RESOLUTION 2023 - 24

A RESOLUTION TO ADOPT THE AMENDED 2014 LEWIS AND CLARK COUNTY PUBLIC WORKS MANUAL

[Supersedes Resolutions 2016-50]

WHEREAS, the Commission has authority to control and manage county roads within the county pursuant to Section 7-14-2101 and 7-14-2103, MCA; and

WHEREAS, the county Public Works Director is responsible for the supervision and direction of county roads, subject to the direction of the Commission, Section 7-14-2102, MCA; and

WHEREAS, the County Public Works Department prepared the Amendments to the 2016 Public Works Manual and received peer review from private engineering consulting firms, State of Montana Agencies, and from other County departments; and

WHEREAS, the Commission held a public review and comment period from March 9, 2023 through March 29, 2023; and

WHEREAS, the Public Works Department presented the proposed amendments to the commission on April 13, 2023; and

WHEREAS, the DRAFT Amendments to the Public Works Manual were made available for public inspection at the Office of the County Commission, the Public Works Department, the Community Development and Planning Department, and on-line on the Lewis and Clark county website from March 9, 2023 through March 29, 2023; and

WHEREAS, after closure of the public comment period, the Public Works Department considered and incorporated applicable public comments into the Amendments to the Public Works Manual; and

WHEREAS, the Commission, following the publication of notice in the publication of record on March 12, 2023 and March 19, 2023, held a public meeting on April 13, 2023, to present the Amendments to the Public Works Manual and to consider additional public comment; and

WHEREAS, the Commission received no additional public comments.

NOW THEREFORE BE IT RESOLVED that the amendments as written by the Public Works Department and the Community Development and Planning Department

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Amy Reeves Clerk & Recorder, Lewis & Clark MT

and reviewed by the public and revised by the Commission, as attached hereto, Exhibit "A", is hereby adopted for use in Lewis and Clark County; and

BE IT FURTHER RESOLVED, that within 30 days hereof, the updated manual will be now called the 2023 Public Works Manual and made available for use; and

BE IT FURTHER RESOLVED, that the adoption of the 2023 Public Works Manual supersedes any other county resolutions dealing with the subject matter included in this Manual, including Resolution 2014-113 and 2016-50, and supersedes any prior Public Works Manuals; and

BE IT FURTHER RESOLVED, that the Amended Public Works Manual is effective May 1, 2023.

Dated this 13TH day of APRIL, 2023.

LEWIS AND CLARK COUNTY
BOARD OF COMMISSIONERS

Tom Rolfe

Tom Rolfe, Chairman

ATTEST:

Amy Reeves by MSA

Amy Reeves, Clerk of Board

Attachments: Exhibit "A"

EXHIBIT A:
Proposed Amendments to the June 28, 2016 Lewis and Clark County Public Works Manual

The proposed amendments are presented with a page number, chapter, and section to facilitate review. Proposed additions to the Public Works Manual proposed by Public Works Staff (Staff) are in underlined text, while proposed deletions are indicated with ~~strikethrough text~~. Staff has added explanatory notes after most proposed changes indicated by *[italic text in brackets]*. Staff recommends that the proposed amendments be reviewed in consultation with the current June 28, 2016 Public Works Manual, which is available online at http://www.lccountymt.gov/public-works/roads-and-bridges.html.

Please contact Dan Karlin with questions at 447-8034 or dkarlin@lccountymt.gov

GENERAL:

All instances of public road right-of-way have been replaced with public right-of-way.

> *[Not all public rights-of-way have a road constructed. This change is proposed to remove mis-perception that a right-of-way will always contain improvements.]*

TABLE OF CONTENTS: APPENDICES

Removed stand-alone documents from the appendices and renumbered accordingly throughout the document.

> *[References to specific appendices have been updated to reflect renumbered appendices. In several instances, the reference is replaced to point users to the County website for the most current version of a document or standalone standard.]*

SECTION 1: GENERAL PROVISIONS

1.1 Definitions

As used within this Manual, except where otherwise specifically defined or unless the context or subject matter clearly otherwise requires, the following terms, phrases words and their derivations shall have the following meanings:

7. BST: Bituminous Surface treatment.
13. County Road: any and all ways, roads, rights of way and other general terms denoting a public way for purposes of vehicular travel and include the entire area within the right-of-way as follows:

a. A road petitioned by freeholders, approved by resolution, and opened by the Governing Body in accordance with Title 7, MCA;

b. A road dedicated for public use and approved by resolution by the Governing Body

c. A road acquired by eminent domain and accepted by resolution as a county road by the Governing Body;

d. A road gained by the County in exchange with the State;

e. A road for which a legal route has been recognized by a district court as provided in Mont. Code Ann. § 7-14-2622;

f. A road acquired by adverse use by the public and accepted by the County; or

g. A road accepted by resolution which has been laid out, constructed, and maintained with state department of transportation or county funds.

"County Road" refers to a road within the County's jurisdiction regardless of whether the road is maintained by the County.

~~14. County Road: Any and all roads, streets, highways, alleys, ways or paths established as follows:~~

~~a. Those approved by resolution of the County Commissioners as a result of the petition process;~~

~~b. Those taken by the County through condemnation;~~

~~c. Those taken by the County through prescription as declared by a final court order;~~

~~d. Those existing through recorded deeds accepted by the County Commissioners through resolution;~~

~~e. Those transferred by the Montana Department of Transportation to the County, and accepted by the County Commissioners;~~

~~f. Those platted and dedicate to the County as a public access easement.~~

19. Easement: See definition for Public right-of-way.

27. NACTO: National Association of City Transportation Officials

~~29. Public Road Right-of-Way: Rights-of-way for public use within the boundaries of jurisdiction of the Lewis and Clark County and not under the jurisdiction of the Federal government, State of Montana, or cities within the County.~~

~~a. Public road rights-of-way include but are not limited to:~~

~~i. County roads as defined by Sections 7-14-2101(2)(b) and 60-1-103(78), MCA;~~

~~ii. Public highways as defined by Section 60-1-103(2223), MCA;~~

iii. Dedicated county roads created through a petition or other statutory process (and never subsequently abandoned);

iv. Public easements created by reference in a deed to a subdivision plat or certificate of survey on which that public easement is depicted;

v. Public access easements or county road easements dedicated to the public and accepted by the Commission on subdivision plats;

vi. Public easements created by public prescriptive use as determined by a court of law or court ordered stipulation;

vii. Public easements created by eminent domain through condemnation proceedings;

viii. Any improvements constructed with asphalt, gravel or native material surfacing such as trails, walk paths or bike paths that may be located within a public or private road right-of-way or within a dedicated non-motorized easement; and

ix. The entire width between boundary lines when any part thereof is open to the use of the public for purposes of vehicular travel. For example, those areas between lots and blocks depicted on townsite plats of unincorporated areas of the County.

x. Roadways which the County has or is currently maintained (??????)

b. "Public road right-of-way" refers to a road within the County's jurisdiction regardless of whether the road is maintained by the County.

