a mitigation proposal to the County for approval.
5. When used, asphalt seal coatings shall consist of a single application of asphalt material and seal coat aggregate meeting the requirements of the appropriate sections of the latest edition of MPWSS.

6.5 Warranty and Bonding Requirements

Upon final acceptance by the County, a minimum warranty period of one (1) year shall be in effect for all constructed improvements. In addition to the warranty requirements, the following bonding requirements for shall also be in place:

1. Upon completion of construction and prior to acceptance by Missoula County, a performance bond in the amount of 100% of construction costs shall be in place for one year for all paved roads, sidewalks and non-motorized facilities.
2. Performance bonding requirements on paved road improvements will be necessary if any section of the pavement is tested out of density specification:
 - (a) 91.5% to 92.4% Rice density, the performance bond shall be extended for two (2) years;

- (b) 90.5 % to 91.4% Rice density, the performance bond shall be extended for five (5) years;
 - (c) Rice density of less than 90.4% shall be rejected and shall be replaced.
3. Any deficiencies found in the asphalt from lab or field testing requirements shall require an additional two (2) year warranty period beyond the standard one (1) year. The County may consider an overlay, without deficiencies shown in a field Marshall Test for the overlay material, to be satisfactory mitigation and allow the standard one (1) year warranty period.