c. A public road right-of-way may contain a roadway (such as a gravel road or hard-surfaced road) or non-motorized facility. A public road right-of-way also may contain shoulders, berms, ditches, drainage facilities and utility easements. The term "public road right-of-way" may also be used to describe those public road rights-of-way in which nothing has been constructed or installed for the public's use.

d. The types of roadways typically found within public road right-of-way include but are not limited to:

i. Minor Local Road (Gravel): Roadways used primarily for direct access to residential, commercial, industrial, or other abutting property. The annual average daily traffic (AADT) is projected to be 1 - 400.

ii. Local Road: Roadways used primarily for direct access to residential, commercial, industrial, or other abutting property. The annual average daily traffic (AADT) is projected to be 401 - 1,500.

iii. Minor Collector: Minor collector streets serve the dual functions of distributing traffic between local roads, major collectors and arterials, and provide access to abutting properties. Therefore, higher traffic

~~volumes and higher speeds are the norm. Minor collector streets typically carry average daily traffic volumes of 1,501 – 3,500 AADT. Minor Collector streets connect arterial networks and neighborhoods to commercial areas; fixed route transit service is low while bicycle and pedestrian activities range from moderate to high.~~

~~iv. Major Collector: Major collector streets serve the dual functions of distributing traffic between local roads, minor collectors and arterials, and provide access to abutting properties. Therefore, higher traffic volumes and higher speeds are the norm. Major collector streets carry average daily traffic volumes greater than 3,500 AADT. Major collector streets connect arterial networks and neighborhoods to commercial areas; fixed route transit service is low while bicycle and pedestrian activities range from moderate to high.~~

~~v. Arterial: That part of the roadway system serving as the principal network for through traffic flow. The routes connect areas of principal traffic generation and important rural highways entering the City of Helena, East Helena, Lincoln, and Augusta. If an arterial roadway standard is needed, the Montana Department of Transportation (MDT) standards for the appropriate roadway shall be used.~~

31. Public Right-of-Way: An interest in property, also called an easement, often depicted or described on a deed, survey, subdivision plat, or other document filed with the Lewis and Clark County Clerk and Recorder as a strip or area of land including surface, overhead or underground, created for construction and maintenance of highways and other public roadways or to provide access, including but not limited to drainage ditches or storm water retention; electric power, telephone and fiber optic lines; water, sewer and other pipelines.

32. Road or Roadway: Improvements generally meant to carry vehicular traffic and located within a right-of-way.

36. Stormwater Runoff: That part of precipitation (rain or snowmelt) that flows over the land without infiltrating into the soil or being absorbed by plant material.

Documents attached as appendices to this manual are current as of the adoption of this manual. Updates to the documents contained in the appendices shall be superseded as they are adopted by the Lewis and Clark County Commission. Updated documents will be posted on the applicable page of the Lewis and Clark County Website.

[Clarifying definitions.]

1.5 Permitting and Fees

2. Any construction activity which results in the disturbance equal to or greater than one (1) acre of total land area will need to obtain permit coverage from the Montana Department of Environmental Quality (Montana DEQ) with the "General Permit for

Storm Water Discharge Associated with Construction Activity," available from the following source:

Montana DEQ Office
Lee Metcalf Building
1520 East Sixth Avenue
Helena, MT 59601
Phone: (406) 444-2544
http://www.deq.state.mt.us/wqinfo/MPDES/StormwaterConstruction.asp

The County does not review this application nor does it issue any permit for storm water discharge permits. When the permit is issued by the Montana DEQ, the Contractor shall submit the approved Storm Water Pollution Prevention Plan (SWPPP) to the County. The County will use this permit as a reference during routine County inspections of the project. The County may notify or file a complaint with DEQ if significant negligence or gross violations are noted and not immediately corrected. ~~and may act as an agent for the Montana DEQ.~~

[The County does not act as an agent for the Montana DEQ.]

SECTION 2: APPROACHES

2.2 Certified Installer

Approaches shall only be installed by ~~contractors~~ persons that have been certified by the Public Works Department as having training and experience necessary to properly install approaches that meet safety, drainage, and durability standards. ~~The Public Works Department will enact a certification process within six (6) months of the date this Manual is adopted by the Commission.~~ The Public Works Department provides a certification class that interested installers must attend for certification~~.~~ Certified installers shall meet all requirements set forth by the Public Works Department for certification ~~and pay any applicable fees~~. ~~Prior to establishment of the certification process, permits may be issued to non-certified installers provided they install approaches according to all of the requirements of this Section.~~

[The certified installer program has been ongoing for nine years and the deleted provisions are no longer necessary.]

2.5 Maintenance

The County reserves the right to make any changes within the public ~~road~~ right-of-way ~~that may be~~ necessary to provide proper protection and safety for the public or maintenance of the public ~~road~~ right-of-way. However, nothing in this Section shall be construed to require the County to perform maintenance or repairs on approaches within public ~~road~~ rights-of-way. Maintenance and/or repairs of private approaches deemed necessary by the County shall be the responsibility of the Permittee/Property Owner who uses that approach. ~~or is an assessed~~

~~property properties within a Rural Improvement District if a purpose of the RID is to maintain and/or repair approaches.~~

[RID's are not capable of performing maintenance on private approaches.]

2.7 Design and Layout of Approaches

5. ~~The~~ Individual residential approach widths shall be between twelve (12') feet and thirty (30') feet. Shared residential or multifamily approach widths shall be between twelve (12') feet and forty (40') feet. Approaches exceeding these limits may be approved on a case-by-case basis if an engineered design is provided. Approach width is not inclusive of any radius between the approach and the public road. Approaches shall be no wider than necessary to serve the engineering design requirements of the access purposes of the property use.
7. Vertical clearance of fourteen and one half (14½') feet shall be maintained for the full width of the approach on local roads. Vertical clearance of sixteen and one half (16½') feet shall be maintained for the full width of the approach on major and minor collector roads (refer to section 4.2 for road classifications).
8. Approaches must be constructed in accordance with the current County Road Section Requirements ~~Standards~~ for construction specifications (Section 4.5).
13. All approaches shall meet sight distances as required by AASHTO. The minimum spacing between an approach edge and a street intersection ~~near edge and~~ centerline shall meet AASHTO recommendations. At a minimum, the near edge of an approach must be at least forty (40') feet from the near edge of an approach on an adjacent property (forty-five (45') feet on collectors~~,~~) ~~and fifty (50') feet from the centerline of an adjacent or nearby roadway~~.
15. Existing drainage in the public ~~road~~ right-of-way shall not be altered or impeded without specific approval from ~~DEQ and~~ the County on the approach permit.

[Clarifying requirements and including shared approach standards.]

2.9 Covenants, Zoning and Other Restrictions

An approach permit will not be issued unless it complies with County covenants, zoning, storm water drainage plans, subdivision conditions, institutional controls, and floodplain regulations~~, and any other restrictions associated with the property~~.

SECTION 4: ROAD DESIGN STANDARDS

4.3 Design Controls & Criteria

1. Plans for Construction of Roads: Prior to construction plans and specifications for street and utility construction, designed by a Montana Registered Engineer, must be submitted to the Public Works Department for review and approval. The plans and specifications shall include a vicinity map, a plan and profile, special provisions, reference to the standards specifications, and the typical sections designed to meet the specific project needs and conditions.

    d. Format: The cover sheet of all plans shall include a statement identifying, which standard specifications will apply to the project. Plan and profile may be shown on the same sheet with profiles shown on the bottom half of the sheet. Submitted sheets shall measure 11" x 17" based on being a true half (1/2) size of a ~~24" x 36"~~ 24" x 34" drawing. The ~~24" x 36"~~ 24" x 34" original (not submitted) drawing shall have a borderline of three-fourths (3/4") inch on the left side of the length of the sheet and one-fourth (1/4") inch on remaining sides, so that the true 11" x 17" drawing is proportioned correctly. When more than two (2) plan sheets are used, an overall development layout shall be submitted showing the relationship of roads and utilities.

Table 4.1 - County Road Design Standards

Standard	Terrain	Major Collector	Minor Collector	Local Road
Design Speed (MPH)	Level	55	50	30
	Rolling	45	40	25
	Mountainous	45	30	20
Min. Curve Radius at Centerline	Level	Per AASHTO	575	250
	Rolling	Per AASHTO	440	175
	Mountainous	Per AASHTO	300	110
Min. Stopping Sight Distance (ft)	Level	Per AASHTO	425	200
	Rolling	Per AASHTO	305	150
	Mountainous	Per AASHTO	200	110
Max. Grade	Level	Per AASHTO	6%	6%
	Rolling	Per AASHTO	8%	9%
	Mountainous	Per AASHTO	10%	11%
Length of Max. Grade		Per AASHTO	Per AASHTO	Per AASHTO
Minimum Grade		0.5%	0.5%	0.5%
Super Elevation		Per AASHTO	Per AASHTO	Not Allowed
Min. Vertical Curve "K" Value		Per AASHTO	Per AASHTO	Per AASHTO[1]
Min. Road Intersection Spacing (ft)		500	275	150
Min. Driveway Edge - Intersection ℄ Spacing (ft)		Per AASHTO	Per AASHTO	Per AASHTO
Min. Driveway - Driveway Spacing (ft)		Per AASHTO, 45 min.	Per AASHTO, 45 min.	Per AASHTO, 40 min.
Max. Dead End Length (ft)		Not Allowed	Not Allowed	See Section 4.7
Min. Radius of Cul-de-Sac Turn Around (ft)		Not Applicable	Not Applicable	48
Sight Distance Triangle (ft)	Level	300	255	120
	Rolling	210	170	95
	Mountainous	210	120	80
Min. Right-of-Way Width (ft)		100	80	60
Min. Right-of-Way Radius of Cul-de-Sac Turn		N/A	N/A	60

Around (ft)				
Vertical Clearance (ft)		16.5	16.5	14.5
Intersection Return Radii (ft) with or w/o curb		Per AASHTO	25	15[2]
Min. Sidewalk Width (ft)		5	5	5
Sidewalk Offset from Back of Curb (ft)		Per AASHTO	Per AASHTO	5
Bike Lane Width (ft)		Per AASHTO	Per AASHTO	Not Applicable
Min. Culvert Diameter (in)		18	15	15
Min. Culvert Cover		Meet or Exceed Supplier Recommendation	Meet or Exceed Supplier Recommendation	Meet or Exceed Supplier Recommendation
Min. Culvert Grade		0.5%	0.5%	0.5%
Culvert Material		Support HL-93 Loading	Support HL-93 Loading	Support HL-93 Loading

See AASHTO Geometric Design of Highways and Streets, most current Edition

[1] The AASHTO Geometric Design of Very Low-Volume Local Roads (VLVLR) may be applied if 25-year ADT projections are below 400 ADT.

[2]Excludes driveway approaches. Refer to section 2.7 for driveway approach requirements.

4.4 Road Surfacing Design Standards

The County provides two (2) methods for road surfacing design utilizing Uniform Road Design or Engineered Design. These options apply only to the structural section of the road. The profile and section shapes are controlled by the County Road Design Standards. The Uniform Road Design allows for use of a standard County pre-approved road section. The Uniform Road Design is based on new road construction with new materials. Reconstructing or rehabilitating an existing road may require an Engineered Design. Engineered road sections shall be in accordance with the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) *Guide for Design of Pavement Structures* (preferred), *Asphalt Institute Manual Series No. 1 (MS-1)*, or other method. Other methods must be pre-approved by the County Engineer prior to undertaking the surfacing design.

TABLE 4.2 - Uniform Road Design – Local Road #1

Estimated Daily Number of Heavy Trucks *	Subgrade Condition	Subbase Requirement (inches)
	5<CBR < or= ~~3~~9	None
0 to 5	10~~3~~<CBR<or = ~~10~~19	None
	CBR > ~~10~~20	None
	5<CBR < or= ~~3~~9	6
6 to 10	10~~3~~<CBR<or = ~~10~~19	None
	CBR > ~~10~~20	None
	5<CBR < or= ~~3~~9	6
11 to 25	10~~3~~<CBR<or = ~~10~~19	6
	CBR > ~~10~~20	None
	5<CBR < or= ~~3~~9	8
26 to 50	10~~3~~<CBR<or = ~~10~~19	6
	CBR > ~~10~~20	6
Greater Than 50	NA	Note (1)

- Trucks Classified as FHWA Class 5 or Greater. Class 5 Trucks Are Single Unit Trucks with Two-Axles and Six-Tires
- Note (1) - Provide an Engineered Design

[Minor increase in native material CBR requirements]

2. Engineered Road Design Standards These specifications are the County's minimum standards for engineering new or reconstructed road sections. The engineered design must be based on the available material components, either native or imported, to build the road, site conditions, and traffic loading.

   a. Engineered designs shall use a performance period per Table 4.5 when determining the ESAL's and proposed overall structural number. Calculations for a 30-year performance period shall also be submitted for comparison purposes. Provide all calculations to the County for review. The performance periods in Table 4.5 are minimum requirements and may be increased based on projected traffic trends.

   b. Roadway Typical Sections: The minimum surfacing thickness for paved roads in the County is three (3") inches compacted bituminous surface course. ~~over three (3") inches compacted crushed aggregate surfacing, over six (6") inches compacted crushed based course.~~ The use of existing materials or nonstandard surfacing components in the structural section must be supported by ~~an engineered surfacing~~ design engineering analysis and is subject to County approval prior to implementation. ~~If additional depth of surfacing materials is needed to increase subgrade bearing capacity and/or due to higher design ESALs,~~ In all cases, the shoulder width shall be ~~increased~~ adjusted to maintain

the proper road surface taper as indicated in Note B of Figures 1 through 4 of Appendix ~~C~~A.

[Clarifying language on engineered structural sections to allow for value engineering]

TABLE 4.3 - ~~Surfacing~~ Structural Coefficients of Compacted Material

New/Virgin Material		Existing Material	
Surfacing Material	Coefficient (Per Inch)	Surfacing Material	Coefficient (Per Inch)
Plant Mix Bituminous Surfacing	0.41	Plant Mix Bituminous Surfacing	0.33
Multi-shot BST	0.25	-	-
Crushed Aggregate Surfacing	0.14	Crushed Aggregate Surfacing	0.12
Crushed Base~~d~~ Course	0.14	Crushed base~~d~~ Course	0.12
~~Crushed~~ Subbase Course	0.07-0.14*	~~Crushed~~ Subbase Course	0.07
Milled Plant Mix Surfacing	0.12	Milled Plant Mix Surfacing	0.12
Rejuvenated Milled Plant Mix Surfacing (<1 year old)	0.18	Rejuvenated Milled Plant Mix Surfacing (>1 year old)	0.15
Pulverized Plant Mix Surfacing Mixed w/Crushed Base Course	0.12	Pulverized Plant Mix Surfacing Mixed w/ Crushed Base Course	0.12
Recycled Portland Cement Concrete	0.14	Recycled Portland Cement Concrete	0.14
Cement Treated Base Course**	0.20	Cement Treated Base Course**	0.20

*As determined ~~by designer engineer~~ with appropriate analysis.
**Cement Treated base course generally refers to existing material within the roadway prism stabilized with cement powder. Other proprietary products may be used with documentation of engineering properties.

Table 4.3 is ~~from the Montana Department of Transportation (MDT)~~based on material properties ~~evaluated~~ approved by the Montana Department of Transportation (MDT) Materials Bureau and data collected from other state DOT's. Actual structural coefficients could vary from those shown in the table due to variations in material quality, compaction, or support of the underlying material, position in the surfacing section, etc. Actual structural coefficients shall be used in calculations if supported by appropriate lab data, which typically includes the resilient modulus.

[Updating nomenclature and added several materials coefficients.]

Based on ~~the above~~ Table 4.3, the following are the County's ~~minimum allowable~~ Uniform Road Design Standard structural numbers for the applicable road classification. Submit to the County for review and approval complete design calculations for proposed overall structural numbers less than those shown in Table 4.4.

TABLE 4.4 - ~~New Construction County Road Minimum Structural Numbers~~ Uniform Road Design Standard Structural Numbers

	A	x B	=
Surfacing Material	Surfacing Thickness (Inches)	Layer* Coefficient (Per Inch)	Structural Number
Local Road #1			
Crushed Aggregate Surfacing	3	0.14	0.42
Crushed Base Course	6	0.14	0.84
Overall Structural Number			**1.26**
~~All Others~~Local Road #2, Minor Collector #3, Major Collector #4			
Plant Mix Asphalt Surfacing	3	0.41	1.23
Crushed ~~aggregate surfacing~~Base Course	3	0.14	0.42
Crushed ~~select~~ Subbase Course	6	0.14	0.84
Overall Structural Number			**2.49**

- Layer Coefficient for new material (i.e. constructing a new road). See Table 4.3.

TABLE 4.5 - ~~Surfacing~~ Road Design Parameters

Parameter	Local Road #2	Minor Collector #3	Major Collector #4
Performance Period (Design Life)	20 years min.	20 years min.	20 years min.
Initial Serviceability	4.2	4.2	4.2
Terminal Serviceability	2	2.5	2.5
Reliability Level	~~80~~85	~~85~~90	~~90~~95
Overall Standard Deviation	0.45	0.45	0.45

4.5 Typical Roadway Section Requirements

The following requirements shall apply to all roadway structural section elements:

1. Asphalt Chip Seal Coat: When asphalt paving is used as the wearing surface, this item shall consist of a single application of asphalt material on the prepared asphalt surface, followed by spreading seal coat aggregate. The asphalt material application rate shall be between 0.44 and 0.46 gallons per square yard or otherwise approved by the County Engineer and ~~application rates~~ shall meet the requirements of the appropriate sections of the latest edition of MPWSS. The aggregate shall meet the gradation as set forth in Table 4.6 and the aggregate shall be spread per the rate of the latest ~~ad~~edition of MPWSS. All required asphalt chip seal coats must be completed within one (1) year after asphalt paving is completed, or as directed by the County, to allow for proper curing of the asphalt surfacing.

3. Crushed Aggregate Surfacing on Gravel Roads: This consists of crushed gravel, stone or other similar material consisting of hard, durable particles of fragments of stone, free of excess ~~of~~ flat, elongated, soft or disintegrated pieces, dirt clods or other deleterious matter. This is the surface course on graveled roads, ~~and~~ streets, and alleys. The material shall meet the gradation as set forth in Table 4.7.

TABLE 4.7 - SPECIFICATION FOR CRUSHED AGGREGATE SURFACING

(Gravel Roads)

TABLE OF GRADATIONS			
Percentages by Weight Passing Square Mesh Sieves			
Passing	**1-1/4" Minus**	**1" Minus**	**¾" Minus**
2" sieve	--		
1 1/4" sieve	100		
1" sieve	--	100	
¾" sieve	70-90	97-100	100
½" sieve	--	~~70-80 (± 5%)~~	--
3/8 " Sieve		65-80	
No. 4 sieve	45-75	45-64 ~~40-50 (± 7%)~~	40-80
No. 10 sieve	25-55	25-42 ~~25-40 (± 6%)~~	25-60
No. 16 sieve			
No. 40 sieve	--	10-30 ~~15-25 (± 5%)~~	
No. 200 sieve (not more than)	8-20	8-16	8-20
** Preferred use	~~Rural Roads~~ Gravel Arterial	Subdivision Rd	Low Vol~~/Low Speed~~ Subdivision Rd

Meet the following requirements for crushed aggregate surfacing, including added binder or blending material:

** In general, these are the preferred use of these gradations. The Design Engineer must submit gradations for approval.

- The target plasticity index is seven (7), with a tolerance of ± two (2).
- Dust Ratio: the portion passing the No. 200 sieve cannot exceed two-thirds (2/3) of the portion passing the No. 40 sieve.
- The maximum liquid limit for the material passing the No. 40 sieve must not exceed thirty-five (35)~~, while the plasticity index may vary from three (3) to ten (10). A target plasticity index of seven (7) is desirable.~~
- A wear factor not exceeding fifty (50%) percent at five hundred (500) revolutions.
- At least twenty (50 ~~20~~%) percent by weight of the aggregate retained on the No. 4 sieve must have one (1) fractured face.
- ~~For the one (1") inch Minus aggregate surfacing the Table of Gradations establishes target. During production of the crushed aggregate surfacing, the gradations shall lie within the gradation target values, and the gradation tolerances specified in the Table of Gradations. For example, the No. 4 sieve band (% Passing) is forty to fifty (40-50%) percent. With this example, the QA target value of forty-five (45) has been selected for the No. 4 sieve. The job mix gradation limits would then be forty-five (45), plus and minus seven (7). Therefore, the job mix gradation limits for the No. 4 sieve band production is thirty eight to fifty two (38 – 52).~~

[Updating gravel gradation specification to match Public Works preferred material]

4. Crushed Base Course ~~Under Paved Roads~~: This consists of crushed gravel, stone or other similar material consisting of hard, durable particles of fragments of stone, free of excess ~~of~~ flat, elongated, soft or disintegrated pieces, dirt clods or other deleterious matter. ~~This is the layer immediately below the asphalt paving (crushed base course).~~ This material shall meet the gradation as set forth in Table 4.8 ~~for under paved roads (crushed base course)~~.

5. ~~Imported Select~~ Crushed Subbase Course: This consists of crushed ~~select base course material~~ ~~of~~ gravel, stone, or other similar material consisting of hard, durable particles ~~gravel or other similar materials~~ mixed or blended with sand, stone dust, or other binding or filler materials produced from sources that provide a uniform mixture. The material shall meet the gradation as set forth in Table 4.9.

TABLE 4.9 - SPECIFICATION FOR ~~SELECT~~CRUSHED SUBBASE COURSE MATERIAL

TABLE OF GRADATIONS					
Percentages by Weight Passing Square Mesh Sieve					
Passing	**4" Minus**	**3" Minus**	**2 ½" Minus**	**2" Minus**	**1 ½" Minus**
4" sieve	100%				

3" sieve	--	100%			
2½" sieve	--	--	100%		
2" sieve	--	--	--	100%	
1½" sieve	--	--	--	--	100%
No. 4 sieve	25-60%	25-60%	25-60%	25-60%	25-60%
No. 200 sieve (not more than)	2-12%	2-12%	2-12%	2-12%	2-12%

- A tolerance of five (5%) percent, by weight, up to the next above-specified gradation (2 1/2" for 2" max.) is allowed. The produced material passing the maximum screen opening and retained on the No. 4 sieve shall be reasonably well graded in its grading between those limits within five (5%) percent.
- Suitability of the aggregate for its particular use is determined by the final gradation required for grading, as established by the Engineer, within the limits allowed in the table for the particular grading specified.
- The liquid limit for that portion of the fine aggregate passing a No. 40 sieve cannot exceed twenty-five (25), nor the plasticity index exceed six (6), as determined by AASHTO T89 and T90.
- At least twenty (20%) percent by weight of the aggregate retained on the No. 4 sieve must have one (1) mechanically fractured face.

6. Subbase Course: ~~Subbase, if required by subgrade conditions, is the layer of aggregate located immediately below the layer of crushed select subbase course and on top of the subgrade material.~~ This consists of gravel, stone, or other similar material consisting of hard, durable particles mixed or blended with sand, stone dust, or other binding or filler materials produced from sources that provide a uniform mixture. This material shall meet the requirements of Table 4.9, with the exception that the aggregate may be ~~crushed or~~ uncrushed. The depth of this layer of material will be determined by ~~a Uniform Road Design, or an Engineered Road Design, as applicable~~ the engineer based on existing conditions and design requirements.

[Updating nomenclature and consistency of specifications]

4.10 Road Maintenance Policy

The County determines maintenance based on the Road Prioritization Plan criteria approved by the Board of County Comissioners in accordance with MCA 7-14-2103. ~~The County will not accept existing or new roadways for maintenance. Roads constructed in new subdivisions are generally will only be maintained by a Rural Improvement District (RID). The RID shall be created concurrently with final subdivision plat approval.~~ The County Special Districts ~~Planner~~ Coordinator will assist residents in the formation of RIDs ~~to fund~~ that desire a higher level of service, maintenance, and/or improvements of public ~~road~~ rights-of-way in the County. ~~At a minimum, any RID shall provide for road maintenance, dust control, weed control, and maintenance of turnouts, traffic control signs, and drainage facilities.~~

[Updated section to include Road Prioritization Plan approved by Board of County Commissioners.]

4.11 Sidewalks and Non-Motorized Facilities

Maintenance of sidewalks, trails, open space, non-motorized paths and bicycle paths will not be provided by the County without written approval and development of a separate maintenance funding mechanism, such as an RID.

3. Boulevard Sidewalk Installations

   g. Maintenance of the boulevard section shall be the responsibility of the property owner or if fee title right-of-way, the adjacent property owner.

4. Non-Motorized Facilities

   a. Class I trails are described as those trails connecting major destination nodes such as individual neighborhoods, schools, entertainment venues, or public destinations.

   b. Class II trails are described as those trails contained within individual neighborhoods or connecting individual neighborhoods within 1,200 feet of each other.

   c. Class III trails are described as those trails not contained within developed areas and do not meet the definition for Class I or Class II trails.

   i. The standard section for a non-motorized facility with crushed aggregate surfacing shall consist of the following:

TABLE 4.10 - NON-MOTORIZED FACILITIES STANDARDS

	Class I Core Trail Network	Class II Neighborhood Collector	Class III Low Impact Trail
Surface Width	8' – 10'	4 5' – 8'	1' – ~~5~~ 8'
Vertical Clearance	8'-6"	8'-6"	8'-6"
Recommended Surfaces	Asphalt, concrete ~~crushed rock~~	Asphalt, concrete, ~~crushed rock~~	Crushed rock or native soil
Resting and Passing Space	400'	600'	At trail head

[Updating trail requirements to reduce maintenance and increase ADA accessibility]

4.13 Road Naming and Addressing Standards

1. Road Naming Conventions, Addressing Numbers and Plaques, Procedures for Naming or Renaming Roads

The following are the general conventions for road naming for all unincorporated areas within the County. See Resolution 2021-63.

~~a. Every road with three (3) or more structures shall be given a separate, unique name. For addressing purposes, a structure is defined as a building for occupancy as a residential unit or commercial unit, excluding garages, barns, and sheds.~~

b. Each road shall have only one-word names or two-word short names.

c. A named road shall be essentially continuous, without gaps.

d. Directional prefixes (north, east, etc.) will only be used when necessary to distinguish the road location relative to the address grid.

e. All roadways created through subdivision review shall be named by the Developer in accordance with road naming conventions.

f. All roadways created through certificates of survey shall be named by the landowner in accordance with road naming conventions, with approval of the City-County Address Coordinator (Address Coordinator).

g. All prospective road names shall be submitted to the Address Coordinator to be checked against existing names. The Address Coordinator shall coordinate with emergency services dispatch with regard to clarity of proposed road names.

h. No roadway shall be given a name that is currently in use elsewhere in the County. However, some duplication may occur between addressing areas (defined by zip codes, telephone exchanges, planning areas, special districts, etc.) where historical naming conventions have been accepted and provide for facilitated emergency response.

i. No roadway shall be given a name that sounds the same as another road name currently in use elsewhere in the County, e.g. Diehl and Deal.

j. Full name street names (e.g., Meriwether Lewis Road) are not allowed. However, upon request, the Commission may consider waiving this requirement for historical reasons.

k. When renaming roads, the following shall be considered:

    i. The name of a road or street that has an historical reason for having its name should retain its name.

    ii. The road with the most properties on it, and thus would require the most effort to coordinate with residents, should retain its name.

    iii. The road that has retained its name for the longest time or has been consistently signed for the longest time should retain its name. The same would be true for a road with the more descriptive name.

l. All roadways running generally east and west shall use the term road, e.g. Sierra Road.

m. Roads running generally north and south shall use the term drive, e.g. Green Meadow Drive.

n. A road running diagonally will be given the term road or drive depending on its general direction.

o. Additional provisions for naming other types of roads are as follows:

i. Way: A north/south road less than one thousand (1,000') feet in length

ii. Place: An east/west road less than one thousand (1,000') feet in length

iii. Court: Any cul-de-sac with a circle at one end, and less than one thousand three hundred (1,300') feet in length

iv. Lane: A meandering roadway less than two thousand five hundred (2,500') feet in length

v. Loop: A generally curved road that has an origin and terminus on the same roadway, and which does not contain significant intersections along its route

vi. Street: For urban areas, roads running generally north/south

vii. Avenue: For urban areas, roads running generally east/west

viii. Trail: An existing path or road that was historically named as such

p. Types of roadways, e.g. road, court, shall not be used to distinguish road names, e.g. Forest Road, Forest Court.

q. Whenever possible, extensions of roadways crossing jurisdictional boundaries shall use the same name on either side of the boundary, e.g. Montana Avenue in the City and the County.

r. Extensions of roadways shall be named the same as the road from which they extend.

s. In some circumstances, roads that are designated State or Federal Highways may be named by that designation, e.g. US Highway 12 West or MT Highway 21.

t. Otherwise unnamed roads crossing national forests within the County will defer to the designated U.S. Forest Service road name.

2. Address Numbers & Plaques

It is important that address numbers are clearly visible for the efficient provision of delivery and emergency services. The installation and maintenance of address numbers shall be the responsibility of the landowner. Address Numbers and Plaques shall meet the following requirements:

a. Address plaques shall be installed prior to final plat, or bonded for through a subdivision improvements agreement.

b. Address plaques shall be posted at the entrance to a property when the structure's address number is not visible from the road.

c. Address plaques shall conform to the design standards for street identification signs except for color (blue background, white reflective letters).

d. Address plaques shall be installed in a horizontal or vertical orientation. If installed vertically, the address numbering sequence shall begin at the top.

e. Procurement of address plaques shall be made through the Community Development and Planning Department.

f. Lots within a subdivision that are two (2) acres or larger shall be required to have an address plaque.

3. Procedures for Naming or Renaming Roads

a. Persons wishing to name an unnamed road must present a petition signed by a simple majority of abutting landowners who are in agreement with the prospective name. The petitioner must adhere to the following process:

i. Petitioner must present a proof of easement or access via Certificate of Survey to the Community Development and Planning Department for review and approval.

ii. Once approved by Community Development and Planning Department, the petitioner must provide plans and road name to Address Coordinator for review. The proposed road name will be reviewed in accordance with subsection 4.13.1 g.

iii. After the Address Coordinator approves the road name, notification letters with petition forms are sent to all adjacent landowners for review. A simple majority of landowners must sign and agree to the prospective name. Within four (4) weeks of road name approval, petitions may be be sent or presented to the Address Coordinator.

iv. If a simple majority of landowners have signed the petition, the new road can be named. The petitioner must contact the Public Works Department to purchase a road sign and schedule installation. Upon confirmation of payment and installation schedule from the Public Works Department, the Address Coordinator will issue new addresses and notify service providers.

v. If participation by the property owners is not forthcoming within four (4) weeks, the Address Coordinator will initiate the process to have the road named by the Commission. Once named, the petitioner must contact the Public Works Department to purchase a road sign and schedule installation. Upon confirmation of payment and installation schedule from the Public Works Department, the Address Coordinator will issue updated addresses and notify service providers.

b. Persons wishing to rename an already-named road must present a petition signed by a simple majority of abutting landowners who are in agreement with the proposed road name change. The petitioner must adhere to the following process:

i. Obtain petition from the Community Development and Planning Department or Address Coordinator.

ii. The proposed road name shall be reviewed in accordance with subsection 4.13.1 g.

iii. After the Address Coordinator approves the name and has verified that a simple majority of landowners have signed the petition, the Address Coordinator shall schedule a public hearing before the Commission for approval of the road name change.

iv. Once named, the petitioner must contact the Public Works Department to purchase a road sign and schedule installation. Upon confirmation of payment and installation schedule from the Public Works Department, the Address Coordinator will issue updated addresses and notify service providers.

c. The Address Coordinator may assign or re-assign road names to promote an orderly road naming system, and may charge appropriate fees for such services.

d. The Address Coordinator will notify the following service providers of new addresses: sheriff, fire department, post office, ambulance service, the Department of Revenue, utility companies, and city/county departments.

[Revised at the request of addressing department.]

4.15 Cattle Guards

Cattle guards within the public ~~road~~ right-of-way shall be constructed of non-combustible materials and shall be rated for HS20 loading. Design shall conform to MDT standard cattle guard requirements. All cattle guards require an encroachment agreement per the requirements of Section 3.1 and an excavation permit per Section 5. Cattle guards shall be privately installed and the responsibility of the landowner.

~~4.16 County Public Roads and Easement Dedications~~

~~Public road rights-of-way and public road dedications must be recorded on a certificate survey, recorded in the County Clerk and Recorder's Office, in accordance with state surveying requirements.~~

4.18 Grandfathered Typical Roadway Section Requirements

External and internal access roads constructed to the previous County Road Standards ~~(Peccia Typical Sections No. 1, 2, 3, or 4)~~ are grandfathered and acceptable as standard physical access if they meet all of the following criteria:

4.21 Speed Limits on Newly Established or Constructed Roads

Speed limits for newly designed roads shall be recommended by the engineer of record to the Public Works Department within the construction plans. Recommendations shall be based upon the engineering analysis used to design the road and comply with MCA 61-8-303 & 61-8-310.

[New section to specify consultant for developer to provide recommended speed limits]

4.22 Variance from Road Design Standards

A variance from the road design standards within this section may be granted or approved by the County Engineer if, in their engineering judgment, the variance does not significantly impede, hinder, or reduce the function the roadway system, or any element thereof. Submit requests for a variance in writing to the County Engineer. Requests shall provide engineering analysis and explain the reason for the request. While reducing cost may be a benefit of the requested variance, it will not be considered as a determining factor to grant a variance. The County Commission retains authority to nullify any variance if deemed in the public interest by giving 30-days notice prior to work taking place.

[New section to provide County Engineer ability to approve minor variances.]

SECTION 5: EXCAVATIONS WITHIN THE COUNTY ROAD OR PUBLIC ~~ROAD~~ RIGHT-OF-WAY

5.2 Application Fees

Any person or persons applying for permission to excavate within the public ~~road~~ right-of-way shall pay the current administrative fee in the County fee schedule, for each excavation permit in addition to the hard surface assessment ~~maintenance fee~~. The application fees may be waived by the County for one-time excavations across gravel roads for the purpose of repairing or extending irrigation systems.

5.6 Micro-Trenching

Micro-trenching (trenches with a width of less than 2 inches) will only be allowed after an engineering study and plans have been submitted and approved by Public Works. The study and plans will include, but is not limited to location, depth (miinimum of 18 inches below bottom of asphalt), type of trenching backfill to be used, and a schedule of work to be performed. An over-cut of 6 inches, either side of the trench, will be required in hard surfaces.

[New Section added to account for new trenching methods]

5.9 Surface Replacement

~~4. Any hard surface road that is considered a chip sealed road shall comply with Section 5.8.2.~~

5.13 Bonding and Insurance

3. The bond shall be conditioned upon the proper installation or repair of the facility, proper backfill of the excavation and proper restoration of the surface in accordance with these standards. Said bond shall remain in full force for the duration of the warranty period. ~~The bond amount may be reduced by the County for one-time excavations.~~

4. Full Comprehensive General Liability Insurance coverage shall be in effect for the duration of the work. This coverage shall provide for both bodily injury and property damage as follows:

   a. Bodily injury portion shall include coverage for injury, sickness or disease and death arising directly or indirectly out of or in connection with the performance of work under this permit and shall provide for a limit of not less than ~~seven hundred and fifty thousand~~ one million ($~~750,000.00~~1,000,000.00) dollars for all damages arising in bodily injury, sickness or disease or death of one person and a total limit of ~~one~~ two million ~~five hundred thousand~~ ($~~1,500,000.00~~2,000,000.00) dollars for damages arising out of bodily injury, sickness or disease and death of two or more persons in any one occurrence.

   [Updated to current insurance requirements]

5.15 Public Utility Companies

1. Excavation permits are required for new primary installations or any road openings. Any public utility owning or operating a system of distribution lines for electric power, natural or artificial gas, telephone, fiber optics, cable television, sewer or water service or as otherwise recognized by the County, shall not be required to obtain a permit for each excavation necessary for maintenance or service connections outside the road surface. The utility shall notify and coordinate with the ~~Public Works~~ Road Department a minimum of two (2) weeks prior to the excavation activity.

2. Public Utility companies shall be governed by the full provisions of these standards except for Sections 5.1, 5.2, 5.3, 5.12, and 5.13. It is recognized that continual maintenance of utility facilities is necessary and that reasonable operation in making excavations to restore or maintain service will be allowed under emergency conditions. The Public Works Department shall be notified as soon as practical in these cases.

   [Updated to requirements to increase P/W awareness of work taking place]

~~5.15 Penalties~~

~~Noncompliance with these standards shall be subject to the following penalties.~~

~~1. First offense of an unauthorized excavation shall not be penalized but will be documented and the offender notified by the County.~~

~~2. Second First offense of an unauthorized excavation will result in a penalty of two times (2x) the cost of the excavation permit.~~

~~3. Third Second offense shall result in a five hundred ($500) dollar penalty.~~

~~4. All further offenses, at the discretion of the County, may result in removal of all utilities and infrastructure from the public road right-of-way at the sole expense of the utility or installer.~~

SECTION 6: TRAFFIC CONTROL

6.4 Speed Bumps

Permanent speed bumps are not permitted within County Road/public right-of-ways. **Temporary** speed bumps may be authorized in limited circumstances. Authorization for a temporary speed bump may be granted or approved by the Public Works Director, or their designee, if in their judgment, the temporary speed bump does not significantly impede, hinder, or reduce the function the roadway system, or any element thereof. Submit requests for a variance in writing to the County Engineer. Requests shall provide engineering analysis and explain the reason for the request. The County Commission retains authority to nullify any variance if deemed in the public interest by giving 30-days notice prior to work taking place.

Any pinning shall be repaired using a tar product compatible with the existing road surface.

[New section to allow temporary speed bumps at the discretion of the Public Works Director in certain instances.]

SECTION 8: CONSTRUCTION ACTIVITY CONDITIONS

During any construction activity that is subject to approval and inspection by the County, the following conditions shall be met:

3. Whenever construction is to commence pursuant to the creation of a subdivision, a preconstruction conference shall be conducted by the engineer of record. Attendees shall include at a minimum the developers engineer, the county road and bridge supervisor or their designee, the county engineer, and the contractor performing the work.
4. While disturbed areas of one (1) acre or greater requires a stormwater discharge permit authorization from the Montana DEQ, regardless of the disturbed area, erosion control Best Management Practices (BMP's) and Stormwater Pollution Prevention Plan (SWPPP) for all construction activity shall be submitted to the County as part of the construction plan submittal. During construction, the BMP's shall be used and maintained at all times by the Contractor. Once active construction activity has been completed, any temporary BMP's shall be removed and the area reclaimed. Where long-term BMP's are employed after construction activity is substantially complete, their installation shall be completed within fourteen (14) days of direction by the County. Long term BMP's shall be maintained by the Contractor for a period of one (1) year or until vegetation has been established over seventy ~~eighty-five~~ (~~85~~ 70%) percent of the disturbed area, whichever is longer.

7. All construction is subject to section 14 of this manual.

[Not all public rights-of-way have a road constructed. This change is proposed to remove mis-perception that a right-of-way will always contain improvements.]

SECTION 13: PARKING RESTRICTIONS

As provided in Section 61-8-355(4), MCA, the County has the authority ~~and responsibility~~ to place official traffic control devices prohibiting or restricting the stopping, standing, or parking of vehicles on a highway where in its judgment this stopping, standing, or parking is dangerous to those using the highway or where stopping, standing, or parking unduly interferes with the free movement of traffic.

~~1. The Public Works Director shall have authority to determine where conditions warrant the placement of traffic control devices to limit stopping, standing, or parking of vehicles in on all County Roads or public road rights-of-way under its jurisdiction.~~

~~2. For any location that the Public Works Director determines a need to place traffic control devices limiting stopping, standing, or parking vehicles, they shall prepare a written report documenting the conditions leading to their conclusion that such stopping, standing, or parking is dangerous to those using the highway or unduly interferes with those using the highway.~~

~~3. The Public Works Director shall, bi-annually, prepare a list of all locations where stopping, standing, or parking vehicles is restricted. The Public Works Director will present the list to the Commission at a public meeting along with reports for any newly posted locations as to the reasons for their addition.~~

4. All traffic control devices installed to limit stopping, standing, or parking ~~in~~ on all County Roads or a public right-of-way shall contain a reference to Section 61-8-355 (4), MCA, and Section 13 of the County Public Works Manual.

[Removal of some language not necessary for the section]

SECTION 15: APPEAL PROCEDURE

This appeal procedure is established for anyone wishing to depart from the requirements set forth in Sections 2,3, 5, and 6 of this Manual ~~or those decisions of County staff authorized by this Manual~~. The appeal should be in writing, signed by Applicant/Owner/Entity or affected party, and should contain, but is not limited to, the following information:

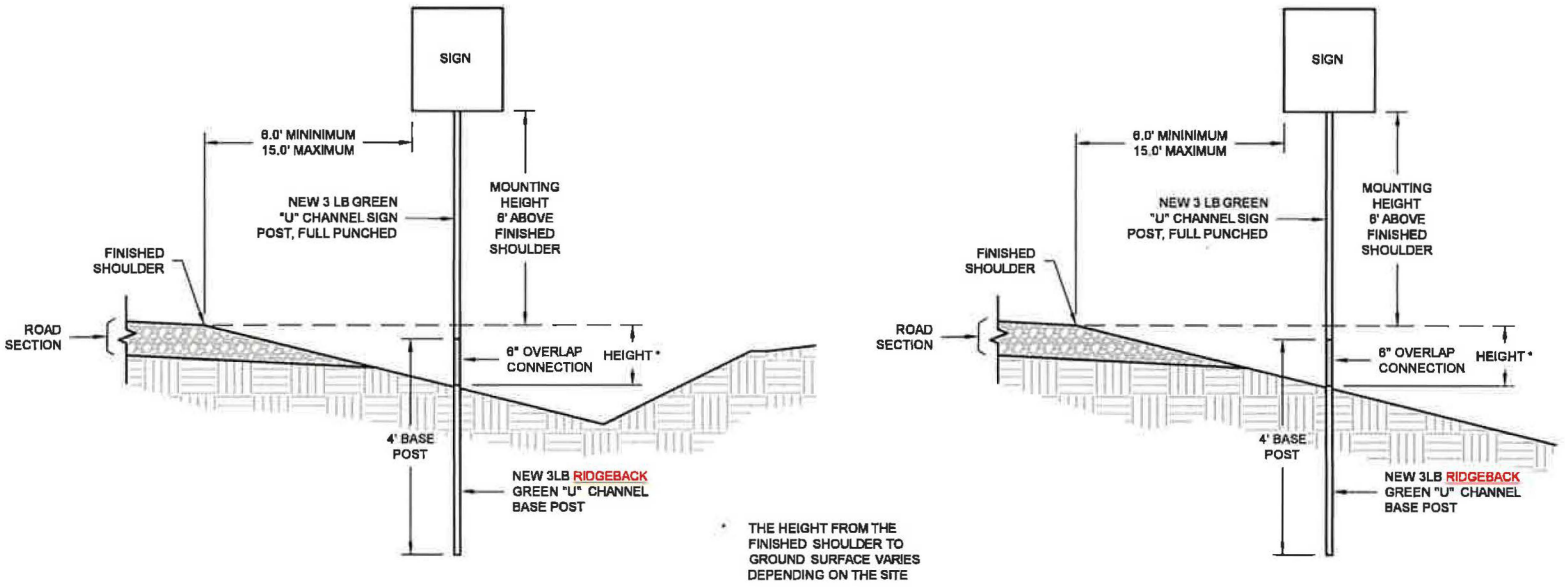
[Specifying which sections the appeal procedure applies to.]

EXHIBIT B:
Proposed Amended Forms and Diagrams
Lewis and Clark County Public Works Manual

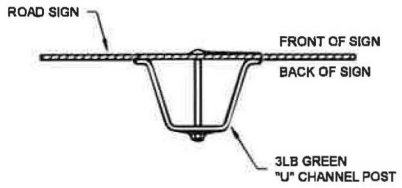
The following forms are to be replaced with the attached versions:

APPENDIX A – DESIGN STANDARDS DRAWINGS

Figure 7 – Sign Mounting Guidelines
Figure 8 – Sign Mounting Guidelines



MOUNTING HEIGHTS AND LATERAL LOCATION

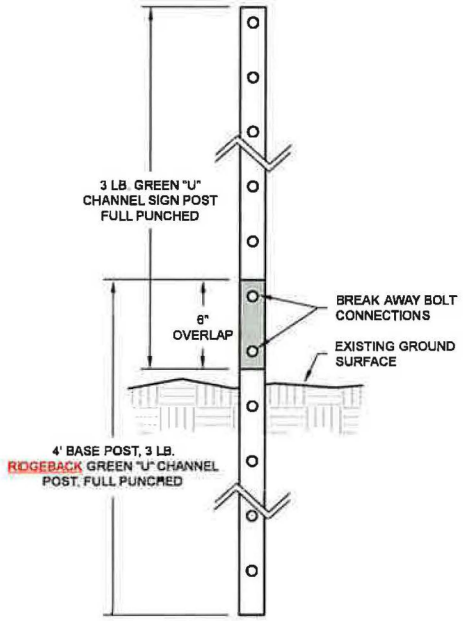


TYPICAL SIGN MOUNTING

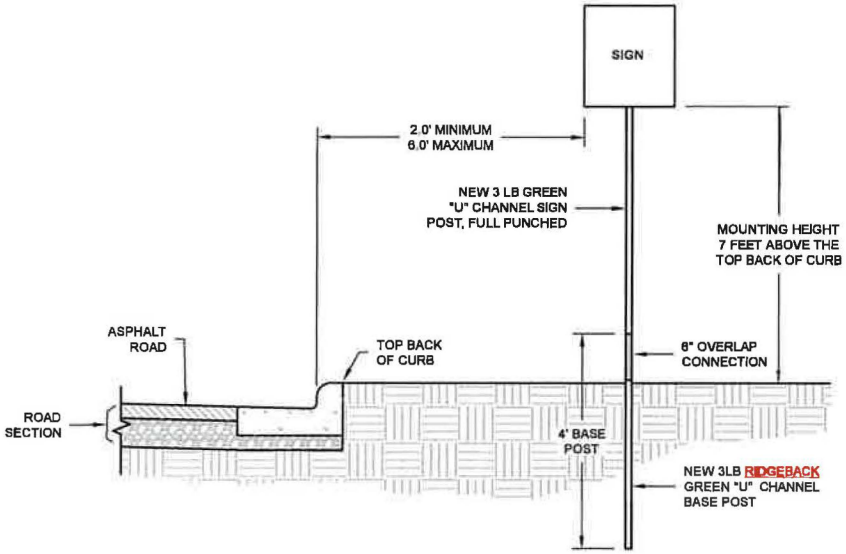
NOTES:

1. ESTABLISH THE CORRECT LOCATION FOR THE POST AND CALL FOR UTILITY LOCATES.
2. DRIVE A 4 FOOT LONG 3 LB FULL PUNCHED RIDGEBACK GREEN "U" CHANNEL POST (BASE POST) INTO THE GROUND LEAVING 4 TO 6 INCHES ABOVE GRADE. ESTABLISH THE CORRECT HEIGHT OF POST, CUT THE SIGN POST AND ATTACH IT TO THE BASE POST BY OVERLAPPING THE SIGN POST AND BASE POST BY 8 INCHES AND CONNECT USING TWO BREAKAWAY BOLTS. (SEE FIGURE 2)
3. STOP, YIELD, AND STREET SIGNS WILL BE INSTALLED ON THE RIGHT SIDE OF THE ROAD AS THE DRIVER APPROACHES THE INTERSECTION.
4. ONLY ONE STREET SIGN(S) PER INTERSECTION.
5. ALL SIGN MOUNTING HARDWARE MAY BE PURCHASED FROM LEWIS & CLARK COUNTY.

FIGURE 7 - SIGN MOUNTING GUIDELINES



BASE POST & SIGN POST CONNECTION



MOUNTING HEIGHTS AND LATERAL LOCATION

FIGURE 8 - SIGN MOUNTING GUIDELINES